Shri Ram College, Muzaffarnagar

Notice

Date: 10/10/2022

This is hereby informed to all faculty members that Shri Ram College, Muzaffarnagar organizing a Faculty Exchange Program with IIMT College, Kota, Saharanpur 17/10/2022 to 22/10/2022 for the session 2022-23. The main focus of this program encourages the side as and job opportunities in their field. These faculty members are finalized for this program –

From Shri Ram College, Muzaffarnagar to IIMT, College, Kota, Saharanpur

1. Mr. Rajdeep Sehrawat (Basic Science)
2. Dr. Kamal Krishan (Basic Science)

From IIMT, College, Kota, Saharanpur to Shri Ram College, Muzaffarnagar

1. Mr. Alok Jain (Basic Science)

Dr. Shweta Rathi (Program Coordinator)

CC:

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College
Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)
A+ Grade Accredited by NAAC

Date: 15/10/2022

To,

The Principal,

IIMT, College

Saharanpur

Subject: Regarding the faculty exchange program and student exchange program:

Sir,

As there is a MOU signed between Shri Ram College, Muzaffarnagar and IIMT College, Kota, Saharanpur for the faculty exchange and student exchange program in context of the knowledge enhancement of the students of both the institutes. Keeping same in mind here I'm sharing a tentative schedule and faculty members name for the said program from 17/10/2022 to 22/10/2022 for the session 2022-23. If this schedule is suitable to you, kindly finalized it and also sharing the name of faculty member(s) that will be visiting our institution in exchange. These faculty members are finalized for this program from our institution and student's list is attached along with –

1. Mr. Rajdeep Sherawat (Basic Science)
2. Dr. Kamal Krishan (Basic Science)

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

IIMT SAHARANPUR
Indraprastha
Institute of Management & Technology
Approved by AICTE, PCI & Affiliated to Dr. A.P.J. Abdul Kalam Tech. University, Lucknow, BTEUP, Lucknow

Date:14.10.2022

To,

The principal
Shri Ram College
Muzaffarnagar

Subject: Regarding the faculty exchange program and student exchange program:

Sir,

As per your letter dated 13/10/2022 regarding the faculty exchange program and student exchange program. We are eager to welcome the faculty members and students in our premises according to the mention schedule. Their boarding and lodging arrangements will be done accordingly. And here, I am also sharing the name of faculty members and students list for the same program in your institution. I hope that this program will be beneficial for faculty members and students. These faculty members are finalized for this program from our institution and students list is attached along with.

1.Mr. Alok Jain. (Basic science)

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Near Sidki Chauraha, Muzaffarnagar-Dehradun Highway, Saharanpur (U.P.) I Call : 9012400089, 9927880086, 992788009
Website : www.iimt.org.in Email : info@iimt.org

Detail of faculty Exchange & Student Exchange Program Session (2022-23):

S.No.	Nature of Activity	No. of Participants	Duration
1	Faculty Exchange Program IIMT, Kota, Saharanpur	**SRC to IIMT** Dr. KamalKrishan (Basic science) Mr. Rajdeep sehrawat (Basic science) **IIMT to SRC** Mr. AlokJain (Basic science)	06 days (17/10/2022 to 22/10/2022)
2	Student Exchange Program IIMT, Kota, Saharanpur	**IIMT TO SRC** SHATAKSHI GUPTA SHALUD TANU GUPTA **SRC TO IIMT** AAMIS ALI AMANDEEP CHAUHAN AMIR ALAM BITTU KUMAR MOHD AHAMAD NAWAJ AJAY KUMAR YASH PRATAP	06 days (17/10/2022 to 22/10/2022)
3	Faculty Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC to CHSM** Dr. Jitendra Singh (Basic science) **CHSM to SRC** Mr. KapilSaini (Botany, basic science)	06 days (14/11/2022 to 19/11/2022)
4	Student Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC TO CHSM** SANSKAR VERMA SONAM KATARIYA SHALU SAINI **CHSM TO SRC** ARTI ASHISH DAGAR AMIL KAVITA AKSHAY KUMAR PARTH MITTAL TANIYA TYAGI	06 days (14/11/2022 to 19/11/2022)
5	Faculty Exchange Program with SD (PG) College Muzaffarnagar.	**SD(PG) COLLEGE TO SRC** Dr. Shuchi Mittal Home Science **SRC TO SD(PG) COLLEGE** Dr. Shweta Rathi Home Science	1 Day Guest Lecture 10/11/2022 1 Day Guest Lecture 12/11/2022
	Faculty Exchange Program with	**CH. Kaliram Degree College TO SRC**	1 Day Guest Lecture 15/12/2022

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

6	CH. Kaliram Degree College Nagal Saharanpur (UP)	1.Dr. Ravindra Saini (Basic Science)	1 Day Guest Lecture 17/12/2022
		2. Mr. Mohit Kumar (Basic Science)	
		SRC TO CH. Kaliram Degree College	
		1.Dr. Kamal Krishan (Basic Science)	
		2.Mr. Vivek Kumar (Basic Science)	

Shweta

(Dr. Shweta Rathi))

Program Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

Date 07/10/2022

NOTICE

All the students of Shri ram college, Muzaffarnagar are here by informed that college is organizing 6 days students exchange program with IIMT College, Kota Saharanpur. Interested students may give their names latest by 15/10/2022 to their respective class teachers.

Shweta

(Dr. Shweta Rathi))

Program Coordinator

CC:

(Director/ Principal)

IQAC, Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

DATE: 15/10/2022

NOTICE

This is hereby informed to all students that Shri Ram College, Muzaffarnagar organizing a student exchange program with IIMT, College, Kota, Saharanpur on 17/10/2022 to 22/10/2022 for the session 2022-2023. the main focus of this program encourages the students to improve their skills with new environment and learn new ideas and job opportunities in their field. Selected students list is attach with it.

After discussion with head of department, 7 students selected for this program. Student's list is attached along with.

Shweta

Dr.Shweta Rathi
(Program Coordinator)

CC:

(Director/Principal)
IQAC, Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

STUDENT EXCHANGE PROGRAM

(COLLABORATIVE ACTIVITY OF SHRI RAM COLLEGE, MUZAFFARNAGAR AND IIMT COLLEGE, KOTA SAHARANPUR)

Session: 2022-23 Students from IIMT College visited to SRC)					
Duration: 06 Days					
From: 17/10/2022 to 22/10/2022					
S.NO.	NAME	FATHER'S NAME	COURSE	PHONE NO.	COLLEGE
1.	SHATAKSHI GUPTA	ASHOK TYAGI	B.Sc. CBZ	6397149277	IIMT
2.	SHALUD	NARENDRA TYAGI	B.Sc. CBZ	9398832214	IIMT
3.	TANU GUPTA	RAKESH GUPTA	B.Sc. CBZ	8865002825	IIMT

Session: 2022-23 Students from SRC College visited to IIMT)					
Duration: 06 Days					
From: 17/10/2022 to 22/10/2022					
S.NO.	NAME	FATHER'S NAME	COURSE	PHONE NO.	COLLEGE
1.	AAMIS ALI	MOHD NAZIM	B.Sc. CBZ	7037762931	SRC
2.	AMANDEEP CHAUHAN	SANDEEP KUMAR	B.Sc. CBZ	9557735418	SRC
3.	AMIR ALAM	MOHD JUBEDEEN	B.Sc. CBZ	9639310300	SRC
4.	BITTU KUMAR	MOHAR SINGH	B.Sc. CBZ	8449087474	SRC
5.	MOHD AHAMAD NAWAJ	MOHD NAWAB	B.Sc. CBZ	9760056223	SRC
6.	ANURADHA	SHUBASHCHANDRA	B.Sc. CBZ	8791384607	SRC
7.	YASH PRATAP	SUNIL KUMAR	B.Sc. PCM	7895042625	SRC

Shweta

Dr. Shweta Rathi

Program Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

FACULTY EXCHANGE PROGRAM

(COLLOBORATIVE ACTIVITY OF SHRI RAM COLLEGE MUZAFFARNAGAR AND IIMT KOTA, SAHARANPUR)

Session: 2022-2023 Faculty Members from CIISM College to visited to SRCDEPT. Basic Science				
Duration 06 Days				
From: 17/10/2022to 22/10/2022				
S.NO.	**NAME**	**DEPARTMENT**	**CONTACT NO.**	**DESIGNATION**
1	MR. ALOK JAIN	BASIC SCIENCE	9897396390	ASST. PROF.

Session: 2022-2023 Faculty Members from SRC College to visited to IIMT College DEPT. Basic Science				
Duration 06 Days				
From: 17/10/2022 to 22/10/2022				
S.NO.	**NAME**	**DEPARTMENT**	**CONTACT NO.**	**DESIGNATION**
1	MR. RAJDEEP SEHRAWAT	Basic Science	865948097	ASST. PROF.
2	DR. KAMAL KRISHAN	Basic Science	9759664388	ASST. PROF.

Shweta

Dr. Shweta Rathi

(Program Coordinator)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

STUDENT EXCHANGE PROGRAM ATTENDANCE SHEET

SESSION 2022-2023

S.NO.	NAME OF STUDENTS	F. I	17/10/22	18/10/22	19/10/22	20/10/22	21/10/22	22/10/22
1.	SHATAKSHI GUPTA	AT	P	P	P	P	P	P
2.	SHALUD	NT	P	P	P	P	P	P
3.	TANU GUPTA	RG	P	P	P	P	P	P

Dr. Shweta Rathi

Program Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Notice

Date: 02/11/2022

This is hereby informed to all faculty members that Shri Ram College, Muzaffarnagar organizing a Faculty Exchange Program with CHSM Ghotni, bulandsahar 14/11/2022 to 19/11/2022 for the session 2022-23. The main focus of this program encourages the side as and job opportunities in their field. These faculty members are finalized for this program –

From Shri Ram College, Muzaffarnagar to CHSM, Ghotni, Bulandsahar.

1. Dr. Jitendra Singh (Basic Science)

From CHSM,Ghotni, Bulandsahar. to Shri Ram College, Muzaffarnagar

1. Mr. Kapil Saini (Basic Science)

Dr. Shweta Rathi (Program Coordinator)

CC:

(Principle)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College
Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)
A+ Grade Accredited by NAAC

Date: 04/11/2022

To,

The Principal,

CHSM, Gothni

Bulanadshahar

Subject: Regarding the faculty exchange program and student exchange program

Sir,

As there is a MOU signed between Shri Ram College, Muzaffarnagar and IIMT College, Kota, Saharanpur for the faculty exchange and student exchange program in context of the knowledge enhancement of the students of both the institutes. Keeping same in mind here I'm sharing a tentative schedule and faculty members name for the said program from 14/11/2022 to 19/11/2022 for the session 2022-23. If this schedule is suitable to you, kindly finalized it and also sharing the name of faculty member(s) that will be visiting our institution in exchange. These faculty members are finalized for this program from our institution and student's list is attached along with

1. Dr. Jitendra Singh (Basic Science)

Dr. Prerna Mittal

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Ch. Harchand Singh Mahavidhyalaya

(Approved By NCTE and Affiliated to CCS University, Meerut)
Shahpur More, Jewar Road, Khurja, Distt. Bulandshahar (UP)

To,

Date:07.11.2022

The principal

Shri Ram College

Muzaffarnagar

Subject: Regarding the faculty exchange program and student exchange program.

Sir,

As per your letter dated 14/11/2022 regarding the faculty exchange program and student exchange program. We are eager to welcome the faculty members and students in our premises according to the mention schedule. Their boarding and lodging arrangements will be done accordingly. And here, I am also sharing the name of faculty members and students list for the same program in your institution. I hope that this program will be beneficial for faculty members and students. These faculty members are finalized for this program from our institution and students list is attached along with.

1. **Mr. Kapil Saini**

Principal

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

CITY OFFICE : Opposite Nagar Palika, Khurj
Phone No.: 0573[illegible], 262222, 9927026388, 9412326388, 983702747
*Web:chscollegegothni.com *E Mail: chscollege@yahoo.co.i

Detail of faculty Exchange & Student Exchange Program Session (2022-23):

S.No.	Nature of Activity	No. of Participants	Duration
1	Faculty Exchange Program IIMT, Kota, Saharanpur	**SRC to IIMT** Dr. Kamal Krishan (Basic science) Mr. Rajdeep Sherawat (Basic science) **IIMT to SRC** Mr. Alok Jain (Basic science)	06 days (17/10/2022 to 22/10/2022)
2	Student Exchange Program IIMT, Kota, Saharanpur	**IIMT TO SRC** SHATAKSHI GUPTA SHALUD TANU GUPTA **SRC TO IIMT** AAMIS ALI AMANDEEP CHAUHAN AMIR ALAM BITTU KUMAR MOHD AHAMAD NAWAJ AJAY KUMAR YASH PRATAP	06 days (17/10/2022 to 22/10/2022)
3	Faculty Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC to CHSM** Dr. Jitendra Singh (Basic science) **CHSM to SRC** Mr. Kapil Saini (Botany, basic science)	06 days (14/11/2022 to 19/11/2022)
4	Student Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC TO CHSM** SANSKAR VERMA SONAM KATARIYA SHALU SAINI **CHSM TO SRC** ARTI ASHISH DAGAR AMIL KAVITA AKSHAY KUMAR PARTH MITTAL TANIYA TYAGI	06 days (14/11/2022 to 19/11/2022)
5	Faculty Exchange Program with SD (PG) College Muzaffarnagar.	**SD(PG) COLLEGE TO SRC** Dr. Shuchi Mittal Home Science **SRC TO SD(PG) COLLEGE** Dr. Shweta Rathi Home Science	1 Day Guest Lecture 10/11/2022 1 Day Guest Lecture 12/11/2022
	Faculty Exchange Program with	**CH. KALIRAM DEGREE COLLEGE TO SRC** 1.Dr. Ravindra Saini	1 Day Guest Lecture 15/12/2022

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

6	CH. KALIRAM DEGREE COLLEGE	(Basic Science)	1 Day Guest Lecture 17/12/2022
		2. Mr. Mohit Kumar (Basic Science)	
		SRC TO CH. KALIRAM DEGREE COLLEGE	
		1.Dr. Kamal Krishan (Basic Science)	
		2.Mr. Vivek Kumar (Basic Science)	

(Dr. Shweta Rathi))

Program Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE MUZAFFARNAGAR

DATE: 25/10/2022

NOTICE

All the students of Shri ram college, Muzaffarnagar are by informed that college is organizing 6 days students exchange program with Chaudhary Harchand Singh College, Khurza. Interested students may give their names latest by 01/11/2022 to their respective class teachers.here

Dr. Shweta Rathi
(Program coordinator)

CC:

(Director/ Principal)

IQAC, Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZFFARNAGAR

NOTICE

DATE: 01/11/2022

This is hereby informed to all students that Shri Ram College, Muzaffarnagar organizing a student exchange program with Chaudhary Harchand Singh College, Khurza. on 14/11/2022 to 19/11/2022 for the session 2022-2023. the main focus of this program encourages the students to improve their skills with new environment and learn new ideas and job opportunities in their field. Selected students list is attached with it.

After discussion with head of department, 7 students selected for this program. Student's list is attached along with.

Dr. Shweta Rathi

(Program Coordinator)

CC:

(Director/Principal)

IQAC, Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

STUDENT EXCHANGE PROGRAM

(COLLABORATIVE ACTIVITY OF SHRI RAM COLLEGE, MUZAFFARNAGAR AND CHSM COLLEGE, GOTHNI BULANDSAHAR)

Session: 2022-23 Students from SRC College visited to CHSM)					
Duration: 06 Days					
From: 07/11/2022 to 12/11/2022					
S.NO.	NAME	FATHER'S NAME	COURSE	PHONE NO.	COLLEGE
1.	AAMIS ALI	MOHD NAZIM	B.Sc. CBZ	7037762931	SRC
2.	AMANDEEP CHAUHAN	SANDEEP KUMAR	B.Sc. CBZ	9557735418	SRC
3.	AMIR ALAM	MOHD JUBEDEEN	B.Sc. CBZ	9639310300	SRC

Session: 2022-23 Students from CHSM College visited to SRC)					
Duration: 06 Days					
From: 07/11/2022 to 12/11/2022					
S.NO.	NAME	FATHER'S NAME	COURSE	PHONE NO.	COLLEGE
1.	Aditi Rathore	Pramod Kumar Rathore	B.Sc. CBZ	6398400480	CHSM
2.	Kanishka	Munish sign	B.Sc. CBZ	9537403430	CHSM
3.	Anjali Chaudhary	Sanjay Kumar	B.Sc. PCM	8218783225	CHSM
4.	Surbhi	Rishi pal	B.Sc. PCM	8218783225	CHSM
5.	Deeksha Kumari	Govardhan Singh	B.Sc. CBZ	8530689944	CHSM
6.	Anshu Raghav	Parveen Kumar	B.Sc. PCM	9910900595	CHSM
7.	Neha	Mahesh Chand	B.Com.	9193773673	CHSM

Shweta

Dr. Shweta Rathi
Program Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

FACULTY EXCHANGE PROGRAM

(COLLOBORATIVE ACTIVITY OF SHRI RAM COLLEGE MUZAFFARNAGAR AND IIMT KOTA, SAHARANPUR)

Session: 2021-2022 Faculty Members from CHSM College to visited to SRCDEPT. Basic Science				
Duration 06 Days				
From: 07/11/2022 to 12/11/2022				
S.NO.	NAME	DEPARTMENT	CONTACT NO.	DESIGNATION
1	MR. KAPIL SAINI	(BOTANY) BASIC SCIENCE	8800542122	ASST. PROF.

Session: 2021-2022 Faculty Members from SRC College to visited to CHSM College DEPT. Basic Science				
Duration 06 Days				
From: 07/11/2022 to 12/11/2022				
S.NO.	NAME	DEPARTMENT	CONTACT NO.	DESIGNATION
1	DR. JITENDRA SINGH	BASIC SCIENCE	9410073549	ASST. PROF.

Shweta

DR. Shweta Rathi

(Program Coordinator)

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

STUDENT EXCHANGE PROGRAM ATTENDANCE SHEET

SESSION 2022-2023

S.NO.	NAME OF STUDENTS	F.I	07/11/22	08/11/22	09/11/22	10/11/22	11/11/22	12/11/22
1.	ARTI	P	P	P	P	P	P	P
2.	ASHISH DAGAR		P	P	P	P	P	P
3.	AMIL		P	P	P	P	P	P
4.	KAVITA		P	P	P	P	P	P
5.	AKSHAY KUMAR		P	P	P	P	P	P
6.	PARTH MITTAL		P	P	P	P	P	P
7.	TANIYA TYAGI		P	P	P	P	P	P

Dr. Shweta Rathi

Program Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Department of Home Science

Notice

Dated: - 7/11/2022

This is to be hereby informed that Department of Home Science is going to organize a one-day Guest lecture "Entrepreneurship in Home Science" on 10/11/2022 at 11:00 A.M. All Students are compulsory to attend this Program.

Dr. Shweta Rathi

Program coordinator

CC to:

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College
Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)
A++ Grade Accredited by NAAC

Date 1/11/2022

To,

The principal

S.D. (PG)College

Muzaffarnagar

Subject: - Regarding the faculty exchange program for one day guest lecture.

Sir,

As there is a telephonic discussion between both colleges, Shri Ram College Muzaffarnagar and SD (PG) College Muzaffarnagar for the guest lecture in context of the knowledge enhancement of the students of both the colleges. Keeping same in mind here, I am sharing the name of our faculty member which will deliver guest lecture for the above said program at your college. kindly finalized the schedule and also share the name of faculty member which will visit our institution for guest lecture.

1. **Dr. Shweta Rathi (Department of Home Science)**

Thank you

(Principal)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Contact @ 9927028908, 9927011422
Website : www.srgcmzn.com E-Mail : src_mzn@rediffmail.com

0131-2604053
0131-2602354

सनातन धर्म कॉलेज, मुजफ्फरनगर – 251001
(चौधरी चरण सिंह विश्वविद्यालय मेरठ से सम्बद्ध)
S.D. COLLEGE (068), MUZAFFARNAGAR - 251001

सन्दर्भ सं० / Ref. No.: दिनाँक / Date: 05/11/2022

To,

The principal

Shri Ram College

Muzaffarnagar

Subject: - Confirmation of the faculty exchange program for one day guest lecture.

Sir,

As there is a telephonic discussion between both colleges, SD (PG)S College Muzaffarnagar and Shri Ram College Muzaffarnagar for the guest lecture in context of the knowledge enhancement of the students of both the colleges. Keeping same in mind here, I am sharing here schedule and faculty name for the above said program of the session 2022-23.

Dr. Shuchi Mittal (Department of Home Science)

Thank you

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Detail of faculty Exchange & Student Exchange Program Session (2022-23):

S.No.	Nature of Activity	No. of Participants	Duration
1	Faculty Exchange Program IIMT, Kota, Saharanpur	**SRC to IIMT** Dr. KamalKrishan (Basic science) Mr. Rajdeep sehrawat (Basic science) **IIMT to SRC** Mr. Alok Jain (Basic science)	06 days (17/10/2022 to 22/10/2022)
2	Student Exchange Program IIMT, Kota, Saharanpur	**IIMT TO SRC** SHATAKSHI GUPTA SHALUD TANU GUPTA **SRC TO IIMT** AAMIS ALI AMANDEEP CHAUHAN AMIR ALAM BITTU KUMAR MOHD AHAMAD NAWAJ AJAY KUMAR YASH PRATAP	06 days (17/10/2022 to 22/10/2022)
3	Faculty Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC to CHSM** Dr. Jitendra Singh (Basic science) **CHSM to SRC** Mr. KapilSaini (Botany, basic science)	06 days (14/11/2022 to 19/11/2022)
4	Student Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC TO CHSM** SANSKAR VERMA SONAM KATARIYA SHALU SAINI **CHSM TO SRC** ARTI ASHISH DAGAR AMIL KAVITA AKSHAY KUMAR PARTH MITTAL TANIYA TYAGI	06 days (14/11/2022 to 19/11/2022)
5	Faculty Exchange Program with SD (PG) College Muzaffarnagar.	**SD(PG) COLLEGE TO SRC** Dr. Shuchi Mittal Home Science **SRC TO SD(PG) COLLEGE** Dr. Shweta Rathi Home Science	1 Day Guest Lecture 10/11/2022 1 Day Guest Lecture 12/11/2022
6	Faculty Exchange Program with CH. Kaliram Degree College	**CH. Kaliram Degree College TO SRC** 1.Dr. Ravindra Saini (Basic Science)	1 Day Guest Lecture 15/12/2022

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

	Nagal Saharanpur (UP)	1. Mr. Mohit Kumar (Basic Science)	1 Day Guest Lecture 17/12/2022
		SRC TO CH. Kaliram Degree College	
		1.Dr. Kamal Krishan (Basic Science)	
		2.Mr. Vivek Kumar (Basic Science)	

(Dr. Shweta Rathi))

Program Coordinator

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

ENTEREPRENEURSHIP IN HOME SCIENCE

Guest Lecture

Organized by Department of Home Science

Date: - 10/11/2022

No. of Students: -65

Name & Details of the Resource Person: -Dr. Shuchi Mittal, Associate Professor, S.D. Degree college Muzaffarnagar.

Objective: Deliver engaging and insightful guest lecture on entrepreneurship, drawing from personal experience, to inspire and educate participants in a home setting.

Brief write-up about the program: -

The department of Home Science brought the students one day guest lecture program on "Entrepreneurship in Home Science"on 10/11/2022 from 11:00 A.M. to 3:00 P.M. at Auditorium of Shri Ram College Muzaffarnagar.On November 15, 2022, the Home Science Department hosted a guest lecture on "Entrepreneurship in Home Science" by Dr. Shuchi Mittal.A seasoned entrepreneur and academic expert Dr. Mittal explored the vast potential within Home Science for entrepreneurial ventures, particularly in areas like culinary arts, sustainable textiles, and family resource management. She outlined essential steps for launching a business, such as identifying market needs, securing funding, and leveraging digital marketing. The lecture was rich with real-world examples and success stories, encouraging students to think creatively about how they can innovate within their field. Dr. Mittal, engaging presentation and practical advice left a lasting impact, motivating students to pursue entrepreneurial paths with confidence and enthusiasm.

Dr. Mittal, emphasized the significant opportunities within Home Science, highlighting areas such as Nutrition, Textiles, and Interior Design. She discussed how innovative business ideas could transform traditional home science disciplines into profitable ventures. Dr. Mittal provided practical insights on starting and managing a business, including market research, funding, and marketing strategies. The session was interactive, with students engaging in discussions and seeking advice on their entrepreneurial aspirations. Overall, the lecture was inspiring and informative, offering valuable guidance to aspiring entrepreneurs in the field of Home Science

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Dr. Mittal, provided a comprehensive guide on transforming academic knowledge into profitable enterprises, focusing on crucial aspects like market analysis, business planning, and effective promotion strategies.Dr. Mittal. lecture was both motivational and educational, offering a clear roadmap for aspiring entrepreneurs in the Home Science field.

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REASARCH AND INNOVATION IN HOME SCIENCE

Guest Lecture

Organized by Department of Home Science

Date: - 12/11/2022

No. of Students: -65

Name of the Details of the Resource Person: -Dr. Shweta Rathi, Associate Professor, Shri Ram college Muzaffarnagar.

Objective"Empowering future Home Science professionals through insights into cutting-edge research and innovation."

Brief write-up about the program: -

The department of Home Science brought the students one day guest lecture program on "Entrepreneurship in Home Science" on 15/12/2022 from 11:00 A.M. to 3:00 P.M. in Auditorium of S.D. Degree. College Muzaffarnagar.On December 15, 2022, Dr. Shweta Rathi, a renowned expert in Home Science, delivered an insightful guest lecture on "Research and Innovation in Home Science." Dr. Rathi emphasized the critical role of interdisciplinary research in advancing the field, highlighting recent innovations in sustainable home management, nutrition, and family dynamics. She showcased pioneering studies on eco-friendly household practices, advancements in food preservation techniques, and the integration of smart technology in home environments. Dr. Rathi, also discussed the importance of community-based research and collaboration with industry partners to address real-world challenges. The lecture underscored the potential of Home Science to improve quality of life through scientific inquiry and innovative solutions.Dr. Rathi explored the dynamic intersection of technology and home management, detailing cutting-edge research on sustainable living practices, nutritional advancements, and the impact of digital tools on household efficiency. She highlighted innovative approaches to energy conservation, waste reduction, and the development of smart home systems that promote healthier and more sustainable lifestyles. Additionally. The lecture provided valuable insights into the transformative potential of research and innovation in enhancing everyday life.

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Dr. Shweta Rathi, an esteemed Home Science researcher, delivered a compelling guest lecture on "Research and Innovation in Home Science." Dr. Rathi discussed recent advancements in sustainable household technologies, nutrition science, and ergonomic home design. She showcased innovative research projects that address current environmental challenges, such as reducing household carbon footprints and improving waste management practices.

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STUDENT ATTENDANCE SRC

SESSION 2022-2023

S.NO.	Candidate Name	Class	Sign
1	AFREEN	B.SC. HSc	Afreen
2	ALISHA	B.SC. HSc	Alisha
3	ALKA	B.SC. HSc	Alka
4	ALMISBAH	B.SC. HSc	Almisba
5	ANANYA GARG	B.SC. HSc	~~Anaya~~ Ananya
6	ANSHIKA	B.SC. HSc	Anshika
7	AYUSHI	B.SC. HSc	Ayushi
8	FALAK TYAGI	B.SC. HSc	Falak Tyagi
9	FIRDOUS ZAIDI	B.SC. HSc	firdous
10	HIMANSHI PAL	B.SC. HSc	HIMANSHI PAL
11	IQRA TABASSUM	B.SC. HSc	Iqra Tabassum
12	KAJAL VARDHAN	B.SC. HSc	Kajal Vardhan
13	KHUSHBOO	B.SC. HSc	Kushboo
14	KM RITHIKA	B.SC. HSc	Rithika
15	LAYBA	B.SC. HSc	Layba
16	MANISHA	B.SC. HSc	Manisha
17	MANSI	B.SC. HSc	Mansi
18	MANU MALIK	B.SC. HSc	Manu
19	MEGHA RANI	B.SC. HSc	Megha Rani
20	MEHWISH	B.SC. HSc	Mehwish
21	NAGMA	B.SC. HSc	Nagma
22	NANDINI VERMA	B.SC. HSc	N verma
23	NARGIS PRAVEEN	B.SC. HSc	Nargis
24	NASIMA	B.SC. HSc	Nasima
25	NAZMA	B.SC. HSc	Nazma
26	PAYAL	B.SC. HSc	Payal
27	PRITI PAL	B.SC. HSc	Priti Pal
28	SANA ANSARI	B.SC. HSc	Sana

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29	SANA PARVEEN	B.SC. HSc	Sana Parveen
30	SARITA	B.SC. HSc	Sarita
31	SHALU	B.SC. HSc	Shalu
32	SHIVANGI	B.SC. HSc	Shivangi
33	SHIVANI	B.SC. HSc	Shivani
34	SIMRAN	B.SC. HSc	Simran
35	SUMAILA PRAVEEN	B.SC. HSc	Swati
36	SWATI	B.SC. HSc	Swati
37	SWATI RANI	B.SC. HSc	Swati Rani
38	TANU	B.SC. HSc	Tanu
39	TANU	B.SC. HSc	Tanu
40	VANSHIKA CHAUDHARY	B.SC. HSc	Vanshika
41	DIVYA TYAGI	B.SC. HSc	Divya Tyagi
42	HARSHA	B.SC. HSc	Harsha
43	KHUSHI	B.SC. HSc	Khushi
44	KHUSHI	B.SC. HSc	[illegible]
45	KM RIYA SHARMA	B.SC. HSc	Riya Sharma
46	KRITIKA AGARWAL	B.SC. HSc	Agarwal
47	NANDINI	B.SC. HSc	Nandini
48	RUPA	B.SC. HSc	Rupa
49	IQRA TABASSUM	B.SC. HSc	Iqra
50	JASMINE KHAN	B.SC. HSc	JasminE Khan
51	LUBNA KHAN	B.SC. HSc	Lubna Khan
52	NOORAS	B.SC. HSc	Nooras
53	SUBHANA PARVEEN	B.SC. HSc	[illegible]
54	AMREEN	B.SC. HSc	Amreen
55	FARHEEN NAAZ	B.SC. HSc	Farheen.
56	MEHVISH ARSHAD	B.SC. HSc	Mehvesh
57	SANIYA	B.SC. HSc	Saniya
58	SANIYA	B.SC. HSc	Saniya
59	SONAM	B.SC. HSc	Sonam.

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60	SONAM SAIFI	B.SC. HSc	
61	ZAINAB RIYAZ	B.SC. HSc	Zriyaz
62	ANCHAL	B.SC. HSc	Anchal
63	DIKSHA	B.SC. HSc	Diksha
64	DIVYA	B.SC. HSc	Divya
65	DIVYANSHI CHIKARA	B.SC. HSc	Divyanshi Chikara
66	EKTA	B.SC. HSc	Ekta
67	GUNJAN	B.SC. HSc	Gunjan
68	KHUSHI	B.SC. HSc	Khushi
69	KM SHIVANGI	B.SC. HSc	Shivangi
70	KM VARSHA	B.SC. HSc	Varsha

Shweta
Dr. Shweta Rathi
Program Coordinator

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Shri Ram College, Muzaffarnagar

Department of Basics Sciences

Notice

Dated: - 16/12/2022

This is to be hereby informed that Department of Basics Sciencesis going to organize a one-day Guest Lecture "QUANTUM MECHANICS AND ITS APPLICATIONS, and MATHEMATICS IN NATURE"on 20/12/2022 at 11:00 A.M. All Students are compulsory to attend this Program.

Dr. Shweta Rathi (Program Coordinator)

CC to:

(Principal)

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Shri Ram College

Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)

A++ Grade Accredited by NAAC

Date 10/12/2022

To,

The principal

CH. Kaliram Degree College

Nagal Saharanpur (UP)

Subject: - Regarding the guest lecture between Shri Ram College and CH. Kaliram Degree College Nagal Saharanpur (UP)for one day guest lecture.

Sir,

As there is a telephonic discussion between both colleges, Shri Ram College Muzaffarnagar and CH. Kaliram Degree College Nagal Saharanpur (UP)for the guest lecture in context of the knowledge enhancement of the students of both the colleges. Keeping same in mind here, I am sharing the name of our faculty member which will deliver guest lecture for the above said program at your college. kindly finalized the schedule and also share the name of faculty member which will visit our institution for guest lecture.

1. **Dr. Kamal Krishan (Basic Science Math's)**
2. **Mr. Vivek Kumar (Basic Science Physics)**

Thank you

(Principal)

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CH. KALIRAM DEGREE COLLEGE
(AFFILIATED TO MAA SHAKUMBHARI UNIVERSITY, PUNWARKA, SAHARANPUR)
NAGAL, SAHARANPUR (U.P.)
Website : www.krdegreecollege.org

Date ....

Date 14/12/2022

To,

The principal

Shri Ram College

Muzaffarnagar

Subject: - Confirmation of the faculty exchange program for one day guest lecture.

Sir,

As there is a telephonic discussion between both colleges, CH. Kaliram Degree College Nagal Saharanpur (UP) and Shri Ram College Muzaffarnagar for the guest lecture in context of the knowledge enhancement of the students of both the colleges. Keeping same in mind here, I am sharing here schedule and faculty name for the above said program of the session 2022-23.

1. **Dr. Ravindra Saini (Basic Science Physics)**
2. **Dr. Mohit Kumar (Basic Science Math's)**

Principal

Thank you

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Detail of faculty Exchange & Student Exchange Program Session (2022-23):

S.No.	Nature of Activity	No. of Participants	Duration
1	Faculty Exchange Program IIMT, Kota, Saharanpur	**SRC to IIMT** Dr. KamalKrishan (Basic science) Mr. Rajdeep sehrawat (Basic science) **IIMT to SRC** Mr. Alok Jain (Basic science)	06 days (17/10/2022 to 22/10/2022)
2	Student Exchange Program IIMT, Kota, Saharanpur	**IIMT TO SRC** SHATAKSHI GUPTA SHALUD TANU GUPTA **SRC TO IIMT** AAMIS ALI AMANDEEP CHAUHAN AMIR ALAM BITTU KUMAR MOHD AHAMAD NAWAJ AJAY KUMAR YASH PRATAP	06 days (17/10/2022 to 22/10/2022)
3	Faculty Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC to CHSM** Dr. Jitendra Singh (Basic science) **CHSM to SRC** Mr. KapilSaini (Botany, basic science)	06 days (14/11/2022 to 19/11/2022)
4	Student Exchange Program with CHSM, Gothni, Bulanadsahar	**SRC TO CHSM** SANSKAR VERMA SONAM KATARIYA SHALU SAINI **CHSM TO SRC** ARTI ASHISH DAGAR AMIL KAVITA AKSHAY KUMAR PARTH MITTAL TANIYA TYAGI	06 days (14/11/2022 to 19/11/2022)
5	Faculty Exchange Program with SD (PG) College Muzaffarnagar.	**SD(PG) COLLEGE TO SRC** Dr. Shuchi Mittal Home Science **SRC TO SD(PG) COLLEGE** Dr. Shweta Rathi Home Science	1 Day Guest Lecture 10/11/2022 1 Day Guest Lecture 12/11/2022
6	Faculty Exchange Program with CH. Kaliram Degree College	**CH. Kaliram Degree College TO SRC** 1.Dr. Ravindra Saini (Basic Science)	1 Day Guest Lecture 15/12/2022

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	Nagal Saharanpur (UP)	1. Mr. Mohit Kumar (Basic Science)	1 Day Guest Lecture 17/12/2022
		SRC TO CH. Kaliram Degree College	
		1.Dr. Kamal Krishan (Basic Science)	
		2.Mr. Vivek Kumar (Basic Science)	

(Dr. Shweta Rathi))

Program Coordinator

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MATHEMATICS IN NATURE:

Guest Lecture

Organized by Department of Basics Sciences

Date: -20/12/2022

No. of Students: -70

Name & Details of the Resource Person: -Mr.**MohitKumar**, Assistant Professor, CH. Kaliram Degree College Nagal Saharanpur (UP)

ObjectiveTo examine the pervasive role of mathematics in natural phenomena, illustrating its fundamental principles and applications in understanding the natural world.

Brief write-up about the program: -

The department of Basic Science brought the students one day guest lecture program on "MATHEMATICS IN NATURE:" on 20/12/2022 from 11:00 A.M. to 3:00 P.M. at Auditorium of Shri Ram College.Muzaffarnagar.OnDecember 20, 2022. Mr. Mohit Kumar. guest lecture on "Mathematics in Nature" was both enlightening and engaging. She began by highlighting the presence of mathematical patterns in various natural phenomena, such as the Fibonacci sequence in sunflower seed arrangements and the golden ratio in nautilus shells. Mr. Kumar. also explored fractals in snowflakes and mountain ranges, emphasizing how mathematical principles underpin the complexity and beauty of the natural world. Her discussion on the applications of these mathematical concepts in fields like biology and environmental science provided a deeper understanding of the interconnectedness between mathematics and nature. Overall, Mr. Kumar. lecture offered a fascinating glimpse into how mathematical principles are intricately woven into the fabric of the natural world.Mr.Kumar, provided a captivating insight into the hidden mathematical structures that govern the natural world. He illustrated how the Fibonacci sequence and the golden ratio appear in diverse forms, from the branching of trees to the spirals of galaxies. Mr. Kumar also delved into the role of symmetry and tessellations in the animal kingdom, such as the hexagonal patterns in honeycombs and the striking geometries in butterfly

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wings. His exploration of chaos theory and its implications for weather patterns and ecosystem dynamics showcased the profound impact of mathematics on understanding and predicting natural phenomena. Mr. Kumar, presentation was a compelling reminder of the pervasive and fundamental role of mathematics in deciphering the complexities of nature.Mr. Kumar discussed the intricate geometry found in plant growth patterns, highlighting the role of algorithms like L-systems in modeling these phenomena. Professor Chang also examined the mathematical basis of animal behaviors, showcasing how equations describe flocking patterns in birds and schooling behaviors in fish. His discussion on the mathematical modeling of climate patterns underscored the interdisciplinary nature of studying nature through mathematics. Overall, Professor Chang's lecture provided a comprehensive view of how mathematics serves as a universal language to unravel the mysteries of nature's design.

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QUANTUM MECHANICS AND ITS APPLICATIONS

Guest Lecture

Organized by Department of Basics Sciences

Date: -20/12/2022

No. of Students: -70

Name & Details of the Resource Person: -**Dr.Ravindra Saini**, Associate Professor, CH. Kaliram Degree College Nagal Saharanpur (UP)

ObjectiveTo explore the principles of Quantum Mechanics and their practical applications in contemporary science and technology.

Brief write-up about the program: -

The department of Basic Science brought the students one day guest lecture program on "QUANTUM MECHANICS AND ITS APPLICATIONS" on 20/12/2022 from 11:00 A.M. to 3:00 P.M. at Auditorium of Shri Ram College Muzaffarnagar. On December 20, 2022, the Basic Science Department hosted a guest lecture on " Quantum Mechanics and Its Applications" by Dr. Ravindra Saini, a distinguished physicist, delivered an insightful guest lecture on Quantum Mechanics and its applications. She began by explaining the fundamental principles of quantum mechanics, highlighting the significance of wave-particle duality, superposition, and entanglement. Dr. Saini emphasized the revolutionary impact of quantum mechanics on modern technology, particularly in the fields of quantum computing and cryptography. She discussed how quantum computers leverage the principles of superposition and entanglement to perform complex calculations exponentially faster than classical computers. Additionally, Dr. Saini explained the potential of quantum cryptography in ensuring secure communication by utilizing quantum key distribution. The lecture also covered quantum mechanics' role in advancements in

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material science, leading to the development of new materials with unique properties. Dr. Saini engaging presentation provided a comprehensive overview of how quantum mechanics is not only a cornerstone of modern physics but also a driving force behind cutting-edge technological innovations. Dr. Saini, a renowned physicist, recently delivered an engaging lecture on Quantum Mechanics and its diverse applications. He began by outlining the core principles of quantum mechanics, such as the uncertainty principle, wave-particle duality, and quantum entanglement. Dr. Saini, illustrated how these principles fundamentally challenge classical physics and offer new ways to understand the universe. He then transitioned to discussing practical applications, emphasizing the burgeoning field of quantum computing. Dr. Saini, explained how quantum computers have the potential to revolutionize industries by solving complex problems at unprecedented speeds. He also highlighted advancements in quantum cryptography, which promises to enhance data security through unbreakable encryption methods based on quantum key distribution. Additionally, he touched on quantum sensors and their applications in precision measurements and imaging. Dr. Saini lecture effectively conveyed the profound impact of quantum mechanics on both theoretical physics and practical technologies, inspiring the audience with the limitless possibilities of this fascinating field.

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APPLICATIONS OF MATHEMATICS IN REAL-WORLD PROBLEMS

Guest Lecture

Organized by Department of Basics Sciences

Date: -23/12/2022

No. of Students: -70

Name & Details of the Resource Person: -Dr. Kamal Krishan, Assistant Professor, Shri Ram College, Muzaffarnagar.

ObjectiveTo explore the practical applications of mathematics in solving real-world problems across various disciplines and industries.

Brief write-up about the program: -

The department of Basic Science brought the students one day guest lecture program on "APPLICATIONS OF MATHEMATICS IN REAL-WORLD PROBLEMS" on 23/12/2022 from 11:00 A.M. to 3:00 P.M. at Auditorium of CH. Kaliram Degree College Nagal Saharanpur (UP) On December 23, 2022, Dr. Kamal Krishan delivered an engaging lecture on "Applications of Mathematics in Real-World Problems" to a group of undergraduate students majoring in mathematics. Dr. Krishan presentation highlighted various practical uses of mathematical concepts, ranging from modeling population growth to optimizing resource allocation in business scenarios. She emphasized the importance of mathematical modeling in predicting trends and making informed decisions in fields such as economics, engineering, and biology. The lecture concluded with a lively Q&A session where students discussed potential career paths and the evolving role of mathematics in addressing global challenges. Overall, Dr. Krishan lecture underscored the interdisciplinary nature of mathematics and its critical role in solving complex real-world problems.Dr. Krishan highlighted various ways mathematics is applied in everyday life, from designing smartphone algorithms to predicting weather patterns. She engaged the audience with interactive demonstrations, showcasing how mathematical concepts like calculus and statistics play a crucial role in technological innovations and scientific discoveries. The lecture concluded with Dr. Krishan encouraging students to explore careers in fields where mathematics is foundational, emphasizing its role in shaping the future of technology and innovation. The students left inspired and eager to further explore the practical applications of mathematics in their studies and future career

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BIOPHYSICS: THE INTERSECTION OF BIOLOGY AND PHYSICS

Guest Lecture

Organized by Department of Basics Sciences

Date: -23/12/2022

No. of Students: -70

Name & Details of the Resource Person: -Mr.**Vivek Kumar**, Assistant Professor, Shri Ram College, Muzaffarnagar.

ObjectiveTo investigate the interdisciplinary field of Biophysics, exploring its pivotal role at the interface of biology and physics.

Brief write-up about the program: -

The department of Basic Science brought the students one day guest lecture program on "BIOPHYSICS: THE INTERSECTION OF BIOLOGY AND PHYSICS" on 23/12/2022 from 11:00 A.M. to 3:00 P.M. at Auditorium ofCH. Kaliram Degree College Nagal Saharanpur (UP) On December 23, 2022, our class had the privilege of attending a guest lecture on the topic "Biophysics: The Intersection of Biology and Physics," delivered by Mr. Vivek Kumar, a renowned biophysicist from Stanford University. Mr. Kumar began by elucidating the fundamental concept of biophysics, emphasizing how this interdisciplinary field merges the principles of physics with the complexities of biological systems. She provided compelling examples, such as the use of spectroscopy to study protein structures and the application of quantum mechanics in understanding photosynthesis. The lecture highlighted the importance of mathematical models in predicting biological behaviors and how technological advancements, like cryo-electron microscopy, have revolutionized our ability to visualize biomolecules at atomic resolution. Mr. Kumar, insights into how physical laws underpin biological processes fostered a deeper appreciation for the synergy between these two sciences, illustrating how biophysics is pivotal in driving innovations in medical research, drug development, and

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understanding fundamental life processes. explored the profound ways in which physical principles are applied to solve complex biological problems. Mr. Kumar discussed the role of thermodynamics in understanding cellular processes and the importance of fluid dynamics in blood circulation. He also delved into the use of computational models to simulate biological systems, providing insights into how these models can predict disease progression and treatment outcomes. One of the most captivating parts of the lecture was Mr. Kumar, explanation of the biophysical techniques used in neuroscience to study brain function, such as magnetic resonance imaging (MRI) and electrophysiology. Through his engaging presentation, Mr. Kumar, demonstrated how the integration of physics and biology not only enhances our understanding of life at a molecular level but also paves the way for groundbreaking advancements in healthcare and biotechnology.

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STUDENT ATTENDANCE SHEET

SESSION 2022-2023

S.No.	Student	Course	Sign
1	AMARJEET	BSC (PCM)	Amarjeet
2	ANSHUL KUMAR	BSC (PCM)	Anshul Kumar
3	TUSHAR KUMAR	BSC (PCM)	Tushar
4	ANUJ	BSC (PCM)	Anuj
5	ANIKET	BSC (PCM)	Aniket
6	ARIF CHOUDHARY	BSC (PCM)	A
7	RAJKUMAR	BSC (PCM)	Rajkumar
8	SHWETA SHARMA	BSC (PCM)	Shweta
9	ABBAS	BSC (PCM)	Abbas
10	KIRAN	BSC (PCM)	Kiran
11	ABHIJEET BALIYAN	BSC (PCM)	Abhijeet Baliyan
12	VISHAL KUMAR	BSC (PCM)	Vishal Kumar
13	ANGEL	BSC (PCM)	Angel
14	KAMAL SAINI	BSC (PCM)	Kamal Saini
15	ANIL KUMAR	BSC (PCM)	Anil Komar
16	SOFIYA PARVEEN	BSC (PCM)	Sofiya
17	NEHA	BSC (PCM)	Neha
18	SHAINKY KUMAR	BSC (PCM)	Shainky Kumar
19	ANJALI	BSC (PCM)	Anjali
20	ABHAY PANWAR	BSC (PCM)	A Panwar
21	SWATI	BSC (PCM)	Swati
22	DEEPANKAR	BSC (PCM)	Deepankar
23	PREETI BALIYAN	BSC (PCM)	Preeti Baliyan
24	DARPAN	BSC (PCM)	DarPan
25	MANASHAVI ARYA	BSC (PCM)	Manashavi Aarya
26	INSAF ALI	BSC (PCM)	Insaf
27	SIDDHARTH CHOUDHARY	BSC (PCM)	Siddharth Choudhary
28	MOHD SUHAIL	BSC (PCM)	M suhail
29	NISHANT KUMAR	BSC (PCM)	Nishant Kumar
30	SARTHAK TYAGI	BSC (PCM)	Styagi

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31	HARSHIT VERMA	BSC (PCM)	Harshit Verma
32	PURVA SINGH	BSC (PCM)	Purva Singh
33	PRIYANSHI	BSC (PCM)	Priyanshi
34	LAKKI	BSC (PCM)	Lakki
35	DIVYA BALIYAN	BSC (PCM)	Divya Baliyan
36	ANUSHKA SHARMA	BSC (PCM)	Anushka Sharma
37	RITIKA BALIYAN	BSC (PCM)	Ritika Baliyan
38	KANIKA	BSC (PCM)	Kanika
39	ANNU PUNDIR	BSC (PCM)	Annu Pundir
40	VAIBHAV KUMAR	BSC (PCM)	
41	BHAVESH KUMAR	BSC (PCM)	Bhavesh Kumar
42	MUSKAN TOMAR	BSC (PCM)	Muskan
43	PARTYAKSH GAUTAM	BSC (PCM)	Partyakash Gautam
44	SAJAL PRATAP SINGH	BSC (PCM)	Sajal Pratap singh
45	RAJAT KUMAR	BSC (PCM)	Rajat kumar
46	KHUSHI RANI	BSC (PCM)	Khushi Saini
47	AKANSHA	BSC (PCM)	Akansha
48	EKRA PARVEEN	BSC (PCM)	Ekra Parveen
49	TARUN SHARMA	BSC (PCM)	Tarun sharma
50	PRADUMAN	BSC (PCM)	Praduman
51	VINIT KUMAR	BSC (PCM)	Vinit Kumar
52	DEEPANSHU TYAGI	BSC (PCM)	Deepanshu
53	ANJALI	BSC (CBZ)	Anjali
54	GOURAV PAL	BSC (CBZ)	Gourav Pal
55	ALISHA	BSC (CBZ)	Alisha
56	KAMNA	BSC (CBZ)	Kamna
57	ABHISHEK UPADHAYAY	BSC (CBZ)	Abhishek
58	ANSHUL KUMAR	BSC (CBZ)	Anshul Kumar
59	ANAM	BSC (CBZ)	Anam
60	KHUSHI SAINI	BSC (CBZ)	Khushi saini
61	GAUTAM	BSC (CBZ)	Sahil Abbas
62	AINUL ABBAS	BSC (CBZ)	Ainul Abbas
63	ADITI SINGH	BSC (CBZ)	Aditi Singh
64	GOURAV	BSC (CBZ)	Gourav
65	GULISTA	BSC (CBZ)	Gulista

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Muzaffarnagar

66	BUSHRA	BSC (CBZ)	Bushra
67	MOHD AMAN	BSC (CBZ)	Mohd Aman
68	CHINU	BSC (CBZ)	Chinu
69	HARSH DHIMAN	BSC (CBZ)	Harsh Dhiman
70	ISHIKA SHARMA	BSC (CBZ)	ISHIKA SHARMA

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Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

Department of Business Administration

Date: 09-03-2023

NOTICE

All the students of BBA are hereby informed that an "**Awareness Program on Water Conservation**" is being organized in our college in collaboration with Himalayan Management and Development Resources Institute, Rishikesh. All the students are supposed to join the program which is to be held on 17-03-2023.

Dr. Vivek Kumar Tyagi
Head of the Department

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

Department of Business Administration

Date:- 18-03-2023

Report

on

Awareness Program on Water Conservation

1. Introduction

Water conservation is an essential practice to ensure sustainable water resources for future generations. On 17/03/2023 an awareness program on water conservation was held at Shri Ram College, Muzaffarnagar in association with Himalayan Management and Development Resources Institute, Rishikesh. The primary objective of the event was to educate students about the importance of water, the challenges of water scarcity, and practical methods of conserving water.

2. Objectives of the Program

- To raise awareness about the growing issue of water scarcity.
- To educate students on how they can contribute to water conservation in their daily lives.
- To promote sustainable practices for water management both at home and school.
- To motivate students to become ambassadors for water conservation in their communities.

3. Program Structure

The awareness program was conducted in the following structured format:

Session 1: Introduction to Water Conservation

- **Overview**: The session began with an introduction to the global and local water crisis, highlighting statistics related to water usage and scarcity. The speaker provided insights into the role of water in ecosystems, agriculture, and human life.
- **Key Topics**:
  - Importance of water for life
  - The global water crisis and its impact

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- Water wastage statistics

Session 2: Practical Water Conservation Methods

- **Overview:** This session focused on actionable steps students could take to conserve water at home, school, and in their communities. Techniques such as rainwater harvesting, efficient water usage, and minimizing wastage were covered.
- **Key Topics:**
  - Fixing water leaks
  - Using water-efficient appliances
  - Promoting rainwater harvesting
  - Behavior changes like turning off the tap while brushing, using less water for cleaning, etc.

Session 3: Closing Remarks and Pledge

- **Overview:** The program concluded with a message of hope and encouragement, urging students to take individual responsibility for conserving water. The students then took a collective pledge to adopt water-saving habits in their daily lives and encourage others to do the same.

4. Outcome of the Program

The awareness program was met with enthusiasm and engagement from the students. The following outcomes were observed:

- **Student Participation:** All 219 students actively participated in the sessions.
- **Awareness Increased:** Through the program, students gained a deeper understanding of the water crisis and the simple steps they can take to reduce water waste.
- **Pledge:** The students collectively pledged to conserve water at home and college and to spread awareness within their communities.

5. Conclusion

The awareness program on water conservation successfully achieved its goals of educating students on the importance of water conservation and motivating them to adopt sustainable practices. The program provided the students with valuable knowledge and tools to conserve water in their daily lives and inspired them to be ambassadors of change in their communities.

This initiative is an important step in fostering a culture of environmental responsibility among the younger generation.

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Summary :

Date of the Program	: 17/03/2023
Venue of the Program	: SRC Auditorium
Resource Person	: Dr. Aditya Gautam (Secretary, HiMADRI, Rishikesh)
Event Coordinator	: Mr. Pankaj Kaushik
Anchor	: Ms. Shruti Mittal
Supporting Faculties	: Mr. Kapil Dev Dhiman
	Ms. Hansika Jain
	Mr. Ankush Rawal

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR
DEPARTMENT OF BUSINESS ADMINISTRATION

LIST OF PARTICIPATING STUDENTS IN AWARENESS PROGRAM ON WATER CONSERVATION DATED 17-03-2023

No	Name	Father's Name	Year	Sign
1	AAKUL	VINOD	BBA I Year	Aakul
2	AARISH AHMAD	KHALIL	BBA I Year	Aarish
3	AASHA PAL	RAVINDRA PAL	BBA I Year	Aasha
4	AASHISH KUMAR	VIJAY PRASAD	BBA I Year	
5	AASHISH KUMAR JHA	DHARMENDRA JHA	BBA I Year	Ashish
6	AASHISH PAL	RAVINDRA PAL	BBA I Year	Aashish Pal
7	ABHAY ARORA	RAJKUMAR ARORA	BBA I Year	
8	ABHAY KUMAR	DARIYA SINGH	BBA I Year	Abhay
9	ARJUN KUMAR	LAXMAN YADAV	BBA I Year	Arjun
10	ARJUN SINGH	RANDHEER SINGH	BBA I Year	
11	ARPIT KUMAR	RAN KUMAR	BBA I Year	Arpit
12	BITTU PATEL	VASHISHTH PATEL	BBA I Year	Bittu
13	BULBUL	MAHESH KUMAR	BBA I Year	
14	CHARU	KAMAL TYAGI	BBA I Year	Charu
15	CHEENU PAL	BRAHAM PAL	BBA I Year	Cheenu
16	CHESTA VERMA	DINESH KUMAR VERMA	BBA I Year	Chesta
17	CHETNA SAINI	BIJENDER SAINI	BBA I Year	Chetna
18	DEVANAND KUMAR	JAYPRAKASH SINGH	BBA I Year	
19	DEVANSH TYAGI	RAVINDRA TYAGI	BBA I Year	Devansh Tyagi
20	DHANANJAY BHARGAV	ADESH KUMAR BHARGAV	BBA I Year	D.B.
21	DHARMENDRA KUMAR	SHIVPOOJAN RAM	BBA I Year	
22	GUNGUN	PRAVEEN	BBA I Year	Gungun
23	GUNJAN KUMAR	MADAN KUMAR	BBA I Year	
24	HAMZA ZAHID	ZAHID HUSAIN	BBA I Year	
25	HARISH KHAN	IZHAR AHMAD KHAN	BBA I Year	Harish
26	HITAKSHI SINGHAL	RAJESH SINGHAL	BBA I Year	
27	INDRAMANI DUBEY	SANTOSH DUBEY	BBA I Year	
28	IQRA SIDDIQUI	SHAHNAWAJ SIDDIQUI	BBA I Year	Iqra
29	IRTAQA BATOOL	HUSAIN MEHDI	BBA I Year	
30	ISHANT	JOGENDRA SINGH	BBA I Year	Ishant
31	ISHIKA	GAURAV KUMAR	BBA I Year	Ishant
32	HITAKSHI SINGHAL	RAJESH SINGHAL	BBA I Year	
33	INDRAMANI DUBEY	SANTOSH DUBEY	BBA I Year	Indramani
34	IQRA SIDDIQUI	SHAHNAWAJ SIDDIQUI	BBA I Year	Iqra
35	IRTAQA BATOOL	HUSAIN MEHDI	BBA I Year	
36	ISHANT	JOGENDRA SINGH	BBA I Year	
37	ISHIKA	GAURAV KUMAR	BBA I Year	Ishika
38	KAJAL KUMARI	DAYASHANKAR PRASAD	BBA I Year	Kajal
39	KALIM ANSARI	MD AKHTAR ANSARI	BBA I Year	Kalim
40	KAMAR FAIZI	HASEEN ABBAS	BBA I Year	Kamar Faizi
41	KANAK GOEL	PARVEEN GOEL	BBA I Year	Kanak
42	KUSHAGRA BHARDWAJ	SACHIN KUMAR SHARMA	BBA I Year	
43	LAKSHAY GAUTAM	SHISRAM	BBA I Year	Lakshay
44	MANI SHARMA	AMRISH SHARMA	BBA I Year	Mani Sharma
45	MANISH KUMAR	SALENDRA MEHTA	BBA I Year	Manish
46	MANSAB SIDDIQUI	MAZHAR SIDDIQUI	BBA I Year	Mansab
47	MANSHI	RAJBEER	BBA I Year	Manshi

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

	MUSKAN KUMARI	YASHWANT SINGH	BBA I Year	Muskan
	NAMO NARAYAN	CHANDAN KUMAR	BBA I Year	Namo
50	NANDANI RANJAN	JAGAT NANDAN PRASAD	BBA I Year	Nandani
51	NAVNEET RAJ	CHANDRA MOHAN SINGH	BBA I Year	Navneet
52	NEESHU KASHYAP	SOMDATT	BBA I Year	Neeshu
53	NIHAL KUMAR	DINESH TIWARI	BBA I Year	Nihal
54	AAMIR	sattar	BBA II Year	Aamir
55	AARTI TIWARI	SANJAY KUMAR TIWARI	BBA II Year	[illegible]
56	AASHISH SHARMA	RAJKUMAR	BBA II Year	Aashish
57	AASHISH TYAGI	PAWAN KUMAR	BBA II Year	Aashish
58	AAYUSH SHARMA	ROHITASH SHARMA	BBA II Year	Aayush
59	ABHAY KUMARYADAV	TEJNARAYAN YADAV	BBA II Year	Abhay
60	AYUSHI RATHI	GAURAV RATHI	BBA II Year	Ayushi
61	AYUSHMAAN	JYOTI RAJ	BBA II Year	Ayushman
62	BADAL KUMAR GHOSH	FANIL KUMAR GHOSH	BBA II Year	Badal
63	BIKASH KUMAR YADAV	SANTOSH YADAV	BBA II Year	Bikash
64	BITTU KUMAR	KUMOD MANDAL	BBA II Year	Bittu
65	BITTU KUMAR	SURENDRA SHARMA	BBA II Year	Bittu
66	DEVANSHI TYAGI	PANKAJ KUMAR TYAGI	BBA II Year	Devanshi
67	DIKSHA KUMARI	VIJAY KUMAR METHA	BBA II Year	Diksha
68	DIKSHANT MALIK	UMESH MALIK	BBA II Year	Diksha
69	DIPA KUMARI	SHAMBHUSHARAN PRASAD	BBA II Year	Dipa
70	DIPANDER	SUDHIR KUMAR	BBA II Year	Dipander
71	GUDDU CHAUDHARY	MEHERMAN CHOUDHARY	BBA II Year	Guddu
72	GULSHAN KHATOON	HAIDAR ALI	BBA II Year	Gulshan
73	HARSH KUMAR	RAJAT KUMAR	BBA II Year	Harsh
74	HARSH RAJ PANWAR	VIRENDRA PANWAR	BBA II Year	Harsh
75	JITENDRA KUMAR MISHRA	UGRAKANT MISHRA	BBA II Year	Jitendra
76	JUNAID	MOHD IKHLAK	BBA II Year	Junaid
77	KABEER CHOUDHARY	SUNIT TOMAR	BBA II Year	Kabeer
78	KAJAL SAINI	BHUSHAN SAINI	BBA II Year	Kajal
79	KARUNA PATEL	BABAN KUMAR	BBA II Year	Karuna
80	KASHISH SINGH	OM PRAKASH SINGH	BBA II Year	Kashish
81	LAKSHAY SHARMA	RAJESH SHARMA	BBA II Year	Lakshay
82	LALIT KUMAR	SUDHIR KUMAR	BBA II Year	Lalit
83	LAVISH BABBAR	MAHESH KUMAR	BBA II Year	Megha
84	MEGHA KUMARI	SHYAM NANDAN PRASAD	BBA II Year	Megha
85	MINAKSHI	GOVIND SINGH	BBA II Year	[illegible]
86	MINI SUJATA	RAJKISHOR SAH	BBA II Year	Mini
87	MUSKAN	MUKESH KUMAR	BBA II Year	Muskan
88	MUSKAN KUMARI	SAROJ SINGH	BBA II Year	Muskan
89	NABIYA	MURSALEEM	BBA II Year	Nabiya
90	NAKUL PUNDIR	JITENDRA KUMAR	BBA II Year	Nakul
91	NANDINI	LOKESH	BBA II Year	Nandini
92	NITIN KUMAR	VIJAY KUMAR	BBA II Year	Nitin
93	PALAK KUMARI	MUKUND SINGH	BBA II Year	Palak
94	PARAS SINGHAL	RAKESH KUMAR SINGHAL	BBA II Year	Paras Singhal
95	PARTH KUMAR	CHANDRA PRAKASH	BBA II Year	Parth
96	PAYAL PRIYA	RANJEET KUMAR	BBA II Year	Payal
97	PINKI KUMARI	VIJAY PANDIT	BBA II Year	Pinky
98	PRIYANK GARG	NEERAJ GARG	BBA II Year	Priyank
99	RADHA RANI	PRABHAT SINGH	BBA II Year	Radha Rani

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IQAC, Shri Ram College,
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Chairman
IQAC, Shri Ram College,
Muzaffarnagar

	RADHIKA GARG	SANJAY GARG	BBA II Year	Radhika
1	RADHIKA GAUTAM	SHAKTI SHARMA	BBA II Year	Radhika
102	RANU SINGH	RAKESH KUMAR SINGH	BBA II Year	Ranu
103	RASHI MITTAL	SACHIN MITTAL	BBA II Year	Rashi
104	RAUSHAN KUMAR	JUGESHAWAR SAH	BBA II Year	
105	RAVI KUMAR	SANT KUMAR	BBA II Year	Ravi
106	RISHABH	SHAJID	BBA II Year	Risabh
107	RISHABH BALIYAN	MANOJ KUMAR	BBA II Year	
108	RUHANI	RAJEEV KUMAR	BBA II Year	Ruhi
109	SACHIN RAJ	OM PRAKASH	BBA II Year	Sachin
110	SAGAR SHARMA	LATE NEERAJ SHARMA	BBA II Year	
111	SAHDEV PUNDIR	JITENDRA KUMAR	BBA II Year	
112	SAHIL AHMAD	MOHD. MUZAMMIL	BBA II Year	Sahil
113	SATAKSHI GUPTA	MANOJ GUPTA	BBA II Year	Satakshi
114	SATYAM TYAGI	PRAVESH TYAGI	BBA II Year	Satyam
115	SAURAV KUMAR	RAJA SAH	BBA II Year	
116	SAURAV KUMAR SINHA	SUJEET KUMAR	BBA II Year	Saurav
117	SHAEEMA SHAHJADI	SADAKAT ALI	BBA II Year	
118	SHRISTI SHARMA	GAURAV SHARMA	BBA II Year	Shristi
119	SHRUTI NAMDEV	MOHAN NAMDEV	BBA II Year	Shruti
120	SNEHA	DHARMENDRA KUMAR	BBA II Year	Sneha
121	SNEHLATA	JIYALAL	BBA II Year	
122	SOFIYA PARVEEN	MOHD ABID	BBA II Year	Sofiy
123	SOMA	RAVINDRA KUMAR	BBA II Year	Soma
124	TRISHA	RAJESH KUMAR	BBA II Year	Trisha
125	TUSHAR SHARMA	NAVEEN SHARMA	BBA II Year	
126	UJJAWAL SINGH	BHAGAT SINGH	BBA II Year	Ujjawal
127	UJJWAL KUMAR	RAHUL KUMAR YADAV	BBA II Year	
128	UMANG GARG	RAJEEV GARG	BBA II Year	Umang
129	AANCHAL TYAGI	SURENDRA TYAGI	BBA III Year	
130	AATIKA	MOHD NASIR	BBA III Year	Aatika
131	AAYUSHI JAIN	NEERAJ JAIN	BBA III Year	
132	ABHINAV KUMAR SINGH	VIJAY SINGH	BBA III Year	
133	ABHISHEK MEHTA	DHANANJAY YADAV	BBA III Year	
134	ADITI PANWAR	ANAND MEHTA	BBA III Year	Aditi
135	ADITYA BALIYAN	VISHAL PANWAR	BBA III Year	
136	ADITYA KUMAR PRASAD	ARVIND BALIYAN	BBA III Year	Aditya Kumar
137	AINAL ZAIDI	DEWANAND PRASAD	BBA III Year	
138	AKARSH	URUJ ALAM ZAIDI	BBA III Year	Akarsh
139	AKHILESH KUMAR	PRITAM KUMAR	BBA III Year	
140	AKSHAY KADIYAN	VIJAYKANT JHA	BBA III Year	A.K.
141	ALI NAWAZ	RAVINDER KADIYAN	BBA III Year	Ali Nawaz
142	ALIZA KHANAM	SHAHNAWAZ	BBA III Year	Aliza
143	AMIR SINGH	MOHD ASLAN	BBA III Year	Amir
144	ANCHAL TOMAR	RAMESHAWAR SINGH	BBA III Year	Anchal
145	ARCHIT TYAGI	MAHESH KUMAR	BBA III Year	
146	ARIZ ALI	SACHIN TYAGI	BBA III Year	Ariz Ali
147	AYUSH PUNDIR	RAFIUDDIN	BBA III Year	Ayush
148	AYUSHI GARG	DHEER SINGH	BBA III Year	
149	AYUSHI MITTAL	NEERAJ GARG	BBA III Year	
150	BABLU KUMAR	PRADEEP MITTAL	BBA III Year	Bablu Kumar
151	BABY VANI TYAGI	SIKANDRA DAS	BBA III Year	Baby

Coordinator
IQAC, Shri Ram College
Muzaffarnagar

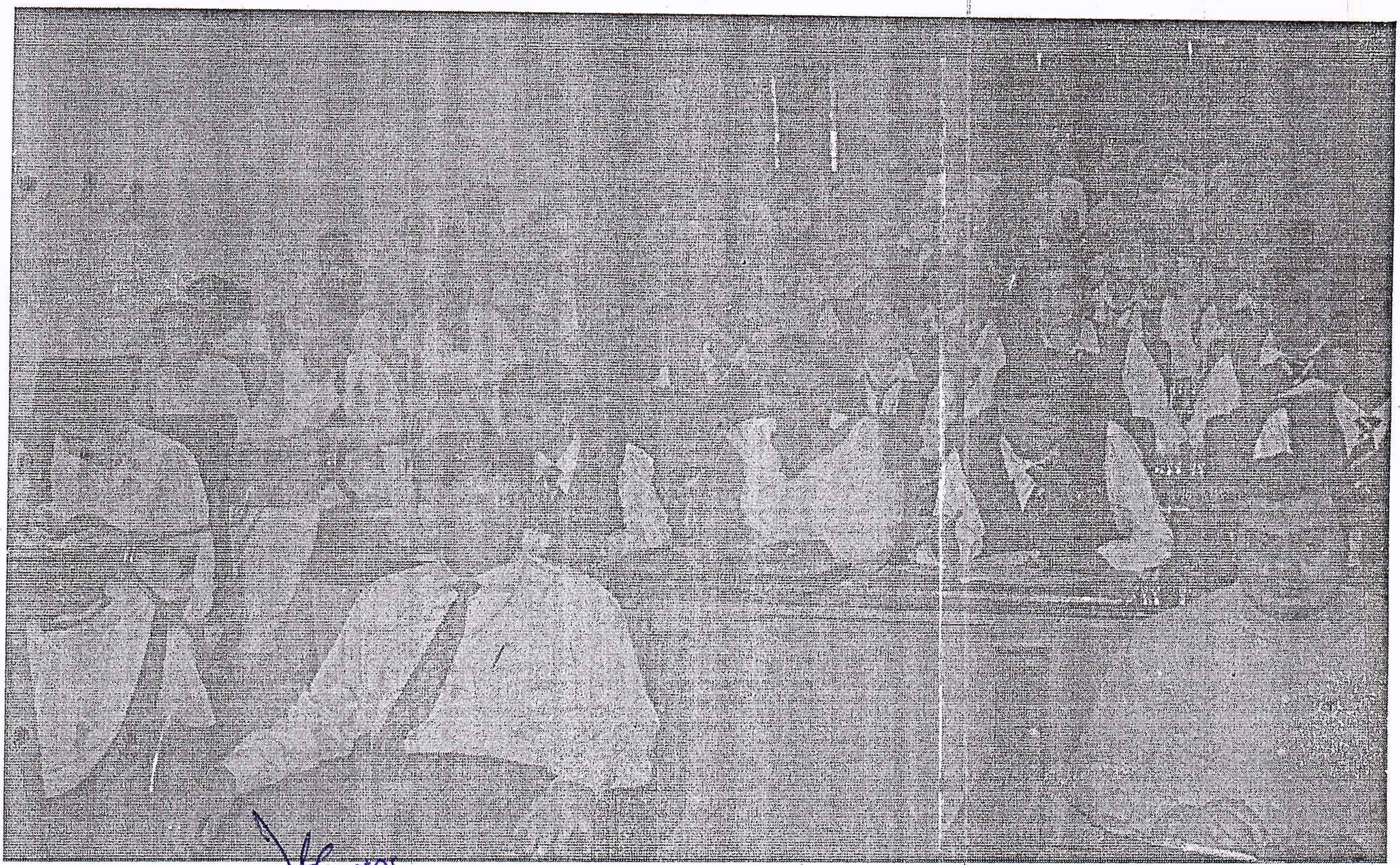
Chairman
IQAC, Shri Ram College
Muzaffarnagar

	CHANCHAL	GUNWANT TYAGI	BBA III Year	Chanchal
53	CHETAN SIROHI	PARVENDER KUMAR	BBA III Year	Chetan
154	CHIRAG JAIN	DINESH SIROHI	BBA III Year	Chirag
155	DEEPAK MALIK	OM PRAKASH SHARMA	BBA III Year	Deepak
156	DEVANSH CHOUDHARY	ANIRUDH MALIK	BBA III Year	Devansh
157	DEVANSH TYAGI	DHARMENDRA KUMAR	BBA III Year	Devansh
158	DEVANSHU VERMA	SURYAKANT TYAGI	BBA III Year	
159	DIKSHIT KUMAR	AMBRISH KUMAR	BBA III Year	Dikshit
160	FARHEEN QURESHI	ANIL KUMAR	BBA III Year	
161	FATIMA	MOHD ARIF QURESHI	BBA III Year	
162	GARV	ZAMEER KHAN	BBA III Year	Garv
163	GOVIND KUMAR CHAUPAL	SANJAY KUMAR	BBA III Year	G.K.
164	GULAFSHA ANSARI	RAMESH CHAND	BBA III Year	Gulafsha
165	GUNJAN SAINI	JAGAI CHAUPAL	BBA III Year	Gunjan
166	HARSH BANSAL	SHAHID ANSARI	BBA III Year	Harsh
167	HARSH KUCCHAL	SATYAVEER SINGH	BBA III Year	
168	HARSH SAINI	RAVI KANT BANSAL	BBA III Year	Harsh
169	HARSHIT SHUKLA	MANOJ KUCCHAL	BBA III Year	
170	HARSHIT TYAGI	MEHKAR SINGH	BBA III Year	Harshit
171	HUSNA ZAMAN	MUKESH THAKUR	BBA III Year	Husna
172	ISHIKA ARORA	MUNISH SHARMA	BBA III Year	Ishika
173	ISHITA GARG	YASHPAL TYAGI	BBA III Year	
174	KAILASH KUMAR	KADRUZ ZAMAN	BBA III Year	Kailash
175	KAJAL DHIMAN	RAJESH ARORA	BBA III Year	
176	KAJAL SAINI	NARESH GARG	BBA III Year	
177	KANIKA CHAUHAN	MOTI LAL DAS	BBA III Year	
178	KHUSHI JAIN	NEERAJ KUMAR	BBA III Year	Khushi
179	KIRTI	SANJAY SAINI	BBA III Year	Kirti
180	KIRTI	GAJENDRA CHAUHAN	BBA III Year	Kirti
181	KISHAN KUMAR	MU ANEES	BBA III Year	K.K.
182	KM SEEMA PRAVEEN	RAJIV KUMAR JAIN	BBA III Year	
183	MAHIMA PAL	SHYAM SUNDAR	BBA III Year	
184	MD RAMIJ RAJA	ONKAR SINGH	BBA III Year	Ramij
185	MD SHAHRUKH	DEVANAND PRASAD	BBA III Year	
186	MEENU	ANIS TYAGI	BBA III Year	Meenu
187	MEERA KUMARI	VISHAMBAR KAMTI	BBA III Year	Meera
188	MEGHNA GAGNEJA	KAILASH CHANDRA	BBA III Year	
189	MEHAK	MD ALAM	BBA III Year	Mahak
190	MOHD ABOOZER SIDDIQUI	MD FAHIM	BBA III Year	Mohd Aboozer
191	MOHD AMIR	OMVEER SINGH	BBA III Year	
192	MOHD AREEB	MUNNILAL TIWARI	BBA III Year	Md. Areeb
193	ISHIKA ARORA	MUNISH SHARMA	BBA III Year	Ishika
194	ISHITA GARG	YASHPAL TYAGI	BBA III Year	Ishita Garg
195	KAILASH KUMAR	KADRUZ ZAMAN	BBA III Year	Kailash
196	KAJAL DHIMAN	RAJESH ARORA	BBA III Year	Kajal
197	KAJAL SAINI	NARESH GARG	BBA III Year	Kajal.
198	KANIKA CHAUHAN	MOTI LAL DAS	BBA III Year	
199	KHUSHI JAIN	NEERAJ KUMAR	BBA III Year	Khushi
200	KIRTI	SANJAY SAINI	BBA III Year	Kirti

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Awareness Program on Water Conservation



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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Ch. Harchand Singh Mahavidhyalaya

Approved by NCTE and Affiliated to CCS University, (Meerut)

Shahpur More, Jewar Road, Khurja, Distt, Bulandshahar (UP)

Date 29.07.2022

Attendance Certificate

This is to certify that **Ms. Kehkasha Mirza**, Assistant Professor of the Department of Journalism and Mass Communication, Shri Ram College Muzaffarnagar was present as Keynote speaker for a guest lecture on **"Credibility of New Media in Current Scenario"** on 29 July 2022.

Your insightful presentation and valuable contribution has grateful and enriched our understanding of the subject matter.

Principal
Ch.Harchand Singh Mahavidhyalya
Gothni,Distt. Bulandshahr

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

CITY OFFICE: Opposite Nagar Patika K

IIMT UNIVERSITY MEERUT

Established by Govt. of U.P. vide U.P Act No.32 of 2016

Date: 13.08.2022

Certificate

This is to certify that **Mr. Mayank Verma,** Assistant Professor, Journalism and Mass Communication Department, Shri Ram College Muzaffarnagar was present for a guest lecture on the **"Decreasing the Popularity of Newspaper in Present era "** on 13 August 2022.

(Dr. Ravindra Rana)

Dean

(Journalism & Mass Communication)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

"O" Pocket, Ganga Nagar, Mawana Road, Meerut

Contact No. 0121-2793700, 701, 702; Website: iimtu.com; E-mail: mail@iimtu.com

IIMT SAHARANPUR

Indraprastha
Institute of Management & Technology

Approved by AICTE & PCI; Affiliated to Dr. A.P.J. Abdul Kalam Tech. University Lucknow & BTEUP, Lucknow

Date: 18.03.2023

Attendance Certificate

This is to certify that **Ms. Shivani Burman,** Assistant Professor, Department of Journalism and Mass Communication, Shri Ram College, Muzaffarnagar was present for a guest lecture on the **"Investigative Journalism in Print Media"** on **18 March 2023.**

Your wonderful presentation and valuable contribution have made a significant impact on the students. We Sincerely appriciate your time and effort.

Principal
Indraprastta Institute of Mgnt. & Technology
Saharanpur (U.P.)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

IIMT SAHARANPUR

Indraprastha
Institute of Management & Technolog

Approved by AICTE & PCI; Affiliated to Dr. A.P.J. Abdul Kalam Tech. University Lucknow & BTEUP, Luckno

Date: 20.02.2023

Certificate

This is to certify that **Dr. Ravi Gautam**, Head of the Department of Journalism and Mass Communication, **Shri Ram College, Muzaffarnagar** was present as a resource person in a National Seminar on **"Business and Technology"** on **20 February 2023** organized by **Indraprastha Institute of Management & Technology, Saharanpur.**

Principal
Indraprastta Institute of Mgnt. & Technology
Saharanpur (U.P.)

Co-ordinator
IQAC. Shri Ram College
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

Ch. Harchand Singh Mahavidhyalay

Approved by NCTE and Affiliated to CCS University, (Meerut)

Shahpur More, Jewar Road, Khurja, Distt, Bulandshahar (UP)

Date 29.07.2022

Attendance Certificate

This is to certify that **Dr. Ravi Gautam,** Head of the Department of Journalism and Mass Communication, Shri Ram College Muzaffarnagar was present as Keynote speaker for a guest lecture on **"Credibility of New Media in Current Scenario"** on 29 July 2022.

Your insightful presentation and valuable contribution has grateful and enriched our understanding of the subject matter.

Principal
Ch.Harchand Singh Mahavidhyalya
Gothni,Distt. Bulandshahr

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

CH. HARCHAND SINGH MAHAVIDHYALYA

GOTHANI (BULANDSHAHR)

[Affiliated to CCS University Meerut, Approved by NCTE]

Ref No.

Dated 5-10-2022

CERTIFICATE OF APPRECIATION

This is to certify that **Dr. Nishant Kumar Rathi, Associate Professor & Head, Department of Computer Application, Shri Ram College, Muzaffarnagar** has delivered a lecture on **"Data Structures"** organized by department of BCA on 5-10-2022.

प्राचार्य
Principal
Ch. Harchand Singh Mahavidayalaya
Gothani (BSR)

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

Chairman
IQAC, Shri Ram College
Muzaffarnagar

Project Report

On

A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop

Submitted by

Vikas Kumar

Assistant professor, Department of Bioscience, Shri Ram College, Muzaffarnagar

Submitted to

Agarwal Duplex Board Mills Ltd., Muzaffarnagar

2022-2023

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Date 04-07-2022

To

The Manager
Agarwal Duplex Board Mills Ltd., Muzaffarnagar

Sub: Proposal letter for approval of research project.

Sir,

I, Dr. Vikas Kumar, am working as Assistant Professor in Department of Bioscience, Shri Ram College. I am planning to start a research project on effect of paper mill effluent on germination of wheat crop. I would like to request your approval for our project proposal so we can continue innovating; our team has been hard at work envisioning the ideal "A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop".

Here is a brief summary of our proposal including the scope, budget and objective. Here are a few aspect of the proposal we are most excited about accomplishing. We hope these highlight accurately demonstrate the goal and vision of our project to you. Please let us know if there is any other information you need regarding our proposal to help you make your decision.

With Regards

Dr. Vikas Kumar

Assistant Professor
Department of Bioscience
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

TIN : 09372800376

AGARWAL DUPLEX BOARD MILLS LIMITED

Office & Works : 4TH KM. STONE, BHOPA ROAD, MUZAFFARNAGAR-251001(U.P.)
✆ 0131-2614623, 2614200, 2614734, 2411509 FAX : 2614881

Ref. No. ....

To

Dr. Vikas Kumar

Assistant Professor
Department of Bioscience
Shri Ram College, Muzaffarnagar

Sir,

With reference to you're the letter dated 04-07-2022 regarding approval of proposal of research project. We are glad to offer our association with you for this Industry sponsored project. Our Industry is ready to release a grant as per mention in proposal letter by you.

Please send your acceptance if you are ready to handle this project on the following terms and conditions.

1) The company is ready to pay Rs. 150000/- as the cost of the project.
2) The company will not bear TA and other cost including stay arrangements.
3) Cost of project will be paid in advanced at the beginning of the task.
4) After completion of the project, it will be necessary to submit the final report.
5) A Certificate of completion will be issued after satisfactory completion of the project.

Hope you find the document in order. Please send a signed copy of the letter as your acceptance as soon as possible, so that we send the other required documents and the payment of **Rs. 150000/-**

Thanks and regards

Date: 02-08-2022

For Agarwal Duplex Board Mills Ltd., Muzaffarnagar

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IQAC, Shri Ram College
Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Correspondence Address : 122, SOUTH BHOPA ROAD, NEW MANDI, MUZAFFARNAGAR - 251001 (U.P.)
Regd. Office : 301-AGARWAL CITY MALL, OPP. M-2-K CINEMA, PITAMPURA, NEW DELHI-11003

Duration of Project

One Year (From 02 September 2022 to 01 September 2023)

Sanctioned Amount of Project

Amount – 150,000/-

Supervisor

Vikas Kumar, Faculty of Bioscience, Shri Ram College, Muzaffarnagar

Student Engaged in project

One student was involved in research and data collection for the project

Expenditure

Head	Number of Unit	Amount (in Rs./-)
Manpower	01	10,000 × 12 (Months) = 120,000/-
Honorarium	Given to Project Supervisor	10,000/-
Miscellaneous		20,000/-
Total		150,000/-

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Muzaffarnagar

GOEL RAKESH & CO
CHARTERED ACCOUNTANTS

57-A, Aggarwal Market first floor,
Mahavir Chowk
Muzaffarnagar(U.P.)-251001
Phone no-0131-2622405

Utilization certificate

S.N.	Detail of sanction of fund with project name and duration	Amount
	One Year project on "A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop" Date from 02-09-2022 to 01-09-2023 as per sanction latter	150,000/-
	Total	150,000/-

1. It is certify that out of Rs.150,000/- (One lack Fifty Thousand) of grant sanction by Agarwal Duplex Board Mills Ltd., Muzaffarnagar during the year 2022-23 in favor of Shri Ram College Muzaffarnagar a sum of Rs. 150,000/- has been utilized for the purpose of the project for which it was sanctioned and that the balance of Rs. Nil remaining unutilized at the end of the year has been surrendered. The extra amount (if any) is met out by Shri Ram College

2. Certified that we have satisfied our self that the conditions on which the grant was sanction have been duly fulfilled/are being fulfilled and that we have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned

For Shri Ram College

Secretary
Place : Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

For Goel Rakesh& Co
Chartered Accountants

Rakesh Goel (Proprietor)
M.N0 :0711858
FRN.:003374C

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

TIN : 09372800375

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DUPLEX BOARD MILLS LIMITED
Office & Works : 4TH KM. STONE, BHOPA ROAD, MUZAFFARNAGAR-251001(U.P.)
Ph 0131-2614623, 2614200, 2614734, 2411509 FAX : 2614381

Ref. No. ....

Date 25-09-2023

Completion Certificate

We are pleased to certify that Dr. Vikas Kumar, Assistant Professor , Department of Bioscience Shri Ram College, Muzaffarnagar worked for Agarwal Duplex Board Mills Ltd., Muzaffarnagar on a industry Sponsored consultancy project on **A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop".** He and his team have worked up to the entire satisfaction of company's Management and his findings and recommendation are found to be useful for decreasing company effluent load .

We wish him all the best his future.

For Agarwal Duplex Board Mills Ltd.
Muzaffarnagar

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Muzaffarnagar

Chairman
IQAC Shri Ram College,
Muzaffarnagar

OBJECTIVE

1) **Collection of effluent samples and analysis**
2) **Isolation, Screening and Identification of fungal strain**
3) **Physico-chemical analysis of water sample collected from Paper Mills Ltd.,**
4) **Phytotoxic effect of treated effluent on wheat crop germination rate.**

INTRODUCTION

One of the main sources of environmental contamination, especially in developing nations, is waste waters released by industry. One of India's oldest and biggest industries is the production of pulp and paper, with an installed capacity of over three million metric tons of finished goods annually. Given that around 300 m3 of water are used for every ton of paper produced, the business produces an enormous amount of hazardous and brightly colored effluents. Paper mill effluent has been shown to include about 500 distinct chlorinated organic chemicals. Fish and other aquatic communities in recipient water bodies are subject to a range of clastogenic, carcinogenic, endocrinic, and mutagenic effects due to the considerable chemical diversity of these pollutants.

To remove the color and toxicity of these effluents, a variety of physical-chemical treatment systems based on membrane filtration, coagulation, adsorption, and precipitation have been used in the past. However, due to various drawbacks, none of these systems have been found to be industrially applicable. The activated sludge technique is the most commonly utilized biological treatment system. But it also fails to completely eliminate the toxicity and color of the effluents. Due to these issues, current studies have concentrated on using white-rot fungus (WRF) in biotechnological methods because of their potent lignin-degrading enzyme system. The various pollution parameters of the Kraft bleach plant effluents have been reported to be effectively reduced by *Phanerochaete chrysosporium*, *Lentinus edodes*, and *Trametes (Coriolus) versicolor*. To increase the treatment process's efficiency, it is necessary to look for more effective WRF species. Furthermore, a single fungus species has only been employed in all of the published study.

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many places nowadays. These wastes and effluents are made up of all kinds of components, ranging from basic nutrients to extremely poisonous compounds. The condition of the land and water has changed as a result of the discharge of industrial effluents containing different levels of contaminants. The paper industry is one of the main industries that pollute the environment among the others.

The installed capacity of the approximately 700 paper mills in India is 701.4 million metric tons. The mills discharge a significant volume of effluent including different physical and chemical agents during the paper-making process. They are released into neighboring bodies of water or onto land. Farmers in the area are irrigating their fields with the contaminated water. Because treated wastewater has a significant amount of nutrients that may be helpful for plant growth, it is now seen as a potential supply of water and fertilizers. These wastewaters are on the verge of being classified as salt water, although they may be used as an irrigation source [1].The treated paper mill effluent had more sodium, calcium, sulfate, and chloride as well as greater BOD and COD values with low NPK[2].

Pulp and paper industry history

Papermaking appears to have started in China and then expanded to other parts of the world, including India. In the fourteenth century, Kashmir witnesses the establishment of India's first mill for handmade paper. The first mechanized paper mill using jute and grass was founded at Serampore, West Bengal, in 1832—a long time later. The Indian Finance Act (1931) and the Bamboo Protection Act (1925) spurred the growth after it had a sluggish beginning. During this time, over ten paper mills were put into service, and by 1931, 45,600 metric tons of paper could be produced [3].

Classification of paper mills

The categorization of pulp and paper mills is based on the raw material used, plant size, and end products manufactured. Based on the raw materials used, the paper mills are classified as follows:

Wood or forest-based mills:

These mills use imported pulp as well as indigenous hardwood pulp from bamboo, eucalyptus, etc. The Indian paper industries, on average, consume about 3– 4% of the total wood in India.

Agro-residue-based mills: Agricultural leftovers, such as rice straw, wheat, sarkanda grass, bagasse, jute, etc., are used as raw materials in agro-residue-based mills. Since the early 1970s, these mills have become more and more dependent on agricultural leftovers, in part because of the depletion of bamboo resources and in part because of government investment in agro-based paper manufacturing encouraged by industrial strategy. On the other hand, it is believed that expenditures in pollution control technology, transportation expenses, and seasonal availability are limiting considerations.

Wastepaper-based mills: These mills use imported and indigenous wastepaper, corrugated waste paper, kraft paper, and waste cuttings as raw materials. The recovery of wastepaper by these mills for the production of paper has increased from 65 000 metric tonnes in 1995 to 850000 metric tonnes in 2000; however, the 20% rate of recovery is still among the lowest internationally [4].

Chemical constituents of Raw materials and wastewater:

Serious health and environmental issues arise from the large-scale wastewater discharged into nearby streams as effluent from the pulp and paper industries. Prior to their disposal, these massive volumes of effluents must be analyzed in order to develop an appropriate treatment plan[5]. Raw materials with cellulose fibers, usually wood, recycled paper, and non-wood raw materials like bagasse, cereal straw, bamboo, reeds, esparto grass, jute, flax, and sisal are used to make pulp and paper. A significant amount of fresh water is used in the production process, most of which is discarded as wastewater. One of the biggest and most well-known sources of industrial pollution is the pulp and paper sector. The pulp and paper sector is one of the twenty most polluting industries, according to the Ministry of Environment and Forests, Government of India[6]. Stray wood chips, bark fragments, cellulose fibers, dissolved ligneous material (30–45%), saccharinic acid (25–35%), formic and acetic acid (10%), and extractives (3–5%) are all found in the wastewater from the pulp and paper industries. The precise chemical makeup of wastewater from pulp and paper mills is complicated and unknown. The majority of the chemical components included in the effluent of pulp and paper mills are wood extractives, lignin, cellulose, and hemicellulose degradation products.

Many different chemicals, including manomeric phenols, enol ethers, mercaptides, stilbene, quinone derivatives, and chlorinated substances, are among the lignin breakdown products detected in the pulp and paper mill effluent. In effluent, some 300 different organochlorine chemicals have been found; hundreds more are still unknown. Of these chemicals, chlorophenols (catechols, guaicols, and their transformation products, anisoles and verathroles) are the most

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toxic. The most prevalent types of chlorophenols are the persistent and exceedingly poisonous trichlorophenol (TCP) and pentachlorophenol (PCP). The two most harmful documented chlorinated chemicals are furans (PCDF) and dioxins (polychlorodibenzo-p-dioxin, or PCDD). Other chlorinated compounds detected in pulp and paper mill effluent, besides dioxins and furans, are chloroforms, chloroacetones, aldehydes, and and acetic acids [7]

Wastewater treatment methods

Pulp and paper plants that use agricultural residues typically handle mixed wastewater. Equalization, primary settling, clari-flocculation, and secondary biological treatment (aerobic or aerobic) are the steps in the treatment sequence. The activated sludge treatment and secondary clarification come next. To recover used pulping chemicals, the majority of large paper mills, along with a few medium-sized and small ones, have chemical recovery plants. The treated wastewater is dumped into drains, rivers, or surface water on land. The primary sludge is dried in sludge drying beds or lagoons depending upon land availability and is generally sold to board manufacturers. The waste water treatments are usually categorized into physicochemical and biological techniques.

Physiochemical methods:

Numerous physicochemical techniques for removing color have been discovered and documented in the literature in the past, including adsorption, fast sand filtering, chemical precipitation, membrane processes, and electrochemical techniques. [8]

More and more research is being done on the elimination of synthetic organic compounds, organics that generate color, and disinfection byproducts using adsorption techniques. Activated carbon, processed bone, char powder, activated alumina, magnesia, activated bauxite, fly ash, alum, lime, etc. are among the several adsorbates that are frequently employed in wastewater treatment [8].The primary adsorbent used in large-scale wastewater treatment is activated carbon. In certain circumstances, other naturally occurring adsorbents are employed. Fluoride elimination is one of the common uses for activated alumina. Hydrocarbons are separated using silica gel. Carbonized and polymeric resins are frequently used to remove organic pollutants from wastewater more effectively.

Both a significant initial outlay and pretreatment are necessary for the membrane approaches. Another issue with this approach is membrane fouling. Although costly, adsorption and membrane methods are effective [9]. The wastewater from the production of cellulose paper can also be treated by applying the electrochemical approach [10]. High treatment efficiency is guaranteed by this technology; nevertheless, the kind of electrodes used, the design of the electro-coagulators, and the operating environment all affect how efficient the procedure.

There has been a lot of research done on chemical precipitation employing lime, ferric chloride, and alum [11]. Some disadvantages have been mentioned, despite the short detention period and cheap capital cost. These include the high cost of chemicals for pH correction and precipitation, the large amount of sludge produced as a result of hefty doses, the need to dewater and dispose of the generated sludge, and the high amounts of residual cations. Although chemical precipitation procedures are inexpensive, they generate a significant amount of sludge and do not eliminate toxicity entirely.

It is crucial to consider the chemical side of color removal from pulp and paper sector wastewater. During alkaline extraction, the addition of calcium hypochlorite (1-2% of available chlorine) resulted in an 84% reduction in effluent color without compromising pulp quality. When chlorinated backwater (containing 0.8% residual chlorine) was used to wash brown stock, the color of the effluent was reduced by 60% without compromising pulp quality. When ferric acid chloride was present, the amounts of alum, lime, and magnesium sulphate decreased by 97%, 68%, and 52%, respectively, as well as the color. The most efficient mixture to reduce color, BOD, and COD by 97, 71, and 64% in chlorine-treated water was alum, calcium hypochlorite, and ferrous sulphate. The treatment options that have been explored till now are not cost-effective at the plant level, and no completely efficient method is currently available.

Biological methods:

The drawbacks of physicochemical techniques may be mitigated or eliminated by using biological techniques. Numerous investigations have been conducted on the biological treatment and decolorization of such wastewaters. Because of the presence of carbon-to-carbon biphenyl linkages, polymerized tannins and lignin, as well as their derivatives, are resistant to degradation and are primarily responsible for the color of paper mill effluent. Certain microorganisms are said to be capable of biodegrading lignin and its derivatives given the right environmental circumstances. It has been observed that a wide variety of bacteria, including Pseudomonas species, Flavobacteria, Xanthomonas species, Bacillus species, Aeromonas species, Cellulomonas species, Chromobacteria, etc., degrade lignins and lignin derivatives [12]. Fewer strains of bacteria are able to adhere to lignin derivatives derived from various pulping procedures, despite the fact that many of them are capable to breaking down monomeric lignin structure models.

Numerous previous research endeavors have concentrated on the identification, screening, and assessment of fungi's capacity and efficacy in the in situ and in vitro degradation of lignins. Based on the kind of wood decay that these organisms carry out, a variety of fungus are categorized as white-rot, soft-rot, and brown-rot fungi [12]. These fungi have been shown to degrade lignin.

The most effective microbes for breaking down lignin and its modified forms are the white rot fungi, a class of basidiomycetes with an active lignolytic enzyme system [13]. These fungi use lignin as a secondary metabolite, which is not necessary for their growth, rather than as a carbon source for their growth. Three extracellular phenoloxidases—lignin peroxidases (LiP), manganese peroxidases (MnP), and laccases (Lac)—cause the lignin breakdown by white rot fungus, which has been the subject of much research (Peng Wang et al. 2008). Apart from lignin, these fungi have the ability to break down a range of environmentally harmful substances, including heterocyclic aromatic hydrocarbons, synthetic high polymers, and different types of dyes [14].

Various fungal species have been shown by several writers to be able to extract color from kraft mill effluent [15,16,17]. [18] documented a significant decrease in color and COD by the application of T. versicolor and P. chysosporium, two white-rot fungus. [19] shown that color, COD, and lignin content may be eliminated by using surfactants and the white-rot fungi P. chysosporium in conjunction with P. sanguineus, P. ostreatus, and H.annosum. Additionally, it was discovered that the fungus Pleurotusostreatus removed color, BOD, COD, and lignin to the extent of 77%, 76.8%, 60%, and 80%, respectively. Discovered a fungus (Pencillium sp.) that, after two days of contact, was able to eliminate 50% of the AOX and color from the soft-wood bleachery effluents [21]. Demonstrated that the dissolved and colloidal materials could be effectively broken down by fungi like T. versicolor and the fungal culture filtrate (FCF) that was extracted from these organisms. Other white-rot fungus that have been shown to deteriorate the color of wastewater under ideal circumstances are Pleurotusostreatus, Aspergillus fumigatus, Schizophyllum commune, and Tinctoporia bonbonica [22].

Effect of untreated effluent on land quality:

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Additionally prevalent in pulp mill wastewater are elements like sulfur, magnesium, and sodium chloride, which can lead to nutritional imbalances in crops, increase soil salinity, weaken soil structure, and eventually reduce crop yield [23]. The paper mill wastewater contains hazardous trace elements that can build up excessively in soils and cause serious issues for humans and animals by getting into the food chain. Heavy metal concentrations are significant in untreated industrial effluents. Untreated paper mill effluents increase the concentration of heavy metals in irrigated surface soils by containing greater levels of Cd, Pb, Zn, Cu, Mn, and Fe. Soils being watered by paper and pulp industry effluents have been found to have significantly higher values of EC, organic carbon, accessible K, exchangeable cations (Ca2+, Mg2+), exchangeable anion (Cl-, HCO3-), and micronutrient cation (Cu2+). The agronomic performance and soil fertility of certain soils were impacted by the biochar that resulted from the gradual pyrolysis of paper effluent.

Effect of untreated effluent on Crops:

Pulp and paper mill effluent is also responsible for affecting the quality of crops due to irrigation with polluted water, which damages the soil, growth, quality, and yield of the crop.

1. Decrease germination percentage and seedling growth in crops [23]
2. Inhibiting effect on the germination of crops [24]
3. Reduces crop growth and gives severe adverse effect on soil properties [25]
4. Seed germination in Sunflower and maize [26]
5. Germination of seeds in paddy [28]
6. Reduction in shoot weight (44%) in paddy [29]
7. Germination percentage and yield in paddy [30]

Effects of untreated effluent on water bodies:

Research showed that fish populations residing downstream of bleached kraft pulp mills exhibited a range of reactions. These included a decline in secondary sexual traits, decreased gonads, altered fish reproduction, and delayed sexual maturity. The primary issue brought about by pulp and paper factories was the development of sewage fungus in the rivers that received the wastewater. The presence of suspended solids in the water might result in issues with its dark color and excessive turbidity, which can cover up river or lakebeds. In aquatic habitats, severe blanketing may cause anaerobic decomposition beneath the blanket, generating hydrogen sulfide. In water plants, the blanketing and dark color can lower photosynthetic activity [28]. The growth of primary, secondary, and tertiary consumers is negatively impacted, which sets off a cascade of negative impacts on the aquatic ecosystem. As a result, before they may be introduced into surface waters, color and toxicity must be removed.

Effect of untreated effluent on Soil Biology

Investigations on how wastewater application affects the biological characteristics of soil have produced a range of outcomes, depending on the experimental setup and measurements made. For instance, reports of microbiological counts have been made historically, but more recent research has used molecular biological techniques that focus on gene expression and enzyme activity. Rice seed germination is negatively impacted by paper mill effluents [28]. According to [30], compared to control seeds, the germination of rice seeds gradually decreased at 50% and higher wastewater concentrations during the course of the trial also demonstrated a 44% decrease in shoot weight in soil that has received 100% wastewater treatment.

1. Accumulate metal (loid)s, salts, and organic compounds such as pesticides in soils that might be toxic to soil fauna and flora [30]

2. Antibiotics are bioactive compounds and can reach soils through wastewater irrigation, thereby affecting soil biological activity [31]

3. Wastewater-borne microorganisms might compete with indigenous microbial communities [32]

4. Microbiological population from aerobic to anaerobic microorganisms due to shortterm oxygen depletion of the topsoil resulting from wastewater irrigation, as seen by adecrease in oxygen diffusion rate [33]

5. The stimulation of copiotrophic bacteria was observed in the same long-term wastewater irrigation area [34,35]

Effect of treated effluent on soil properties:

The various irrigation sources can be augmented by using the effluent from the pulp and paper industry.

1. Soil physical and hydraulic properties [36]

2. Soil aggregate stability [37]

3. Bulk density and porosity induced [38]

4. Lower bulk density and increase soil porosity [38]

5. Total porosity [39]

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6. Actinomycetes and fungi population [40]

7. Soil nutrients status [41]

8. N, PO4, Na, K, Mg, and Ca ([42]

9. Na, and extractable S, Zn, Fe, Mn, Pb, and Ni [43]

10. Soil pH and organic C, N, P, and K. [44]

11. Organic carbon (3.2–5.9 gkg1), and concentrations of N, P, K, and Na [45]

12. Long-term wastewater irrigation affects total microbial biomass and/or soil enzyme activities in different soils [46]

13. Increase in bacterial counts and bacterial activity [47]

14. Increased the soil bacteria, actinomycetes, fungi, rhizobia, and yeasts, and the populations of soil microorganisms [44]

The reuse of industrial effluents for irrigation purposes is an alternate and effective waste disposal method commonly called "agro-recycling" where wastewater and plant nutrients could be recycled to diminish pollution and accomplish additional income.

1. Germination percentage, plant height, crop growth rate (CGR), and relative growth rate (RGR), of sorghum, maize, and sunflower [47]

2. Pod yield and oil content of the groundnut [48]

3. Yield parameters of tomato, viz., number of fruiting clusters, fruit weight, and fruit yield, were higher [49]

4. Quality traits of bhendi and amaranthus [50]

5. Cowpea yield by up to 28 percent and the nodule formation [51]

6. Higher chlorophyll, protein content, root length, shoot length, leaf area, and total biomass in black grammes at a 10% concentration of paper mill effluent irrigation. [42]

7. Bacterial, fungal, and nodule counts had also increased in black gramme up to 50% concentration [52]

8. Germination and growth of peas [53]

9. Pod (2608 kg ha-1) and kernel yield (1534 kg ha-1) [54]

10. Length of seedlings after germination in vegetable crops [55]

11. Yield and biominerals viz., Ca and Fe, of banana [56]

12. Paper mill effluent on germination, seedling growth and chlorophyll content in Zea mays L [57]

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13. Increase in chlorophyll content, plant height, shoot and root biomass, grain yield etc. in Triticum aestivum L. [28]

MATERIALS AND METHODS

Sample Collection

Samples were collected from the inlet of effluent treatment plant from Paper Mills, Ltd., Muzaffarnagar, India, stored at 4^0C and filtered through a 0.5 mm sieve to remove suspended particles.

Isolation of Fungal Strain and Screening

For bioremediation fungus was isolated from the effluent collected from paper mill by effluent enrichment technique. 1 ml effluent sample was inoculated into potato dextrose agar (PDA) media containing distilled water, potato extract, dextrose and agar at 30℃ for 48 hrs for spore formation. Fungal colonies which appeared on the media were sub- cultured to obtain pure isolates.

Identification of Fungi

Fungal isolates were identified on the basis of morphology i.e hyphe, conidiophores, conida etc., Microscopic examination was done for isolates at 40X magnification. Isolated culture was identified as *Aspergillus niger* by following the culture identification technique.

Treatment of effluent

For the treatment, effluent sample was diluted to 3 different concentration viz. 25%, 50% and 75%. The purpose of dilution is to study the degradation efficiency of the organism at different effluent concentrations. *The isolated fungus Aspergillus niger* was tested for biodegradation ability under laboratory condition. The organism was inoculated into each effluent concentration and treatment was conducted for 7 days.

Physico-Chemical Characterization of Effluent

1) Biological Oxygen Demand (BOD)

BOD of effluent was determined by the standard dilution technique of APHA. The method consists of filling an air tight bottle with sample and incubating at 200 C for 5 days. The dissolved oxygen (DO) was measured before and after the incubation. The difference in DO was computed and BOD of effluent is calculated.

2) Chemical Oxygen Demand (COD)

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13. Increase in chlorophyll content, plant height, shoot and root biomass, grain yield etc. in Triticum aestivum L. [28]

MATERIALS AND METHODS

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2) Chemical Oxygen Demand (COD)

COD of effluent was calculated using closed reflux unit by titrimetric method of APHA. The effluent is refluxed in strong acid (H_2So_4) solution with $K_2Cr_2O_7$, silver sulphate and mercuric sulphate. Oxygen consumed was measured by titrating the sample against ferrous ammonium sulphate (FAS) using ferroin indicator.

3) Lignin

Total lignin content of effluent was measured by following the method of Pearl and Benson. In this method, effluent sample (50 mL) was mixed with 1 ml of CH_3COOH (10%), 1 mL of $NaNo_2$ (10%) and pH was adjusted to 7. Then 2 ml of NH_4OH was added and absorbance was measured at 430 nm. The absorbance value was transformed into lignin content (ppm) using the following formula

$$\text{Lignin (ppm)} = \frac{\text{Absorbance}}{0.000247}$$

4) Phytotoxicity Studies

Phytotoxicity studies were conducted to check the toxic effects of treated effluent. Experiment was performed under room temperature using presterilized 10 *Vigna radiata* seeds. For the experiment 10 mL of treated and untreated effluent samples were used per day. A control set was also maintained. Treatment was conducted for a week and results were noted in terms of seed germination index (GI), relative seed germination (RSG) and (RRE) relative root elongation.

$$\text{RSG (\%)} = \frac{\text{Number of seeds germinated in the sample extract} \times 100}{\text{Number of seeds germinated in the control}}$$

$$\text{RRE (\%)} = \frac{\text{Mean root elongation in the sample extract} \times 100}{\text{Mean root elongation in the control}}$$

$$\text{GI (\%)} = \frac{(\text{\%Seed germination}) \times (\text{\%Root elongation})}{100}$$

RESULTS AND DISCUSSION

Results are expressed as mean ± SEM. The statistical analysis was carried out using one way ANOVA followed by *Tukey's* t-test. The difference in values at $p<0.05$ or $p<0.01$ were considered as statistically significant. Statistical analysis was performed using ez ANOVA 0.98 version.

Physico-Chemical Characterization of Effluent C

1) COD

It is observed that *Aspergillus niger* has shown COD reduction in all treatment systems (Table 1). COD reduction in 25% concentration was 180.20±0.34 to 86.00±0.34, in 50% concentration 354.20±0.36 to 168.32±0.42, in 75% concentration 512.30±0.22 to 280±0.23 and in raw effluent 692.30±0.43 to 362.43±0.40.

Table 1: Reduction in COD Concentration after Treatment with *A. Niger*

Concentration	Before treatment	After treatment
Raw	692.30±0.43	362.43±0.40
75%	512.30±0.22	280±0.23
50%	354.20±0.36	168.32±0.42
25%	180.20±0.34	86.00±0.34

2) BOD

Results revealed reduction of BOD by *Aspergillus niger* during the treatment. In 25% concentration it was reduced from 120.10±0.22 to 42.40±0.23, in 50% concentration 294.10±0.16 to 72.27±0.25, in 75% concentration 504.27±0.25 to 98.02±0.22 and in raw effluent 661.20±0.42 to 118.00±0.18.

Table 2: Reduction in BOD Concentration after Treatment with *A. niger*

Concentration	Before treatment	After treatment
Raw	661.20±0.42	118.00±0.18
75%	504.27±0.25	98.02±0.22
50%	294.10±0.16	72.27±0.25
25%	120.10±0.22	42.40±0.23

D. Lignin

From the results it is observed that *Aspergillus niger* has potency to degrade lignin. Degradation of lignin in 25% concentration was 992.56±0.15 to 564.20±0.60, in 50% concentration

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1552.20±0.43 to 752.27±0.43, in 75% concentration 1682.34±0.30 to 1204.70±0.42 and in raw effluent 2093.43±0.65 to 1423.50±0.50.

Table 3: Delignification of Effluent using *A. niger*

Concentration	Before treatment	After treatment
Raw	2093.43±0.65	1423.50±0.50
75%	1682.34±0.30	1204.70±0.42
50%	1552.20±0.43	752.27±0.43
25%	992.56±0.15	564.20±0.60

E. Phytotoxicity Studies

Using Vigna radiata, the phytotoxicity test was carried out to determine the hazardous impact of the effluent after treatment with A. niger. Table 4 presents the results of a seed germination test on many criteria, including the percentage of germination, root and shoot length, and GI index. It was noted that seeds cultivated in the treated and control samples exhibited high root and shoot growth as well as a high germination percentage. Reduced seed germination and minimal shoot and root growth are observed in seeds cultivated with untreated wastewater. Untreated wastewater was found to have a low GI index.

The effluent treated with *A. niger* shows high GI (89.43%). *Barapatre, A. and Jha, H.* (2016) have made a similar observation in their studies. This suggests that the use of microorganisms in the biological treatment process is successful in lowering the effluent's pollutant load, which promotes the germination and growth of some food plants.

Table: 4 Effect of Effluent Treated with *A. Niger* on the Germination and Growth of *Vigna Radiata.*

Sample	Shoot Length (cm)	Root Length h (cm)	Germination %	GI Index %
Control	48.5	12.5	100%	100%
Raw	35.7	9.6	80%	75.32%

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Treated	39.2	12.0	90%	89.43%

CONCLUSION

Among the main industries, pulp and paper mills are ranked as the fifth biggest source of industrial water pollution. The resultant effluent has a high phenolic content, turbidity, BOD, and COD concentration, and it is dark in color. Numerous physical, chemical, and biological treatments have been used to treat wastewater; among these, the biological process has proven to be efficient and economical, as have natural processes that cause matter to break down into simpler components. In this study, pulp and paper mill wastewater was treated using *Aspergillus niger*. Based on the findings, it can be observed that this microorganism works by lowering the wastewater's contents of lignin, BOD, and COD.

The pulp and paper mill effluent can be effectively biodegraded by *Aspergillus niger*, according to the results. The effluent exhibits minimal phytotoxicity and is appropriate for plant growth, according to the results of the phytotoxicity investigations. Therefore, it is recommended to use this fungal isolate for the bioremediation of paper mill wastewater.

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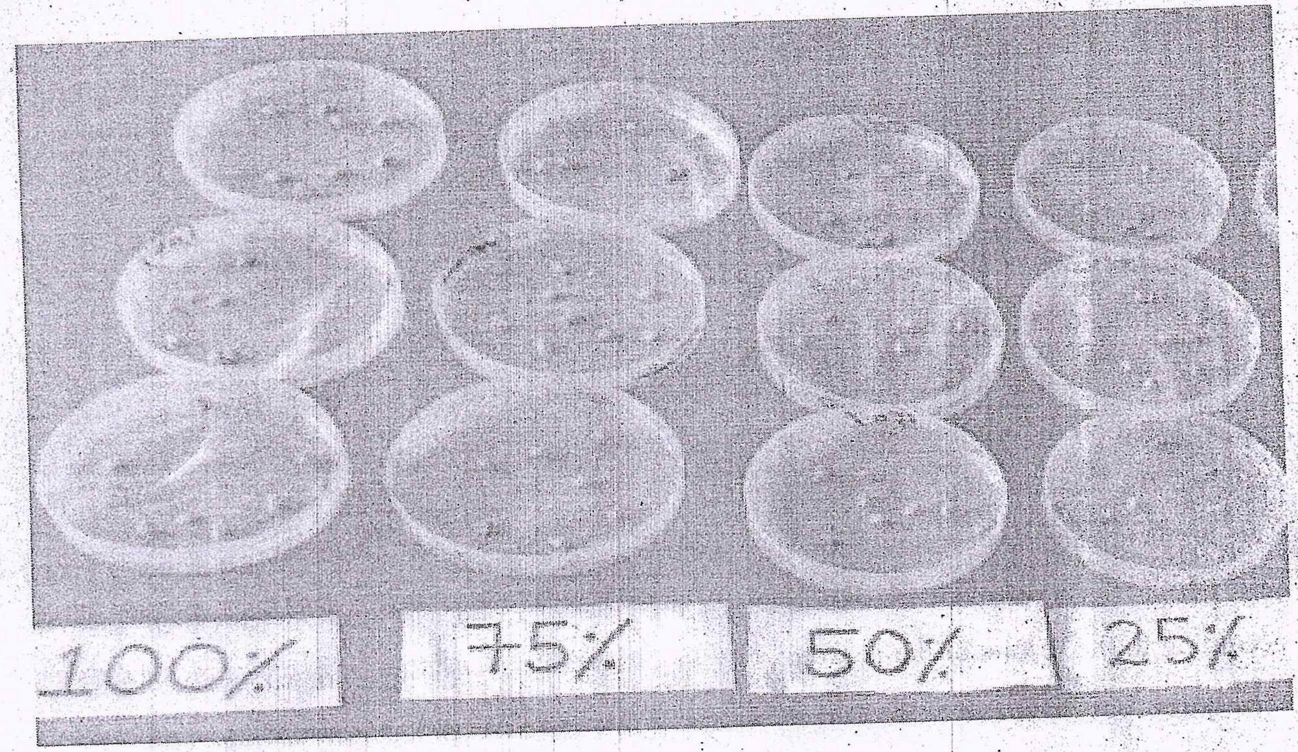

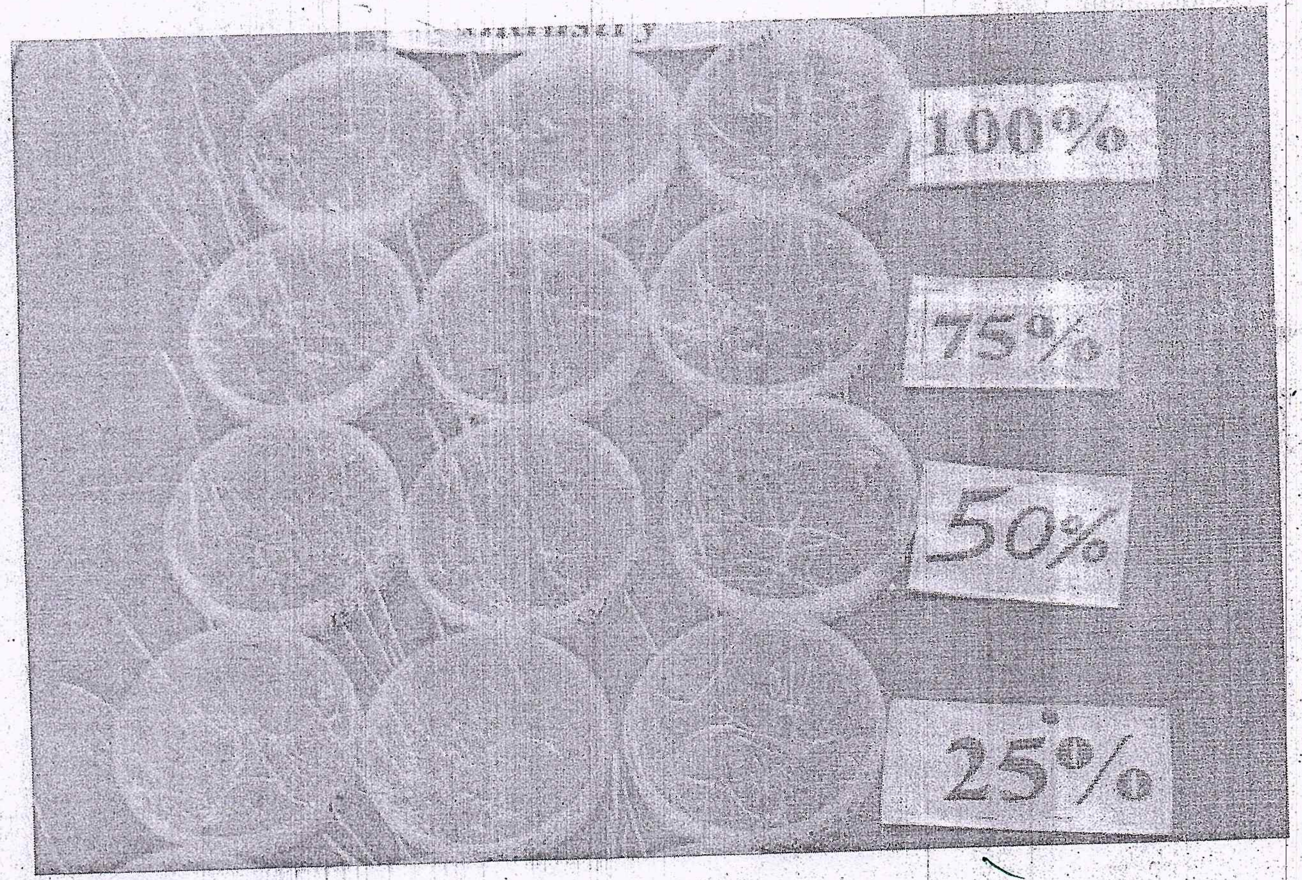

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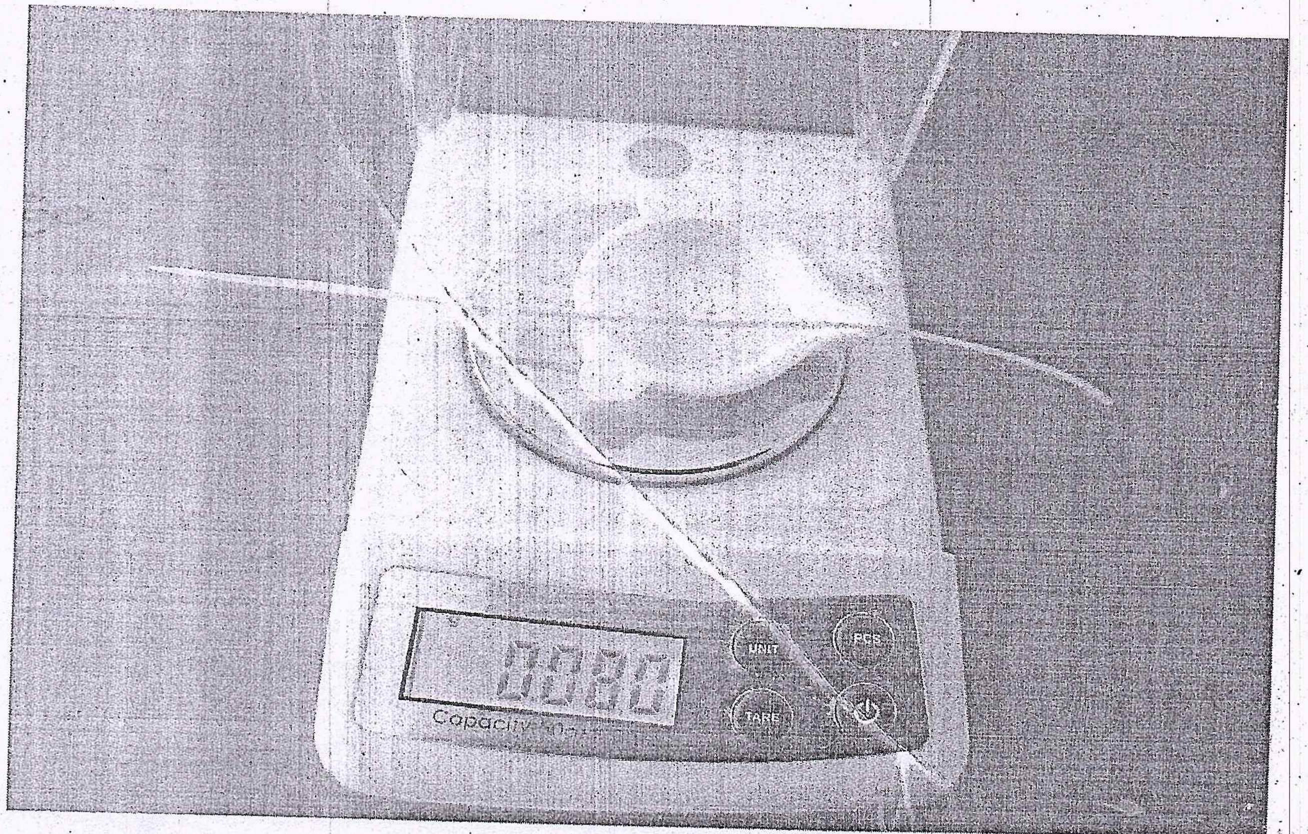

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PROJECT REPORT

ON

Fit India Movement in Model Sports Village

Submitted By:

Bhupendra Kumar

Asst. Prof. Department of Physical Education

Shri Ram College, Muzaffarnagar

Submitted to:

Institute of Management & Technology, Ghaziabad

2022-2023

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Sports: A Way Of Life

An NGO Sports Literacy Mission
606 C, Gulmohar Green Apartment, Mohan Nagar, Ghaziabad (UP) - 201007

To

Mr. Bhupendra Kumar

Dept of Physical Education

Shri Ram College, Muzaffarnagar

07/7/2022

Subject: Approval for Project

Dear Mr. Bhupendra Kumar,

I hope you are doing well. You will be delighted to know that the **'Fit India Movement in Model Sports Village-Bahadarpur Kheriviran'** has been approved. I am pleased to inform you that a grant of Rs 90,000 has been approved for the research project. You have mentioned that it will take 1 year to complete the project. We wish you all the best to accomplish the task. You will need to submit report regarding the project's progress and how it is being completed. We wish you all the best.

Yours Sincerely,

Authorized signatory

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Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

SHRI RAM COLLEGE

(Affiliated To CCS University, Meerut & Approved By NCTE) CIRCULAR ROAD, MUZAFFARNAGAR

'A' Grade Accredited by NAAC

Date: 07.06.2022

To

Chairman
Institute of Management & Technology
Ghaziabad.

Dear Sir,

As per our discussion with you, we have proposed for the financial support of a Student Research Project on ***'Fit India Movement in Model Sports Village Bahadarpur-Kheriviran'***.

We propose to complete the project within 01 year ensuring timely delivery without compromising on quality. The detail of estimated cost for the project is attached herewith.

We are excited about the possibility of working with your organization on this project.

Hope you find the document in order. Kindly accept the proposal and release the fund accordingly.

Thanks and regards

Principal
Shri Ram College, Muzaffarnagar

Co-ordinator
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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Details of proposed Activities in 2022-23 at Model Sports Village Bahadarpur-Kheriviran and Estimated cost under the research project *'Fit India Movement in Model Sports Village'*

S.No.	Activity	Proposed Month	Estimated Cost
1	**Fitness Camp -** a) Physical Fitness Activities b) Balance Diet c) Training, recreational & Sporting Activities d) Environment Friendly Lifestyle e) Awareness from Disease f) Sports Facilities g) Data Collection h) Data Analysis	July-22 to June-23	120000/-
		Total	120000/-

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खेल परियोजना का विश्लेषण

माननीय प्रधानमंत्री ने शारीरिक फिटनेस को जीवन का एक तरीका बनाने के उद्देश्य से 29 अगस्त 2019 को ''फिट इंडिया मूवमेंट'' की शुरुआत की है। फिट इंडिया मूवमेंट का उद्देश्य आसीन जीवन शैली से लेकर दिन-प्रतिदिन के जीवन के शारीरिक रूप से सक्रिय तरीके से व्यवहार में परिवर्तन करना है। फिट इंडिया तभी सफल होगा जब वह जन आंदोलन बने। हमें उत्प्रेरक की भूमिका निभानी होगी। यह राष्ट्र को फिटनेस और आरोग्य के रास्ते पर ले जाने का आंदोलन है। यह एक स्वस्थ भारत की दिशा में काम करने का एक अनूठा और रोमांचक अवसर प्रदान करता है। आंदोलन के हिस्से के रूप में, व्यक्ति और संगठन अपने स्वयं के स्वास्थ्य और भलाई के साथ-साथ साथी भारतीयों के स्वास्थ्य और भलाई के लिए विभिन्न प्रयास कर सकते हैं।

जैसा की सभी को विदित है कि श्री राम कॉलेज, मुजफ्फरनगर एवं आईएमटी गाजियाबाद व खेल संस्था स्पोटर्स: ए वे आफ लाइफ के सहयोग से एक महत्वपूर्ण परियोजना आधुनिक खेलगांव बहादुरपुर, खेड़ी विरान में प्रस्तावित है। इस योजना को बहादुरपुर गांव में कार्यान्वित करने का मुख्य उददेश्य रहा क्योंकि खेल गांव को श्रीराम कॉलेज, मुजफ्फरनगर द्वारा गोद लिया हुआ है तथा इसे आधुनिक खेल गांव के रूप में विकसित करने का लक्ष्य निर्धारित किया गया है।

गत वर्ष भी इस ग्राम में खेल परियोजना का आयोजन किया गया था जिसके सकारात्मक परिणाम सामने आये तथा खेल को बढावा देने का वातावरण तैयार हुआ। सभी आयु वर्ग के लोगो द्वारा इसका लाभ प्राप्त किया गया।

इसी के तहत खेल गॉव में वर्ष 2022-23 में ''आधुनिक खेल गांव में स्वस्थ भारत अभियान'' शीर्षकान्तर्गत शारीरिक स्वस्थता, पोषित आहार, खेल गतिविधिया, पर्यावरण अनुकूल जीवनशैली, बीमारियों के प्रति जागरूकता आदि कार्यक्रमों का

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IQAC, Shri Ram College,
Muzaffarnagar

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आयोजन किया गया। आधुनिक खेल गांव में इस योजना के तहत आईएमटी गाजियाबाद, व स्पोटर्स: ए वे आफ लाइफ के सहयोग से परियोजना को क्रियान्वित किया गया। परियोजना के समन्वयक श्री भूपेंद्र कुमार द्वारा परियोजना को कार्यान्वित करने मे होने वाले व्यय रूपये 1,20,000/–का प्रस्ताव संस्थाओं को भेजा गया, जिसके सापेक्ष आईआईएमटी संस्था द्वारा रूपये 90,000 की धनराशि प्रदान की गयी। जैसा कि प्रस्तावित परियोजना का मुख्य उददेश्य खेल गांव में खेल वातावरण को विकसिकत करना था। इसके लिए महाविद्यालय द्वारा दो प्रशिक्षक नियुक्त है जो मैदान पर खिलाडियों को विभिन्न खेल की गतिविधियों से प्रशिक्षित कर रहे है।

इस परियोजना को क्रियान्वित करने के लिए एक वर्ष का समय निर्धारित किया गया, जिसको निम्नलिखित चार चरणों में वर्गीकृत कर लागू किया गया –

1. शारीरिक क्षमता के विकास हेतु व्यायाम व योगिक व्यायाम
2. आहार संबंधी आदतें
3. पर्यावरण–अनुकूल जीवन शैली
4. बीमारियों के प्रति जागरूकता एवं रोकथाम के उपाय

प्रथम चरण को शारीरिक क्षमता के विकास के लिए समर्पित किया गया। इस चरण में खेलो की विभिन्न गतिविधियों के द्वारा शारीरिक क्षमता का विकास करने का लक्ष्य रखा गया। इस कार्य हेतु दो विशेषज्ञो को गांव के खेल मैदान पर तैनात किया गया तथा इनके माध्यम से लगातार विभिन्न प्रकार की खेल गतिविधियों का संचालन कराया गया। प्रतिदिन सांय 03 से 06 बजे तक शरीर को स्वस्थ्य बनाने के लिए विभिन्न खेल गतिविधियों व व्यायाम क्रियाओं यथा–दौड, कूद, खिचाव वाले व्यायाम, योग क्रियाएं, तालबद्ध क्रियाए, समूह क्रियाकलाप, नेतृत्व विकास संबंधी गतिविधियॉ आदि का आयोजन कराया गया, जिनमें विभिन्न आयु वर्ग के बच्चे व युवाओं ने बंढ–चढ कर हिस्सा लिया। गांव के बच्चो को प्रोत्साहित करते हुए

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बताया गया कि पढ़ाई के साथ–साथ विद्यार्थियों की शारीरिक क्षमता बढ़ाने के लिए खेलों का बहुत महत्व है। छात्र मेहनत कर बेहतरीन खिलाड़ी बन सकते हैं। इसलिए खेल भी भाग एवं रूचि लेना जरूरी है, बच्चों को इसमें जरूर भाग लेना चाहिए, तभी वह बड़े स्तर पर देश व अपने परिवार का नाम रोशन कर सकते हैं।

द्वितीय चरण में प्रशिक्षकों ने ग्रामीण बच्चों व युवाओं को स्वस्थ रहने के लिए आहार संबंधी जानकारियाँ प्रदान की गयी, जिसमें उनका स्वास्थ्य उच्च श्रेणी का हो तथा शारीरिक व मानसिक विकास में सहायता मिले। शिविर के उपरान्त निम्नलिखित आदतों का विकास बच्चों में देखा गया–

1. सुबह जल्दी जागना
2. व्यक्तिगत स्वच्छता का ध्यान स्वयं ही बच्चों में देखा गया
3. सुबह के नाश्ते में पोष्टिक आहार यथा–अंकुरित चना, उबले अनाज, फल, मुंगफली आदि का प्रयोग अपनाया गया।
4. दोपहर के खाने को समय से करना
5. दोपहर को आराम करना
6. शाम के समय विभिन्न खेल गतिविधियों में भाग लेना
7. रात को कम मात्रा में भोजन ग्रहण करना
8. आठ घंटे की नींद लेना

तृतीय चरण में बच्चों को पर्यावरण के अनुकूल जीवन शैली अपनाने के लिए प्रोत्साहित किया गया तथा बताया गया कि प्रदूषण पर नियंत्रण और पर्यावरण संरक्षण के लिए सरकार अपने स्तर पर गंभीर प्रयास कर रही है पर इसके साथ ही प्रदूषण के घातक दुष्परिणामों से बचने के लिए हर व्यक्ति को पर्यावरण अनुकूल

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IQAC, Shri Ram College,
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आचरण अनिवार्य रूप से करना होगा। हमारा जीवन चक्र व सृष्टि एक दूसरे से जुड़े हुए हैं लेकिन हमने सृष्टि के तत्वों जल, वायु को प्रदूषित किया। इसका खामियाजा हमें विभिन्न प्रकार की बीमारियों के रूप में भुगतना पड़ रहा है।

बच्चो को अपनी रोजाना की जिंदगी में पानी के संरक्षण, रीसाइक्लिंग उत्पादों को खरीदने, वाहनों की बजाय साइकिलिंग या फिर पैदल चलना, अधिक पौधे लगाने, प्लास्टिक का सीमित उपयोग, पॉलिथीन का प्रयोग न करना आदि कार्यो के लिए प्रोत्साहित किया गया। गांव के बच्चो व युवाओं ने पौधे लगाने तथा पानी बचाने के साथ–साथ यह संकल्प भी लिया कि वह न तो स्वयं ऐसा कार्य करेंगे जिससे पर्यावरण दूषित हो वरण दूसरो को पर्यावरण अनुकूल जीवन शैली अपनाने के लिए प्रेरित करेंगें।

चतुर्थ चरण में ग्रामीणो को बीमारियों की रोकथाम के प्रति जागरूक करने हेतु विभिन्न जागरूकता अभियान चलाये गये। ग्रामीणों को विभिन्न बीमारियों के बारे में जानकारी प्रदान की गयी तथा अपनी जीवन शैली में बदलाव कर कैसे इन बीमारियों से बचा जा सकता है, इसके संबंध में जानकारियां प्रदान की गयी।

<u>बीमारियाँ कैसे फैलती हैं ?</u>

बीमारियां ऐसे बहुत ही छोटे कीड़ों या उनके अण्डों से जिन्हें हम देख नहीं सकते हैं या बीमार व्यक्तियों के मल से, दूषित भोजन और पानी से अधिक फैलती हैं, मक्खियों के भोजन पर बैठने से, गन्दे पानी से भी बीमारियाँ फैलती हैं, ऐसी बीमारियाँ हैं–

– आतों में कीड़ों का होना

– दस्त, पेचिस

– हैजा, मियादी बुखार

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– पीलिया तथा लीवर की और बिमारियाँ

बीमार व्यक्तियों को छूने से, उनके कपड़े पहनने से, उनके बिस्तर पर सोने से, उनके चादर ओढने से भी बीमारियाँ हो सकती हैं जैसे –

– चमड़ी के रोग, दाद, दिनाय, खुजली

– सुजाक

खांसी या छींक से भी सामने बैठे लोगों में बीमारियाँ फैल सकती है जैसे –

– तपेदिक (टी. बी.)

– ख़सरा, छोटी माता

– सर्दी, जुकाम

– निमोनिया

– डिप्थीरिया (गला घोंटू)

कुछ बीमारियाँ कीड़े मकोड़ों और जानवरों द्वारा भी फैलती है जैसे–

– मलेरिया

– हाथीपांव

– पेट का कीड़ा

– रैबिज

ऐसी बीमारियों को रोका कैसे जाए ?

शौचालय का इस्तेमाल करें,

खेत में शौच के बाद मल को मिटटी से ढक कर

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मच्छर, मक्खी से दूर रहकर

सूअर को घर में न आने देकर

बच्चों को सूअर से दूर रखकर

खाना बनाने वाले और परोसने वाले को अच्छी तरह हाथ धोना

साफ–सफाई

– जल्दी उठाना

– मल के बाद साबुन या राख से हाथ धोना

– दांतों की सफाई

– नहाना, गर्मियों में कई बार नहाना

– नंगे पांव न चलना

– खाने के बाद अच्छी तरह दांतों की सफाई

– घर की साफ–सफाई

– यदि घर में या आस–पास बच्चे, बड़े या पशु मल दिखे तो उस पर राख या मिटटी दाल दें

– कपड़ों और बिस्तर को बराबर धूप दिखाएँ

– जमीन पर न थूकें थुक से बीमारी फैलती है

– कच्चे घरों को गोबर और चिकनी मिटटी से बराबर लिपते रहें ताकि मक्खियाँ नहीं आए

खाने पीने में सफाई

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उबले पानी सबसे अच्छा होता है

पानी को अगर चार–पांच घंटे धूप में रख दिया जाए तो भी काफी कीटाणु मर जाते हैं

मक्खियों ओर दूसरे कीड़े–मकोडो को भोजन पर न बैठने दें, इससे बीमारी हो सकती है

अपने आस पास बचा हुआ खाना या गन्दे बरतन न रखे इनसे मक्खियों का जमाव बढता है और बीमारी फैलती है

भोजन को ढक कर रखना चाहिए, अच्छा होगा जालीदार ढक्कन से ढक दें

बाजार में खुले में बिकने वाली मिठाइयां न खाएं उन पर मक्खियां बैठती हैं ऐसी चीजों को खाने से दस्त हैजा, मियादी बुखार तक हो सकता है

खेत से तोड़ी गयी या उखाड़ी गयी सब्जियों को धोने के बाद ही पकाएं

बसी भोजन का सेवन न करें, उनके खाने से बहुत तरह की बीमारियाँ हो सकती है

<u>टीकाकरण</u>

डी.पी.टी. –डिप्थेरिया (गला घोंटू) काली खांसी तथा टेटनस से बचाव के लिए तीन टिके लगाने चाहिए

पोलियो (बच्चों का लकवा)– पोलियो से बचने के लिए कम से कम तीन बार दो–दो बूंद पिला देना चाहिए। बच्चा जब तीन महीने का हो जाता है तो पहला टीका छह महीने पर दूसरा टीका और नौ महीने पर तीसरा टीका लगवा देना चाहिए, फिर बूस्टर डोज डेढ़ साल के बीच दे देनी चाहिए।

खसरा– (मीजल्स) जब बच्चा नौ महीना का हो जाए तो खसरे का टीका लगवा देना चाहिए

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टेटनस– जब बच्चा एक महीने का हो जाए तो एक टीका और दो महीने का हो जाने के बाद एक और टीका लगवा देना चाहिए। बच्चा जब छह महीने का हो जाए तो तीसरा टीका लगवा देना चाहिए।

बच्चों को रोज नहलाएं– नहलाने के बाद साफ कपड़ा पहनाएं और नाखून हर हफ्ते कांटे।

सबसे जरूरी है बच्चे का भोजन– जिसमें हरी सब्जी और साग, पीली सब्जी और फल हो; दाल काफी मात्रा में हो, हो सके तो दूध, दही और अंडा भी खिलाएं, लड़के –लड़कियों के बीच किसी तरह का भेद भाव न करें।

कार्यक्रम को सफल बनाने में श्रीराम कॉलेज के सभी संकायो के डीन तथा विभागाध्यक्षों का महत्वपूर्ण योगदान रहा।

इस खेल विकास की परियोजना के पूर्ण होने पर परियोजना के समन्वक भूपेंद्र कुमार ने सभी को धन्यवाद व आभार व्यक्त कर आशा प्रकट की कि श्री राम कॉलेज, स्पोटर्सः ए वे आफ लाइफ, आई एम टी गाजियाबाद संस्थाये आगे भी इस तरह के कार्यक्रम को आयोजित करने का अवसर प्रदान करेगी।

(भूपेन्द्र कुमार)
परियोजना समन्वयक,

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Project Report

On

A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop

Submitted by

Vikas Kumar

Assistant professor, Department of Bioscience, Shri Ram College, Muzaffarnagar

Submitted to

Agarwal Duplex Board Mills Ltd., Muzaffarnagar

2022-2023

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IQAC, Shri Ram College,
Muzaffarnagar

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Shri Ram College
Approved by UGC, NCTE and Affiliated to MS University Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)

Date 04-07-2022

To

The Manager
Agarwal Duplex Board Mills Ltd., Muzaffarnagar

Sub: Proposal letter for approval of research project.

Sir,

I, Dr. Vikas Kumar, am working as Assistant Professor in Department of Bioscience, Shri Ram College. I am planning to start a research project on effect of paper mill effluent on germination of wheat crop. I would like to request your approval for our project proposal so we can continue innovating; our team has been hard at work envisioning the ideal "A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop",

Here is a brief summary of our proposal including the scope, budget and objective. Here are a few aspect of the proposal we are most excited about accomplishing. We hope these highlight accurately demonstrate the goal and vision of our project to you. Please let us know if there is any other information you need regarding our proposal to help you make your decision.

With Regards

Dr. Vikas Kumar

Assistant Professor
Department of Bioscience
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

TIN 09372800376

AGARWAL
DUPLEX BOARD MILLS LIMITED

Office & Works : 4TH KM. STONE, BHOPA ROAD, MUZAFFARNAGAR-251001(U.P.)
✆ 0131-2614623, 2614200, 2614734, 2411509 FAX : 2614881

Ref. No. ....

To

Dr. Vikas Kumar

Assistant Professor
Department of Bioscience
Shri Ram College, Muzaffarnagar

Sir,

With reference to you're the letter dated 04-07-2022 regarding approval of proposal of research project. We are glad to offer our association with you for this Industry sponsored project. Our Industry is ready to release a grant as per mention in proposal letter by you.

Please send your acceptance if you are ready to handle this project on the following terms and conditions.

1) The company is ready to pay Rs. 150000/- as the cost of the project.
2) The company will not bear TA and other cost including stay arrangements.
3) Cost of project will be paid in advanced at the beginning of the task.
4) After completion of the project, it will be necessary to submit the final report.
5) A Certificate of completion will be issued after satisfactory completion of the project.

Hope you find the document in order. Please send a signed copy of the letter as your acceptance as soon as possible, so that we send the other required documents and the payment of **Rs. 150000/-**

Thanks and regards

Date: 02-08-2022

For Agarwal Duplex Board Mills Ltd., Muzaffarnagar

Chairman
IQAC, Shri Ram College
Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Duration of Project

One Year (From 02 September 2022 to 01 September 2023)

Sanctioned Amount of Project

Amount – 150,000/-

Supervisor

Vikas Kumar, Faculty of Bioscience, Shri Ram College, Muzaffarnagar

Student Engaged in project

One student was involved in research and data collection for the project

Expenditure

Head	Number of Unit	Amount (in Rs./-)
Manpower	01	10,000 × 12 (Months) = 120,000/-
Honorarium	Given to Project Supervisor	10,000/-
Miscellaneous		20,000/-
Total		150,000/-

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

GOEL RAKESH & CO
CHARTERED ACCOUNTANTS

57-A, Aggarwal Market first floor,
Mahavir Chowk
Muzaffarnagar(U.P.)-251001
Phone no-0131-2622405

Utilization certificate

S.N.	Detail of sanction of fund with project name and duration	Amount
	One Year project on "A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop" Date from 02-09-2022 to 01-09-2023 as per sanction latter	150,000/-
	Total	150,000/-

1. It is certify that out of Rs.150,000/- (One lack Fifty Thousand) of grant sanction by Agarwal Duplex Board Mills Ltd., Muzaffarnagar during the year 2022-23 in favor of Shri Ram College Muzaffarnagar a sum of Rs. 150,000/- has been utilized for the purpose of the project for which it was sanctioned and that the balance of Rs. Nil remaining unutilized at the end of the year has been surrendered. The extra amount (if any) is met out by Shri Ram College

2. Certified that we have satisfied our self that the conditions on which the grant was sanction have been duly fulfilled/are being fulfilled and that we have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned

For Shri Ram College

Secretary
Place : Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

For Goel Rakesh& Co
Chartered Accountants

Rakesh Goel (Proprietor)
M.N0 :0711858
FRN.:003374C

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

TIN : 09372800375

AGARWAL
DUPLEX BOARD MILLS LIMITED
Office & Works : 4TH KM. STONE, BHOPA ROAD, MUZAFFARNAGAR-251001(U.P.)
✆ 0131-2614623, 2614200, 2614734, 2411509 FAX : 2614881

Ref. No. ....

Date 25-09-2023

Completion Certificate

We are pleased to certify that Dr. Vikas Kumar, Assistant Professor , Department of Bioscience Shri Ram College, Muzaffarnagar worked for Agarwal Duplex Board Mills Ltd., Muzaffarnagar on a industry Sponsored consultancy project on **A study of Bioremediation on Pulp and Paper Mill Effluent from Muzaffarnagar and their Effect on Germination of Wheat Crop".** He and his team have worked up to the entire satisfaction of company's Management and his findings and recommendation are found to be useful for decreasing company effluent load .

We wish him all the best his future.

For Agarwal Duplex Board Mills Ltd.
Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

OBJECTIVE

1) **Collection of effluent samples and analysis**
2) **Isolation, Screening and Identification of fungal strain**
3) **Physico-chemical analysis of water sample collected from Paper Mills Ltd.,**
4) **Phytotoxic effect of treated effluent on wheat crop germination rate.**

INTRODUCTION

One of the main sources of environmental contamination, especially in developing nations, is waste waters released by industry. One of India's oldest and biggest industries is the production of pulp and paper, with an installed capacity of over three million metric tons of finished goods annually. Given that around 300 m3 of water are used for every ton of paper produced, the business produces an enormous amount of hazardous and brightly colored effluents. Paper mill effluent has been shown to include about 500 distinct chlorinated organic chemicals. Fish and other aquatic communities in recipient water bodies are subject to a range of clastogenic, carcinogenic, endocrinic, and mutagenic effects due to the considerable chemical diversity of these pollutants.

To remove the color and toxicity of these effluents, a variety of physical-chemical treatment systems based on membrane filtration, coagulation, adsorption, and precipitation have been used in the past. However, due to various drawbacks, none of these systems have been found to be industrially applicable. The activated sludge technique is the most commonly utilized biological treatment system. But it also fails to completely eliminate the toxicity and color of the effluents. Due to these issues, current studies have concentrated on using white-rot fungus (WRF) in biotechnological methods because of their potent lignin-degrading enzyme system. The various pollution parameters of the Kraft bleach plant effluents have been reported to be effectively reduced by *Phanerochaete chrysosporium*, *Lentinus edodes*, and *Trametes (Coriolus) versicolor*. To increase the treatment process's efficiency, it is necessary to look for more effective WRF species. Furthermore, a single fungus species has only been employed in all of the published study.

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many places nowadays. These wastes and effluents are made up of all kinds of components, ranging from basic nutrients to extremely poisonous compounds. The condition of the land and water has changed as a result of the discharge of industrial effluents containing different levels of contaminants. The paper industry is one of the main industries that pollute the environment among the others.

The installed capacity of the approximately 700 paper mills in India is 701.4 million metric tons. The mills discharge a significant volume of effluent including different physical and chemical agents during the paper-making process. They are released into neighboring bodies of water or onto land. Farmers in the area are irrigating their fields with the contaminated water. Because treated wastewater has a significant amount of nutrients that may be helpful for plant growth, it is now seen as a potential supply of water and fertilizers. These wastewaters are on the verge of being classified as salt water, although they may be used as an irrigation source [1].The treated paper mill effluent had more sodium, calcium, sulfate, and chloride as well as greater BOD and COD values with low NPK[2].

Pulp and paper industry history

Papermaking appears to have started in China and then expanded to other parts of the world, including India. In the fourteenth century, Kashmir witnesses the establishment of India's first mill for handmade paper. The first mechanized paper mill using jute and grass was founded at Serampore, West Bengal, in 1832—a long time later. The Indian Finance Act (1931) and the Bamboo Protection Act (1925) spurred the growth after it had a sluggish beginning. During this time, over ten paper mills were put into service, and by 1931, 45,600 metric tons of paper could be produced [3].

Classification of paper mills

The categorization of pulp and paper mills is based on the raw material used, plant size, and end products manufactured. Based on the raw materials used, the paper mills are classified as follows:

Wood or forest-based mills:

These mills use imported pulp as well as indigenous hardwood pulp from bamboo, eucalyptus, etc. The Indian paper industries, on average, consume about 3– 4% of the total wood in India.

Agro-residue-based mills: Agricultural leftovers, such as rice straw, wheat, sarkanda grass, bagasse, jute, etc., are used as raw materials in agro-residue-based mills. Since the early 1970s, these mills have become more and more dependent on agricultural leftovers, in part because of the depletion of bamboo resources and in part because of government investment in agro-based paper manufacturing encouraged by industrial strategy. On the other hand, it is believed that expenditures in pollution control technology, transportation expenses, and seasonal availability are limiting considerations.

Wastepaper-based mills: These mills use imported and indigenous wastepaper, corrugated waste paper, kraft paper, and waste cuttings as raw materials. The recovery of wastepaper by these mills for the production of paper has increased from 65 000 metric tonnes in 1995 to 850000 metric tonnes in 2000; however, the 20% rate of recovery is still among the lowest internationally [4].

Chemical constituents of Raw materials and wastewater:

Serious health and environmental issues arise from the large-scale wastewater discharged into nearby streams as effluent from the pulp and paper industries. Prior to their disposal, these massive volumes of effluents must be analyzed in order to develop an appropriate treatment plan[5]. Raw materials with cellulose fibers, usually wood, recycled paper, and non-wood raw materials like bagasse, cereal straw, bamboo, reeds, esparto grass, jute, flax, and sisal are used to make pulp and paper. A significant amount of fresh water is used in the production process, most of which is discarded as wastewater. One of the biggest and most well-known sources of industrial pollution is the pulp and paper sector. The pulp and paper sector is one of the twenty most polluting industries, according to the Ministry of Environment and Forests, Government of India[6]. Stray wood chips, bark fragments, cellulose fibers, dissolved ligneous material (30–45%), saccharinic acid (25–35%), formic and acetic acid (10%), and extractives (3–5%) are all found in the wastewater from the pulp and paper industries. The precise chemical makeup of wastewater from pulp and paper mills is complicated and unknown. The majority of the chemical components included in the effluent of pulp and paper mills are wood extractives, lignin, cellulose, and hemicellulose degradation products.

Many different chemicals, including manomeric phenols, enol ethers, mercaptides, stilbene, quinone derivatives, and chlorinated substances, are among the lignin breakdown products detected in the pulp and paper mill effluent. In effluent, some 300 different organochlorine chemicals have been found; hundreds more are still unknown. Of these chemicals, chlorophenols (catechols, guaicols, and their transformation products, anisoles and verathroles) are the most

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toxic. The most prevalent types of chlorophenols are the persistent and exceedingly poisonous trichlorophenol (TCP) and pentachlorophenol (PCP). The two most harmful documented chlorinated chemicals are furans (PCDF) and dioxins (polychlorodibenzo-p-dioxin, or PCDD). Other chlorinated compounds detected in pulp and paper mill effluent, besides dioxins and furans, are chloroforms, chloroacetones, aldehydes, and and acetic acids [7]

Wastewater treatment methods

Pulp and paper plants that use agricultural residues typically handle mixed wastewater. Equalization, primary settling, clari-flocculation, and secondary biological treatment (aerobic or aerobic) are the steps in the treatment sequence. The activated sludge treatment and secondary clarification come next. To recover used pulping chemicals, the majority of large paper mills, along with a few medium-sized and small ones, have chemical recovery plants. The treated wastewater is dumped into drains, rivers, or surface water on land. The primary sludge is dried in sludge drying beds or lagoons depending upon land availability and is generally sold to board manufacturers. The waste water treatments are usually categorized into physicochemical and biological techniques.

Physiochemical methods:

Numerous physicochemical techniques for removing color have been discovered and documented in the literature in the past, including adsorption, fast sand filtering, chemical precipitation, membrane processes, and electrochemical techniques. [8]

More and more research is being done on the elimination of synthetic organic compounds, organics that generate color, and disinfection byproducts using adsorption techniques. Activated carbon, processed bone, char powder, activated alumina, magnesia, activated bauxite, fly ash, alum, lime, etc. are among the several adsorbates that are frequently employed in wastewater treatment [8].The primary adsorbent used in large-scale wastewater treatment is activated carbon. In certain circumstances, other naturally occurring adsorbents are employed. Fluoride elimination is one of the common uses for activated alumina. Hydrocarbons are separated using silica gel. Carbonized and polymeric resins are frequently used to remove organic pollutants from wastewater more effectively.

Both a significant initial outlay and pretreatment are necessary for the membrane approaches. Another issue with this approach is membrane fouling. Although costly, adsorption and membrane methods are effective [9]. The wastewater from the production of cellulose paper can also be treated by applying the electrochemical approach [10]. High treatment efficiency is guaranteed by this technology; nevertheless, the kind of electrodes used, the design of the electro-coagulators, and the operating environment all affect how efficient the procedure.

There has been a lot of research done on chemical precipitation employing lime, ferric chloride, and alum [11]. Some disadvantages have been mentioned, despite the short detention period and cheap capital cost. These include the high cost of chemicals for pH correction and precipitation, the large amount of sludge produced as a result of hefty doses, the need to dewater and dispose of the generated sludge, and the high amounts of residual cations. Although chemical precipitation procedures are inexpensive, they generate a significant amount of sludge and do not eliminate toxicity entirely.

It is crucial to consider the chemical side of color removal from pulp and paper sector wastewater. During alkaline extraction, the addition of calcium hypochlorite (1-2% of available chlorine) resulted in an 84% reduction in effluent color without compromising pulp quality. When chlorinated backwater (containing 0.8% residual chlorine) was used to wash brown stock, the color of the effluent was reduced by 60% without compromising pulp quality. When ferric acid chloride was present, the amounts of alum, lime, and magnesium sulphate decreased by 97%, 68%, and 52%, respectively, as well as the color. The most efficient mixture to reduce color, BOD, and COD by 97, 71, and 64% in chlorine-treated water was alum, calcium hypochlorite, and ferrous sulphate. The treatment options that have been explored till now are not cost-effective at the plant level, and no completely efficient method is currently available.

Biological methods:

The drawbacks of physicochemical techniques may be mitigated or eliminated by using biological techniques. Numerous investigations have been conducted on the biological treatment and decolorization of such wastewaters. Because of the presence of carbon-to-carbon biphenyl linkages, polymerized tannins and lignin, as well as their derivatives, are resistant to degradation and are primarily responsible for the color of paper mill effluent. Certain microorganisms are said to be capable of biodegrading lignin and its derivatives given the right environmental circumstances. It has been observed that a wide variety of bacteria, including Pseudomonas species, Flavobacteria, Xanthomonas species, Bacillus species, Aeromonas species, Cellulomonas species, Chromobacteria, etc., degrade lignins and lignin derivatives [12]. Fewer strains of bacteria are able to adhere to lignin derivatives derived from various pulping procedures, despite the fact that many of them are capable to breaking down monomeric lignin structure models.

Numerous previous research endeavors have concentrated on the identification, screening, and assessment of fungi's capacity and efficacy in the in situ and in vitro degradation of lignins. Based on the kind of wood decay that these organisms carry out, a variety of fungus are categorized as white-rot, soft-rot, and brown-rot fungi [12]. These fungi have been shown to degrade lignin.

The most effective microbes for breaking down lignin and its modified forms are the white rot fungi, a class of basidiomycetes with an active lignolytic enzyme system [13]. These fungi use lignin as a secondary metabolite, which is not necessary for their growth, rather than as a carbon source for their growth. Three extracellular phenoloxidases—lignin peroxidases (LiP), manganese peroxidases (MnP), and laccases (Lac)—cause the lignin breakdown by white rot fungus, which has been the subject of much research (Peng Wang et al. 2008). Apart from lignin, these fungi have the ability to break down a range of environmentally harmful substances, including heterocyclic aromatic hydrocarbons, synthetic high polymers, and different types of dyes [14].

Various fungal species have been shown by several writers to be able to extract color from kraft mill effluent [15,16,17]. [18] documented a significant decrease in color and COD by the application of T. versicolor and P. chysosporium, two white-rot fungus. [19] shown that color, COD, and lignin content may be eliminated by using surfactants and the white-rot fungi P. chysosporium in conjunction with P. sanguineus, P. ostreatus, and H.annosum. Additionally, it was discovered that the fungus Pleurotusostreatus removed color, BOD, COD, and lignin to the extent of 77%, 76.8%, 60%, and 80%, respectively. Discovered a fungus (Pencillium sp.) that, after two days of contact, was able to eliminate 50% of the AOX and color from the soft-wood bleachery effluents [21]. Demonstrated that the dissolved and colloidal materials could be effectively broken down by fungi like T. versicolor and the fungal culture filtrate (FCF) that was extracted from these organisms. Other white-rot fungus that have been shown to deteriorate the color of wastewater under ideal circumstances are Pleurotusostreatus, Aspergillus fumigatus, Schizophyllum commune, and Tinctoporia bonbonica [22].

Effect of untreated effluent on land quality:

Additionally prevalent in pulp mill wastewater are elements like sulfur, magnesium, and sodium chloride, which can lead to nutritional imbalances in crops, increase soil salinity, weaken soil structure, and eventually reduce crop yield [23]. The paper mill wastewater contains hazardous trace elements that can build up excessively in soils and cause serious issues for humans and animals by getting into the food chain. Heavy metal concentrations are significant in untreated industrial effluents. Untreated paper mill effluents increase the concentration of heavy metals in irrigated surface soils by containing greater levels of Cd, Pb, Zn, Cu, Mn, and Fe. Soils being watered by paper and pulp industry effluents have been found to have significantly higher values of EC, organic carbon, accessible K, exchangeable cations (Ca^{2+}, Mg^{2+}), exchangeable anion (Cl^-, HCO_3^-), and micronutrient cation (Cu^{2+}). The agronomic performance and soil fertility of certain soils were impacted by the biochar that resulted from the gradual pyrolysis of paper effluent.

Effect of untreated effluent on Crops:

Pulp and paper mill effluent is also responsible for affecting the quality of crops due to irrigation with polluted water, which damages the soil, growth, quality, and yield of the crop.

1. Decrease germination percentage and seedling growth in crops [23]
2. Inhibiting effect on the germination of crops [24]
3. Reduces crop growth and gives severe adverse effect on soil properties [25]
4. Seed germination in Sunflower and maize [26]
5. Germination of seeds in paddy [28]
6. Reduction in shoot weight (44%) in paddy [29]
7. Germination percentage and yield in paddy [30]

Effects of untreated effluent on water bodies:

Research showed that fish populations residing downstream of bleached kraft pulp mills exhibited a range of reactions. These included a decline in secondary sexual traits, decreased gonads, altered fish reproduction, and delayed sexual maturity. The primary issue brought about by pulp and paper factories was the development of sewage fungus in the rivers that received the wastewater. The presence of suspended solids in the water might result in issues with its dark color and excessive turbidity, which can cover up river or lakebeds. In aquatic habitats, severe blanketing may cause anaerobic decomposition beneath the blanket, generating hydrogen sulfide. In water plants, the blanketing and dark color can lower photosynthetic activity [28]. The growth

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of primary, secondary, and tertiary consumers is negatively impacted, which sets off a cascade of negative impacts on the aquatic ecosystem. As a result, before they may be introduced into surface waters, color and toxicity must be removed.

Effect of untreated effluent on Soil Biology

Investigations on how wastewater application affects the biological characteristics of soil have produced a range of outcomes, depending on the experimental setup and measurements made. For instance, reports of microbiological counts have been made historically, but more recent research has used molecular biological techniques that focus on gene expression and enzyme activity. Rice seed germination is negatively impacted by paper mill effluents [28]. According to [30], compared to control seeds, the germination of rice seeds gradually decreased at 50% and higher wastewater concentrations during the course of the trial also demonstrated a 44% decrease in shoot weight in soil that has received 100% wastewater treatment.

1. Accumulate metal (loid)s, salts, and organic compounds such as pesticides in soils that might be toxic to soil fauna and flora [30]

2. Antibiotics are bioactive compounds and can reach soils through wastewater irrigation, thereby affecting soil biological activity [31]

3. Wastewater-borne microorganisms might compete with indigenous microbial communities [32]

4. Microbiological population from aerobic to anaerobic microorganisms due to shortterm oxygen depletion of the topsoil resulting from wastewater irrigation, as seen by adecrease in oxygen diffusion rate [33]

5. The stimulation of copiotrophic bacteria was observed in the same long-term wastewater irrigation area [34,35]

Effect of treated effluent on soil properties:

The various irrigation sources can be augmented by using the effluent from the pulp and paper industry.

1. Soil physical and hydraulic properties [36]

2. Soil aggregate stability [37]

3. Bulk density and porosity induced [38]

4. Lower bulk density and increase soil porosity [38]

5. Total porosity [39]

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6. Actinomycetes and fungi population [40]

7. Soil nutrients status [41]

8. N, PO4, Na, K, Mg, and Ca ([42]

9. Na, and extractable S, Zn, Fe, Mn, Pb, and Ni [43]

10. Soil pH and organic C, N, P, and K. [44]

11. Organic carbon (3.2–5.9 gkg1), and concentrations of N, P, K, and Na [45]

12. Long-term wastewater irrigation affects total microbial biomass and/or soil enzyme activities in different soils [46]

13. Increase in bacterial counts and bacterial activity [47]

14. Increased the soil bacteria, actinomycetes, fungi, rhizobia, and yeasts, and the populations of soil microorganisms [44]

The reuse of industrial effluents for irrigation purposes is an alternate and effective waste disposal method commonly called "agro-recycling" where wastewater and plant nutrients could be recycled to diminish pollution and accomplish additional income.

1. Germination percentage, plant height, crop growth rate (CGR), and relative growth rate (RGR), of sorghum, maize, and sunflower [47]

2. Pod yield and oil content of the groundnut [48]

3. Yield parameters of tomato, viz., number of fruiting clusters, fruit weight, and fruit yield, were higher [49]

4. Quality traits of bhendi and amaranthus [50]

5. Cowpea yield by up to 28 percent and the nodule formation [51]

6. Higher chlorophyll, protein content, root length, shoot length, leaf area, and total biomass in black grammes at a 10% concentration of paper mill effluent irrigation. [42]

7. Bacterial, fungal, and nodule counts had also increased in black gramme up to 50% concentration [52]

8. Germination and growth of peas [53]

9. Pod (2608 kg ha-1) and kernel yield (1534 kg ha-1) [54]

10. Length of seedlings after germination in vegetable crops [55]

11. Yield and biominerals viz., Ca and Fe, of banana [56]

12. Paper mill effluent on germination, seedling growth and chlorophyll content in Zea mays L [57]

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13. Increase in chlorophyll content, plant height, shoot and root biomass, grain yield etc. in Triticum aestivum L. [28]

MATERIALS AND METHODS

Sample Collection

Samples were collected from the inlet of effluent treatment plant from Paper Mills, Ltd., Muzaffarnagar, India, stored at 4^0C and filtered through a 0.5 mm sieve to remove suspended particles.

Isolation of Fungal Strain and Screening

For bioremediation fungus was isolated from the effluent collected from paper mill by effluent enrichment technique. 1 ml effluent sample was inoculated into potato dextrose agar (PDA) media containing distilled water, potato extract, dextrose and agar at 30℃ for 48 hrs for spore formation. Fungal colonies which appeared on the media were sub- cultured to obtain pure isolates.

Identification of Fungi

Fungal isolates were identified on the basis of morphology i.e hyphe, conidiophores, conida etc., Microscopic examination was done for isolates at 40X magnification. Isolated culture was identified as *Aspergillus niger* by following the culture identification technique.

Treatment of effluent

For the treatment, effluent sample was diluted to 3 different concentration viz. 25%, 50% and 75%. The purpose of dilution is to study the degradation efficiency of the organism at different effluent concentrations. *The isolated fungus Aspergillus niger* was tested for biodegradation ability under laboratory condition. The organism was inoculated into each effluent concentration and treatment was conducted for 7 days.

Physico-Chemical Characterization of Effluent

1) Biological Oxygen Demand (BOD)

BOD of effluent was determined by the standard dilution technique of APHA. The method consists of filling an air tight bottle with sample and incubating at 200 C for 5 days. The dissolved oxygen (DO) was measured before and after the incubation. The difference in DO was computed and BOD of effluent is calculated.

2) Chemical Oxygen Demand (COD)

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2) Chemical Oxygen Demand (COD)

COD of effluent was calculated using closed reflux unit by titrimetric method of APHA. The effluent is refluxed in strong acid (H_2So_4) solution with $K_2Cr_2O_7$, silver sulphate and mercuric sulphate. Oxygen consumed was measured by titrating the sample against ferrous ammonium sulphate (FAS) using ferroin indicator.

3) Lignin

Total lignin content of effluent was measured by following the method of Pearl and Benson. In this method, effluent sample (50 mL) was mixed with 1 ml of CH_3COOH (10%), 1 mL of $NaNo_2$ (10%) and pH was adjusted to 7. Then 2 ml of NH_4OH was added and absorbance was measured at 430 nm. The absorbance value was transformed into lignin content (ppm) using the following formula

$$\text{Lignin (ppm)} = \frac{\text{Absorbance}}{0.000247}$$

4) Phytotoxicity Studies

Phytotoxicity studies were conducted to check the toxic effects of treated effluent. Experiment was performed under room temperature using presterilized 10 *Vigna radiata* seeds. For the experiment 10 mL of treated and untreated effluent samples were used per day. A control set was also maintained. Treatment was conducted for a week and results were noted in terms of seed germination index (GI), relative seed germination (RSG) and (RRE) relative root elongation.

$$\text{RSG (\%)} = \frac{\text{Number of seeds germinated in the sample extract} \times 100}{\text{Number of seeds germinated in the control}}$$

$$\text{RRE (\%)} = \frac{\text{Mean root elongation in the sample extract} \times 100}{\text{Mean root elongation in the control}}$$

$$\text{GI (\%)} = \frac{(\text{\%Seed germination}) \times (\text{\%Root elongation})}{100}$$

RESULTS AND DISCUSSION

Results are expressed as mean ± SEM. The statistical analysis was carried out using one way ANOVA followed by *Tukey's* t-test. The difference in values at $p<0.05$ or $p<0.01$ were considered as statistically significant. Statistical analysis was performed using ez ANOVA 0.98 version.

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Physico-Chemical Characterization of Effluent C

1) COD

It is observed that *Aspergillus niger* has shown COD reduction in all treatment systems (Table 1). COD reduction in 25% concentration was 180.20±0.34 to 86.00±0.34, in 50% concentration 354.20±0.36 to 168.32±0.42, in 75% concentration 512.30±0.22 to 280±0.23 and in raw effluent 692.30±0.43 to 362.43±0.40.

Table 1: Reduction in COD Concentration after Treatment with *A. Niger*

Concentration	Before treatment	After treatment
Raw	692.30±0.43	362.43±0.40
75%	512.30±0.22	280±0.23
50%	354.20±0.36	168.32±0.42
25%	180.20±0.34	86.00±0.34

2) BOD

Results revealed reduction of BOD by *Aspergillus niger* during the treatment. In 25% concentration it was reduced from 120.10±0.22 to 42.40±0.23, in 50% concentration 294.10±0.16 to 72.27±0.25, in 75% concentration 504.27±0.25 to 98.02±0.22 and in raw effluent 661.20±0.42 to 118.00±0.18.

Table 2: Reduction in BOD Concentration after Treatment with *A. niger*

Concentration	Before treatment	After treatment
Raw	661.20±0.42	118.00±0.18
75%	504.27±0.25	98.02±0.22
50%	294.10±0.16	72.27±0.25
25%	120.10±0.22	42.40±0.23

D. Lignin

From the results it is observed that *Aspergillus niger* has potency to degrade lignin. Degradation of lignin in 25% concentration was 992.56±0.15 to 564.20±0.60, in 50% concentration

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1552.20±0.43 to 752.27±0.43, in 75% concentration 1682.34±0.30 to 1204.70±0.42 and in raw effluent 2093.43±0.65 to 1423.50±0.50.

Table 3: Delignification of Effluent using *A. niger*

Concentration	Before treatment	After treatment
Raw	2093.43±0.65	1423.50±0.50
75%	1682.34±0.30	1204.70±0.42
50%	1552.20±0.43	752.27±0.43
25%	992.56±0.15	564.20±0.60

E. Phytotoxicity Studies

Using Vigna radiata, the phytotoxicity test was carried out to determine the hazardous impact of the effluent after treatment with A. niger. Table 4 presents the results of a seed germination test on many criteria, including the percentage of germination, root and shoot length, and GI index. It was noted that seeds cultivated in the treated and control samples exhibited high root and shoot growth as well as a high germination percentage. Reduced seed germination and minimal shoot and root growth are observed in seeds cultivated with untreated wastewater. Untreated wastewater was found to have a low GI index.

The effluent treated with *A. niger* shows high GI (89.43%). *Barapatre, A. and Jha, H.* (2016) have made a similar observation in their studies. This suggests that the use of microorganisms in the biological treatment process is successful in lowering the effluent's pollutant load, which promotes the germination and growth of some food plants.

Table: 4 Effect of Effluent Treated with *A. Niger* on the Germination and Growth of *Vigna Radiata*.

Sample	Shoot Length (cm)	Root Length h (cm)	Germination %	GI Index %
Control	48.5	12.5	100%	100%
Raw	35.7	9.6	80%	75.32%

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Treated	39.2	12.0	90%	89.43%

CONCLUSION

Among the main industries, pulp and paper mills are ranked as the fifth biggest source of industrial water pollution. The resultant effluent has a high phenolic content, turbidity, BOD, and COD concentration, and it is dark in color. Numerous physical, chemical, and biological treatments have been used to treat wastewater; among these, the biological process has proven to be efficient and economical, as have natural processes that cause matter to break down into simpler components. In this study, pulp and paper mill wastewater was treated using *Aspergillus niger*. Based on the findings, it can be observed that this microorganism works by lowering the wastewater's contents of lignin, BOD, and COD.

The pulp and paper mill effluent can be effectively biodegraded by *Aspergillus niger*, according to the results. The effluent exhibits minimal phytotoxicity and is appropriate for plant growth, according to the results of the phytotoxicity investigations. Therefore, it is recommended to use this fungal isolate for the bioremediation of paper mill wastewater.

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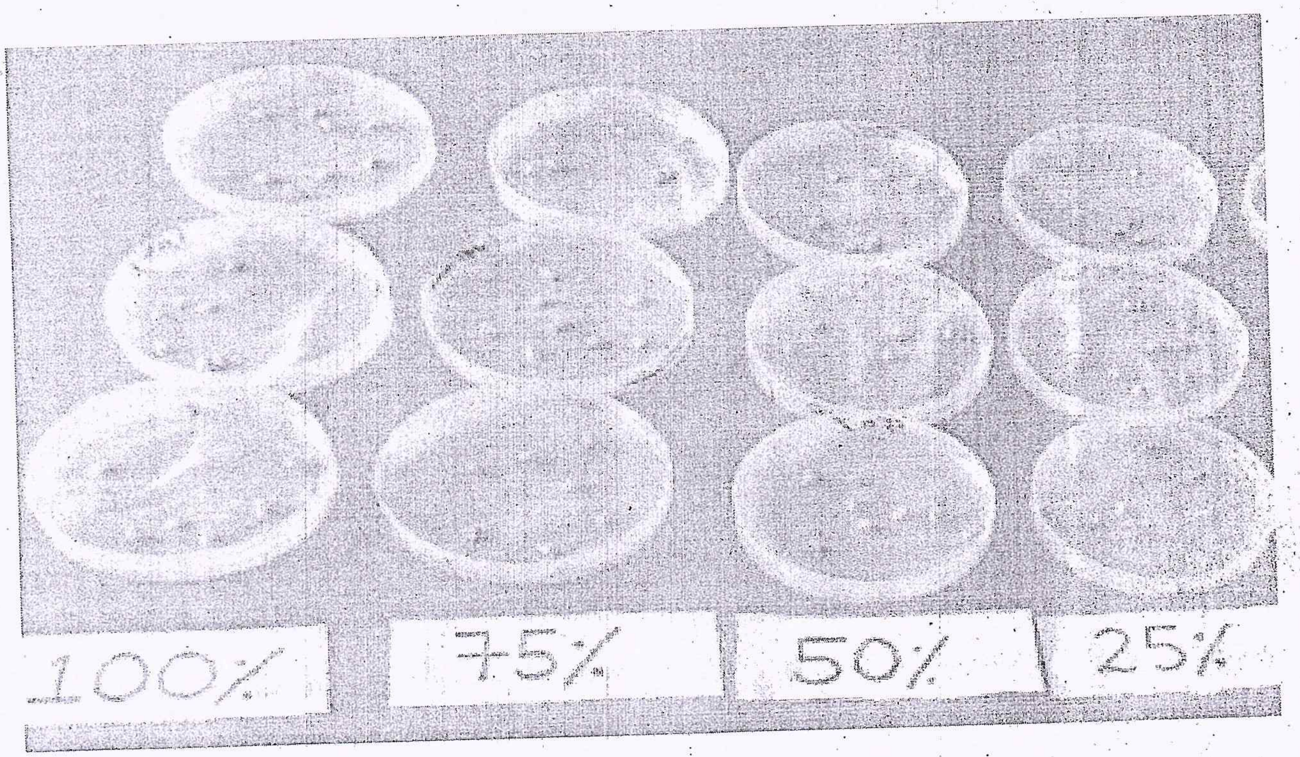

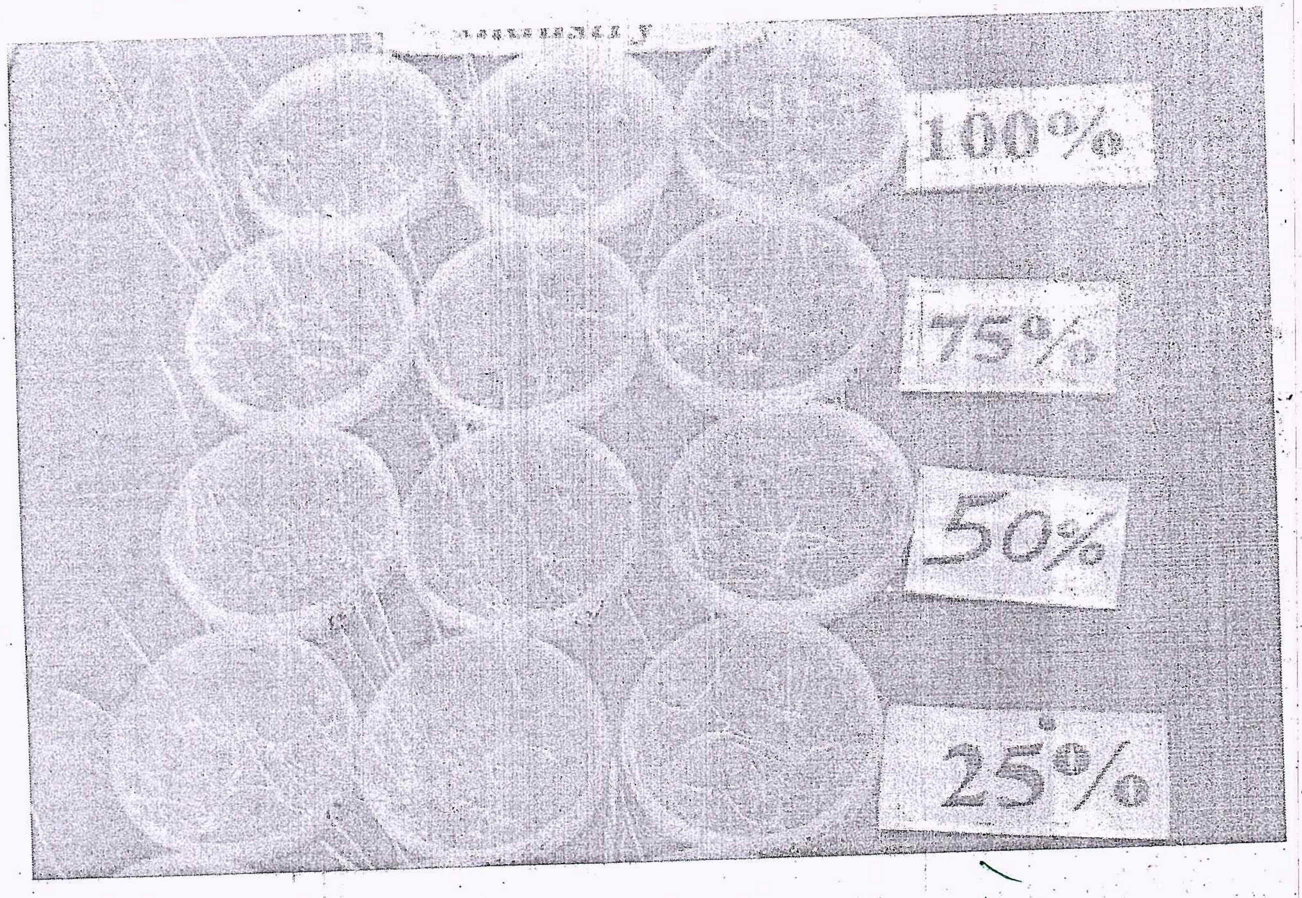

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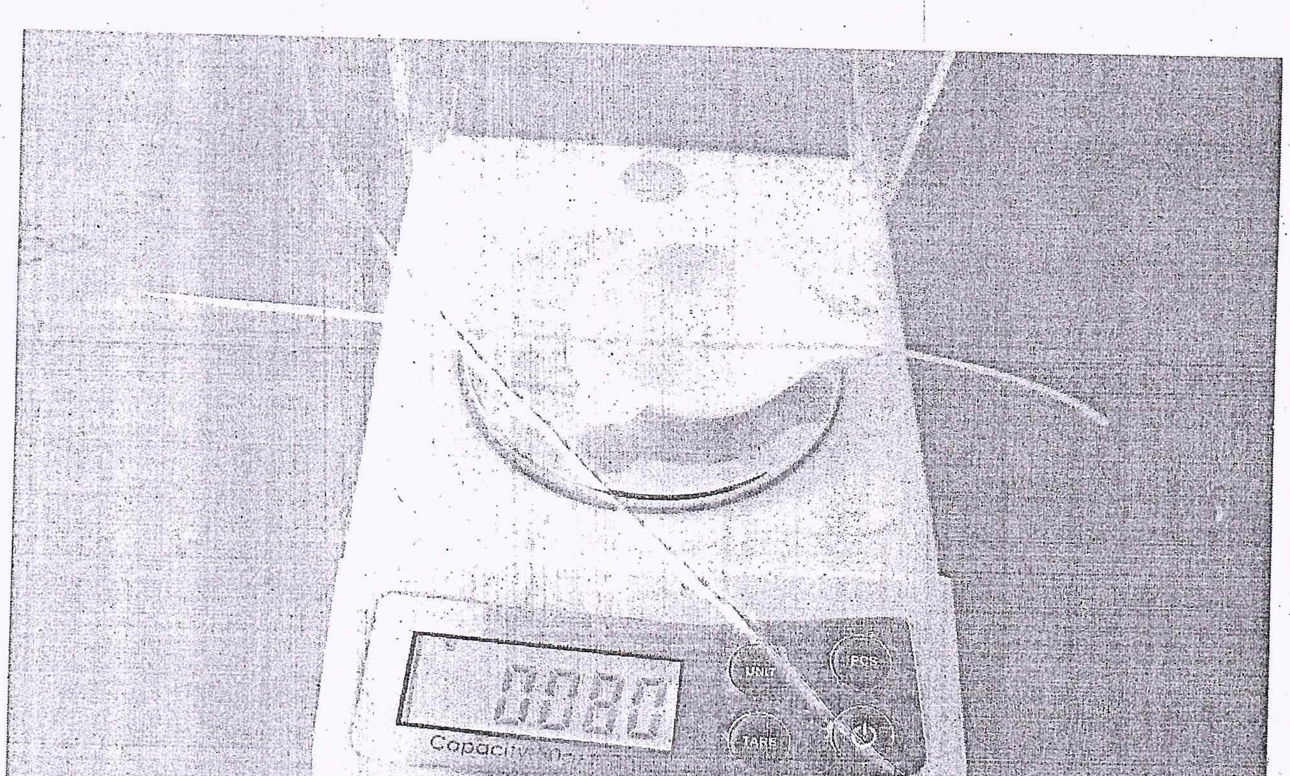

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A

PROJECT

REPORT

ON

"CHEMICAL REMEDIATION OF PAPER INDUSTRY AND EFFECT ON SOIL"

Submitted By

Er. Rajdeep Saharawat

Assistant Professor, Department of Basic Science

(2022-23)

SHRI RAM COLLEGE, MUZAFFARNAGAR

(Affiliated to Maa Shakumbhari University, Saharanpur)

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EXECUTIVE SUMMARY

"Soil pollution" refers to the presence in the soil of a chemical or substance out of place and/or present at a higher than normal concentration that has adverse effects on any non-targeted organism. Soil pollution often cannot be directly assessed or visually perceived, making it a hidden danger

The Status of the World's Soil Resources Report (SWSR) identified soil pollution as one of the main soil threats affecting global soils and the ecosystems services provided by them '

Concerns about soil pollution are growing in every region. Recently, the United Nations Environmental Assembly (UNEA-3) adopted a resolution calling for accelerated actions and collaboration to address and manage soil pollution. This consensus, achieved by more than 170 countries, is a clear sign of the global relevance of soil pollution and of the willingness of these countries to develop concrete solutions to address the causes and impacts of this major threat

The main anthropogenic sources of soil pollution are the chemicals used in or produced as byproducts of industrial activities, domestic, livestock and municipal wastes (including wastewater), agrochemicals, and petroleum-derived products. These chemicals are released to the environment accidentally, for example from oil spills or leaching from landfills, or intentionally, as is the case with the use of fertilizers and pesticides, irrigation with untreated wastewater, or land application of sewage sludge. Soil pollution also results from atmospheric deposition from smelting, transportation, spray drift from pesticide applications and incomplete combustion of many substances as well as radionuclide deposition from atmospheric weapons testing and nuclear accidents. New concerns are being raised about emerging pollutants such as pharmaceuticals, endocrine disruptors, hormones and toxins, among others, and biological pollutants, such as micropollutants in soils, which include bacteria and viruses.

Based on scientific evidence, soil pollution can severely degrade the major ecosystem services provided by soil. Soil pollution reduces food security by both reducing crop yields due to toxic levels of contaminants and by causing crops produced from polluted soils to be unsafe for consumption by animals and humans. Many contaminants (including major nutrients such as nitrogen and phosphorus) are transported from the soil to surface waters and ground water, causing great environmental harm through eutrophication and direct human health issues due to polluted drinking water. Pollutants also directly harm soil microorganisms and larger soil-dwelling organisms and hence affect soil biodiversity and the services provided by the affected organisms

The results of scientific research demonstrate that soil pollution directly affects human health. Risks to human health arise from contamination from elements such as arsenic, lead, and cadmium, organic chemicals such as PCBs (polychlorinated biphenyls) and PAHs (polycyclic aromatic hydrocarbons), and pharmaceuticals such

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as antibiotics. The health risks associated with the widespread soil contamination by radionuclides from the Chernobyl disaster in 1986 are an enduring memory for many people.

Remediation of polluted soils is essential, and research continues to develop novel, science-based remediation methods. Risk assessment approaches are similar worldwide and consist of a series of steps to be taken to identify and evaluate whether natural or human-made substances are responsible for polluting the soil, and the extent to which that pollution is posing a risk to the environment and to human health. Increasingly expensive physical remediation methods such as chemical inactivation or sequestration in landfills are being replaced by science-based biological methods such as enhanced microbial degradation or phytoremediation

FAO's Revised World Soil Charter recommends that national governments implement regulations on soil pollution and limit the accumulation of contaminants beyond established levels in order to guarantee human health and wellbeing, a healthy environment and safe food. Governments are also urged to facilitate remediation of contaminated soils that exceed levels established to protect the health of humans and the environment. It is also essential to limit pollution from agricultural sources by the global implementation of sustainable soil management practices.

This book aims to summarise the state of the art of soil pollution, and to identify the main pollutants and their sources affecting human health and the environment, paying special attention to those pollutants that are present in agricultural systems and that reach humans through the food chain. It concludes with some case studies of the best available techniques for assessing and remediating contaminated soils

This book has been developed within the framework of the Global Symposium on Soil Pollution (GSOP18), identifying the main gaps in knowledge on soil pollution worldwide and serving as a basis for future discussions.

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Glossary

Contaminant: substance or agent present in the soil as a result of human activity (ISO, 2013). Leaching: the dissolution and movement of dissolved substances by water (ISO, 2013). Parent material: The original material (mineral and/or organic) from which soil developed by pedogenetic processes. Persistent organic pollutant (POP): Synthesized carbon-based compounds from agrochemicals and industrial products that generally biodegrade very poorly and most of which will bioaccumulate in tissues of organisms. Some pesticides are POPs, as are Polychlorinated dibenzodioxins (PCDDs), Polychlorinated dibenzofurans (PCDFs), Polychlorinated biphenyls (PCBs), and Polycyclic aromatic hydrocarbons (PAHs). Soil: the upper layer of the Earth's crust transformed by weathering and physical/ chemical and biological processes. It is composed of mineral particles, organic matter, water, air and living organisms organized in genetic soil horizons (ISO, 2013). Soil ecosystem functions: description of the significance of soils to humans and the environment. Examples are: (1) control of substance and energy cycles within ecosystems; (2) basis for the life of plants, animals and man; (3) basis for the stability of buildings and roads; (4) basis for agriculture and forestry; (5) carrier of genetic reservoir; (6) document of natural history; and (7) archaeological and paleoecological document (ISO, 2013). Soil health: the continued capacity of the soil to function as a vital living system, within ecosystem and land-use boundaries, to sustain biological productivity, promote the quality of air and water environments, and maintain plant, animal, and human health (Doran, Stamatiadis and Haberern, 2002). Soil ecosystem services: the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly (Groot, 1992). Food security: it is defined as the availability, access, utilization and stability of food supply. Soil contamination: occurs when the concentration of a chemical or substance is higher than would occur naturally but is not necessarily causing harm (this volume). Soil pollution: refers to the presence of a chemical or substance out of place and/ or present at higher than normal concentration that has adverse effects on any non-targeted organism (this volume).

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INTRODUCTION

WHAT IS SOIL POLLUTION?

"Soil pollution" refers to the presence of a chemical or substance out of place and/ or present at a higher than normal concentration that has adverse effects on any non-targeted organism (FAO and ITPS, 2015). Although the majority of pollutants have anthropogenic origins, some contaminants can occur naturally in soils as components of minerals and can be toxic at high concentrations. Soil pollution often cannot be directly assessed or visually perceived, making it a hidden danger.

The diversity of contaminants is constantly evolving due to agrochemical and industrial developments. This diversity, and the transformation of organic compounds in soils by biological activity into diverse metabolites, make soil surveys to identify the contaminants both difficult and expensive. The effects of soil contamination also depend on soil properties since these control the mobility, bioavailability, and residence time of contaminants (FAO and ITPS, 2015).

Industrialization, wars, mining and intensification in agriculture have left a legacy of contaminated soils around the world (Bundschuh et al., 2012; DEA, 2010; EEA, 2014; Luo et al., 2009; SSR, 2010). Since urban expansion, soil has been used as a sink for dumping solid and liquid wastes. It was considered that once buried and out of sight, the contaminants would not pose any risk to human health or the environment and that they would somehow disappear (Swartjes, 2011). The main sources of soil pollution are anthropogenic, resulting in the accumulation of contaminants in soils that may reach levels of concern (Cachada, Rocha-Santos and Duarte, 2018)

Soil pollution is an alarming issue. It has been identified as the third most important threat to soil functions in Europe and Eurasia, fourth in North Africa, fifth in Asia, seventh in the Northwest Pacific, eighth in North America, and ninth in sub-Saharan Africa and Latin America (FAO and ITPS, 2015). The presence of certain pollutants may also produce nutrient imbalances and soil acidification, two major issues in many parts of the world, as identified in the Status of the World's Soil Resources Report (FAO and ITPS, 2015)

The unique global estimate of soil pollution was done in the 1990s by the International Soil Reference and Information Centre (ISRIC) and the United Nations Environment Programme (UNEP), which estimated that 22 million hectares had been affected by soil pollution (Oldeman, 1991). Latest data, however, indicate that this number may underestimate the nature and extent of the problem. National attempts to estimate the extent of soil pollution have been undertaken mainly in developed countries. According to the Chinese Environmental Protection Ministry, 16 percent of all Chinese soils and 19 percent of its agricultural soils are categorized as polluted (CCICED, 2015). There are also approximately 3 million potentially polluted sites in the European Economic Area and cooperating countries in the West Balkans (EEA-39) (EEA, 2014) and more than 1 300 polluted or contaminated sites in the United States of America (USA) are included on the Superfund National Priorities List (US EPA, 2013). The total number of contaminated sites is estimated at 80 000 across Australia (DECA, 2010). While these numbers are informative in helping us understand the effects of certain activities on soils, they do not reflect the complete extent of soil pollution around the world, and they highlight the inadequacy of available information and the differences in registering polluted sites across geographic regions (Panagiotakis and Dermatas, 2015). In low- and middle-income countries, the lack of data and information makes one of the world's biggest global problems invisible to the international community. With this overview, it is evident that there is an urgent need to implement a global assessment of soil pollution

Fortunately, awareness on the importance of soil pollution is increasing around the world, leading to an increase in research conducted on the assessment and remediation of soil pollution (Figure 1). The Revised World Soil Charter (FAO, 2015b) recommends that national governments implement regulations on soil pollution and limit the accumulation of contaminants beyond established levels in order to guarantee human health and well-being. Governments are also urged to facilitate remediation of contaminated soils that exceed levels established to protect the health of humans and the environment. Soil pollution took centre stage at the Fifth Global Soil Partnership (GSP) Plenary Assembly (GSP, 2017). Recently, the United Nations Environmental Assembly (UNEA-3) adopted a resolution calling for accelerated actions and collaboration to address and manage soil pollution in the framework of Sustainable Development. This consensus, achieved by more than 170 countries, is a clear sign of the global relevance of pollution and of the willingness of these countries to develop concrete solutions to address pollution problems (UNEP, 2018). At the national level, many countries around the world have adopted or are currently adopting national regulations to protect their soils, to prevent pollution and to address historic problems of contamination. During the Estonian presidency of the Council of the European Union in the second half of 2017, soil became one of the main topics within European discussions, focusing on the key role soils play in food production. In China, soil pollution concerns have grown over the last few years, partly because the problem is directly related to human health. Other developing countries have also recently adopted regulations to prevent and control soil pollution, and to determine soil quality (Conselho Nacional do Meio Ambiente, 2009; MINAM, 2017; MMA, 2013)

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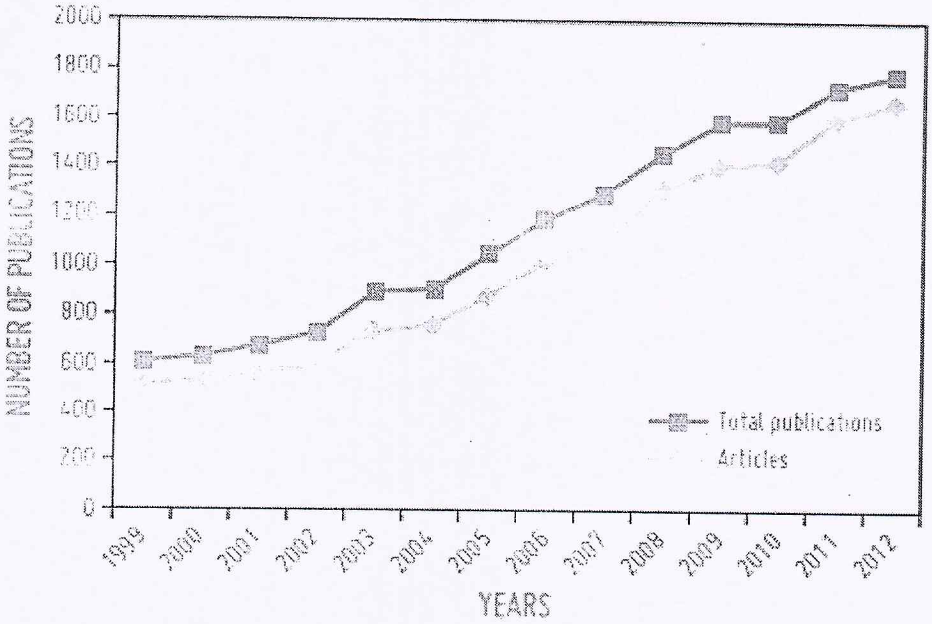

Figure 1. Number of scientific publications on soil pollution in the period of 1999-2012. Source: Guo et al., 201

The term "soil contamination" has frequently been used as a synonym for soil pollution. The Intergovernmental Technical Panel on Soils (ITPS) under the Global Soil Partnership (GSP) has formalized definitions of the two terms (FAO and ITPS, 2015). Soil contamination occurs when the concentration of a chemical or substance is higher than would occur naturally but is not necessarily causing harm. Soil pollution, on the other hand, refers to the presence of a chemical or substance out of place and/or present at a higher than normal concentration that has adverse effects on any non-targeted organism

One issue is the difficulty in establishing a definition of "normal concentrations." It can be easier to establish hazardous concentrations for human-made substances that do not naturally occur in soils, but it can be challenging to do the same for heavy metals and metalloids, which can originate from the weathering of rocks and minerals. In that case, the parent material, climate and weathering rate need to be taken into consideration before establishing thresholds. Additionally, land use and management practices can affect background levels of substances occurring in soils. When referring to recommended levels, there are also many differences from country to country and among regions, not only about the value itself, but also about the name used to define it, including screening values, threshold values, acceptable concentrations, target values, intervention values, clean-up values, and many others (Beyer, 1990; Carlon et al., 2007; Jennings, 2013). For that reason, to carry out a global study on the actual state of soil pollution and to be able to make comparisons is extremely complex. However, this is one of the main challenges when making a regional or global assessment of soil pollution

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Agreement among scientists regarding concepts and definitions would help policy-makers and stakeholders to identify other strategies and techniques used in different parts of the world to assess and to address soil pollution. Using a common and a simplified language would also lead to better understanding of the issue of soil pollution.

POINT-SOURCE AND DIFFUSE SOIL POLLUTION

Soil pollution, as has been said, can result from both intended and unintended activities. These activities can include the direct deposition of contaminants into the soil as well as complex environmental processes that can lead to indirect soil contamination through water or atmospheric deposition (Tarazona, 2014). In the following sections, the different types of soil pollution are described.

POINT-SOURCE POLLUTION

Soil pollution can be caused by a specific event or a series of events within a particular area in which contaminants are released to the soil, and the source and identity of the pollution is easily identified. This type of pollution is known as point-source pollution. Anthropogenic activities represent the main sources of point-source pollution. Examples include former factory sites, inadequate waste and wastewater disposal, uncontrolled landfills, excessive application of agrochemicals, spills of many types, and many others. Activities such as mining and smelting that are carried out using poor environmental standards are also
sources of contamination with heavy metals in many regions of the world (Lu et al., 2015; Mackay et al., 2013; Podolský et al., 2015; Strzebońska, Jarosz-Krzemińska and Adamiec, 2017). Other examples of point-source pollution are aromatic hydrocarbons and toxic metals, which are related to oil products. The sites range from leakage from tank installations in Greenland, which caused aromatic hydrocarbon and toxic metal levels that exceeded the Danish environmental quality criteria (Fritt-Rasmussen et al., 2012), to accidental leakage from oil refinery storage tanks in Tehran (Bayat et al., 2016).
Point-source pollution is very common in urban areas. Soils near roads have high levels of heavy metals, polycyclic aromatic hydrocarbons, and other pollutants (Kim et al., 2017; Kumar and Kothiyal, 2016; Venuti, Alfonsi and Cavallo, 2016; Zhang et al., 2015b). Old or illegal landfills, where waste is not disposed of properly or according to its toxicity (e.g. batteries or radioactive waste), as well as disposal of sewage sludge and wastewater, can also be important point-source pollutants (Baderna et al., 2011; BaumanKaszubska and Sikorski, 2009; Swati et al., 2014). Finally, point-source pollution caused by industrial activities can pose risks to human health. For example, over 5 000 brownfields in China are currently affecting the health of their inhabitants (Yang et al., 2014). Urban brownfields, located in urban

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centres, are sites that once harboured industrial activities that have since been relocated.

DIFFUSE POLLUTION

Diffuse pollution is pollution that is spread over very wide areas, accumulates in soil, and does not have a single or easily identified source. Diffuse pollution occurs where emission, transformation and dilution of contaminants in other media have occurred prior to their transfer to soil (FAO and ITPS, 2015). Diffuse pollution involves the transport of pollutants via air-soil-water systems. Complex analyses involving these three compartments is therefore needed in order adequately to assess this type of pollution (Geissen et al., 2015). For that reason, diffuse pollution is difficult to analyze, and it can be challenging to track and to delimit its spatial extent. Many of the contaminants that cause local pollution may be involved in diffuse pollution, since their fate in the environment is not well understood (Grathwohl and Halm, 2003). Examples of diffuse pollution are numerous and can include sources from nuclear power and weapons activities; uncontrolled waste disposal and contaminated effluents released in and near catchments; land application of sewage sludge; the agricultural use of pesticides and fertilizers which also add heavy metals, persistent organic pollutants, excess nutrients and agrochemicals that are transported downstream by surface runoff; flood events; atmospheric transport and deposition; and/or soil erosion (Figure 2). Diffuse pollution has a significant impact on the environment and human health, although its severity and extent are generally unknown

It has been widely demonstrated that the upper layers of soil are enriched in many metals and other elements that are linked to atmospheric deposition from natural and anthropogenic sources (Blaser et al., 2000; Steinnes et al., 1997; Steinnes, Berg and Uggerud, 2011). Almost every soil of the northern hemisphere contains radionuclides in higher concentrations than the background level, even in remote areas of North America and Eastern Asia. Due to the nuclear fallout after the catastrophic Chernobyl accident, radionuclides will be present in soils for centuries (Fesenko et al., 2007). More than 50 years will be needed to reach a reduction of 50 percent of the radionuclides, such as 239/240 Pu or 241Am, in areas up to 200 km away from Chernobyl. Due to these different types of pollution from diverse sources, an increase in scientific and technical efforts is needed to develop new methods for measuring, monitoring and better understanding atmospheric deposition processes and the extent of diffuse pollution

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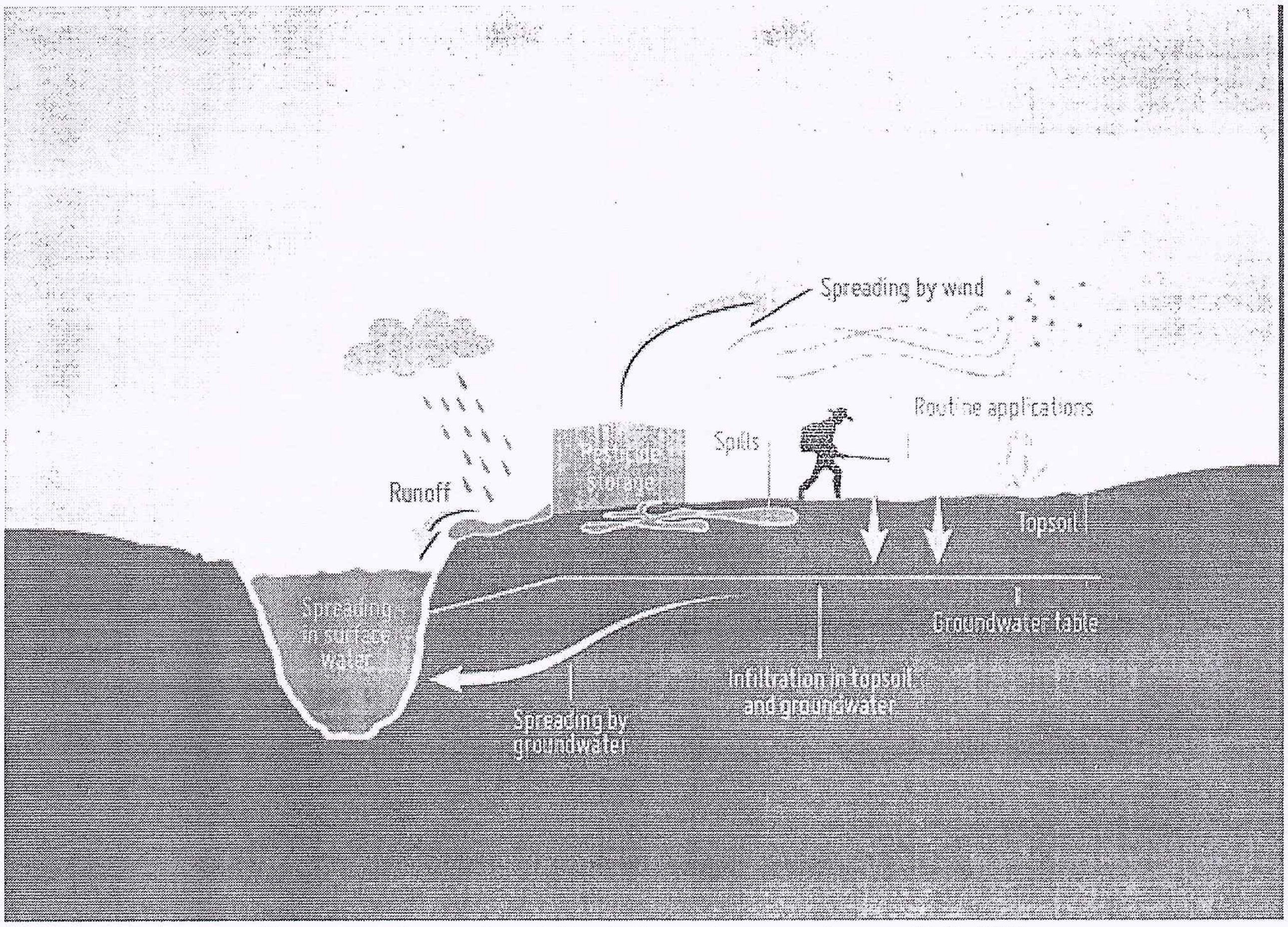

Transport pathway of pesticides in the environment. Source: FAO, 2000

SOURCES OF SOIL POLLUTANTS

NATURAL, GEOGENIC SOURCES

It is crucial to separate background values from baseline values when defining the extent of contamination in areas where environmental legislation has not yet established intervention limits for all environmental matrices (Albanese et al., 2007). Background values indicate geogenic natural content, while baseline values indicate the actual content of an element in the superficial environment at any given point (Reimann, Filzmoser and Garrett, 2005; Salminen and Gregorauskiene, 2000).

Background concentrations in the soils of a region will be strongly related to the pedo-geochemical fraction and the dynamics of the environment that led to the formation of the soil. The use of averages or global intervals is therefore not suitable for determining background levels at the regional or local levels (Horckmans et al., 2005; Paye, Mello and Melo, 2012). For example, heavy metals in soils can vary over two to three orders of magnitude, considering the natural variation in the concentration of trace metals within the parent rock type (Shacklette and Boerngen, 1984).

Several soil parent materials are natural sources of certain heavy metals and other elements, such as radionuclides, and these can pose a risk to the environment and human health at elevated concentrations. Arsenic (As) contamination is one of the major environmental problems around the world. Natural sources of As include volcanic releases (Albanese et al., 2007) and weathering of As-containing minerals and ores (Díez et al., 2009), but also naturally occurring mineralized zones of arsenopyrite (gossans), formed by the weathering of sulphide-bearing rock (Scott, Ashley and Lawie, 2001). Many of these minerals present a high spatial variability and many of them can be found in higher concentrations in deeper layers (Li et al., 2017). However, As is slightly bioaccessible when coming from natural sources (Juhasz et al., 2007).

Soils and rocks are also natural sources of the radioactive gas Radon (Rn). Radon diffusion from deeper layers to the surface is controlled, in part, by soil structure and its porosity (Hafez and Awad, 2016). High natural radioactivity is common in acidic igneous rocks, mainly in feldspar-rich rocks and illite-rich rocks (Blume et al., 2016). Gregorič et al. found higher emissions of radon from soils containing carbonates than from any other soil or rock types (Gregorič et al., 2013). Reference data for other natural radionuclides in rocks and soils are shown in Table 1

Rock/Soil	^{40}K	^{226}Ra	^{232}Th
Sandstones	461	35	4
Claystones	876	n.d.	41
Schist (Franconia)	1000	3000	60
Carbonates	97	<10	5
Acidic igneous rocks	997	37	52
Basic igneous rocks	187	10	8
Soils developed from loess	n.d.	41	54
Soils developed from granite	~1100	65–75	38–72
Soils developed from quartzite	~300	54–56	63–70
Soils developed from phyllite	n.d.	40–70	50–80

Specific activities of natural radionuclides in rocks and soils (given in Bq kg-1). Source: Blume et al., 2016

Natural events such as volcanic eruptions or forest fires can also cause natural pollution when many toxic elements are released into the environment. These toxic elements include dioxin-like compounds (Deardorff, Karch and Holm, 2008) and polycyclic aromatic hydrocarbons (PAHs). High level of heavy metals have been identified in volcanic soils in Réunion that can be associated with the active volcanic activity, mainly mercury (Hg), or with the weathering of the parent material, where high levels of chromium (Cr), copper (Cu), niquel (Ni) and zinc (Zn) have a natural pedo-geochemical origin (Dœlsch, Saint Macary and Van de Kerchove, 2006). High levels of Cr and Ni have also been reported in volcanic Indonesian soils, associated with pedo-geochemical origins (Anda, 2012). However, this natural pollution does not normally cause environmental problems due to the regenerative ability and the adaptation capacity of plants (Kim, Choi and Chang, 2011). The problems arise when the ecosystems are subject to external pressures, which alter their resilience and response ability.

Polycyclic aromatic hydrocarbons can also occur naturally in soils. They are usually of cosmogenic origin, being relatively common in cosmic dust samples and meteorites (Basile, Middleditch and Oró, 1984; Li, 2009), or derive from the diagenetic alteration processes of waxes contained in soil organic matter (Trendel et al., 1989). Biogenic production of PAHs is favoured under reducing conditions (Thiele and Brümmer, 2002).

Naturally occurring asbestos (NOA) are fibrous minerals that occur naturally in soils formed from ultramafic rock, especially serpentine and amphibole. The main risk associated with NOA is inhalation exposure of humans related to extraction activities, while its natural presence in soils poses a negligible risk to the environment. However, NOA can be easily dispersed by wind erosion, and their mobilization will depend on the characteristics of the asbestos-containing materials, soil properties, humidity, and local weather conditions (Swartjes and Tromp, 2008). The environmental issues caused by NOA arise when they are released from soils close to urban areas, because asbestos is a carcinogenic substance, posing a high risk to human health from inhalation (Lee et al., 2008).

ANTHROPOGENIC SOURCES

Centuries of anthropogenic activities have resulted in a widespread problem of soil pollution around the world (Bundschuh et al., 2012; DEA, 2010; EEA, 2014; FAO and ITPS, 2015; Luo et al., 2009; SSR, 2010).

The main anthropogenic sources of soil pollution are the chemicals used in or produced as by-products of industrial activities, domestic and municipal wastes, including wastewater, agrochemicals, and petrol-derived products (Figure 3). These chemicals are released to the environment accidentally, for example from oil spills or leaching from landfills, or intentionally, as is the case with the use of fertilizers and pesticides, irrigation with untreated wastewater, or land application of sewage sludge.

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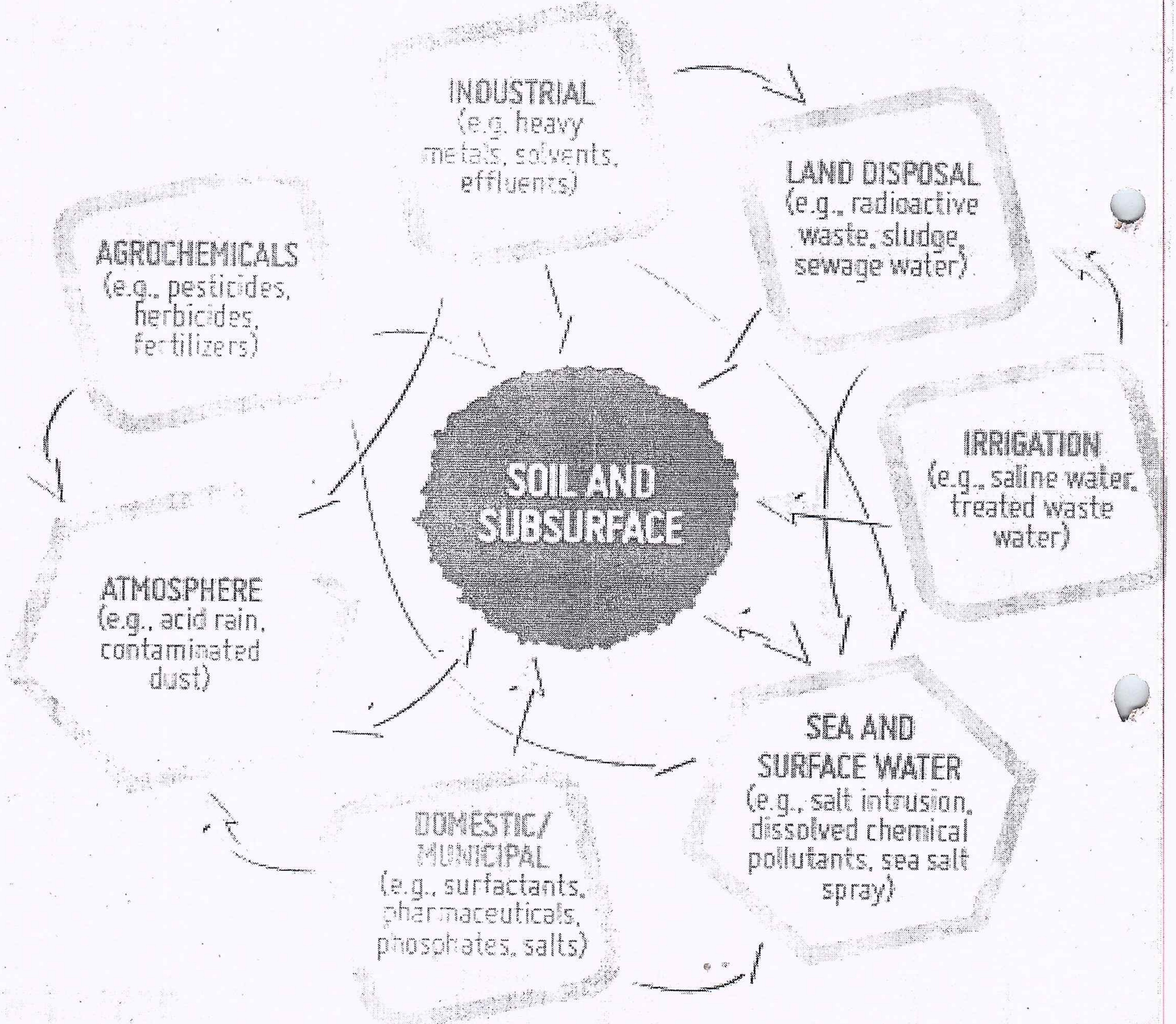

Potential interrelated pathways for soil-subsurface chemical contamination. Source: Yaron, Dror and Berkowitz, 2012

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INDUSTRIAL ACTIVITIES

The range of chemicals used in industrial activities is vast, as is their impact on the environment.

Industrial activities release pollutants to the atmosphere, water and soil. Gaseous pollutants and radionuclides are released to the atmosphere and can enter the soil directly through acid rain or atmospheric deposition; former industrial land can be polluted by incorrect chemical storage or direct discharge of waste into the soil; water and other fluids used for cooling in thermal power plants and many other industrial processes can be discharged back to rivers, lakes and oceans, causing thermal pollution and dragging heavy metals and chlorine that affect aquatic life and other water bodies. Heavy metals from anthropogenic activities are also frequent in industrial sites and can arise from dusts and spillages of raw materials, wastes, final product, fuel ash, and fires (Alloway, 2013).

According to the European Directive concerning integrated pollution prevention and control (IPPC) (EC, 1996), potentially polluting activities can be grouped into six main categories: 1) energy industries; 2) production and processing of metals; 3) mineral industry; 4) chemical industry and chemical installations; 5) waste management; and 6) other activities (which include paper and board production, manufacture of fibres or textiles, tanning of hides and skins, slaughterhouses, intensive poultry or pig rearing, installations using organic solvents, and the production of carbon or graphite) (García-Pérez et al., 2007)

Salinization, another major threat to global soils, affects many soils which are close to certain industrial activities, mainly those associated with chlor-alkali, textiles, glass, rubber production, animal hide processing and leather tanning, metal processing, pharmaceuticals, oil and gas drilling, pigment manufacture, ceramic manufacture, and soap and detergent production (Saha et al., 2017).

MINING

Mining has had a major impact on soil, water and biota since ancient times (FAO and ITPS, 2015). Many documented examples can be found of heavily contaminated soils associated with mining activities around the world (Alloway, 2013)

Metal smelting to separate minerals has introduced many pollutants into the soil. Mining and smelting facilities release huge quantities of heavy metals and other toxic elements to the environment; these persist for long periods, long after the end of these activities (Ogundele et al., 2017).

Toxic mining wastes are stocked up in tailings, mainly formed by fine particles that can have different concentrations of heavy metals. These polluted particles can be dispersed by wind and water erosion, sometimes reaching agricultural soils. For example, Mileusnić et al. found high levels of lead and copper in agricultural fields located near a tailings dam in Namibia (Mileusnić et al., 2014). Toxic concentrations of chromium and nickel were also found in agricultural soils near an abandoned chromite-asbestos mine waste in India and in crops grown in those soils, resulting in a high risk to human and livestock health (Kumar and Maiti, 2015)

The use of phosphate rocks, which are naturally rich in radioactivity, in the production of fertilizers generates a by-product called phosphogypsum, which maintains nearly 80 percent of its original radioactivity due to 238U decay products such as radon, 226Ra, and polonium, 210Po. These industries generate a radioactive source of pollution, which constitutes a threat to the surrounding ecosystems and organisms (Bolívar, García-Tenorio and García-León, 1995).
Significant point-source soil pollution occurs from oil and gas extraction due to spills of crude oil and brines. Brines have high salinity levels and can also contain toxic trace elements and naturally occurring radioactive materials. Brine spills are widespread: for example, Lauer et al. state that there have been approximately 3 900 brine spills associated with unconventional oil and gas production (including fracking) from the Bakken region of North Dakota since 2007 (Lauer, Harkness and Vengosh, 2016). Spills of crude oil from well sites and from pipelines are also a major source of soil pollution in oil producing areas.

URBAN AND TRANSPORT INFRASTRUCTURES

The widespread development of infrastructure such as housing, roads and railways has considerably contributed to environmental degradation. Their more evident negative effects on soil are soil sealing and land consumption. Apart from these known soil threats, another major impact of infrastructure activities is the entry into the soil system of different pollutants. Despite its being a major threat, soil pollution from infrastructure activities has received very minor consideration in terms of planning and impact assessment.

Activities linked to transportation in and around urban centers constitute one of the main sources of soil pollution, not only because of the emissions from internal combustion engines that reach soils at more than a 100 m distance by atmospheric deposition and petrol spills, but also from the activities and the changes that result from them as a whole (Mirsal, 2008). Splashes generated by traffic during rainfall events and runoff, which may be significant if the drainage system is not well maintained, may translocate particles rich in heavy metals from the corrosion of metal vehicle parts, tires and pavement abrasion (Venuti, Alfonsi and Cavallo, 2016; Zhang et al., 2015b) and other pollutants such as polycyclic aromatic hydrocarbons, rubber and plasticderived compounds (Kumar and Kothiyal, 2016; Wawer et al., 2015). Soil pollution associated with roads and highways is especially important in urban and peri-urban soils, and can be a major threat when food production occurs in adjacent areas. Foliar deposition and root uptake and transfer to above-ground tissues of bioavailable heavy metals are the main processes observed in roadside soil (Hashim et al., 2017; Kim et al., 2017; Zhang et al., 2015b). Grazing in roadside soils is also quite common, and the ingestion of contaminated soil and plants constitutes potential dietary transfer of pollutants affecting animal and human health (Cruz et al., 2014).

A major legacy source of soil pollution associated with transport is lead contamination of soils from leaded gasoline. Mielke and Reagan cite research that over 10 million tonnes of lead was transferred to the global environment via the motor vehicle fleet, about 5.9 million tonnes in the United States of America alone (Mielke and Reagan, 1998). The soil contamination that resulted from this was concentrated around roads and is especially high in core urban areas.

Municipal waste disposal by landfills, illegal or not, and untreated wastewater release into the environment are important sources of heavy metals, poorly biodegradable organic compounds and other pollutants which enter the soil. In most developed countries, strict regulations control the disposal and recycling of waste, solids and liquids (EC, 1986; US Federal Register, 1993), but there are countries where residue treatment and disposal are still posing a risk to the environment and to human health.

Many household chemicals, particularly those used in bulk quantities such as detergents and personal care products (PPCPs), also end up as sanitary sewage. Biosolids generated from municipal wastewater treatment can be a major sink for many PPCPs, and their land application can potentially introduce these contaminants into terrestrial and aquatic environments. The historical and continuing use of DDT for control of vector-borne diseases such as malaria has led to pollution of soils in urban and peri-urban areas (Mansouri et al., 2017)

Lead-based paint is a major legacy source of lead (Pb) contamination in urban areas. Soils become contaminated when lead-based paint is pulverized into dust or small particles during renovations or demolition and then enters the environment (Mielke and Reagan, 1998). In the United States of America, approximately equal tonnages of lead were used in leaded gasoline between 1929 and 1989 as were used in white-lead paint pigments between 1884 and 1989, with peak use of lead-based paint in the 1920-29 period (Mielke and Reagan, 1998)

Plastics are also a major source of pollution. They are widely used in food packaging, shopping bags, and household items such as toothbrushes and pens, facial cleansers, and many other common items. Plastics have a strong presence in the environment globally. They are, in general, extremely persistent in the environment and they widely accumulate in oceans and landfills, but also in soils where producing factories are located. Polymers are usually considered to be biochemically inert and do not pose a threat to the environment. Unreacted residual monomers or small oligomers can, however, be found in the plastic material, since polymerization reactions are seldom complete (Araújo et al., 2002). The most hazardous monomers, classified as

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either carcinogenic or both carcinogenic and mutagenic, are those belonging to families of polyurethanes, polyacrylonitriles, polyvinyl chloride, epoxy resins and styrenic copolymers (Lithner, Larsson and Dave, 2011). In addition, several thousand different additives such as brominated flame retardants, phthalates and lead compounds are used in the production of plastic. Many of these additives are considered harmful, with demonstrated disruptions to endocrine function, and carcinogenic and mutagenic effects on living organisms (Darnerud, 2003; Heudorf, Mersch-Sundermann and Angerer, 2007; Lithner, Larsson and Dave, 2011). All plastic, from the macro- to the nano-scale, are at risk of being leached and of adsorbing hazardous substances such as persistent organic pollutants and polycyclic aromatic hydrocarbons (Björnsdotter, 2015). They also accumulate heavy metals in high proportions (Mato et al., 2001). The size and surface area are important factors influencing the leaching and adsorption behaviour: the smaller the particle, the larger the surface-volume ratio. The capacity to release or bind compounds is therefore also higher for smaller particles than for larger ones.

Plastics can reach the soil and aquatic systems via wastewater-treatment plants, but they can also be transported and suspended by wind from landfills and become airborne and widely dispersed. In agricultural fields in which plastic mulching is practised, an abundant source of plastic material is available in the soil. The presence and effects of plastic in aquatic organisms and ecosystems are well documented (Browne et al., 2008; Thompson, 2004); however, the risks to human health and terrestrial ecosystems from the use of plastic polymers and products still needs to be assessed (Lithner, Larsson and Dave, 2011; Rillig, 2012; Rocha-Santos and Duarte, 2015). Almost no studies on plastics' fate in soil have been conducted.

WASTE AND SEWAGE GENERATION AND DISPOSAL

As the global population increases, so does the generation of waste. In developing and least developed countries, high rates of population growth and increasing waste and sludge production, combined with lack of municipal services that deal with waste management, create a dangerous situation. According to a World Bank report (Hoornweg and Bhada-Tata, 2012), the global production of municipal solid waste was estimated to be 1.3 billion tonnes per year in 2012, varying from 0.45 kg per person and per day in sub-Saharan Africa to 2.2 kg per capita annually in the Organisation for Economic Co-operation and Development (OECD) countries. Future predictions are worrying, however, as waste production is expected to rise to 2.2 billion tonnes by 2025.

Municipal waste disposal in landfills and incineration are the two most common ways to manage waste. In both cases, many pollutants, such as heavy metals, polyaromatic hydrocarbons, pharmaceutical compounds, personal care products and their derivative products accumulate in the soil (Swati et al., 2014), either directly from landfill leachates that may be polluting soil and under groundwater, or by ash fallout from incinerating plants (Mirsal, 2008). Baderna et al. discovered a complex mixture of pollutants in a landfill leachate that alters groundwater quality and in turn affects the food chain (Baderna et al., 2011)

Establishments that recycle lead batteries have been identified as major sources of soil contamination around the world. This is especially the case in Africa, where the lead battery industry has notably expanded in the last few years and will continue to grow, but where regulations are weak or absent (Gottesfeld et al., 2018). The proximity of lead battery industries and recycling plants to communities poses a high risk to human health, as was demonstrated by blood samples where lead levels exceeded screening level criteria (US Agency for Toxic Subtances and Disease Registry, 2011; Zahran et al., 2013)

The twenty-first century has resulted in improvements in communication and important technological developments. The production of electrical and electronic equipment is growing rapidly in the world and will continue to grow, with developing countries becoming major producers within the next decade (Robinson, 2009). However, once devices become obsolete or are no longer functioning, they eventually become waste. Electronic waste, or e-waste, contains valuable elements, such as copper and gold, but also many other hazardous substances that make it impossible to treat it in a similar manner as regular urban waste. In Europe and North America, the majority of e-waste remains unrecycled (Barba-Gutiérrez, AdensoDíaz and Hopp, 2008; Sthiannopkao and Wong, 2013), while e-waste has become a source of income in developing or emerging industrialized countries. Itai et al. reported high concentrations of heavy metals and of rare metalloids (In, Sb, Bi) in an e-waste recycling site in Ghana, indicating that these metalloids should be included in risk assessment approaches (Itai et al., 2014). Formal recycling centres comprise only 25 percent of the industry, however, and e-waste is mostly recycled in informal sectors using primitive techniques such as burning cables for the harvesting of copper. These techniques release a multitude of hazardous substances (flame retardants, dioxin-like compounds, polycyclic aromatic hydrocarbons, heavy metals) without taking into account protective measures for the environment or for human health (Perkins et al., 2014).

The use of sewage sludge to amend soils may be beneficial, as it adds organic matter and nutrients to soils. However, if that sewage sludge has not been pre-treated before its application, many pollutants such as heavy metals can accumulate in the soil and eventually enter the food chain. In Europe, the use of sewage sludge is regulated, but this is not the case everywhere

The use of treated wastewater for agricultural irrigation is common in arid and semiarid regions as a solution to water scarcity (Jefatura del Estado, 2001; Keraita

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and Drechsel, 2004; Uzen, 2016). In Israel, for example, over 80 percent of municipal treated sewage is re-used (Katz, 2016), and 26 percent of Pakistan's vegetable production is irrigated using wastewater (Ensink et al., 2004). The use of recycled wastewater in the arid regions of Spain has addressed the issue of water deficit, but is also a way to add nutrients, and has led to an increase in crop productivity (Dorta-Santos et al., 2014). The use of wastewater can, however, be an issue in countries where water quality guidelines and legislation do not exist. Improper use of wastewater can lead to the deposition of heavy metals, salts, PPCPs and pathogens, if they are not completely removed after treatment or in cases where wastewater is left untreated (Dalkmann et al., 2014; Flores-Magdaleno et al., 2011; Pedrero et al., 2010).

MILITARY ACTIVITIES AND WARS

Until the twentieth century, most conflicts were of local magnitude and had relatively little impact on soils. However, modern warfare makes use of non-degradable weapons of destruction and of chemicals that can remain in the affected soils for centuries after the end of the conflict (FAO and ITPS, 2015). The nature of soils can be considerably modified by warfare activities in both wartime and times of peace due to military activities such as test-firing facilities. Total and sometimes even partial recovery of these soils can take many years, and in some cases even centuries (Certini, Scalenghe and Woods, 2013).

The First and Second World Wars left Europe with a significant heritage of pollution (land mines, remains of ammunitions and leftover chemicals, radioactive and biological toxic agents), not only in the battlefields but also in sites such as shooting areas, barracks and storage of armaments. This legacy has made the soils in some of these areas unsuitable for any kind of exploitation or service provision. There are approximately 110 million mines and other unexploded ordnance (UXO) scattered in 64 countries on all continents, remnants of wars from the early twentieth century up until today (Kobayashi, 2012)

The disposal of munitions, and the lack of care in their manufacturing caused by the urgency of the situation at the time of their production, can contaminate soils for extended periods of time. There is little published evidence on this type of contamination, largely because of restrictions placed by governments of many

countries on the publication of material related to warfare. In Berlin, for example, more than a thousand hectares presented high levels of contamination (Schafer, 1995); Gruinard Island, in western Scotland, is still polluted with anthrax spores that were used as potential biological weapons, despite remediation efforts (Szasz, 1995; WHO, 2008). Mustard gas stored during the Second World War has also contaminated some sites for up to 50 years (Watson and Griffin, 1992).

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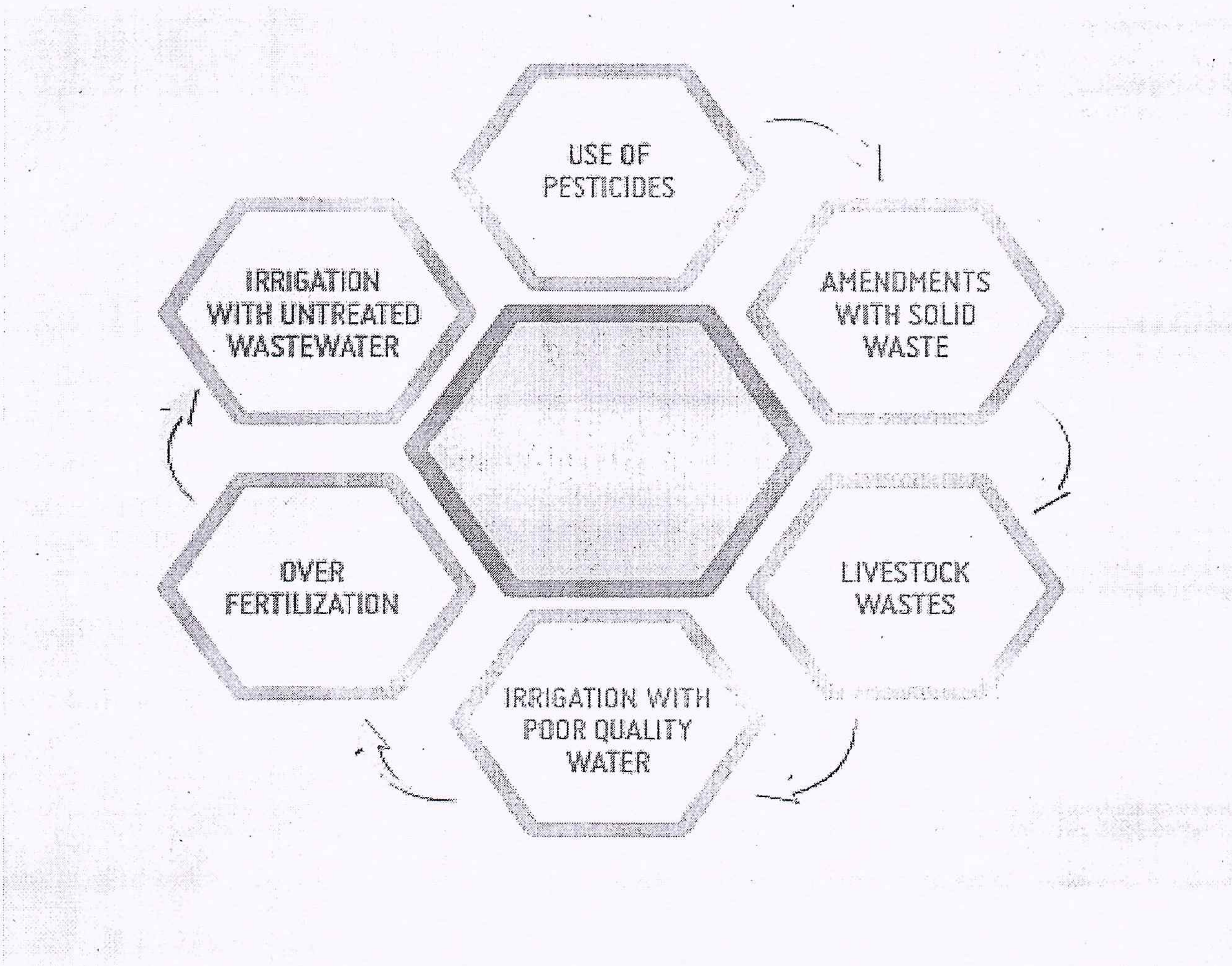
AGRICULTURAL AND LIVESTOCK ACTIVITIES

The different agricultural sources of soil pollutants include agrochemical sources, such as fertilizers and animal manure, and pesticides (Figure 4). Trace metals from these agrochemicals, such as, Cu, Cd, Pb and Hg, are also considered soil pollutants as they can impair plant metabolism and decrease crop productivity. Water sources for irrigation can also cause soil pollution if they consist of waste water and urban sewage. Excess N and heavy metals are not only a source of soil pollution, but also a threat to food security, water quality and human health, when they enter the food chain (FAO and ITPS, 2015).



Agricultural sources of soil pollution

Point sources of pollution in agricultural settings include accidental spills of hydrocarbons in agricultural fields used as fuels for machines or of agrochemicals during their transportation and storage stages.

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As mentioned earlier, livestock production can also be a source of pollution, especially if the waste is not properly managed and disposed of: the urine and faeces may contain parasites and medical substances that can persist and accumulate in the soil (Zhang et al., 2015a). Many medical substances are lipolytic and not readily degradable and therefore have the potential to be retained in the sludge or the manure, which in turn may be used as fertilizer. Such retention can greatly affect microorganisms and other beneficial organisms in the soil (Halling-Sørensen et al., 1998).

Excessive application of fertilizers and manure or inefficient use of the main nutrients (N and P) in fertilizers are the main contributors to environmental issues linked to agriculture (Kanter, 2018). These two nutrients are a source of diffuse pollution. Excess N can also be lost to the atmosphere through greenhouse gas emissions, and excess P contributes to the eutrophication of neighbouring sources of water. Excessive fertilizer usage can lead to soil salinity, heavy metal accumulation, water eutrophication and accumulation of nitrate, which can be a source of environmental pollution but also a threat to human health. The fertilizer industry is also considered to be a source of heavy metals such as Hg, Cd, As, Pb, Cu, Ni and Cu, and natural radionuclides like 238U, 232Th and 210Po. Proper handling and management of fertilizer is crucial to avoid polluting the soil (Stewart et al., 2005).

Compost and animal residues are an important source of nutrients. They contribute to achieving a circular economy, reducing the environmental impacts of waste and increasing organic matter and nitrogen content in soils while reducing external inputs in agroecosystems (Shiralipour, McConnell and Smith, 1992). Xia et al. reported an overall increase in crop production of 4.4percent when manure partially substituted synthetic fertilizers (Xia et al., 2017). The substitution enhanced crop uptakes of N and other nutrients, and significantly reduced N losses by volatilization, erosion and leaching, mainly due to its property of slow nutrient release and to the promotion of microbial immobilization of bioavailable N. However, yield increase depends on the manure and crop types considered (Wang et al., 2016; Xia et al., 2017). Furthermore, compost and manure are great sources of organic matter (Zhao et al., 2014b).

A recent report by the Production and Plant Protection Division of the Food and Agriculture Organization of the United Nations (FAO) documented that global manure production from all livestock has increased by 66 percent, from 73 to 124 million tonnes of N, from 1961 to 2016, with manure applied to soils increasing from 18 to 28 million tonnes of N, and N input from manure left on pasture increasing from 48 to 86 million tonnes of N (Raffa et al., 2018)

Despite their potential benefit for agriculture, there is sufficient scientific evidence of the increase in heavy metals content, pathogens, and veterinary antibiotics residues, which may lead to antimicrobial-resistant bacteria proliferation in soils amended with livestock manure. Heavy metals in livestock manure mainly come from feed (Nicholson et al., 1999), while antibiotics are utilized to prevent and treat diseases and as growth promoters (Kumar et al., 2005). Nicholson et al. conducted an inventory across agricultural fields in England and Wales to determine the main sources of heavy metals (Nicholson et al., 2003). After atmospheric deposition, which is the main source, livestock manures and sewage sludge were identified as important sources of contamination. These were especially important for Zn, Cu, Ni, Pb and Cr contamination (Nicholson et al., 1999; Wang et al., 2016).

Pesticides are substances, or mixtures of substances, intended for preventing, destroying or controlling any pest causing harm or interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products (FAO, 2006). Pesticides are a subset of the overall range of pesticides. They have been intentionally released into the environment at a larger scale since the Second World War, when DDT's insecticidal properties were discovered. The use of pesticides has helped provide food for an increasing population similarly to the application of nutrients; however, the over use of pesticides can have negative effects on human health and the environment (Popp, Pető and Nagy, 2013; FAO and ITPS, 2017). Negative effects on soil organisms have been widely studied (Bünemann, Schwenke and Van Zwieten, 2006; Jacobsen and Hjelmsø, 2014; Komárek et al., 2010; Nguyen et al., 2016; Ockleford et al., 2017; Puglisi, 2012), and health problems have been related to exposure to pesticides and other agrochemicals (Bhatia et al., 2005). The major threat to human health is being exposed to low dose levels over a lifetime (WHO, 1993), as the direct short-term effects of such exposure are not obvious.

Considering the need to have coordinated efforts regarding hazardous chemicals, the Rotterdam Convention was adopted on 10 September 1998. It aims to promote shared responsibility and cooperative efforts among Parties in the international trade of hazardous chemicals and pesticides in order to protect human health and the environment from potential harm. The Convention contributes to the environmentally sound use of such chemicals, by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties

The benefit of the Convention is to prevent unwanted trade in the chemicals included in the legally binding prior informed consent (PIC) procedure. It enables member governments to alert each other to potential dangers by exchanging information on banned or severely restricted chemicals and to take informed decisions on them. It makes the international trade in hazardous chemicals more transparent and less vulnerable to abuse through its export notification provisions and by encouraging harmonized labelling of exported chemicals. The Convention also calls for the provision of technical assistance to help establish the infrastructure and capacity necessary to safely manage chemicals.

The International Code of Conduct on Pesticide Management (FAO, 2003) provides a voluntary framework and standards for managing pesticides throughout their life cycle. The Code is directed primarily at government authorities and the pesticide industry but is also relevant for other stakeholders. The Code is supported by technical guidelines and toolkits, for example the Registration Toolkit (http://www.fao.org/pesticide-registration-toolkit/en/) and the Environmental Management Toolkit for Obsolete Pesticides (EMTK)

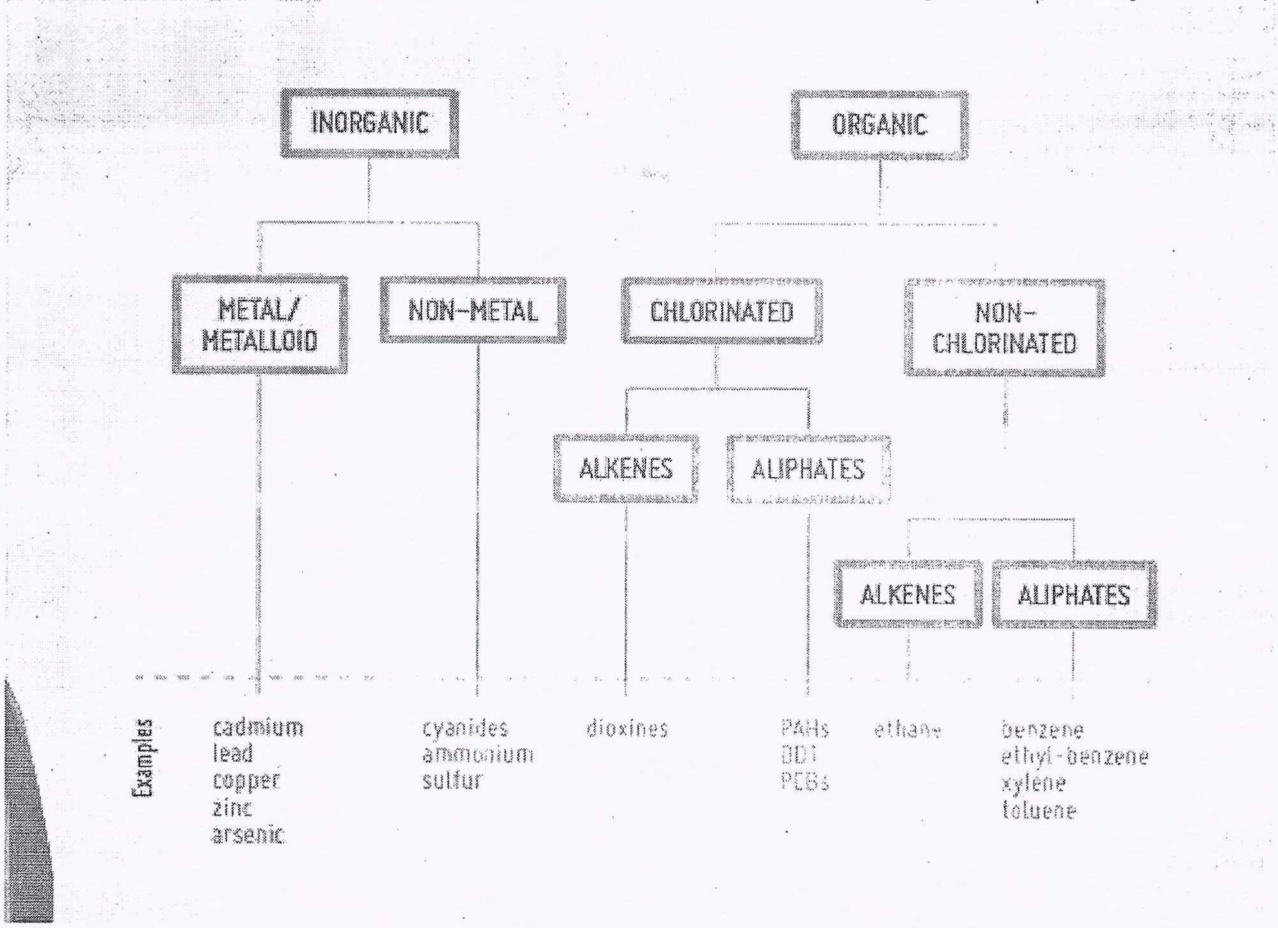
Stocks of obsolete, unwanted and banned pesticides continue to represent a threat to human health, the environment and the sustainable development of the regions in which they are found. The reasons for the accumulation of obsolete pesticide stocks are well documented. They include poor storage and management of pesticide stocks, international bans on the use of harmful pesticides, untimely donations of pesticides, over-ordering and supply and procurement of strategic stocks of pesticides for migratory pest control, which are then not used completely or not needed. Pesticide stocks are often stored under very poor conditions, resulting in container deterioration and leakage into the surrounding environment and ultimately affecting soil and ground water quality. The volumes 1-4 of the FAO EMTK series are designed to assist countries with the risk management of obsolete pesticide stocks. Volume 6 is intended to provide practical methods to assist countries in the formulation of strategies for the management of pesticide contaminated land. As risk reduction largely depends on the accuracy of site investigation and associated risk assessment this document is meant to be used in close conjunction with EMTK Volume 5, the outputs of which are critical in the design of pesticide contaminated land environmental management plans.

Other sources of agricultural pollution include arsenic pollution due to concentrated animal feeding operations (CAFOs), plastic residues from plastic mulching, use of contaminated groundwater for irrigation, and many more. Liu et al., and Cang et al. looked at soil pollution caused by poultry and livestock, and both of them found significant levels of heavy metals coming from livestock and poultry operations (Cang et al., 2004; Liu et al., 2015).

MAIN POLLUTANTS IN SOIL

The release of pollutants to the environment, as has been mentioned, usually originates from anthropogenic processes. Even if some elements and compounds occur naturally in soils, human interventions are the main drivers of soil pollution. The following sections discuss only a small subset of the most common pollutants affecting agricultural areas, and the properties that make these compounds pollutants.

Pollutants have been divided by their chemical characteristics, but some of the categories presented here overlap. Swartjes proposed a systematic categorization of pollutants (Figure 5) that may be useful in better understanding them (Swartjes, 2011)



Systematic categorization of the main pollutants in soils. Source: Swartjes, 2011

HEAVY METALS AND METALLOIDS

The term "heavy metals" refers to the group of metals and metalloids of relatively high atomic mass (>4.5 g/cm3) such as Pb, Cd, Cu, Hg, Sn, and Zn, that can cause toxicity problems. Other non-metals that are often considered together with heavy metals include As, antimony (Sb) and selenium (Se) (Kemp, 1998). These elements naturally occur at low concentrations in soils. Many of them are essential micronutrients for plants, animals and humans, but at high concentrations may cause phytotoxicity and harm human health because of their non-biodegradable nature, which causes them to readily accumulate in tissues and living organisms.

The main anthropogenic sources of heavy metals are industrial areas, mine tailings, disposal of high metal wastes, leaded gasoline and paints, application of fertilizers, animal manures, sewage sludge, pesticides, wastewater irrigation, coal combustion residues, spillage of petrochemicals, and atmospheric deposition from varied sources (Alloway, 2013).

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Heavy metals are the most persistent and complex kind of pollutants to remediate in nature. They not only degrade the quality of the atmosphere, water bodies, and food crops, but also threaten the health and well-being of animals and human beings. Metals accumulate in the tissues of living organisms because unlike most organic compounds they are not subject to metabolic breakdown. Among the heavy metals, Zn, Ni, Co, and Cu are relatively more toxic to plants, and As, Cd, Pb, Cr and Hg are relatively more toxic to higher animals (McBride, 1994)

The most important elements to consider in terms of food-chain contamination are As, Cd, Hg, Pb and Se (McLaughlin, Parker and Clarke, 1999). The main sources of As in soils are agrochemical compounds and mining and smelting activities, but they can also be introduced in manure originating from livestock feed with As-rich additives. Some parent materials are rich in As and therefore their weathering can also be a source of As in high concentrations.

Trace metals from inorganic (Cu-based) and organic pesticides represent a major environmental and toxicological concern (Komárek et al., 2010). Cu is easily immobilized by soil organic matter (SOM) and Fe- and Mn-(hydro)oxides, remaining at high concentrations on upper layers of soils. However, fungicide-derived Cu has been found in large amounts in the potentially available fraction of the soil (Pietrzak and McPhail, 2004).

NITROGEN AND PHOSPHORUS

Nitrogen (N) is an essential component of all living structures such as proteins, DNA, RNA, hormones, enzymes and vitamins. It occurs in both organic and inorganic forms, and in many different oxidation states. Its available forms differ depending on the specific organism. Unreactive forms such as gaseous nitrogen (N_2) can be assimilated through microbial activity. Plants need more chemically available forms, such as ammonium (NH_4^+) and nitrate (NO_3^-), while animals require complex forms, such as amino acids and nucleic acids (Yaron, Dror and Berkowitz, 2012).

Phosphorus (P) is one of the main macronutrients for all living organisms. It forms part of biological molecules, such as DNA and RNA, and it is used to transport cellular energy via adenosine triphosphate (ATP).

In order to feed the increasing population and to supply the nutrient needs of the many deficient soils around the world, additions of N, P and potassium (K) through synthetic fertilizers were widely adopted through the twentieth century (Tilman et al., 2002). Fertilizer demand has increased globally (Figure 6), supported by global economic growth, leading to an excessive application of fertilizers following the idea "the more, the better." According to FAO, fertilizer global consumption by 2018 is

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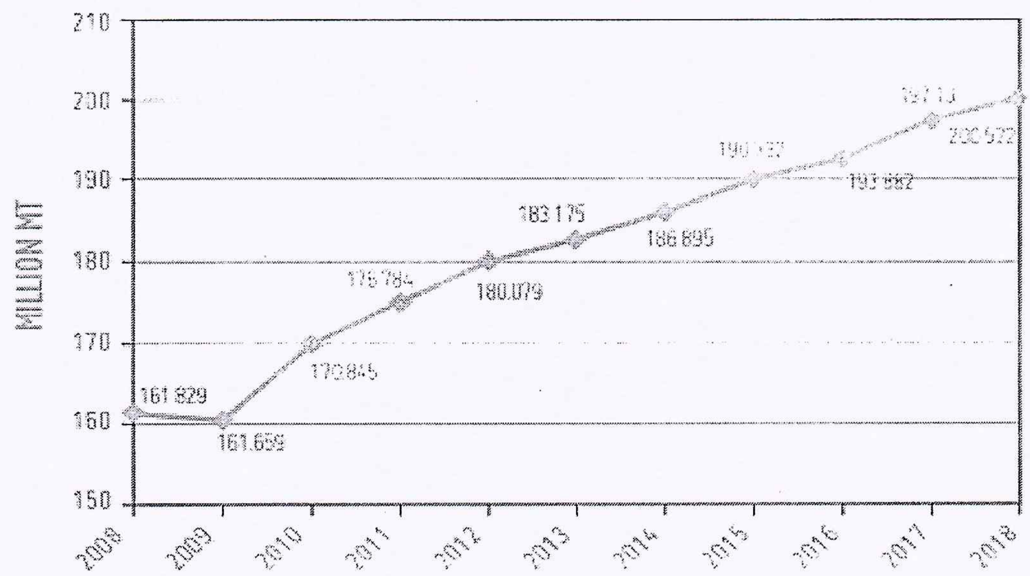
forecast to reach 200 million tonnes, with over 50 percent of global fertilizer consumption concentrated in China, the United States of America, and India (FAO, 2015a). However, there is not a linear correlation between an increase in the amount of fertilizer applied to agricultural soils and an increase in crop production; on the contrary, increases may result in low nutrient use efficiency and in turn lower crop yields (Hossain et al., 2005; Zhu et al., 2005), and may cause acute environmental problems (Good and Beatty, 2011; Vitousek et al., 2009; Withers et al., 2014)



Global synthetic fertilizers consumption. Source: FAO, 2015a

Nitrogen and phosphorus become pollutants when they are applied in excess to agricultural soils in the form of fertilizers, or in areas of intensive livestock production (Carpenter et al., 1998; Torrent, Barberis and Gil-Sotres, 2007). These nutrients are able to leach into the groundwater or be transported to surface water bodies by runoff, causing eutrophication or leading to high nitrate concentrations and related environmental and human health problems (EC, 1991; Frumin and Gildeeva, 2014; Pretty et al., 2003; Yaron, Dror and Berkowitz, 2012). Many heavy metals have also been documented in phosphate and nitrate fertilizers including As, Cd, Cr, Hg, Pb, and Zn (Brevik, 2013)

While nutrients are essential to crop production, when they are applied in excess they can have negative effects on yields. Nitrogen increases chlorophyll production, and energy for flower growth and root elongation is redirected to foliage proliferation, causing disorders in plants and making them more vulnerable to pathogen attacks. It can also affect crop nutrient balance (Hao et al., 2003). Nitrogen pollution influences soil organic matter decomposition, as it affects microbial community composition

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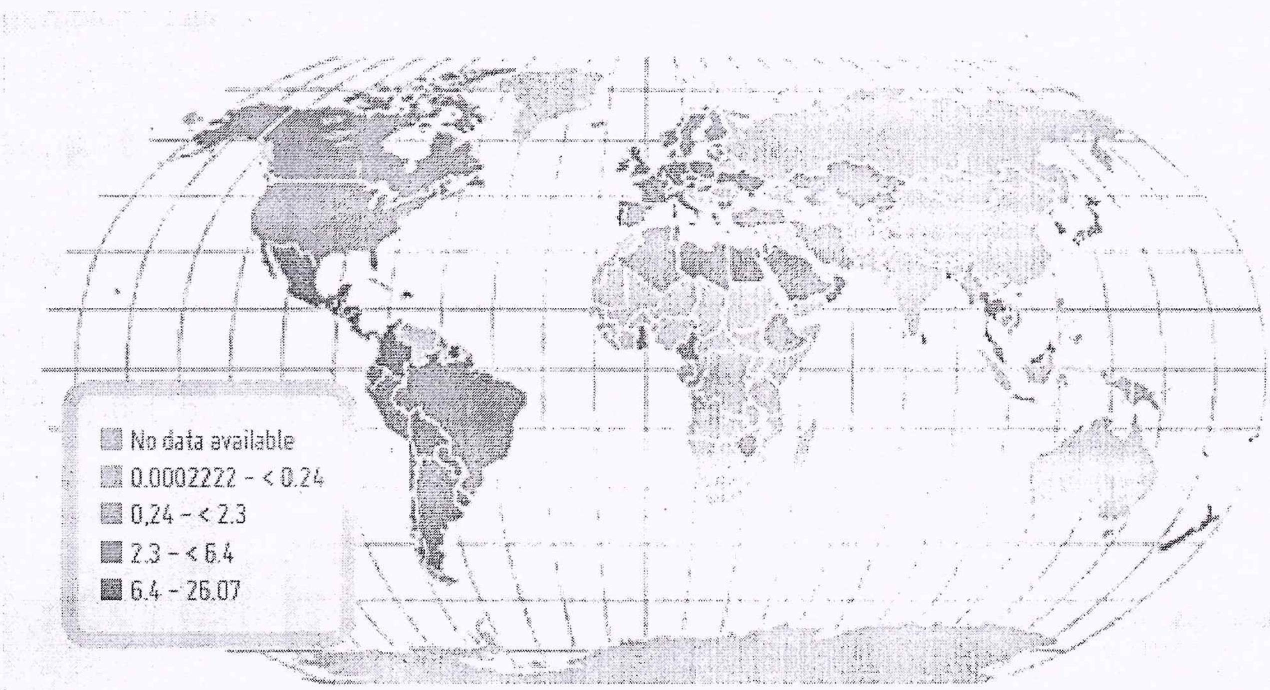
and activities (Bragazza et al., 2006; Luo et al., 2017; Shen et al., 2010; Zhou and Zhang, 2014), as well as soil acidity and salinity (Han et al., 2015).

PESTICIDES

Pesticides are applied to reduce crop losses due to insect pests, weeds and pathogens, and thus to guarantee global food supplies (FAO and ITPS, 2017). Pesticides include but are not limited to insecticides, fungicides, herbicides, rodenticides, molluscicides, nematicides, and plant growth regulators.

Without pesticide use, crop losses have been estimated to vary from 32 percent for cereals to 78 percent in fruit production (Cai, 2008). Pesticides are applied not only on agricultural lands; they also have a great importance on human health protection, for example for sanitary pest control of vector-borne diseases. They are also used to keep infrastructures free of damaging insects and weeds, such as for preventing the attack of wood buildings by termites, or for keeping roadside and train tracks clean in order to help in avoiding accidents (Aktar, Sengupta and Chowdhury, 2009). Their use is not homogeneously distributed around the globe, mainly because of their cost and because pests vary by climatic and geographic region. According to FAOSTAT, FAO's Corporate Database for Substantive Statistical Data (FAOSTAT, 2016), some low and middle income countries have increased their consumption of pesticides in the last decade. Bangladesh, for example, has increased the use of pesticides by four times, while Rwanda and Ethiopia have increased theirs by over six times. This amount goes up to ten times in the Sudan (Figure 7). Once again, the problem arises when a misuse of pesticides occurs: when they are applied in higher amounts than needed and using practices that contribute to their spreading into the environment, such as spraying with not suitable/not maintained/not calibrated application equipment or by planes into vast regions, affecting inhabitants and non-target organisms (Carvalho, 2017).



Use of pesticides per hectare of arable land, kg/ha, in the years 2007–2012. Source: FAO, 2015

Pesticides can be either organic or inorganic synthetic molecules. They are classified on the basis of their chemical structures, their mode of action, their way of entry into the body, and their target organisms. Their toxicological effects on pests depend on their chemical composition, which in turn affects their interaction with soil components (Singh, 2012). According to their chemical structure, pesticides can be divided into twelve distinct groups, with the main pesticides in each group listed below:

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- **organochlorine compounds:** DDT, Methoxychlor, Chlordane, Dicofol. BHC/HCH, Aldrin, Endosulfan, Heptachlor, Methoxychlor, Chlordane, Dicofol;

- **organophosphorus compounds:** Parathion, Malathion, Monocrotophos, Chlorpyrifos, Quinalphos, Phorate, Diazinon, Fenitrothion, Acephate, Dimethoate, Fenthion, Isofenfos, Phosphamidon, Temephos, Triazophos;

- **carbamates:** Aldicarb, Oxamyl, Carbaryl, Carbofuran, Carbosulfan, Methomyl, Methiocarb, Propoxur, Pirimicarb;

- **pyrethroids:** Allethrins, Deltametrin, Resmethrin, Cypermethrin, Permethrin, Fenvalerate, Pyrethrum;
- **neonicotinoids:** Acetamiprid, Imidacloprid, Nitenpyram, Thiamethoxam;

- **organotin compounds:** Triphenyltin acetate, Trivenyltin chloride, Tricyclohexyltin hydroxide, Azocyclotin;

- **organomercurial compounds:** Ethyl mercuric chloride, Phenyl mercuric bromide;

- **dithiocarbamate fungicides:** Zineb, Maneb, Mancozeb, Ziram;

- **benzimidizole compounds:** Benomyl, Carbendazim, Thiophanate methyl;

- **chlorphenoxy compounds:** 2,4-D, TCDD, DCPA, 2,4,5-T, 2,4-DB, MCPA, MCPP;

- **dipyridiliums:** Paraquat, Diquat; and

- **miscellaneous:** DNOC, Bromoxyl, Simazine, Triazamate

Some of the pesticides listed above are also persistent organic pollutants (POPs) and are discussed further below

Some pesticides are also associated with heavy metal contamination of soils. The recent report by the Intergovernmental Technical Panel on Soils (ITPS) on the impact of plant protection products on soil functions and ecosystem services highlighted the severe impact of copper-based fungicides on earthworms and microbial biomass. These fungicides are widely used in organic viticulture to control vine fungal diseases (FAO and ITPS, 2017).

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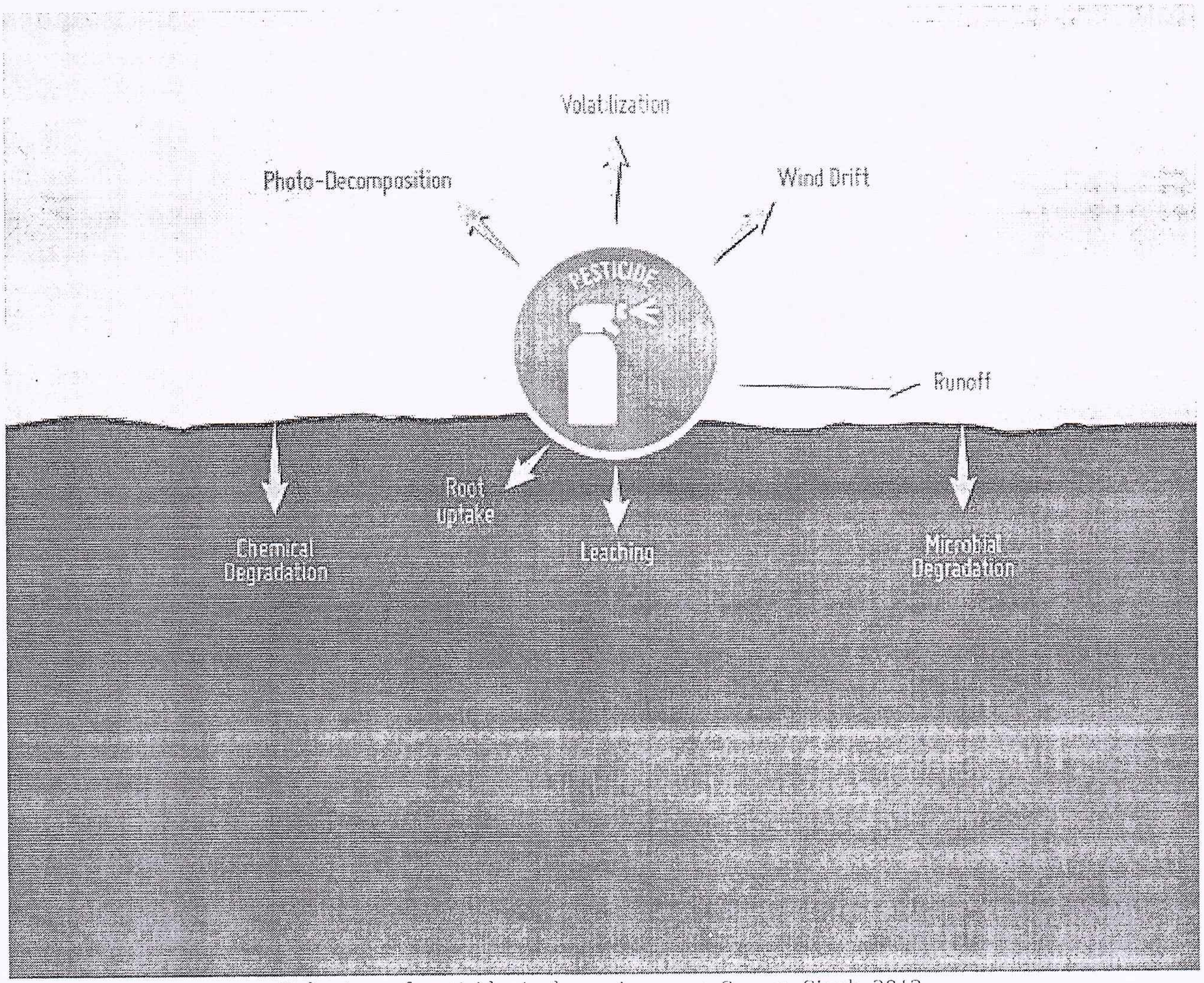
Pesticide persistence, behaviour and mobility are also extremely varied as are the mechanisms involved in their degradation and retention in soils (Figure 8): sorption–desorption, volatilization, chemical and biological degradation, uptake by plants and leaching (Arias-Estévez et al., 2008).



Behaviour of pesticides in the environment. Source: Singh, 2012

POLYCYCLIC AROMATIC HYDROCARBONS

Polycyclic aromatic hydrocarbons (PAHs) are a group of persistent, semi-volatile organic pollutants.

Polycyclic aromatic hydrocarbons represent a broad group of physicochemically different molecules made of two or more unsubstituted benzene rings fused together when a pair of carbon atoms is shared between them. The most frequent PAHs are anthracene, fluoranthene, naphthalene, pyrene, phenantrene and benzopyrene (Lerda, 2011). The very low water solubility of PAHs and the slow mass-transfer rates from

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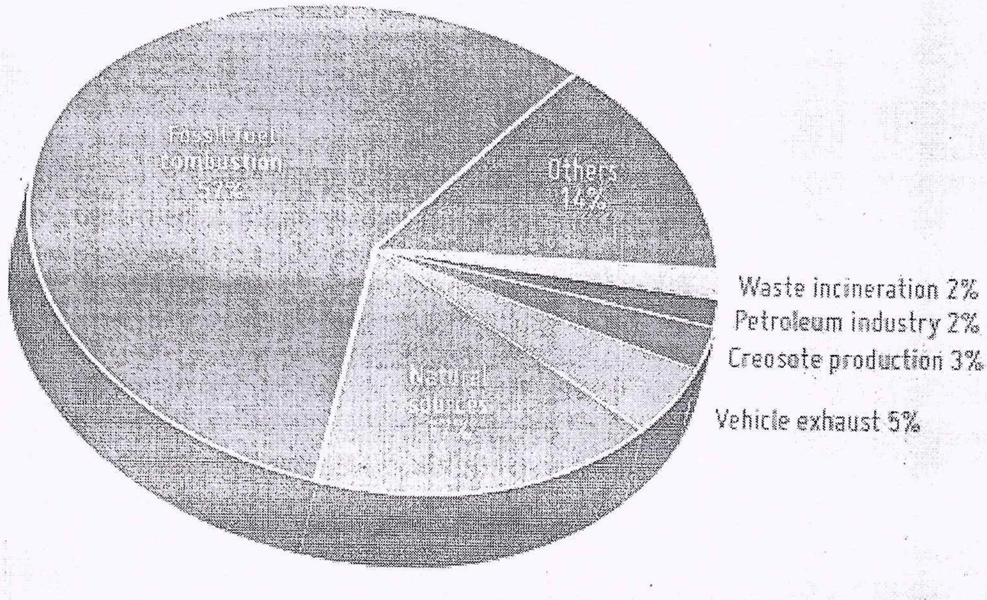
solid phase may limit their availability to microorganisms, thus hindering natural attenuation by microbial processes. Polycyclic aromatic hydrocarbons accumulate in soils because of their persistence and hydrophobicity and tend to be retained in the soil for long periods of time. For that reason, most PAHs are components of POPs and are widespread in air, water, soils, and sediments (Lin et al., 2013). Low-molecular-weight PAHs, with two or three rings, are volatile and occur mainly in the atmosphere, whereas those of medium and high molecular weight are partitioned between the atmosphere and particles, depending on the temperature (Srogi, 2007)

Incomplete combustion of coal, gas, oil, and garbage; pyrolysis of organic materials by industries, agriculture and traffic; diagenetic alteration processes of natural organic matter (OM); long-term wastewater irrigation; reused sewage sludge; and fertilizer use in agricultural production all result in high concentrations of PAHs in agricultural soils (Conte et al., 2001) (Figure 9). For example, in western German forests, brown coal strip-mining sites have been identified as the main sources of low weight PAHs (Aichner et al., 2013), while Khalili et al. identified two- and three-ring PAHs as major products originating from multiple emission sources, including coke ovens, diesel and gasoline engines, and wood combustion (Khalili, Scheff and Holsen, 1995). Traffic emissions and fossil fuel combustion are the main identified sources of PAHs in urban areas (Fabiańska et al., 2016; Keyte, Harrison and Lammel, 2013).



. PAHs global emission sources. Source: Kuppusamy, et al., 2017

Polycyclic aromatic hydrocarbons have attracted attention due to their high toxicity, mutagenicity, carcinogenicity, and widespread presence in the environment (EFSA, 2008). Although there are many PAHs, scientists and regulators have focused on 16 compounds that have been identified as carcinogenic (EC, 2011; US EPA, 1984). Recently, however, many different stakeholders support the implementation of broader regulations that include not only other toxic PAHs but also heterocyclic aromatic compounds and alkyl-derivatives (Andersson and Achten, 2015). In a global analysis of PAH distribution pattern in soils, Wilcke found that Germany and Czechia are more contaminated with PAHs than all other parts of the world that have been studied, such as China, the Russian Federation, Thailand, the United States of America, Brazil and Ghana (Wilcke, 2007). In a more recent study, Loganathan and Lam found higher concentrations of PAHs in soils in India compared to those in Africa, the Islamic Republic of Iran, Brazil, the Russian Federation, Canada and Australia (Loganathan and Lam, 2012). Thus, PAHs are ubiquitous contaminants in soils, but their concentration varies depending on the distance from the pollutant source, soil properties and climatic conditions.

Polycyclic aromatic hydrocarbons that enter soil may be attenuated or degraded by a number of physicochemical and biological processes such as volatilization and/or photo-oxidation to the atmosphere, irreversible sorption to soil organic matter, leaching to groundwater, abiotic loss (influence of daily seasonal temperature fluctuation), uptake by plants or microbial degradation (Okere, 2011; Šmídová et al., 2012). The occurrence of PAHs in unprocessed food is very low and is governed by their relative solubility in water and organic solvents. Polycyclic aromatic hydrocarbons accumulate in the lipid tissues of plants and animals, but they do not tend to accumulate in plant tissues with a high water content. In general, limited transfer from the soil to root vegetables occurs (Abdel-Shafy and Mansour, 2016).

PERSISTENT ORGANIC POLLUTANTS

Persistent organic pollutants (POPs) are chemical substances that persist in the environment, bioaccumulate through the food chain, and have adverse effects on human health and the environment (UNEP, 2001). There are many thousands of POPs, and their origins are numerous, as they have been used in agriculture, disease control, manufacturing and many industrial processes. POPs include chlorinated and brominated aromatics, such as polychlorinated biphenyls (PCBs), which have been useful in a variety of industrial applications, for example in electrical transformers and large capacitors, as hydraulic and heat exchange fluids, and as additives to paints and lubricants; and organochlorine pesticides such as DDT and its metabolites, which are still used to control mosquitoes that carry malaria in some parts of the world. Other chemicals, unintentionally produced, such as dioxins (polychlorinated dibenzo-p-dioxins and –furans), which result from some industrial processes and from combustion (municipal and medical waste incineration and backyard burning of household waste) are also included in this category (US EPA, 2014b).

Persistent organic pollutants are mainly hydrophobic and lipophilic compounds, and therefore present great affinity to organic matter and lipid membranes of cells and hence they can be stored in fatty tissue (Jones and de Voogt, 1999). The Stockholm Convention, a global treaty for protecting humans and the environment against POP contamination, has listed more than 20 POPs so far (Stockholm Convention, 2018). Persistent organic pollutants enter the food chain by accumulating in the body fat of living organisms and becoming more concentrated as they move from one organism to the next in a process known as "biomagnification" (Vasseur and Cossu-Leguille, 2006). Persistent organic pollutants also have high mobility: they can easily penetrate water in its gaseous phase during warm weather and volatilize from soils into the atmosphere. This can then lead to their deposition many miles away from the release point as temperatures cool (Schmidt, 2010). Examples of POP contamination through mobility include the discovery of significant amounts of POPs in isolated regions in the Arctic (AMAP, 1997; Muir and de Wit, 2010). As a general rule, the more chlorinated the molecule, the less water soluble and volatile it is. Polychlorinated biphenyls are poorly taken up by plants but susceptible to bioaccumulation by animals, mainly in adipose tissue and breast milk (Passatore et al., 2014)

Since the publication of the book Silent Spring (Carson, 2002), a multitude of studies have focused on the effects of POPs on living organisms and the environment (de Boer and Fiedler, 2013; Cetin, 2016; Muir and de Wit, 2010; Mwakalapa et al., 2018; Prestt, Jefferies and Moore, 1970; Ratcliffe, 1970; Vasseur and Cossu-Leguille, 2006). Yet there is still a lack of information on the presence of POPs in soils in developing countries (Fiedler et al., 2013). Pollution by POPs could be expected to be significant in dumping sites of developing Asian countries, considering their poor management of municipal wastes and extensive use of such chemicals in the past (Minh et al., 2006).

By the late 1970s most governments had banned PCB production, but an extensive environmental contamination still persists (Figure 10) as a consequence of accidental spills and leaks due to improper transport, storage and disposal (Jones and de Voogt, 1999; Passatore et al., 2014). Despite their use and production having significantly been reduced since the adoption of the Stockholm Convention, POPs persist in the environment, affecting food security, health and the environment for many more generations (Odabasi et al., 2016). Global agreement and increasing efforts and cooperation to remove POPs from soils is essential in preventing future pollution of crops and animals

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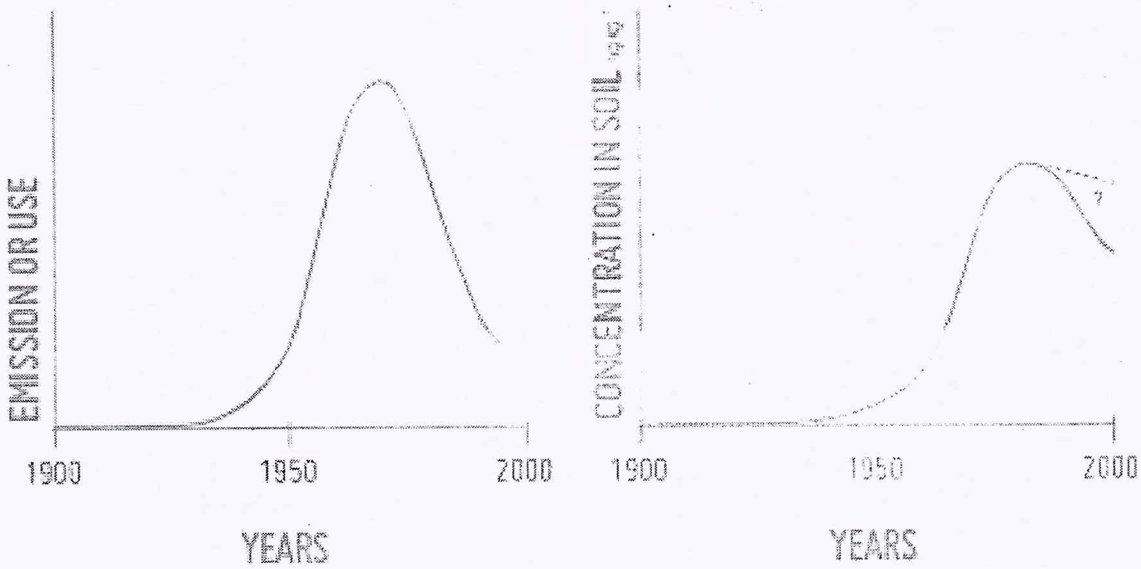

(a) Rate of production/use of POPs in North America and Europe and (b) POPs persistence in soils. Source: Jones and de Voogt, 1999

Soils are the main environmental sink for these persistent pollutants. There, POPs form stable bonds with soil organic matter, where they remain in a non-extractable form. Changes in the soil environment, however, can change partitioning rates of POPs in the soil, leading them to become readily extractable. For example, an increase of 1 °C in air temperature produces an increase in the volatilization of POPs from soils by 8 percent (Komprda et al., 2013). Cold temperatures favour POP deposition (Guzzella et al., 2011), and forest soils can accumulate POPs over extended time periods due to their high organic carbon content (Kukučka et al., 2009). The latitudinal distributions of these compounds (Figure 11) as a consequence of the temperature gradients have been described to respond to a "global distillation effect" (Wania and MacKay, 1996)

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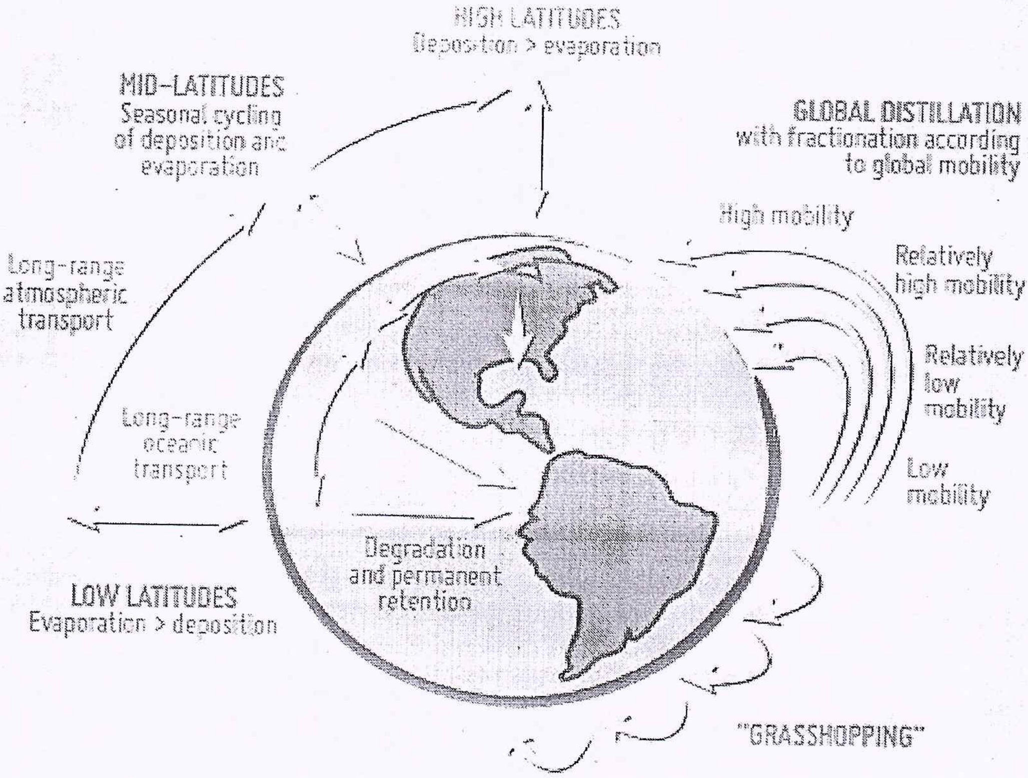

POPs migration processes. Source: Wania and MacKay, 199

Per- and polyfluorinated alkyl substances (PFAS) represent a class of manmade chemicals that has been attracting more attention lately because of their abundance in the environment. Their presence has been confirmed in soils, water and human blood worldwide (Giesy and Kannan, 2001; Kannan et al., 2004; Rankin et al., 2016). Per- and polyfluorinated alkyl substances have been extensively used during the last few decades in military training operations (in fire-fighting foams and metal plating) (Lindstrom, Strynar and Libelo, 2011), and in commercial uses (as in the production of Gore-TexTM and TeflonTM) (Bossi, Dam and Rigét, 2015). Diverse chemical compounds are included in this category; they are highly resistant to degradation and they bioaccumulate in the food chain and result in biomagnification (Giesy and Kannan, 2001; US EPA, 2014c). Per- and polyfluorinated alkyl substances were included in the Stockholm Convention on Persistent Organic Pollutants in 2009 for their potentially harmful effects on human health and their high persistence in organisms, which has been estimated to be 100 days in laboratory rats, but over five years in humans (Wang et al., 2009).

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RADIONUCLIDES

Radionuclides are present in the environment both as a naturally occurring substance and as one of anthropogenic origin (Mehra et al., 2010; Navas, Soto and Machín, 2002). The emission of ionizing radiation during the decay of active atoms is the main contamination route of radionuclides, considering their long half-lives (Table 2)

Isotope	Half-life (yr)	Principal emission	Main occurrence
^{14}C	5.7×10^{3}	β^-	Natural and nuclear reactor
^{40}K	1.3×10^{9}	β^-	Natural
^{90}Sr	28	β^-	Nuclear reactor
^{134}Cs	2	β^-, γ	Nuclear reactor
^{137}Cs	30	β^-, γ	Nuclear reactor
^{239}Pu	2.4×10^{4}	α, X-rays	Nuclear reactor

Characteristics of major radionuclides that occur in soil. Source: Zhu and Shaw, 2000

The most common natural and anthropogenic radionuclides found in soils are 40K, 238U, 232Th, 90Sr and 137Cs (Wallova, Kandler and Wallner, 2012). Anthropogenic sources of nuclear pollution include the global fallout from atmospheric nuclear weapons testing during the middle decades of the last century, operations of nuclear facilities and non-nuclear industry (e.g. coal fire power plants, nuclear waste handling and disposal, and mining of radioactive ores (Ćujić et al., 2015), mineral fertilizers (Schnug and Lottermoser, 2013; Ulrich et al., 2014; Van Kauwenbergh, 2010) and nuclear accidents (Three Mile Island, the United States of America (1979); Chernobyl, Ukrainian SSR (1986); Goiânia, Brazil (1987); Tokaimura (1999) and Fukushima (2011), Japan).

Radionuclides in the soil are taken up by plants, thereby becoming available for further redistribution within the food chain (Zhu and Shaw, 2000). For example, after the Fukushima accident, strict monitoring of agricultural products has been conducted to ensure food safety (Nihei, 2013). The monitoring demonstrated a fast decay in radionuclide content in vegetal products, but also discovered that radionuclides remained bioavailable in soils long after initial contamination (Absalom et al., 1999; Falciglia et al., 2014; Yablokov, Nesterenko and Nesterenko, 2009). Although topsoil removal is highly recommended after a major radioactive accident, it may be not possible for large areas as it would generate a huge amount of radioactive waste. For that reason, agricultural areas are often abandoned for many years. Agricultural countermeasures must be applied to reduce the transfer of radionuclides in the food chain and to facilitate the return of potentially affected soils to their agricultural use (Vandenhove and Turcanu, 2011). The transfer of radionuclides to animal-derived

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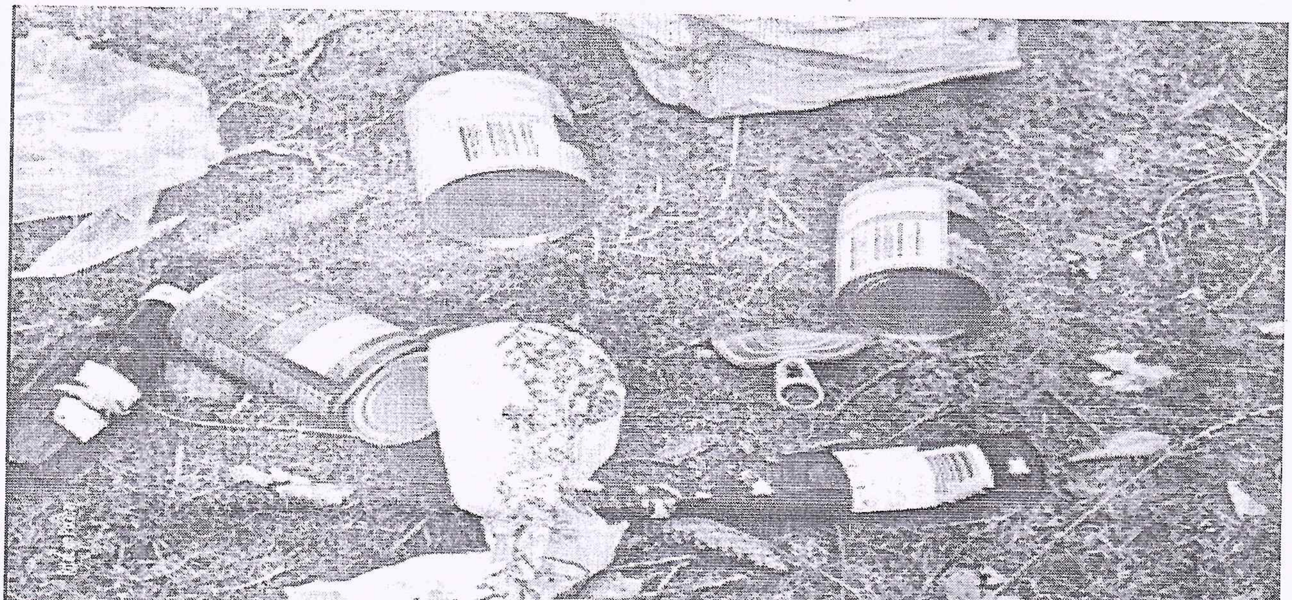
food products has also been analyzed (Howard et al., 2009; Štrok and Smodiš, 2012), but the mechanisms involved are not yet completely clear or well understood

EMERGING POLLUTANTS

Emerging pollutants (EPs) refers to a large number of synthetic or naturally occurring chemicals that have recently appeared in the environment and are not commonly monitored (Geissen et al., 2015). They have the potential to enter the environment and to cause known or suspected adverse ecological and/or human health effects. Emerging pollutants may well become pollutants of emerging concern, as new facts or information have demonstrated that they are posing a risk to the environment and human health (Sauvé and Desrosiers, 2014). Emerging pollutants encompass chemicals such as pharmaceuticals, endocrine disruptors, hormones and toxins, among others, and biological pollutants, such as micropollutants in soils, which include bacteria and viruses.

The anthropogenic production of chemicals has experienced a rapid growth globally since the 1970s. In the European Union in 2016, the chemical industry produced 319 million tonnes of hazardous and non-hazardous chemicals. Of these, 117 million tonnes were deemed to be hazardous to the environment (EUROSTAT, 2018). Global production is projected to increase annually by approximately 3.4 percent until 2030 (Figure 12), and non-OECD countries will be much greater contributors to this production in the future (OECD, 2008). Production and use of hazardous chemicals have been reduced over the last ten years; however, the uncertainties that still remain and the lack of information from many developing countries make it impossible to conclude that risks to the environment and human health have been successfully reduced



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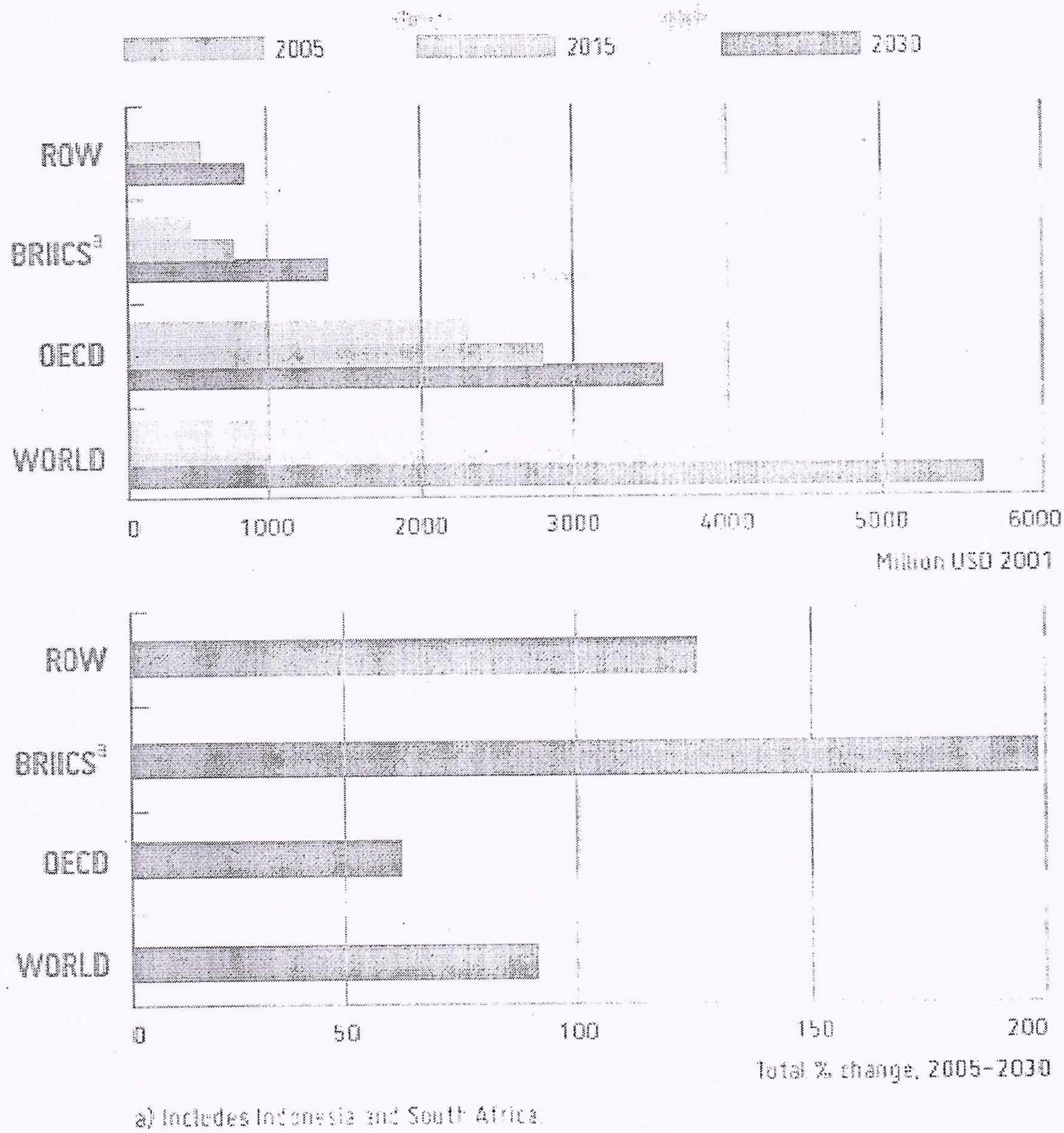


Projected chemicals production by region for the period 2005-2030. Source: OECD, 2008

As an example, properties such as the adsorption behaviour of pharmaceuticals can vary vastly in different soil types as their occurrence in both ionized and unionized forms affects their interaction with different compounds in the soil (ter Laak et al., 2006). The abundance of a high number of potentially toxic emerging pollutants in the environment reinforces the need to better understand their occurrence, fate and ecological impact (Petrie, Barden and Kasprzyk-Hordern, 2015).

Since the sources of EPs are varied and numerous, their nature, physical and chemical properties are also diverse. These include volatility, polarity, adsorption properties, persistence and their interaction with the environment. The main groups of emerging organic pollutants affecting agricultural soils are described below.

Pharmaceutical and personal care products (PPCPs) are a class of emerging chemical contaminants that have been used extensively for decades. There are more than 4 000 pharmaceutical and chemical products, including pharmaceutical drugs, diagnostic agents, cosmetics, fragrances, nutritional supplements and additives used in many household cleaning items. Many PPCPs are biologically active compounds (Boxall et al., 2012), designed to interact with hormonal processes or living tissues; for this reason it is important to know their fate, effects and potential risks when they are released into the environment.

Since the late 1990s, detection of PPCPs in environmental matrices has been increasingly reported worldwide (Buser, Poiger and Müller, 1999; Hamscher et al., 2004; Heberer, 2002; Jones, Voulvoulis and Lester, 2001). PPCPs enter urban wastewater streams but they are not efficiently eliminated by conventional treatment technologies (Miège et al., 2009), and end up accumulating in sludge. Municipal biosolids have been found to be a sink for many PPCPs, and their land application as fertilizers may introduce these compounds into the environment, causing harm to beneficial microorganisms and affecting nutrient cycles. Limited information is available on the concentrations of PPCPs in soils amended with biosolids, even though their persistence in soil is significant (Wu, Spongberg and Witter, 2009; Wu et al., 2010). Another problem associated with PPCPs is the presence of antimicrobial agents and their potential to promote bacterial resistance in the environment (Walsh et al., 2003).

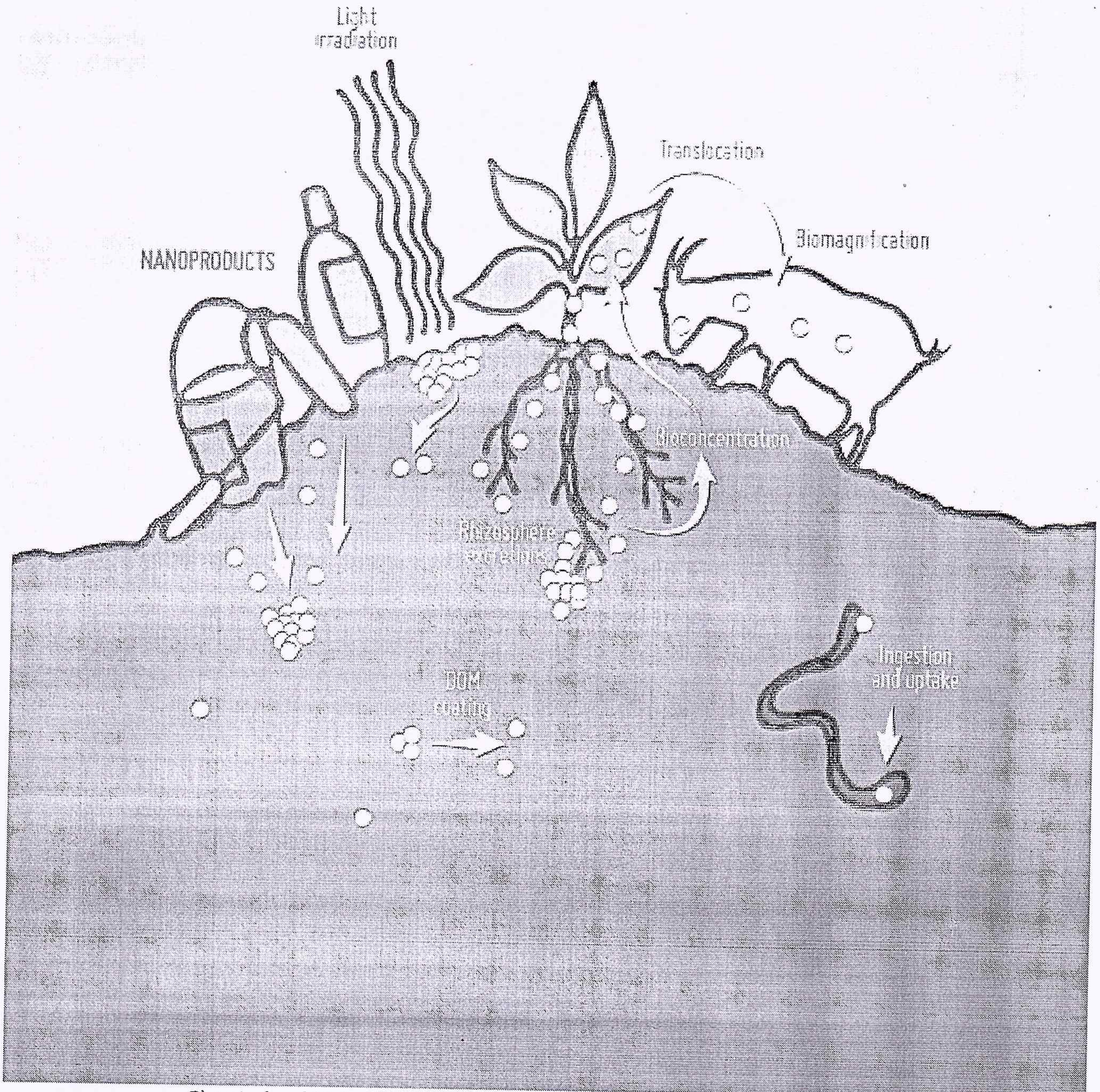
The possible effects of long-term PPCP exposure remain relatively unknown but may ultimately result in chronic toxicity to soil and aquatic organisms (Chalew and Halden, 2009). The presence of PPCPs has been linked to the development of antibiotic resistant bacteria, feminization of male fish, and genotoxicity in aquatic organisms (Daughton and Ternes, 1999). Further field studies are necessary to develop a reliable risk assessment for PPCPs (Walters, McClellan and Halden, 2010) and resistant bacteria and resistance genes (Sun et al., 2018). The United Nations General Assembly has recognized the need for addressing antimicrobial resistance and reducing antimicrobial residues in soils (UN, 2016).

The occurrence and implications of antibiotic residues in the environment is an emerging concern. Antibiotics, fungicides, and other drugs are taken daily by humans, and they are extensively given to livestock to promote growth and reduce or prevent diseases. It is well known that pharmaceuticals, after administration, are absorbed and undergo metabolic reactions (e.g. hydroxylation, cleavage or glucuronation) to produce metabolites, which can be even more harmful than the original compounds or can be transformed back to the original active compounds (Díaz-Cruz and Barceló, 2005). Large fractions of the drugs are not assimilated or metabolized and are excreted in faeces or urine. Therefore, medicines are continuously being released into urban wastewater and animal manure. When manure and sewage sludge are applied to agricultural lands as fertilizers, or when treated wastewater is used for agricultural irrigation, crops are exposed to antibiotics that may persist in soils from a few to several hundred days. It has been documented that certain antibiotics, specifically tetracyclines, amoxicillin and fluoroquinolones, can be taken up by crop plants (Azanu et al., 2016), while other PPCPs, such as miconazole (fungicide) and fluoxetine (antidepressants), are not present in crops, despite their persistence in the soil (Gottschall et al., 2012).

Plasticizers are additives used to increase flexibility or plasticity, such as bisphenol A (BPA) or phthalates, and are particularly recognized as endocrine disruptors (Ghisari and Bonefeld-Jorgensen, 2009). Plasticizers have already been banned or more strictly regulated (CFR, 2017; EC, 2006; NICNAS, 1989; TwEPA, 2014). Phthalate esters (PAEs) are widely used as plasticizers and occur in many products such as lubricating oils, automobile parts, paints, glues, insect repellents, photographic films, perfumes, and food packaging. PAEs and BPA are founded in many agricultural soils close to urban or peri-urban areas, coming from sewage sludge application, agricultural use of plastic films, use of urban wastewater for irrigation or atmospheric deposition (Tran et al., 2015; Zeng et al., 2008). Phthalates and BPA are known to compete with endogenous hormones through binding to their specific receptors or by damaging their synthesis and metabolism (Craig, Wang and Flaws, 2011). Both phthalates and BPA have been detected in food and in humans and are listed as toxic agents in international regulations (Australian Government, 2018; EC, 2006; UNECE, 2011; US EPA, 2012; Yen, Lin-Tan and Lin, 2011).

Two other major groups of emerging contaminants are manmade nanoparticles (MNPs) and treatment by-products. The number of products that contain or require MNPs has greatly increased in the last few decades and they are present in more than a thousand products, including as additives in paints, cosmetics, textiles, papers, plastics and food (Fiorino, 2010). They are also used in textiles to produce clothes that are self-cleaning, water and dirt repellent, anti-microbial and ultraviolet and abrasion resistant. Manufactured nanoparticles are applied deliberately in soil remediation, with the purpose of reducing the impact of both organic and inorganic pollutants, and they are also released unintentionally in the soil through various other pathways (Pan and Xing, 2012).

The behaviour and interactions of MNPs with the soil matrix and with biological excretions and microorganisms (Figure 13) are not yet well understood (Nel et al., 2006). This is due to the lack of available information on their properties, such as solubility, physical conformation, shape, and surface charge. Manmade nanoparticles' transformation before and after their entrance in the environment, such as surface modifications by humic acids, interactions with cations and dissolution, may control their fate in the environment (Liang et al., 2013). Consequently, EP risk management remains fragmented and static (Geissen et al., 2015). Treatment by-products are generated when water treatment (drinking or wastewater) generate new products from the reaction of the reagents with the components of the matrix or when reactions of the target contaminants are incomplete and some by-products that may have some residual toxicity are generated (Handy et al., 2008).



Chemical and biological processes of MNPs in soil. Source: Pan and Xing, 2012

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Manmade nanoparticles have a toxic effect on organisms through four main mechanisms: the generation of reactive oxygen species, causing oxidative stress; alteration of membrane cell permeation properties, thereby interfering with physiological activities; alteration of electron transfer process; and finally, modification of proteins conformation, which disturbs the transfer of bio-signals and gene formation (Pan and Xing, 2012).

Concerns about supply security and the broken biogeochemical phosphorus cycle have promoted the search for new, more sustainable and marketable products. New approaches to a circular economy promote the use of organic and waste-based fertilizers, such as struvite (ammonium–magnesium precipitate from the wastewater stream, slow-release fertilizer), biochar or ashes (from sewage sludge). These new fertilizer product categories aim to recycle nutrients that would otherwise have been lost. However, quality standards for these products, to assure safe application to land and crops, have yet to be established. They may contain heavy metals and residues similar to PPCPs (hormones, etc.) with adverse effects on the environment. Their production and marketability are predicted to increase globally in the next one to two decades. The European Union, for example, is addressing this new challenge by adopting a new action plan on the circular economy (EC, 2015), and is planning to regulate, amongst others, the content of contaminants in the frame of the new European Union Fertilizer Regulation (Vollaro, Galioto and Viaggi, 2017).

PATHOGENIC MICROORGANISMS

Due to vast biodiversity and organism biomass, with more than 10 000 species per square metre and tonnes of bacterial biomass per hectarea (European Commission, Joint Research Centre and Global Soil Biodiversity Initiative, 2016), there is a great competitiveness for resources within the soil. Some organisms have developed chemical defences by excreting compounds that can kill or interfere with the growth of other microorganisms that encounter these compounds. Of these organisms, the vast majority pose no threat to human health, but rather function to provide numerous ecosystem services that emerge through the multitude of complex interactions between organisms within the soil and the soil itself. Some of these organisms, however, can be detrimental to humans by causing soil-borne diseases. They act either as opportunistic pathogens that take advantage of susceptible individuals, such as those who are immuno-compromised, or as obligate pathogens that must infect humans in order to complete their life cycles (Van der Putten et al., 2011). Some of these organisms may be capable of surviving within the soil for extended periods of time before infecting humans who come into contact with contaminated soil, while others require the infection to occur more or less immediately after they leave the previous host.

Van der Putten et al. have defined soil-borne human diseases as "human diseases resulting from any pathogen or parasite, transmission of which can occur from the soil, even in the absence of other infectious individuals" (Van der Putten et al., 2011). They have presented a comprehensive list of pathogens, differentiating between those that are truly soil organisms (euedaphic pathogenic organisms, EPOs) and those that can survive in soils for long periods of time as resistance structures even though they are obligate pathogens (soil transmitted pathogens, STPs) (Table 3).

Euedaphic pathogenic organisms	Soil Transmitted Pathogens
Actinomycetoma: (e.g. *Actinomyces israelii*)	**Poliovirus**
Anthrax: *Bacillus anthracis*	**Hantavirus**
Botulism: *Clostridium botulinum*	**Q Fever:** *Coxiella burnetii*
Campylobacteriosis: e.g. *Campylobacter jejuni*	**Lyme disease:** *Borrelia* sp.
Leptospirosis: e.g. *Leptospira interrogans*	**Ascariasis:** *Ascaris lumbricoides*
Listeriosis: *Listeria monocytogenes*	**Hookworm:** e.g. *Ancylostoma duodenale*
Tetanus: *Clostridium tetani*	**Enterobiasis** (Pinworm)
Tularemia: *Francisella tularensis*	**Strongyloidiasis:** e.g. *Strongyloides stercoralis*
Gas Gangrene: *Clostridium perferingens*	**Trichuriasis** (Whipworm): *Trichuris trichiura*
Yersiniosis: *Yersinia enterocolitica*	**Echinococcosis:** e.g. *Echinococcus multicularis*
Aspergillosis: *Aspergillus* sp.	**Trichinellosis:** *Trichinella spiralis*
Blastomycosis: e.g. *Blastomyces dermatitidis*	**Amoebiasis:** *Entamoeba histolytica*
Coccidioidomycosis: e.g. *Coccidiodes immitis*	*Balantidiasis Balantidium coli*
Histoplasmosis: *Histoplasma capsulatum*	**Cryptosporidiosis:** e.g *Cryptosporidium parvum*
Sporotrichosis: *Sporothrix schenckii*	**Cyclosporiasis:** *Cyclospora cayetanensis*
Mucormycosis: e.g. *Rhizopus* sp.	**Giardiasis:** *Giardia lambila*
Mycetoma: e.g *Nocardia* sp.	**Isosporiasis:** *Isospora belli*
Strongyloidiasis: e.g. *Strongyloides stercoralis*	**Toxoplasmosis:** *Toxoplasma gondii*
	Shigellosis: e.g. *Shigella dysenteriae, Pseudomonas aeruginosa, Eschericia coli*
	Salmonellosis: e.g. *Salmonella enterica*

Some pathogens may originate from animal faeces, and soil represents the main pathway of contamination through dermal contact or contact with contaminated water and food (Ercumen et al., 2017). Helminths, a type of parasitic worms, are present in human faeces, and contaminate the soil in areas with poor sanitation. The World Health Organization (WHO) has estimated that two billion people are infected by soil-transmitted helminths worldwide (WHO, 2001b). Unsafe agricultural practices such as irrigation with untreated domestic wastewater and soil amendments with improperly treated livestock manure are very commonly used by small-holder farmers mainly in developing countries, but these are also practices that can affect developed countries (Allende and Monaghan, 2015; Ongeng et al., 2011; du Plessis, Duvenage and Korsten, 2015; Scallan et al., 2011). The consumption of raw or minimally processed fruits and vegetables, such as lettuce, spinach, and carrots, has increased significantly due to their importance for a healthy diet. When they are produced using improper practices, however, they may become a source of enteric pathogens, as demonstrated by the increasing number of documented human infections associated with fresh produce consumption (Beuchat, 2002; Ingham et al., 2004). Contact with contaminated soils has been identified as a potential source of food contamination (Khandaghi, Razavilar and Barzgari, 2010).

ANTIMICROBIAL RESISTANT BACTERIA AND GENES

Bacteria are very adaptable genetically, and when confronted repeatedly with antibiotics, mutational changes can occur, changes that lead to resistance to the antibiotic. The increased and widespread use of antibiotics is therefore developing antibiotic-resistant bacteria in the environment (Rensing and Pepper, 2006). The other way microbes can become resistant is through the transference of foreign antibiotic resistant genes (Rensing and Pepper, 2006) naturally present in soils or from bacteria introduced by agricultural practices (e.g. animal husbandry, human wastewater disposal, improperly composted manures) or from domesticated and wild animal faecal droppings to the soil microbiome communities (FAO, 2016). Antimicrobial resistance (AMR) is one of the major issues facing society: AMR infections currently claim around 50 000 lives each year in Europe and the United States of America, and by 2050, if the issue is not tackled, it has been predicted that they will kill more people than cancer, and cost, globally, more than the size of the current global economy (O'Neill, 2014). The recent worldwide enrichment and spread of highly resistant pathogenic bacteria in the micro-biosphere has largely been driven by human activities, including the extensive use and misuse of antibiotics in human and veterinary medicine and in agriculture (Witte, 1998).

Antimicrobials are often administered to livestock for growth promotion, prophylaxis, and disease treatment (Joy et al., 2013). Estimated global antimicrobial consumption in the livestock sector in 2010 was 63 151 tonnes (FAO, 2016). However, a substantial portion of the antimicrobials administered to livestock are not absorbed by the animals (Sarmah, Meyer and Boxall, 2006). Once animal manure is applied to the land, the fate of manure-originating antimicrobials in soil and their subsequent transport by runoff will also be affected by the compounds' sorption properties to soil particles (Sassman and Lee, 2005)

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INTERACTION OF POLLUTANTS WITH SOIL CONSTITUENTS

One of the main ecological services provided by soil is filtering, buffering and transforming inorganic and organic contaminants. This essential function ensures good quality of groundwater and safe food production (Blum, 2005). When pollutants enter the soil, they undergo physical, physicochemical, microbiological, and biochemical processes that retain, reduce or degrade them.

Important soil characteristics that affect the behaviour of contaminants include soil mineralogy and clay content (soil texture); amount of soil organic matter (SOM); pH (acidity) of the soil; moisture levels; and temperature. The properties of the contaminants themselves are also very important and include the size, shape, molecular structure, solubility, charge distribution, and acid–base nature of the molecule (Gevao, Semple and Jones, 2000).

SORPTION OF CONTAMINANTS

Sorption (or adsorption) is a process whereby the molecules of a fluid interact with a solid and are retained on the solid for a time (Navarro, Vela and Navarro, 2007). Sorption may be chemical in nature (as with ionic and hydrogen binding) or purely physical (as with van der Waals forces).

Ions or molecules that are positively charged (cationic) participate in cation exchange on charged surfaces. Soil organic matter (SOM) and clay minerals are the source of cation exchange sites in soil and the cation exchange capacity (CEC) of various SOM fractions and types of clay minerals differs greatly. Negatively charged (anionic) ions or molecules are, in general, more weakly bound in soils and react with SOM primarily through hydrogen bonding and ligand exchange (Gevao, Semple and Jones, 2000). The oxidation states of some ions or molecules can transition through cationic, neutral, or anionic states in response to the pH of the soil solution; hence their sorption in the soil is pH dependent. Additionally, some molecules can gain or lose protons and thus exhibit acidic or basic behaviour; the sorption of these molecules is also pH dependent. Finally, changes in the presence or absence of oxygen due to changing soil moisture conditions (i.e. the redox status of the soils) also causes changes in the oxidation states of some ions and compounds and can be an important control on the mobility of these contaminants.

Hydrogen bonding is an important sorption mechanism for non-ionic pesticides that exhibit polarity (i.e. asymmetric distribution of electrical charge in a molecule). Many pesticides are both non-ionic and non-polar and react with SOM through physical van der Waals forces. These forces are strongest for ions that are in close contact with the surface or can conform to the surface; hence the size and structure of the pesticide is an important control on their sorption (Gevao, Semple and Jones, 2000). As well, non-polar molecules are not attracted to polar water molecules and hence are typically insoluble in water (i.e. hydrophobic). Some non-polar and hydrophobic compounds undergo extensive and complex reactions with SOM that lead to their long-term sequestration. For example, DDT is highly insoluble and has a strong affinity for SOM, which accounts in part for the great persistence of DDT in the environment (Mansouri et al., 2017)

Several well-established generalizations can be made about the sorption of contaminants and soil properties. First, the SOM content of the soil (especially the content of highly reactive humus) is the dominant control on sorption. Soil organic matter provides both charged sites for ionic reactions and highly complex structures that enhance physical sorption processes. Dissolved organic matter may also interact with nanoparticles, changing their surface properties and aggregation status, thereby increasing the mobility and bioavailability of the nanoparticles (Pan and Xing, 2012; Wang et al., 2011). Second, the clay content and the nature of the clay minerals is a strong secondary control on sorption. Studies conducted worldwide have demonstrated that the fine-grained soil fraction exhibits a greater tendency for ionic adsorption than do coarse-grained soils. Since the fine fraction contains soil particles with large surface areas such as clay minerals, iron and manganese oxy-hydroxides, and humic acids (Bradl, 2004). The type of clay mineral present is important when comparing temperate-region soils to those of the tropics – soil of the tropics can be highly weathered, with low activity clays whose charge is highly pH dependent (Lewis et al., 2016). Third, and following from the first two generalizations, sandy soils low in organic matter present a particular risk for leaching of contaminants due to the paucity of sorption sites.

BIOAVAILABILITY, MOBILITY AND DEGRADATION OF CONTAMINANTS

Bioavailability refers to the physical, chemical and biological interactions that determine the exposure of organisms to chemicals associated with soils (Committee on Bioavailability of Contaminants in Soils and Sediments, 2002)

Metals

The soil's sorptive capacity has a major effect on the bioavailability of heavy metals and metalloids. Biological uptake of metals by soil biota and plants occurs only when the metals are in ionic form. Many metals occur as simple cationic forms (Table 4), but some like As and Cr form more complex oxyanions. Metals are adsorbed on the surface of very fine organic matter in soils (humus), clay minerals, Fe and Mn hydrous oxides and some sparingly soluble salts such as calcium carbonate (Morgan, 2013). A similar affinity has been observed between clay minerals and radionuclides (van der Graaf et al., 2007). Metals also form complex compounds through interactions with organic molecules; Cu has a particular affinity to forming such compounds (Morgan, 2013).

Many sorption processes for metals are pH dependent. Sorption is highest in less acidic soils, while acidic conditions favour desorption and release of the metals back into solution. Anaerobic conditions caused by water saturation can also result in desorption of some metals.

The addition of organic and inorganic amendments is very effective in reducing the bioavailability of heavy metals in soils by increasing the number of binding sites and through modification of the soil's pH (Puschenreiter et al., 2005). These amendments include compost, biosolids (sewage sludge), manure and by-products of industrial activities. Such measures can have many positive implications for the environment and the same time contribute to waste reduction. Lime application increases soil pH and reduces metal uptake by crops (Knox et al., 2001).

Element	Symbol	Dominant Soil Species
Arsenic	As	AsO_4^{2-}, AsO_4^{3-}
Cadmium	Cd	Cd^{2+}
Chromium	Cr	Cr^{3+}, CrO_4^{2-}
Copper	Cu	Cu^{2+}
Mercury	Hg	Hg^{2+}, $(CH_3)_2Hg$
Nickel	Ni	Ni^{2+}
Lead	Pb	Pb^{2+}
Zinc	Zn	Zn^{2+}

Dominant soil species for common soil metal pollutants. Source: Logan, 2000

Radionuclides

Clay content, pH and organic matter also play an important role in the sorption of 137Cs and other radionuclides in soils (Absalom, Young and Crout, 1995; Rigol, Vidal and Rauret, 2002). Microorganisms play an important role in geochemical changes to radionuclides by catalyzing chemical transformations in the subsoil (Turick, Knox and Kuhne, 2013). The Kd distribution (or partitioning) coefficient is used to describe the propensity of a radionuclide to be sorbed; low Kd values indicate lower sorption of the radionuclide. Cesium is not very chemically reactive and has a similar behaviour in soils to that of potassium. It has enhanced bioavailability in low clay soils and in soils high in kaolinite (Kd = 240 to 290) but is strongly bound to illite clay minerals (Kd= 6 300 to 8 300) (Turick, Knox and Kuhne, 2013). Iodine has multiple redox states and hence exhibits complex behaviour; the -1, +5 and molecular I2 oxidation states are most relevant in environmental systems. The Kd values for mineral soils range between 0.04 and 81 (Turick, Knox and Kuhne, 2013) and hence overall sorption of I in soils is low. Sorption of iodine species appears to be controlled in part by SOM and in part by iron and aluminum oxides; adsorption increases under more acid conditions. For uranium, the +4 and +6 states are the most important from a biological perspective. Uranium in the +4 state is mostly insoluble and largely immobile, whereas the +6 state is soluble and mobile in the environment. Uranium sorption is strongly pH dependent. For example, for reactions between U and the mineral apatite, the value for Kd is 668 at a pH of 4 and 24 660 at a pH of 7 (Turick, Knox and Kuhne, 2013). Plutonium has a complex geochemistry and can exist in +3, +4, +5, and +6 oxidation states. It generally binds easily to surfaces in soil matrix and thereby becomes immobilized. It is also pH dependent, with maximum adsorption at pH6 (Turick, Knox and Kuhne, 2013).

Pesticides

There is a very great range in the chemical composition and structure of pesticides and hence in their interactions with soil constituents (Gevao, Semple and Jones, 2000). The distribution coefficient (Kd) is the concentration of pesticide sorbed by the soil divided by the concentration in solution. A higher value for Kd indicates that the pesticide is more strongly sorbed. In many soils the amount of organic matter present largely controls the sorption capacity of the soil, and the sorption coefficient (Koc) is calculated by dividing the Kd value by the amount of organic carbon in the soil. The higher the Koc value, the more strongly sorbed the chemical is, and hence the less mobile it is in the environment. Generally, pesticides with high Koc values like glyphosate and endosulfan and especially DDT will be relatively immobile, but other factors do come into play (Table 5). For example, Dores et al. observed that despite a relatively high Koc, leaching of endosulfan occurred in the Brazilian soils they examined (Dores et al., 2016); they attributed this to preferential flows paths in the soils

Chemical	Koc mL g⁻¹	Chemical	Koc mL g⁻¹
2,4-D	20–32	α-Endosulfan[2]	8 725–31 992
Atrazine	163–172	β-Endosulfan[1]	8186–31992
Carbofuran	29.4	Glyphosate[1]	10 891–14 863
Chlorthiamid	98–107	Lindane	1081–1340
Chlorpyrifos[2]	1 671–2 896	Malathion	20
Dicamba	2.2	Paraquat	20 000
DDT	243 000		

Values for sorption coefficient Koc from the literature. Source: Wauchope et al., 2002 except for 1 (Farenhorst et al., 2008) and 2 (Dores et al., 2016).

Microbial diversity and activity, especially bacteria and fungi, will also determine the bioavailability of pollutants, as microorganisms are able to degrade and transform certain pollutants, releasing byproducts and affecting their toxicity and mobility (Burgess, 2013). Although most pesticides have novel structures previously unseen in nature, some are able to be metabolized by microorganisms (Topp, 2003). Once microorganisms that can degrade pesticides have been identified, they can be used to inoculate and decontaminate polluted soils in the process of bioremediation.

Aerobic or anaerobic conditions have also been demonstrated to have a significant effect on pollutant persistence and bioavailability. Ying, Yu, and Kookana, for example, observed that biodegradation of triclocarban and triclosan, two antimicrobials widely present in personal care products, occurs under aerobic conditions but not under anaerobic conditions, where the persistence is much longer (Ying, Yu and Kookana, 2007). Dechlorination bacteria, responsible for anaerobic degradation of chlorinated compounds, need time to adapt to target chemicals (Brahushi et al., 2004), and this adaptation seems to happen faster when the pollutant is present in high concentrations, as was observed in two adjacent polluted soils in the Netherlands (Middeldorp et al., 2005).

Persistent organic pollutants

By definition the POPs are resistant to degradation in the soil due to factors such as strong sorption, hydrophobicity, or a structure that is resistant to microbial degradation. Polychlorinated biphenyls are hydrophobic, non-polar, and inert, as are the PCDDs and PCDFs. For the PAHs their degree of hydrophobicity and chemical reactivity decreases with increasing molecular weight; hence, generalization about their fate is difficult (Burgess, 2013).

Nitrogen and phosphorus

The different forms of N and their bioavailability and mobility are very well established (Cameron, Di and Moir, 2013). Nitrogen is available in four major forms in the soil: a) SOM, b) soil organisms and microorganisms, c) ammonium (NH4 +) ions bound to soil particles, and d) mineral-N forms in soil solution including NH4 + , nitrate (NO3 -) and small amounts of nitrite (NO2 -) (Cameron, Di and Moir, 2013). The available forms for plant uptake are nitrate in aerobic soils and ammonium in flooded wetlands or acidic soils (Krapp, 2015). As an anionic compound, NO3 - is not strongly sorbed and nitrate leaching from soils is both a loss of fertility and a threat to the environment and to human health. Nitrate in drinking water has been associated with methaemoglobinaemia in babies and with cancer and heart disease (Cameron, Di and Moir, 2013). Nitrogen is also lost from soils as a gas. Ammonium volatilization is associated with N fertilizer additions and animal urine and faeces deposition, and the highly potent greenhouse gas N2 O is released at several points in the N cycle, but the greatest emissions occur from denitrification from saturated soils.

Phosphorus in the soil exists primarily in orthophosphate (HPO4 2-, H2 PO4 -) and organic forms; it also occurs as sorbed form, forming surface complexes with Al, Fe oxides, other minerals, and organic matter. Phosphorus is strongly retained by solid phase and transported as eroded solid particles and through transport of manure and human waste (Yuan et al., 2018). Phosphorus losses from cropland through erosion and runoff are dominant contributors to aquatic systems: Yuan estimates P losses from cropland to freshwater is 10.4±5.7 Tg P/yr, and natural losses from erosion at 7.6±3.3 Tg P/yr. In their study of P sources in British rivers, Civan et al. found that point sources of P usually contain higher amounts of orthophosphate and more biologically available phosphorus, whereas diffuse sources generally were sorbed to particulates (from farmyard runoff, pig slurry, and erosion from fields) (Civan et al., 2018). Overall, they found a 60 percent decline in mean total reactive P concentration in British rivers since a peak in 1985, which they ascribe to actions taken at sewage treatment plants

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THE IMPACTS OF SOIL POLLUTION ON THE FOOD CHAIN AND ECOSYSTEM SERVICES

The predicted world's population of over nine billion by 2050 will require the provision of enough good quality food and water (Godfray et al., 2010; McBratney, Field and Koch, 2014). According to Dubois (Dubois, 2011), food production will increase by 70 percent by 2050 globally, and by 100 percent in developing countries, compared with 2009 production levels. FAO's latest projections indicate that global food production will increase by 60 percent between 2005/07 and 2050 under its baseline scenario. This represents a downward revision, based on updated data and information, from the 70 percent increase projected for the same period in 2009. (World Agriculture Towards 2030/2050: The 2012 revision ESA E Working PaperNo. 12-03 http://www.fao.org/economic/esa/esag/ en/). The quantity and nutritional quality of food supports human health, and 95 percent of food production depends on soils (Oliver and Gregory, 2015; FAO, 2015). Only healthy soils can provide the needed ecosystem services and secure supplies of more food and fibre. The provision of ecosystem services has received considerable attention and can be defined as "the capacity of natural processes and components to provide goods and services that satisfy human needs, directly or indirectly" (Groot, 1992). Food security is defined as "the availability, access, utilization and stability of food supply." Soil pollution reduces food security both by reducing crop yields due to toxic levels of contaminants and by causing the produced crops to be unsafe for consumption (FAO and ITPS, 2015).

SOIL POLLUTION, PLANT UPTAKE AND FOOD CHAIN CONTAMINATION

The pathways of contamination within the food chain by the transfer of soil pollutants through plants are shown in Figure

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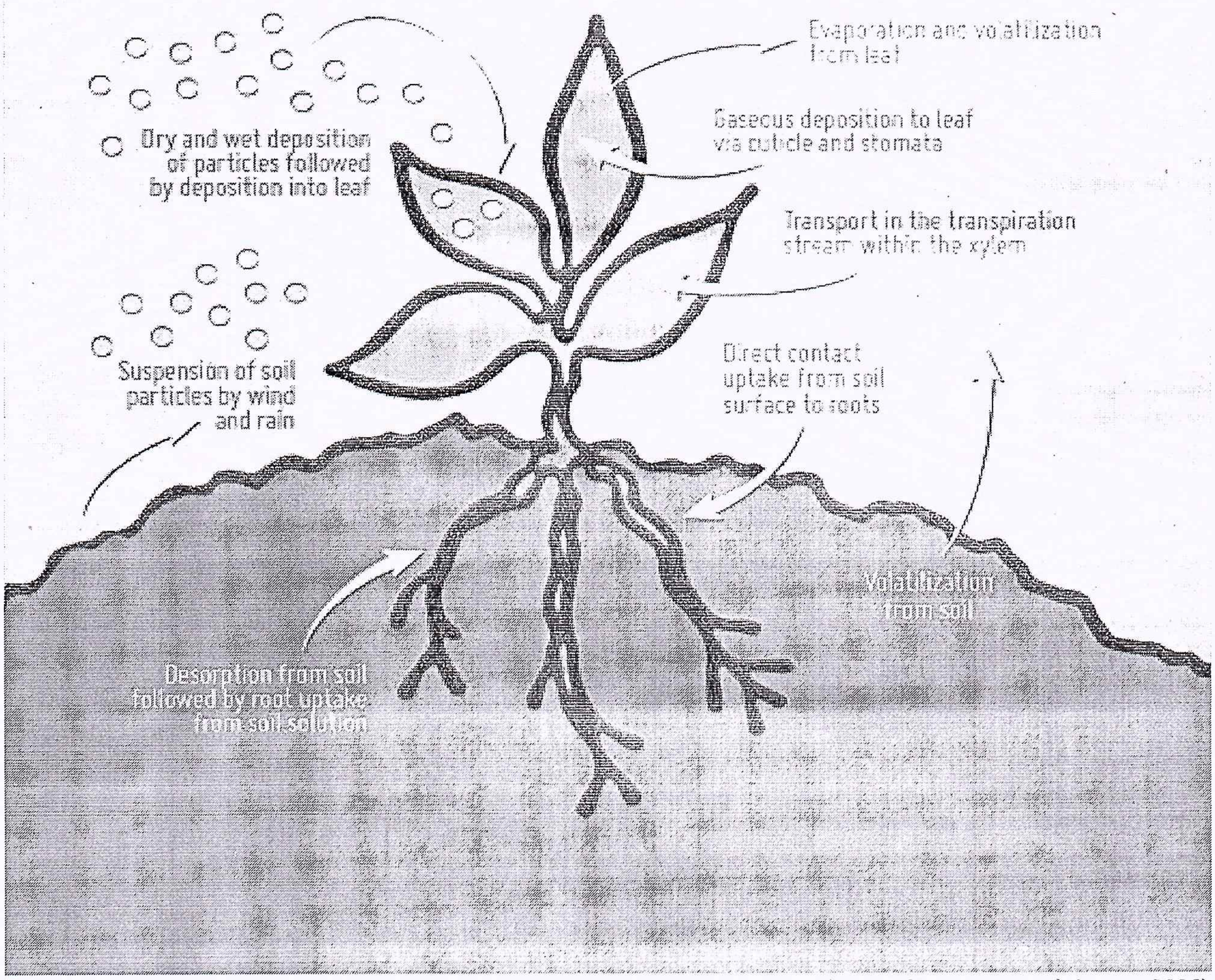

Principal uptake pathways for the uptake of soil contaminants by plants (adapted from Collins, Fryer and Grosso, 2006)

If a contaminant is highly toxic to plants at low concentrations and is not easily translocated to shoots, fruits or tubers to pose a hazard to animals and humans, it is unlikely to enter the food chain and become a hazard. This concept was termed the "Soil-Plant Barrier" by Chaney almost 40 years ago for metals and metalloids (Chaney, 1980). Chaney defined four groups of metals entering the food chain when sewage sludge was applied to soil, as a function of their danger to human health (Table 6).

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Group 1	Group 2	Group 3	Group 4
Silver (Ag)	Mercury (Hg)	Boron (B)	Arsenic (As)
Chromium (Cr)	Lead (Pb)	Copper (Cu)	Cadmium (Cd)
Tin (Sn)		Manganese (Mn)	Cobalt (Co)
Titanium (Ti)		Molybdenum (Mo)	Molybdenum (Mo)
Yttrium (Y)		Nickel (Ni)	Selenium (Se)
Zirconium (Zr)		Zinc (Zn)	Thallium (Tl)

Metals/metalloids classified in groups according to potential food-chain risk via plant uptake. Adapted from: Chaney, 1980

Group 1 comprises the elements that pose a low risk of food chain contamination because they are not taken up by plants, due to their low solubility in soil, which means negligible uptake and translocation by plants. Elevated concentrations of these elements in foods usually indicate direct contamination through soil or dust accumulation. Group 2 includes elements that are strongly sorbed by soil surfaces, and while they may be absorbed by plant roots, they are not readily translocated to the edible tissues and therefore pose minimal risks to human health. These elements could, however, pose a risk to grazing animals (or humans) if contaminated soil is ingested. Group 3 comprises the elements that are readily taken up by plants, but that are phytotoxic at concentrations that pose little risk to human health. Conceptually, the "soil-plant barrier" protects the food chain from contamination by these elements. Group 4 consists of elements that are at the highest risk for foodchain contamination as they pose risks to human or animal health at plant tissue concentrations that are not generally phytotoxic. Chaney originally classified As in Group 2, but research over the last 20 years has indicated that flooded rice systems are at risk from As transfer through the food chain due to low redox conditions in flooded soils. This increases the solubility of As for uptake by rice and hence As should now be classified as a high-risk, Group 4 element. Contamination of soils by As and Cd is perhaps the most widespread risk to the food chain globally (Grant et al., 1999; McLaughlin, Parker and Clarke, 1999), with large areas of South-East Asia having soils contaminated by As (Meharg, 2004) and Cd (Hu, Cheng and Tao, 2016).

In some parts of China, soils polluted by heavy metals are nevertheless used to grow grain. The grain grown in these soils is often in turn polluted with heavy metals. According to China Dialogue, an estimated 12 million tonnes of polluted grain must be disposed of each year, costing Chinese farmers up to CNY 20 billion, or about USD 2.57 billion (Lynn, 2017).

Excess heavy metals such as arsenic, cadmium, lead and mercury in soils can also impair plant metabolism and decrease crop productivity, ultimately putting pressure on arable land. When they enter the food chain, these pollutants also pose risks to food security, water resources, rural livelihoods and human health. The uptake and translocation of metals into above ground tissues are conditioned by genetic and physiological differences of plants (Chen, Li and Shen, 2004), as well as by the concentration of metals in the soil and the exposure time (Rizwan et al., 2017; Tőzsér, Magura and Simon, 2017). Once metals enter plant tissues, they may interfere with several metabolic processes, reducing plant growth and causing toxicity and finally plant death. Decreases in germination rates, oxidative damage, lower roots and shoots elongation and alterations of sugar and protein metabolisms were the main effects reported (Ahmad and Ashraf, 2011). High levels of lead, for example, accelerate the production of reactive oxygen species, causing lipid membrane and chlorophyll damage that further leads to the alteration of photosynthetic processes and of the overall growth of the plant (Najeeb et al., 2017). Cadmium can accumulate in different edible tissues (Baldantoni et al., 2016), causing reduction of root, stem and leaf growth, decreasing net photosynthesis and water use efficiency and altering nutrient uptake (Rizwan et al., 2017).

Radionuclides may also present a potential threat to food quality, through atmospheric deposition of radionuclides on soil from nuclear energy accidents, or the addition of radionuclides to the soil through fertilizers or through wastes and byproducts from the nuclear industry (Mortvedt, 1994). The potential for transfer of radionuclides from soil to plants and to the food chain was first identified in the 1950s both in restricted areas where nuclear weapons testing had taken place and more generally through deposition of fallout from bomb testing. The Chernobyl nuclear accident in 1986 caused widespread pollution of soils by radionuclides (principally 131I, 134Cs and 137Cs) (Bell, Minski and Grogan, 1988). Uptake of pollutants from soils into forages was followed by the contamination of grazing animals and led to restrictions being placed on the sale and slaughter of sheep from affected areas in the United Kingdom of Great Britain and Northern Ireland (Smith et al., 2000). Widespread contamination of the food chain by the same radionuclides also occurred after the Fukushima nuclear accident in Japan (Berends and Kobayashi, 2012).

Compared to metals, metalloids and radionuclides, the global footprint of soils that are highly contaminated by organic contaminants is much smaller, with contamination of the food chain being localized around industrial or urban centres. Contamination occurs through waste re-use on land and as a legacy of the use or disposal of persistent and bioaccumulative organic chemicals (principally organochlorines (OCs), polychlorinated dibenzo-p-dioxin (PCDD), polychlorinated dibenzofurans (PCDF) and poly- and perfluoroalkyl substances (PFAS)). Levels of soil contamination are usually lower than for metals/metalloids, generally in concentrations less than mg/kg in soil, especially for dioxins, furans and PFAS compounds.

The pathway of uptake of organic contaminants into the food chain depends on the properties of the organic contaminant – principally their volatility, hydrophobicity and solubility in water. Hydrophilic organic contaminants with low volatility (e.g. PFAS) will principally enter the food chain through root uptake and translocation to food parts (Navarro et al., 2017). On the other hand, volatile hydrophobic contaminants (e.g. dioxins, furans and polychlorinated biphenyls (PCBs)) will tend to accumulate in the food chain through atmospheric uptake, as they are generally strongly sorbed in soils (Collins, Fryer and Grosso, 2006; Simonich and Hites, 1995). Some plant species, however, can accumulate these compounds through uptake from soil (Huelster, Mueller and Marschner, 1994). Sun et al., were able to quantify organic pollutants and their residues in plants by measuring the uptake of 14C-residues (Sun et al., 2018). Many studies have demonstrated the uptake of pesticide residues through several main pathways. These residues are incorporated in plant tissues and transferred to the end consumer (Randhawa et al., 2014). However, unlike metals and metalloids, the incidence and severity of adverse effects on human health caused by soil contamination by organic chemicals is much less well documented or demonstrated, likely because smaller areas of land are affected by this type of pollutant, and contamination levels are generally lower.

Atmospheric deposition and gas exchange through the stomata are the main mechanisms of absorption of POPs by plants; the pollutants are later translocated to other plant tissues and accumulated in their hydrophobic lipids and waxes (Odabasi et al., 2016). Root uptake of POPs from soils is limited since POPs are tightly bound to soil particles (Collins, Fryer and Grosso, 2006). For that reason, soils can be viewed as a reservoir and as a source of POPs with low and medium volatility; these may enter the food chain after being taken up by plants from the atmosphere. Absorption efficiency of POPs across the gastro-intestinal tract and their storage and release dynamics are intimately linked to that of fat storage and metabolism (Sweetman, Thomas and Jones, 1999).

IMPACT ON ECOSYSTEM SERVICES OF SOIL POLLUTION FROM AGRICULTURE

Entry of pollutants directly (release of effluents on land) or indirectly (use of polluted water as irrigation to crops) has been reported to contaminate vast areas of soil resources and groundwater bodies, affecting crop production as well as human and animal health through food contamination (Saha et al., 2017).

Agricultural inputs such as fertilizers, pesticides, antibiotics contained in animal manure or the ones used for illness prevention and infection treatment in plants are major potential pollutants in agricultural lands and pose special challenges due to the fast-changing chemical formulas employed (GSP, 2017). Intensification of agriculture to produce enough food, fibre and biofuel has led to a heritage of polluted soils. In

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China, heavy metals contents have considerably increased in the last 30 years, with values oscillating between 48 percent for Zn to over 250 percent when Cd is compared with its background levels in 1990 (Zeng, Li and Mei, 2008). However, the transfer of pollutants from soil to plants is not yet well understood, and the question "is food produced in healthier soils also more nutritious?" needs stronger scientific evidence to engage policy makers, governments and land users towards sustainable and environmentally friendly practices and to leave behind more business-oriented approaches

SYNTHETIC FERTILIZERS

Modern agriculture practices accelerate soil pollution with the intensive use of fertilizer and pesticides in order to increase productivity and reduce crop losses. When pollutants reach high levels in the soil, not only do soil degradation processes take place, but crop productivity can also be affected. Therefore, in addition to endangering human health and the environment, soil pollution can also cause economic losses.

Excess N in soil has been identified as the main cause of soil acidification and salinization through nitrification and other N-transformation processes. Soils acidify very slowly under natural conditions over hundreds to millions of years (Guo et al., 2010), but this process is significantly accelerated by agricultural practices, mainly excessive N fertilization, which causes reductions in soil pH by 0.26 pH units on average in different land uses (Lucas et al., 2011; Tian et al., 2015; Zhao et al., 2014a). The analysis of acidification sources in agricultural soils in China demonstrated that anthropogenic acidification driven by N fertilization is indeed the main cause, being 10 to 100 times greater than that associated with acid deposition (Guo et al., 2010).

ACIDIFICATION AND CROP LOSS

Acidification of agricultural soils may contribute to further soil pollution, through the mobilization of toxic heavy metals. If the content of nitrogen applied to agricultural soils is higher than the plants' requirements, nitrification microbial activity will lead to the accumulation of nitrates (NO3 -) that can easily leach to groundwater due to their high solubility, polluting it (Tian et al., 2015). When soil nutrient availability increases, microbial biomass and activity increases as well, but the microbial biodiversity is altered, causing imbalances in the nutrient cycle (Lu and Tian, 2017)
The main risk from P fertilizers is transport to surface water bodies, which has been documented to cause eutrophication of aquatic ecosystems in many regions (Stork and Lyons, 2012; Syers, Johnson and Curtin, 2008). The P is transported to water bodies adsorbed to eroded soil particles or from excessive amounts of P fertilizer or

animal manure applied when conditions are not suitable (Syers, Johnson and Curtin, 2008). Many farmlands receive more P inputs than the amount that crops are able to take up, causing a soil-P surplus, at least in the short term (Aarts, Habekotté and Keulen, 2000; Syers, Johnson and Curtin, 2008).

PESTICIDES

An extensive review of scientific research about the effects of pesticide use on soil functions was recently undertaken by the Intergovernmental Technical Panel on Soil (FAO and ITPS, 2017). The main scientific-based evidence presented in this work showed an increase in the farmers' net return when they applied pesticides, however the benefits of pesticide use are usually assessed by comparing use of synthetic pesticides versus no use of pesticides rather than comparing synthetic pesticides to biological control of pests (Cai, 2008). Negative associated impacts of specific pesticides on soil organisms and soil functions have been also reported.

For example, some organochlorine pesticides suppress symbiotic nitrogen fixation, resulting in lower crop yields (Fabra, 1997; Fox et al., 2007; Santos and Flores, 1995). The FAO and ITPS report also highlights the knowledge gap on the relationship between pesticides and soil health, mainly on soil pollution (FAO and ITPS, 2017). The international efforts to assess the ecotoxicological risk of pesticides and to control their use and release in the environment, through the Rotterdam and Stockholm Conventions (UNEP, 1998, 2001), constitute an important achievement in preventing and controlling soil pollution, but more information is needed regarding their specific interactions with soil components, their mobility in the soil matrix and possible plant uptake, and their effect on crop production (Arias-Estévez et al., 2008). Especially for low and middle income countries not every single compound within the great variability of pesticides available in the market has been analyzed for its ecotoxicological effects before authorization (Aktar, Sengupta and Chowdhury, 2009). For example pesticides that have been taken off the market in High Income Countries (HICs) due to their severe adverse effects on human health and the environment frequently remain registered in Low and Middle Income Countries (LMICs). As pesticides residues can be found throughout the entire ecosystem, pesticide monitoring programmes about the level of residues in soils, surface and groundwater as well as and drinking water but particularly in food items are very important. However, in many low and middle income countries monitoring programmes are inexistent due to their scarcity of regulation capacity (Brodesser et al., 2006).

MANURE

Application of untreated manure may lead to heavy metal pollution, which not only results in adverse effects on various parameters relating to plant quality and yield, but also causes changes in the size, composition and activity of the microbial community (Yao, Xu and Huang, 2003) affecting nutrient cycling and reducing nutrient availability.

As previously discussed, a high proportion of antibiotics given to livestock is poorly assimilated in the animals' guts and is excreted in urine and faeces. Untreated manure can thus contain high amounts of veterinary antibiotics (VA) that can lead to a rapid increase in antibiotic resistance in soils (see Section 2.3.2). The fate and effects of antibiotics in soils have gained great attention in the last few years, motivated in part by the results of the O'Neill commission report (O'Neill, 2014), which estimates that antimicrobial resistant infections may become the leading cause of death in the world by 2050

Most common intestinal pathogens that enter the soil with manure and faeces are Salmonella, Campylobacter, and Escherichia coli viruses. The pathogen levels decrease with time and with high temperatures that are reached during storage before land application (Garcia et al., 2010). Once spread on the soil, pathogens can survive for several months or years.

URBAN WASTES IN AGRICULTURE

Considering that the positive effects of sewage sludge amendment – such as waste reduction, nutrient cycling, increase of soil fertility, improvement of soil structure and water holding capacity – are significantly more important than the negative effects, efforts should focus on reducing the content of pollutants in sewage sludge and wastewaters used for irrigation. As highlighted by Petrie et al., the lack of knowledge on the fate of emerging pollutants and other pollutants present in wastewater and sewage sludge can be solved only by analyzing them before land application (Petrie, Barden and Kasprzyk-Hordern, 2015)

Composting and pretreatments reduce the content of contaminants and pathogen organisms present in urban waste before their application as amendments in soils, and provide an economical and environmentally friendly approach for stabilizing animal waste and converting it into a worthy organic fertilizer. Frequently, however, high levels of heavy metals such as Pb, Cd, Cu, Zn, Cr, Ni, and salts remain in the amendments and may affect soil properties and inhibit plant growth (Bolan et al., 2014; Hargreaves, Adl and Warman, 2008; Stasinos and Zabetakis, 2013; Stratton, Barker and Rechcigl, 1995). The heterogeneous composition of biosolids produced in

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different wastewater treatment plants requires chemical and biological investigation prior to soil application or incorporation (Bauman-Kaszubska and Sikorski, 2009; Bien, Neczaj and Milczarek, 2013). Limited bioavailability and crop uptake of metals from composted biosolids in comparison with untreated sewage sludge demonstrates the need for pretreatment before its application to soils (Smith, 2009).

HUMAN HEALTH RISKS ASSOCIATED WITH SOIL POLLUTION

Oliver and Gregory summarise six soil-related human health risks (Oliver and Gregory, 2015). Of these, three are related to soil pollution: risks from elemental contamination (e.g. As, Cd, Pb); organic chemical contamination (e.g. PCBs, PAHs, POPs); and pharmaceutical contamination (e.g. estrogen, antibiotics). The three other risks are from soil pathogens such as anthrax and prions, micronutrient deficiencies, and under-nutrition due to degraded soils.

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Long-term impacts of soil pollution on human health and the environment are still unclear, and many efforts are underway to better understand the mechanisms involved in natural attenuation and the health impacts of toxic pollutants (Bernhardt and Gysi, 2016). Urban soils deserve special attention because anthropogenic activities are concentrated on those soils, and the exposure patterns are more complex due to interactions with other health determinants such as nutrition, air quality, and access to health services for illness prevention (WHO, 2013). However, non-urban areas are also subjected to many different sources of pollution, frequently from diffuse sources, which makes it difficult to trace and to estimate their extent and risk. Future efforts related to soil pollution control and remediation should include these areas in their risk assessment approaches

PATHWAYS OF EXPOSURE OF HUMANS TO SOIL POLLUTANTS AND THEIR EFFECTS ON HUMAN HEALTH

The main pollutants related to industrial, mining, urban and agricultural land uses have been widely discussed in the previous chapters. This section will focus on the soil pollutants that are the most relevant to human health and the risks associated with them.

The route of human exposure to a soil contaminant will vary depending on the contaminant itself and on the conditions and activities at a particular site (Shayler, McBride and Harrison, 2009). Generally, people can be exposed to contaminants present in soil through ingestion or through the consumption of plants or animals that have accumulated large amounts of soil pollutants (Khan et al., 2015); through dermal exposure, from using spaces such as parks and gardens (Chaparro Leal, Guney and Zagury, 2018); or by inhaling soil contaminants that have been vapourized (Figure 15). Humans may also be affected as a result of secondary contamination of water supplies and from deposition of air contaminants (Science Communication Unit, University of the West of England., 2013); in some situations, soils play an important role as the source of contaminants in these two processes

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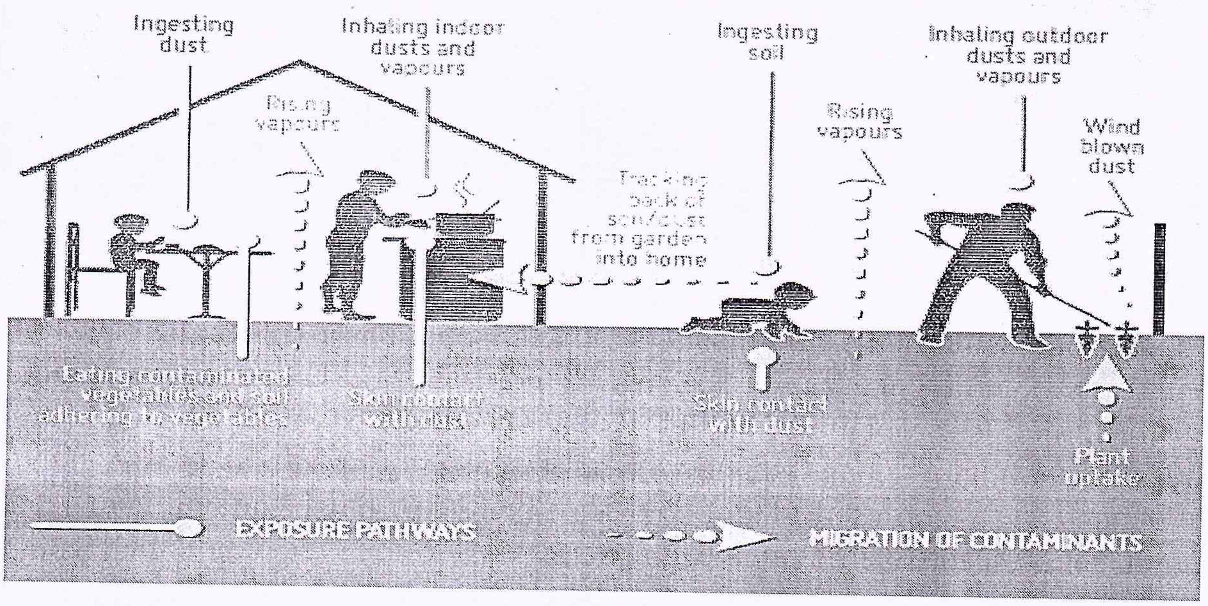


Ten chemicals or groups of chemicals of major public health concern have been identified under the WHO's International Programme on Chemical Safety (WHO, 2010). The ten chemicals or groups of chemicals include soil pollutants such as, Cd, Pb and Hg; dioxin and dioxin-like substances and highly hazardous pesticides (HHP) - whose residues are transferred from contaminated soils to food and water bodies. HHPs are defined as those pesticides that are acknowledged to present particularly high levels of acute or chronic hazards to health or environment according to internationally accepted classification systems or their listing in relevant binding international agreements or conventions. In addition, pesticides that appear to cause severe or irreversible harm to health or the environment under conditions of use in a country may be considered to be and treated as highly hazardous (FAO and WHO, 2016). All of them have chronic effects due to longterm exposure and children, pregnant women and malnourished people are particularly vulnerable to pesticide exposure. Pathogens present in soil may also contaminate food, posing risks to human health. More than 200 diseases – ranging from diarrhea to cancers – are related to contaminated food intake (WHO, 2017b) and 24 percent of the world's population suffers from infections by soil-transmitted helminth, causing nutritional imbalance and chronic anemia (WHO, 2017a).

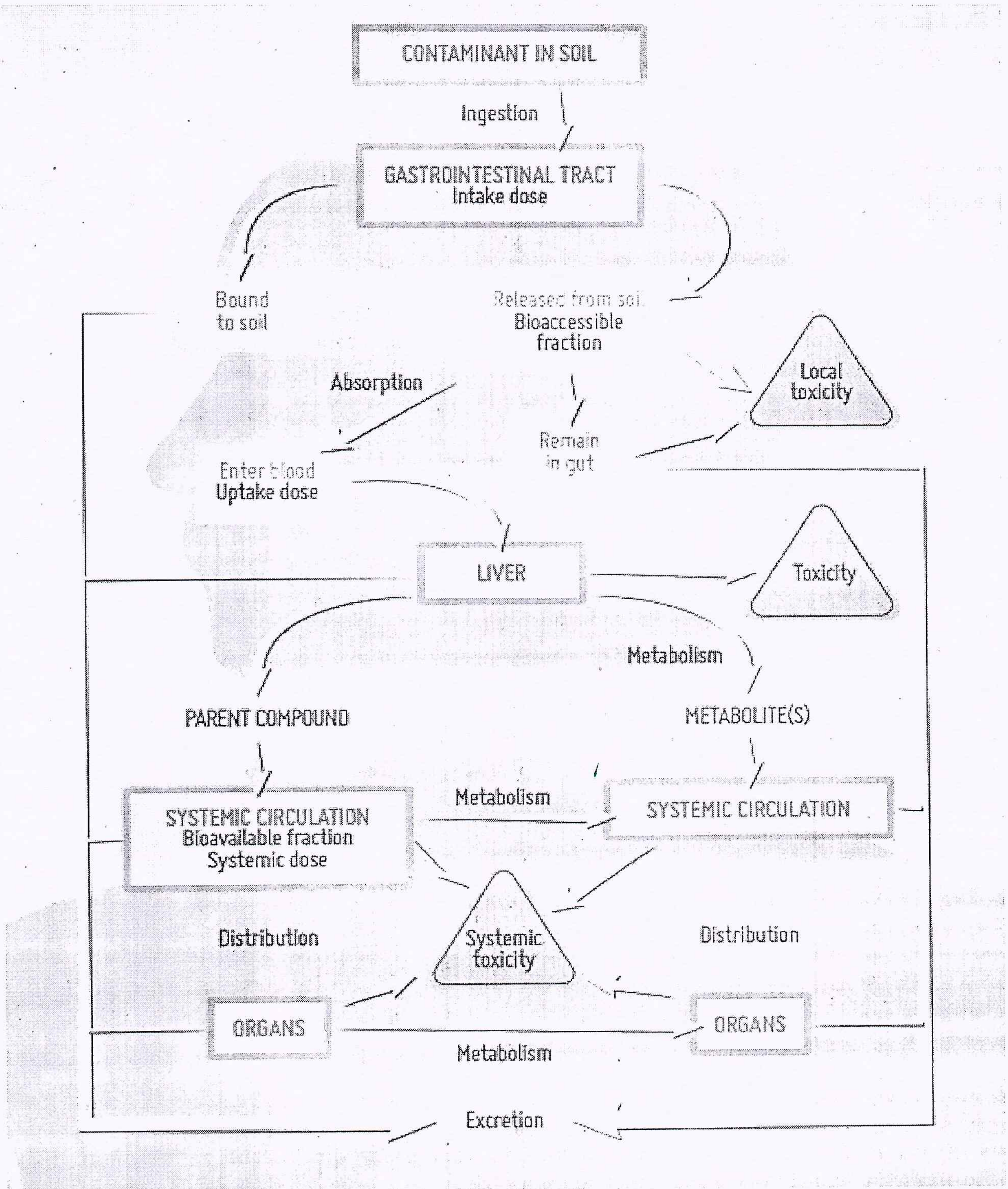
The uptake of metals by plants from soils may result in a significant risk to health (Brevik, 2013; Burgess, 2013; Jordão et al., 2006). The absorption by plant roots is one of the main routes of entrance of heavy metals into the food chain, and varies according to the level of consumption (Pan et al., 2010; Wagner, 1993). Cadmium and lead are the most toxic elements for man (Volpe et al., 2009). Food is the main source of Cd intake by humans. A well-known case was in Japan, where ingestion of rice contaminated with Cd generated the disease known as itaí-itaí (Abrahams, 2002). Cadmium absorbed via food intake can penetrate through the placenta during pregnancy, damaging membranes and DNA and disrupting the endocrine systems, and can induce kidney, liver and bone damage (Brzóska and Moniuszko-Jakoniuk, 2005; Souza Arroyo et al., 2012). The toxic effects of Pb affect several organs, causing biochemical imbalance in the liver, kidneys, spleen and lungs, and causing neurotoxicity, mainly in infants and children (Guerra et al., 2012; Jaishankar et al., 2014). Organomercuric compounds, especially methylmercury, are considered highly toxic. Mercury may induce changes in human neural and gastric systems and can lead to death. Arsenic is absorbed in the body orally or inhaled and is stored mainly in the liver, kidneys, heart and lungs, with smaller amounts accumulating in muscle and nerve tissue, and has been defined as carcinogenic (Brevik, 2013). It can lead to nervous systems disorders, liver and kidney failure as well as anemia and skin cancer. Nickel causes gastric, liver, and kidney defects and neurological effects (Brevik, 2013). Zinc is associated with anemia and tissue lesions, and while the negative effects of copper are rare, liver and kidney damage in infants is possible if exposure is prolonged (Brevik, 2013).

An increasing awareness in terms of the importance of vegetables and fruits to human diet and the identification of food as the main source for many contaminants suggest that the monitoring of heavy metals in food crops should be carried out frequently. The World Health Organization and FAO developed the Codex Alimentarius (WHO and FAO, 1995), which identifies safe limits for contaminants present in fruits, vegetables, fish and fishery products, and animal feed

Aktar, Sengupta and Chowdhury presented a review of pesticide residues in food commodities in the European Union (Aktar, Sengupta and Chowdhury, 2009). Even though the amount of pesticides residues in food did not exceed the acceptable daily intake (ADI), few studies have analyzed the long term risk associated with these persistent pollutants in organisms (Kim, Kabir and Jahan, 2017; Xu et al., 2017). Hernández et al. highlighted the need for further studies of pesticide mixture effects on human health, because current legislation considers maximum residue levels (MRL) of individual pesticides in food and water, without taking into account possible synergetic interactions at their low concentrations (Hernández et al., 2013). Occupational exposure to pesticides is associated with various diseases including cancer, hormone disruption, asthma, allergies, and hypersensitivity (Burgess, 2013; Van Maele-Fabry et al., 2010)

Intake of persistent organic pollutants accumulated in soils has a high relevance for human health (Figure 16). The last results of the WHO/UNEP global monitoring plan (GMP) show that levels of PCDDs, PCDFs and PCBs in human milk are still significantly above those considered toxicologically safe in many regions of the world, with a higher incidence in India and in some European and African countries (van den Berg et al., 2017). Ingestion of soils (geophagia) has been a common practice in many African and South American countries (Woywodt and Kiss, 2002) among children and pregnant and breast-feeding women, and its practice has extended to western societies (Reeuwijk et al., 2013). The intake of contaminated clay with POPs and heavy metals is a soil-borne source of diseases, as daily exposure levels are frequently exceeded (Odongo, Moturi and Mbuthia, 2016). Bányiova et al. pointed out that the main source of POP exposure in the Czech Republic is through intake of polluted food (Bányiová et al., 2017). Even though POP levels in human bodies have been reduced since the introduction of the Stockholm Convention, accidents still occur and they are an important source of soil and food contamination (Hilscherova et al., 2007). The presence of POPs in human milk represents a high risk to the health of newborns and fetuses, as the POPs are circulating in the mother's body (Reeuwijk et al., 2013).

The major exposure route for polycyclic PAHs is through contaminated food ingestion and they are a suspected carcinogenic risk (Brody et al., 2007; Xia et al., 2010). Due to the aromatic nature of PAHs, they easily penetrate cellular membranes and bind covalently with DNA molecules, where they may cause mutations (Muñoz and Albores, 2011). The establishment of a health risk assessment of PAHs would be complex because of the many uncertainties related to exposure and toxicity, which are still unsolved.



Simplified pathway for oral exposure to soil pollutants. Source: Hosford, 2008

Regarding emerging pollutants, there are gaps in our understanding of how they behave in the environment, which interactions occur within the soil matrix, and their toxicity, bioaccumulation properties and transport mechanisms in human bodies, despite the already available information on exposure routes and levels in human tissues (Covaci et al., 2011). Normally, these compounds appear at very low concentrations in human bodies, but the fact that many of them have only recently emerged as contaminants means that long-term studies that focus on the epidemiological aspects of this issue are needed

Comprehensive assessments of the health effects of most forms of soil, heavy metals, and chemical pollution have not yet been published (Landrigan et al., 2018). Basic toxicological data and knowledge on exposure routes and rates are needed in order to analyze the effects of soil pollutants on human health. A risk assessment based on a toxicological approach that considers tolerable doses is frequently used to establish hazard-related doses (Blume et al., 2016; WHO, 2013). These acceptable doses are characterized for examining the harmful effects of individual substances on a person's health considering a conceptual exposure scenario that identifies sources, pathways and receptors.

As described in the WHO's report (WHO, 2013), there are several scientific tools that can be used to evaluate the risk posed to human health by soil pollution. Other models recently developed to assess the human exposure include BROWSE (Bystanders, Residents, Operators and WorkerS Exposure models for plant protection products) which contains more realistic scenarios (Butler Ellis et al., 2017) and integrates large European guidance and regulatory databases to refine the assessment of human exposure (Lammoglia et al., 2017). The real health risk assessment has not yet been well defined in the case of simultaneous exposure to two or more chemical substances, which occurs in real-life conditions and may have synergistic effects (NicolopoulouStamati et al., 2016)

SOILS AS RESERVOIR OF ANTIMICROBIAL RESISTANT BACTERIA AND GENES

The transference of antibiotic resistance genes from the environment to human pathogens has created a great challenge due to an overall decrease in effectivity of antibiotics (Harbarth et al., 2015; Thomas and Nielsen, 2005; WHO, 2018). As a result, infections persist in the body, increasing the risk of contamination of others (WHO, 2018). Each year approximately 700 000 deaths occur globally that are attributable to AMR bacteria; 25 000 deaths in Europe (EC, 2017) and around 23 000 in the United States of America (CDC, 2013). Furthermore, human health implications for intake of antibiotic residues and AMR bacteria present in food are largely unknown, although several potential adverse impacts have been observed.

These include allergic and toxic reactions or chronic toxic effects as a result of prolonged low-level exposure (McManus et al., 2002; Sarmah, Meyer and Boxall, 2006). The risks of AMR are especially important in newborns, where AMR bacteria populate the newborns' guts (Brinkac et al., 2017). Soil is considered to represent a natural reservoir of antibiotic-resistant bacteria carrying a diverse set of known and unknown resistance determinants (Cytryn, 2013). Fungi and bacteria that occur naturally in the environment produce many antibiotics that humans have been using for centuries, and at the same time they have antibiotic-resistant genes against the antibiotics they produce (Hopwood, 2007). Allochthonous resistant bacteria and genes added to soil with manure or sewage sludge might not be well adapted to soil conditions as they are subject to selective pressure by native organisms (Heuer et al., 2008)

When microorganisms (such as bacteria, fungi, viruses and parasites) are continuously exposed to antibiotics or another antimicrobial agent that kills or inhibits the growth of microorganisms, selection of resistant organisms occurs, even at low concentrations. As well, transference of the resistome (extrachromosomal antibiotic-resistant plasmids) or of the mutated genes inside the chromosome to other members of their own species and to other species occurs (Khachatourians, 1998). Antibiotics are used worldwide for animal therapy and growth promotion in livestock production. A high percentage of these antibiotics are not assimilated by organisms' systems and are excreted into the environment. Assimilation rates by livestock depend on the pharmacokinetics and transformation of the antibiotics by the animal's metabolism. Heuer et al., for example, found that more than 96 percent of the veterinary antibiotic sulfadiazine was excreted in its parental form or as metabolites ten days after administration to pigs (Heuer et al., 2008). Excretion rates are lower for tetracyclines (Winckler and Grafe, 2001), but can reach high rates, over 90 percent for amoxicillin and difloxacine (Sukul et al., 2009). Large amounts of these antibiotics end up in farm and urban wastes and soils, and they are not completely removed in wastewater treatment plants or during composting processes. Wastewater treatment plants were identified as the main source of antibiotic release into streams, with highly variable removal rates for different antibiotics (Michael et al., 2013; Watkinson et al., 2009)

Changes in soil microorganism communities and in crucial activities have been observed after the application of amendments to soil, promoting resistant populations (Ding et al., 2014; Tian et al., 2015; Tien et al., 2017). Antimicrobial-resistant populations in manure may be responsible for the horizontal transference of resistant plasmid to soil-dwelling organisms, as confirmed under field conditions in manure-amended soils (Gotz and Smalla, 1997; Smit et al., 1991). This transference process is promoted by the increase of nutrient sources, which activate microbial activity and population density (Ding et al., 2014). Scientific evidence suggests that the presence of heavy metals, mainly Cu and Zn, in soils contributes to the coselection of AMR (Grass, Rensing and Solioz, 2011; Hölzel et al., 2012; Wales and Davies, 2015; Yu et al., 2017). Mutations induced in soil microorganisms may lead to a range of metabolic phenotypes, including variations in the ability to use different carbon, nitrogen or phosphate sources (Perkins and Nicholson, 2008), altering global geochemical cycles (Allen et al., 2010).

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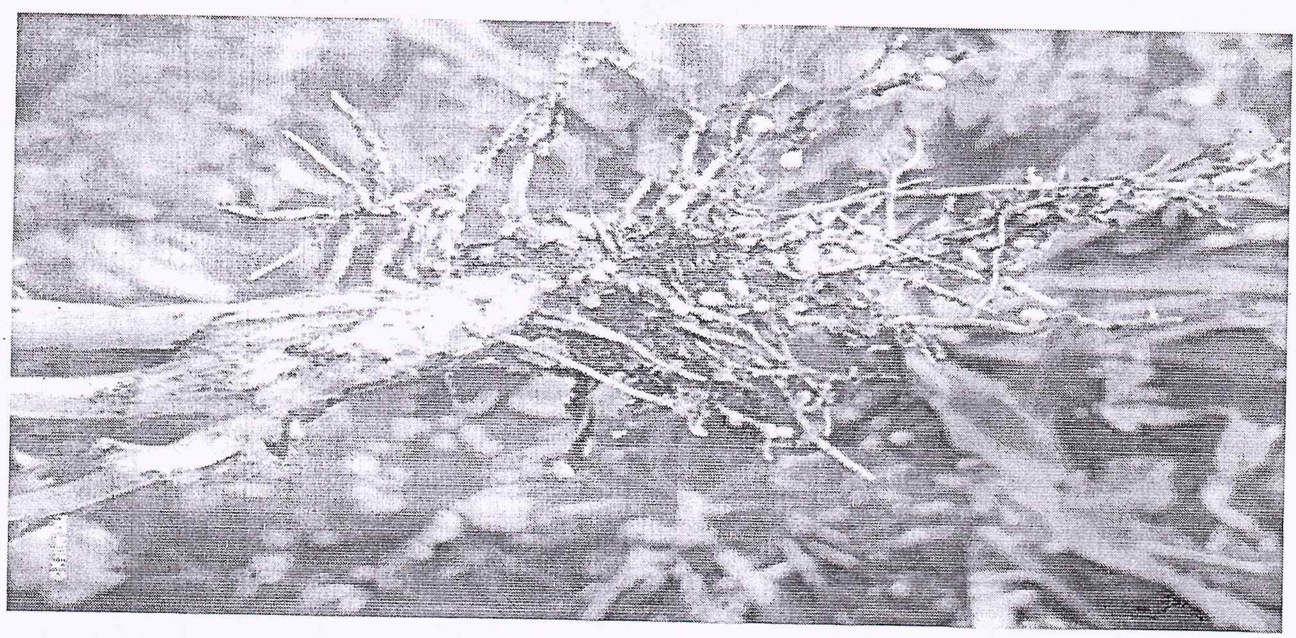
Wales and Davis also found that antimicrobial selection was enhanced by heavy metals even in the absence of antimicrobial substances when they were exposed to other biocides, such as disinfectants and antiseptics (Wales and Davies, 2015). Similar results were found in residential soils of Australia, where the high content of heavy metals stimulated the proliferation of antimicrobial-resistant genes (Knapp et al., 2017). Thus, AMR becomes an even greater challenge in polluted soils. More research is needed to assess the risk of AMR spreading via sewage sludge and manure amendments (Bondarczuk, Markowicz and Piotrowska-Seget, 2016).

Antibiotic concentrations decrease rapidly after their entry in the soil through different processes (Figure 17), such as plant uptake, leaching to groundwater, sequestration in organic complexes, sorption to clay minerals or biodegradation (Jechalke et al., 2014; Kuppusamy et al., 2018). Despite this, an increase in resistant bacteria was observed even when antibiotic concentrations were very low (Gullberg et al., 2011). Sequestration and sorption of antibiotics in soils reduce their bioavailability but increase their permanence and persistence in the environment (Jechalke et al., 2014). The uptake of antibiotics by plants has been widely reported (Boxall et al., 2006), and has gained attention as the food chain may be directly contributing to the spread of antibiotic resistance (Du and Liu, 2012). Furthermore, antibiotics may cause inhibition of seed germination and reduce crop growth (Du and Liu, 2012). If antibiotic-rich soils suffer any alteration that leads to changes in organic matter concentration and conformation (Gulkowska et al., 2013), the sequestered antibiotics may be released in their bioavailable forms (Rosendahl et al., 2011).



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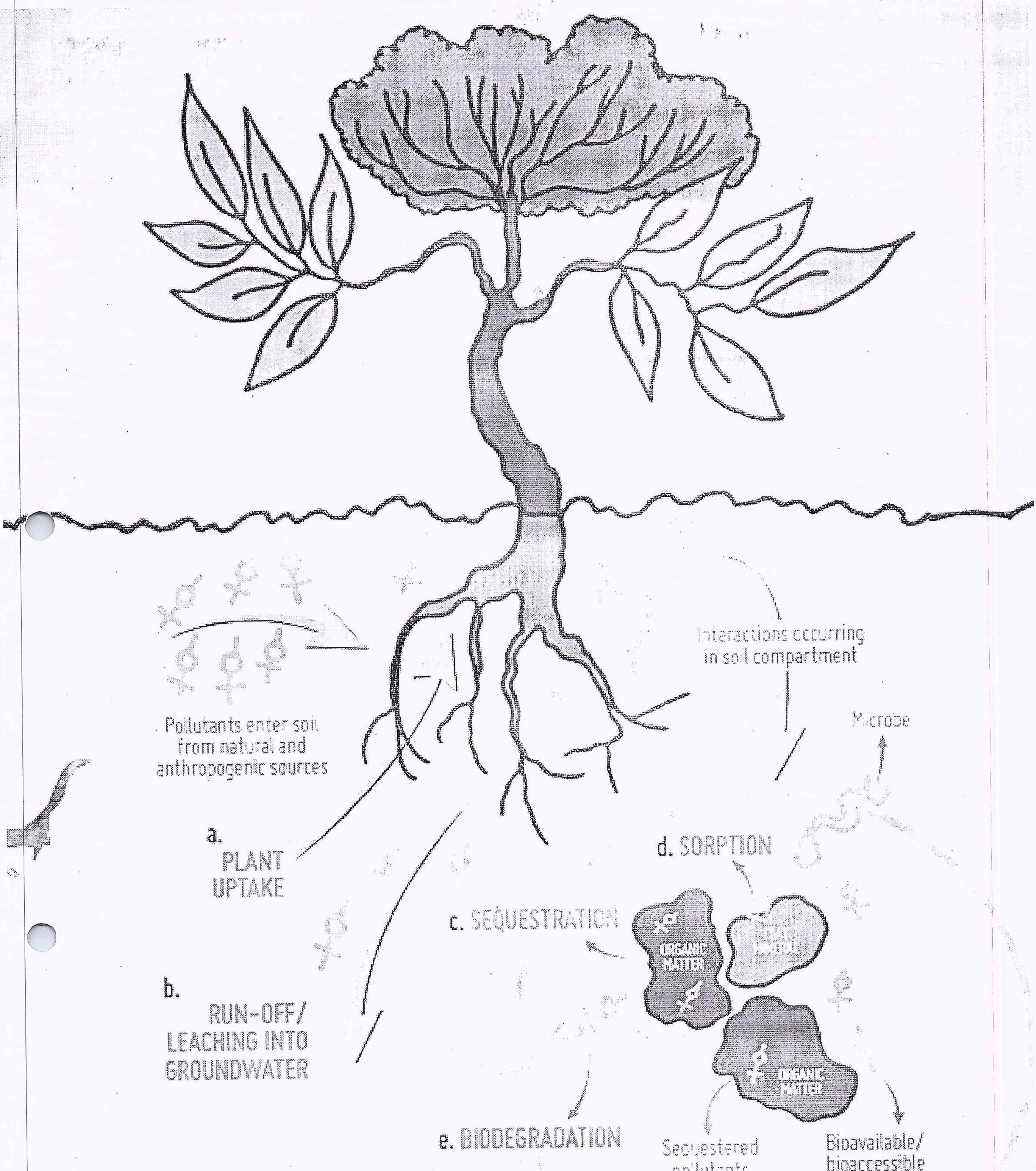

Fate of veterinary antibiotics in the environment. Source: Kuppusamy et al., 2018

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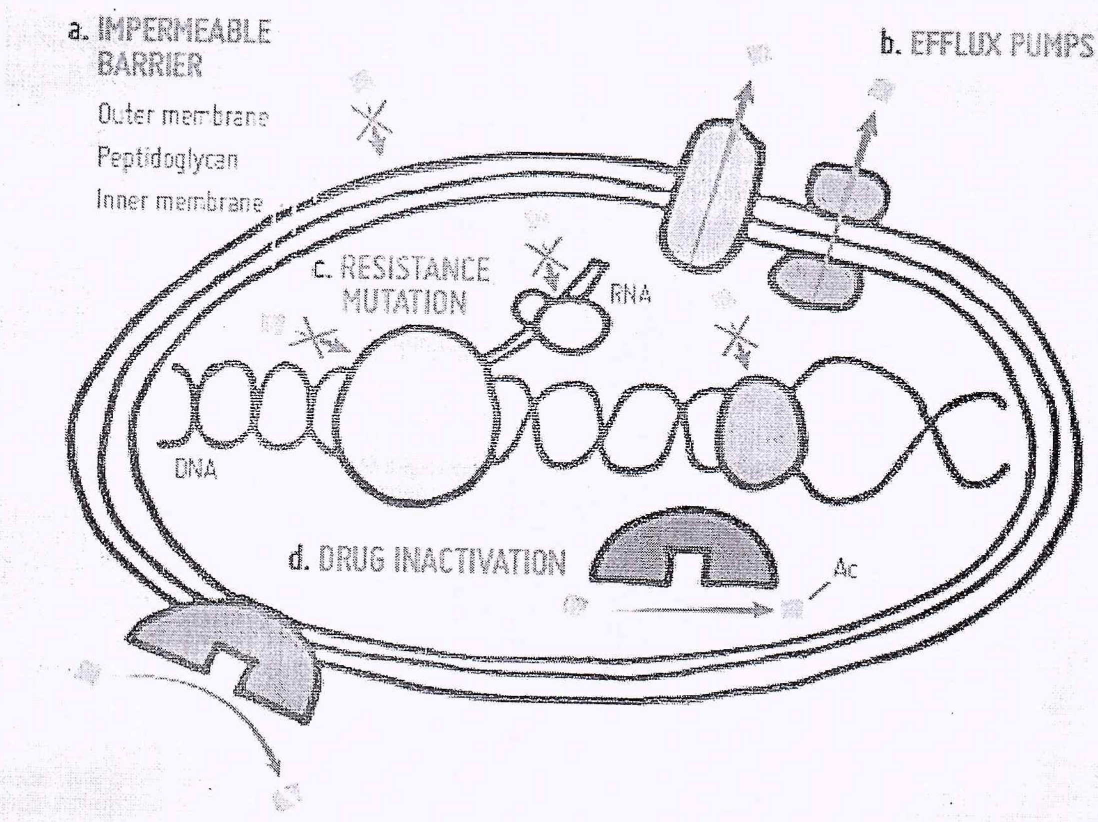
Different antibiotics have different target sites within cells; thus, organisms develop resistance to particular antibiotics and not a general resistance (Khachatourians, 1998). However, it has become more and more common to find multi-drug-resistant bacteria (CDC, 2013; EC, 2017; WHO, 2014). A recent study has shown a high co-presence of antibiotic-resistant genes and mobile genetic elements in a multi-drug-resistant bacteria community isolated from chicken manure (Yang et al., 2017b). Bacteria present four main mechanisms that lead to antimicrobial resistance (Figure 18): 1) enzymatic degradation or modification of antibiotic compounds by intra and extracellular enzymes; 2) efflux pumps that actively remove antibiotic compounds outside the cell or in the periplasm; 3) modification or protection of the antibiotic binding site; and 4) natural or modified membrane permeability (Alekshun and Levy, 2007).



Main mechanisms of antimicrobial-resistance. Source: Allen et al., 2010

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MANAGEMENT AND REMEDIATION OF POLLUTED SOILS

The first step in the assessment and management of polluted soils is the identification of the problem; in this case, the pollutions in the soil. In general, when an area is affected by an accident such as an oil spill, a nuclear accident, or the rupture of a dam tailing, measures to control the extent and prevent further occurrences generally start immediately. However, in legacy polluted soils or where diffuse pollution could be an issue, there are often no established protocols to be followed. In some countries or regions in the world, there are national, regional or local agencies who are responsible for initiating a preliminary investigation to determine whether or not pollution is present and whether further action is needed, while there are many others where no regulation or protocols have been defined (Teh et al., 2016).

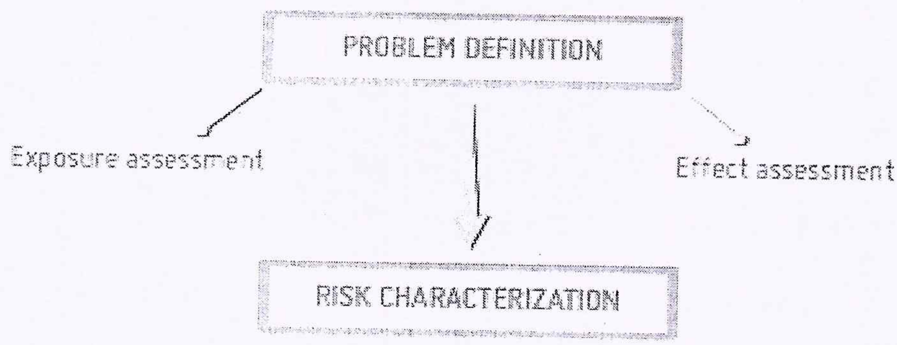
In the past, criteria for land reclamation were established using standards based on background concentration and safe limits. New approaches try to adopt a more comprehensive assessment of the risk that pollutants pose to the environment, humans and food safety. The characterization of the potential risk to the environment and human health is not an easy task, due to the complexity of the matrix, the lack of knowledge on the fate of contaminants in soil and the scarcely available information of toxicological and integrated studies (Cachada et al., 2016). Exposure routes for these compartments modelled taking into consideration certain land-use types (e.g. residential, industrial, and recreational) (Provoost, Cornelis and Swartjes, 2006).

RISK ASSESSMENT APPROACHES

Assessing risks means that, based on scientific evidence, one can estimate the likelihood of a certain outcome and the gravity of that outcome, and use this knowledge to help in decision making. Uncertainties must be reduced when possible, and clearly the remaining uncertainties need to be clearly identified and explained (FAO, 2000). Risk management decisions for soils or sediments focus on identifying relevant pathways of exposure that pose a risk to human health or the environment and developing appropriate remedial measures. These could include treating or removing sources, or cutting off pathways, or both (Committee on Bioavailability of Contaminants in Soils and Sediments, 2002).

Risk assessment approaches (RAA) are similar worldwide and consist of a series of steps to be taken to identify and evaluate whether exogenous or indigenous substances have caused or are causing soil pollution, and to what extent that pollution is posing a risk to the environment and to human health (Figure 19). Risk assessment approaches are tools to enable science-based political and technical decisions and to take action when needed. Risk assessment tools often use a chemical-by-chemical approach, focusing on a single medium, a single source, and a single toxic endpoint, although integrated approaches are gaining popularity. Such approaches use models combining human exposure and effect-based environmental parameters, based on deterministic or probabilistic techniques (DEA, 2010; Hope, 2006; Provoost, Cornelis and Swartjes, 2006). The end user is interested in whether the soil is "fit for use," mainly in industrial and urban sites where local and diffuse pollution may be present. In these cases, a site-specific approach is necessary to obtain an integrated overview of exposure and risk information (Posthuma et al., 2008)

The "universal risk assessment paradigm". Source: Posthuma et al., 2008



Once there is a suspicion of pollution, and after preliminary research on the historical use of the site, an initial assessment should be carried out to define whether exogenous substances are present, which ones are present and whether they pose any risk to the environment and human health. If pollution is confirmed and remediation measures are necessary, a detailed investigation must be accomplished to determine the extent and possible remediation measures. Risk management and/or remediation strategies are subsequently defined and implemented. After-clean-up measures are essential to confirm that the risk has been reduced and that the source of pollution has been controlled.

Worldwide, policies and regulation are based on RAA to forecast risks that cannot be directly measured (Hough, 2007). Regulations include guidelines to identify and assess soil pollution using soil quality standards, in many cases considering national characteristic of soils or site-specific conditions. Because RAA are complex and time-consuming processes, however, not every country in the world can afford to investigate pollution. This is also because no comprehensive information is available, and approaches on a site basis are frequently adopted. As Hope has pointed out, accessing documentation about ecological risk assessment and its regulatory uses is complex, especially in developing countries (Hope, 2006). In those cases, the United States Environmental Protection Agency (US EPA, 1986), Canadian guidelines (Canadian Council of Ministers of the Environment, 1999), and Netherlands

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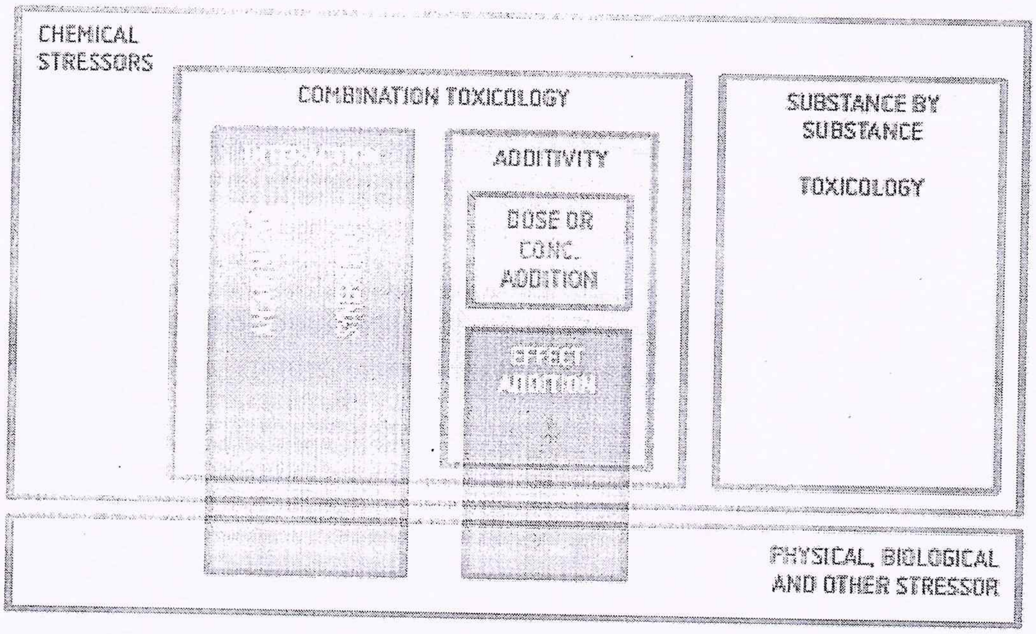
guidelines (Brand, Otte and Lijzen, 2007) among others may be used as a reference, even though the characteristics of climate, soil or the local populations are not the same (Li et al., 2014). Some international efforts, such as the one proposed by FAO (FAO, 2000), which provides guidelines to assess the environmental and human health risk posed by stock of obsolete pesticides with more detailed information on the steps of assessment in Environmental Management ToolKit (Volume5), or the guidelines for Integrated Risk Assessment developed by several international organizations (IAEA, 1998; Meek et al., 2011; WHO, 2001a) are attempts to provide an integrated multichemical, multimedia, multiroute, and multispecies exposures analysis.

It is widely recognized that an integrative approach that includes complex mixtures of pollutants is needed to develop more precise risk assessment tools and a better understanding of the potential impacts and their extent (Reeves et al., 2001). Albert launched the question "Is it possible to predict toxicity of complex mixtures?" more than 30 years ago (Albert, 1987). Since then, many researchers have tried to come up with a suitable solution or at least a more comprehensive study of interactions in complex mixtures, to determine whether additive, synergistic or antagonistic toxic effects occur when pollutant mixtures are present (Chen et al., 2015). The specificity and great variability of pollutant mixtures present in each site, which depend on industrial operations or processes carried out, slow down the progress on the definition of limit values appropriate for a general risk assessment approach (Callahan and Sexton, 2007). The Dutch approach, among others, includes a protocol to analyze the risk when more than one substance is present (Cachada et al., 2016). Normally, a cumulative calculation is used, considering the individual risk and the sum across the potential toxicity and risk, but it does not consider possible interactions and synergies between substances that may attenuate or increase their potential risk (Callahan and Sexton, 2007). Chen et al. found that the more complex the mixtures of pollutants, the greater the synergistic toxicity (Chen et al., 2015). They suggest that the use of a Combination Index (CI) is more accurate to estimate the ecotoxicological risk than the conventional concentration addition (CA) or independent action (IA) models (Figure 20), not only in aquatic environments (Rosal et al., 2010) but also in soils (González-Naranjo and Boltes, 2014; González-Naranjo et al., 2015). The synergistic/antagonistic effect has been confirmed not only for a combination of pesticides (Yang et al., 2017a) but also in other complex mixtures, such as the pollutant mixture found in landfills (Baderna et al., 2011) or in railway tracks. In the latter case, Wierzbicka et al. found highly toxic effects of the pollutant mixture on numerous test organisms from different trophic levels, even though the single concentration of each pollutant did not exceed admissible values (Wierzbicka, Bemowska-Kałabun and Gworek, 2015). However, as explained in Sarigiannis and Hansen, combined toxicology approaches have limited applicability under specific conditions, and data cannot be generalized (Sarigiannis and Hansen, 2012).

The sequence of steps to deal with polluted sites described above is a general one, and depending on national or regional approaches some steps may be omitted or others may be added (Contaminated Sites Management Working Group, 1999; DEA, 2010; FOEN, 2013; Luque, 2014).



Risk assessment approaches based on independent action of substance by substance, additivity of doses and effects or considering interactions for the combined model. Source: Sarigiannis and Hansen, 2012

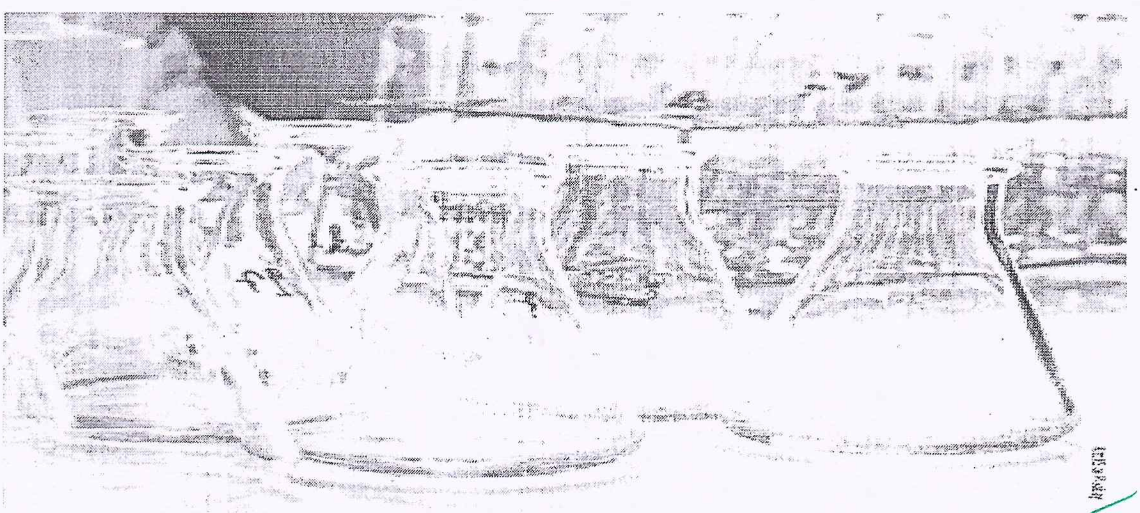
Human health risk assessment (HHRA) can be conducted in different ways and for the purpose of meeting different objectives. This approach can be used for the following:

- derivation of soil quality standards
- site-specific risk assessment
- development of remediation objectives
- ranking of contaminated sites by priority of intervention.

Soil screening values (SSVs) are generic soil quality standards based on generic exposure pathways and scenarios (e.g. inhalation of vapours in residential or industrial areas) adopted in many countries to regulate the management of polluted soils. Soil screening values or soil quality standards are identified by different terms around the world: trigger values, reference values, target values, intervention values, cleanup values, cut-off values and others (Carlon et al., 2007; Swartjes et al., 2012). Furthermore, the threshold values are based on different national strategies in environmental policies and rarely take soil properties into account.

In cases of soil pollution by heavy metals, total metal concentration provides little information on the potential risk (Naidu et al., 2015). It is important to identify the available and unavailable forms of the heavy metals to ensure that the soil is managed in such a way as to prevent the unavailable forms from becoming available. This can be done by using biological tests to determine the bioavailability and toxicity of metal(loid)s (Romero-Freire, Martin Peinado and van Gestel, 2015). In this case, soil quality standards or threshold values must be corrected, taking into account soil properties such as pH, soil texture and organic matter content, because it has been widely demonstrated that in many cases quality standards that do not consider soil properties under- or overestimate the actual risk (Appel and Ma, 2002; Bradl, 2004; Rodrigues et al., 2012; Romero-Freire, Martin Peinado and van Gestel, 2015). In addition, by analyzing and including bioavailability during risk assessment instead of assuming that the target pollutants are 100 percent bioavailable, remediation efforts will be optimized and enhance profitability of the remediation efforts (Naidu et al., 2015; Romero-Freire, Martin Peinado and van Gestel, 2015).

It is therefore crucial to develop regulations and legislation to certify the quality of food depending on its heavy metal content. The international literature contains multiple methodologies and evaluation criteria that identify permissible heavy metal values for soils that differ in magnitude (Table 7). This is generally due to the criteria considered for their establishment (Muñiz, 2008). The obtaining of reference values for soil quality in terms of heavy metal content has been established in many countries, which developed their respective environmental policies for soil protection and food safety assurance. The one developed by USEPA (US EPA, 1998, 2014a) is especially important because several other countries follow it. These standards are based on risk assessment policies and define background levels and the study of human and environmental toxicity. When it comes to food, the FAO Codex Standard is of major importance. It defines the values for contaminants and toxins (including heavy metals) permissible in food products, and it is constantly being reviewed and updated (WHO and FAO, 1995)



Contaminant (mg/kg dm)	Belgium	France	Germany	Great Britain	Great Britain	Hungary	Netherlands	Poland
Arsenic	110	37	50	20	20	15	55	2
Cadmium	6	20	20	8[illegible]	30	1	12	4
Chromium III	300	130[illegible]	400	130	200	75	380	--
Copper	400	190	N.A.	N.A.	N.A.	30	190	150
Mercury	15	7	20	8	8	0.5	10	--
Lead	700	400	400	450	450	100	530	100
Nickel	470	140	140	50	75	40	210	--
Zinc	1000	9000	N.A.	N.A.	N.A.	200	720	300

Threshold values of some heavy metals for residential land-use for various countries. Modified from Provoost, Cornelis and Swartjes, 2006

1. Soil Remediation Decree named Vlarebo from July 8, 2002
2. Standards applicable as national legislation for 'wirkungspad Boden-Mensch' (exposure path soil – humans)
3. Residential area with vegetable garden
4. Residential area without vegetable garden
5. Hungarian Governmental regulation number 10/2000
6. Polish soil quality standards for the top soil layer (0-30 cm), established for the group B of land use (agricultural lands, forest, residential and recreational areas) Regulation 2002
7. Royal Decree 1310/1990 of 29 October 1990 regulating the use of sewage sludge in agriculture. (B. O. E. No. 262, November 1,1990). Values for soils with pH lower or higher than 7.
8. GUIDELINE ON Investigation Levels for Soil and Groundwater. National Environment Protection (Assessment of Site Contamination) Measure as varied 2011.

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9. SEPA (1995) Environmental quality standards for soils. State Environmental Protection Administration, China, GB 15618-1995

10. 1/2/8 mg/kg dm related to the soil clean-up standards at pH 6, 7, 8, respectively. The clean-up standard of 8 mg/kg dm was used in this comparison.

11. Chromium total

12. Chromium (VI)

13. 1000/4 related to the soil clean-up standard as total concentration and soluble concentration. The clean-up standard of 1000 mg/kg dm was used in this comparison.

14. 23/6.1 describes the chlorinated mercury and organic-mercury. The clean-up standard of 23 mg/kg dm was used in this comparison.

15. HIL for lead based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered)

16. 1000/0.1 related to the soil clean-up standard as total concentration and soluble concentration. The clean-up standard of 1000 mg/kg dm was used in this comparison.

17. 2000/5 related to the soil clean-up standard as total concentration and soluble concentration. The clean-up standard of 2000 mg/kg dm was used in this comparison

MAIN TECHNIQUES FOR REMEDIATING POLLUTED SITES

Nathanail referred to sustainable remediation as "remediation that eliminates and/ or controls unacceptable risks in a safe and timely manner, and which maximizes the overall environmental, social and economic benefits of the remediation work" (Nathanail, 2011). Sustainable management requires the incorporation of the best available techniques, not only during the remediation process itself, but for the whole process, including risk assessment and risk reduction. Best management practices (BMPs) are individual or combinations of management, cultural and structural practices that researchers (academic or governmental) have identified as the most effective and economical way of reducing damage to the environment (Cestti, Srivastava and Jung, 2003). Remediation is commonly done on a site-by-site basis, since for every combination of pollutant, soil property, land use, property and liability regimes and technical and economic reality of the site or area, a different technique or combination of techniques may be more appropriate (Swartjes, 2011)

Remediation techniques can be divided in two main groups: in situ (on the site) and exsitu (removal of contaminated soil for treatment off the site) remediation. Available remediation options include physical, chemical and biological treatments, and these options offer potential technical solutions to most soil pollution (Scullion, 2006). For both in situ and ex situ, the net effect on the contaminants can be categorized as reducing the concentration, reducing the bioavailability without reducing the concentration, encapsulating in an inert matrix, containment, and removal (Pierzynski, Sims and Vance, 2005). The management of polluted sites is a site-specific approach that includes characterization, risk assessment and remediation technologies selection, and therefore is mainly focused on local or point-source contamination.

Scullion presented a review of the main treatment approaches to remediate polluted soils and their effect on pollutants (Scullion, 2006), specifying whether they are degraded, separated from soil components, extracted from the matrix or stabilized

Process treatment	Destruction/ degradation	Solid separation	Extraction/ loss	Stabilisation
Physical remediation methodologies				
Thermal	√		√	
Solidification	(√)			√
Vapour extraction			√	
Air sparging	(√)		√	
Washing/pump and treat	(√)		√	
Electroremediation	(√)		√	
Particle sorting		√		
Chemical remediation methodologies				
Oxidation	√		√	√

Main remediation methodologies and their effects on soil pollutants (√ = main process, (√) = subsidiary process limited in extent or in the range of pollutants affected). Source: Scullion, 2006

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Process/treatment	Destruction/ degradation	[illegible]	[illegible]	Stabilisation
Reduction	(√)		√	√
Hydrolysis	√		√	
Solubilisation	(√)		√	
Dechlorination	(√)			
pH manipulation	(√)		√	√
Biological remediation methodologies				
Microbial activity				
Landfarming	√		(√)	√
Biopiling	√		(√)	√
Composting	√		(√)	√
Bioreactor	√			(√)
Bioleaching			√	
Plant activity				
Phytostabilisation	(√)		(√)	√
Phytoextraction	(√)		√	(√)
Phytodegradation	√		(√)	(√)

What makes many of the currently available physical methods so expensive is partially the cost of excavating and transporting large quantities of contaminated materials for ex situ treatment such as chemical inactivation or thermal degradation. The high cost has led to an increasing interest in alternative technologies for in situ applications, in particular those based on the biological remediation capability of plants and microorganisms (Chaudhry et al., 2005). Bioremediation is a technology that destroys or renders harmless various contaminants, using the biological activity of certain microorganisms. Bioremediation actually relies on the microbial growth and activity; its effectiveness is highly dependent on the applied environmental parameters that influence the microbial growth and the degradation rate. Bioremediation is considered a very promising technology with great potential when dealing with certain types of contaminated sites (Zouboulis, Moussas and Nriagu, 2011). Bioremediation has been used worldwide, including in Europe, with varying success (Zouboulis, Moussas and Nriagu, 2011).

According to Alexander, several conditions must be satisfied for bioremediation by microbial activity to take place in the soil (Alexander, 1999). These include the following: 1) the organism must be present in the soil containing the pesticide; 2) an organism must have the necessary enzymes to bring about the biodegradation; 3) the pesticide must be accessible to the organism having the requisite enzymes; 4) if the initial enzyme bringing about degradation is extracellular, the bonds acted upon by that enzyme must be exposed for the catalyst to function; 5) should the enzymes catalyzing the initial degradation be intracellular, that molecule must penetrate the surface of the cell to the internal sites where the enzyme acts; and 6) because the population or biomass of bacteria or fungi acting on many synthetic compounds is initially small, conditions in the soil must be conducive to allow proliferation of the potentially active microorganisms.

Compost made from sawdust, wood chips, bark, straw, plant waste and food waste from households is another common source of organic matter to be added to the soil (Kuo et al., 2004). Addition of organic matter to the soil may help to decrease the mobility of heavy metals and other pollutants (Grobelak and Napora, 2015; Wuana and Okieimen, 2011), reducing the risk to the environment and to human health.

The addition of manure and sewage sludge can be an effective bioremediation tool, but care needs to be taken to ensure that effective pre-treatment of the organic material has occurred. To attenuate the negative impacts associated with livestock manure, simple techniques such as composting can be applied before their application to the land (Zhang et al., 2015a). Compared to fresh manure, composted manure generally has higher contents of lignin and polyphenol, which reduces CH4 emission while further enhancing the potential of SOC sequestration (Xia, Wang and Yan, 2014). Lv et al. observed a positive effect of worms present in the composting process, resulting in the stabilization of heavy metals present in animal manure (Lv, Xing and Yang, 2016). The composting of fresh manure has been proven as an effective method for reducing various types of environmental pathogens and antimicrobial resistant bacteria (Cole, 2015; Holman et al., 2016). Storing slurries for one to three months, composting at high temperatures, spreading in a manner that reduces potential volatilization and avoiding long-distance transport of manure are some of the recommendations proposed by Nicholson et al. in order to reduce pathogen levels in manure and slurries prior their land application (Nicholson et al., 2003). Despite the observed persistence of certain antibiotics in soil and their negligible mineralization due to strong sorption to soil components, several authors highlight the importance of storage time and composting for dissipation of antibiotic compounds in manure before land application (Arikan, Mulbry and Rice, 2009; Halling-Sørensen et al., 2001; Kim et al., 2011; Tien et al., 2017).

The planting of trees that have good resistance to high levels of toxic substances and a high capacity to collect and store pollutants can also be a good practice for bioremediation process in soils (Paz-Alberto and Sigua, 2013). According to Wisłocka et al., the most popular trees exhibiting a high capacity to accumulate heavy metals are silver birch (Betula pendula), alder (Alnus tenuifolia), black locust (Robinia pseudoacacia), willow (Salix sp.), and conifer trees (Wislocka et al., 2006). Selected energy crops such as Miscanthus giganteus have excellent adaptability to change habitat conditions, the possibility to gradually reclaim degraded lands, and the ability to prevent the migration of heavy metals into the soil and groundwater.

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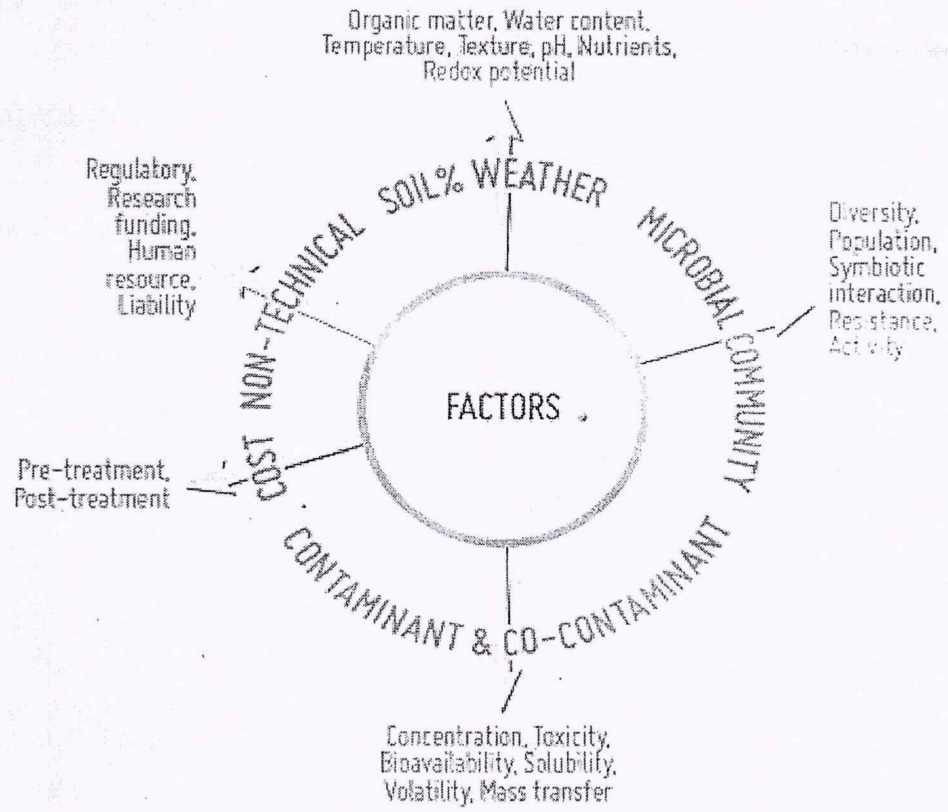

Factors affecting field-scale remediation of PAH-polluted soils. Source: Kuppusamy et al., 2017

Interest in biochar is also growing among scientists, who are particularly interested in how the chemical and physical properties of biochar particles affect water moving through soil, remove pollutants, alter microbial communities and reduce emissions of greenhouse gases. The hope is that biochar can help farmers around the world, particularly those in developing regions who often struggle with poor soils. Biochar has ancient roots. Hundreds to thousands of years ago, residents of the Amazon produced it by heating organic matter to create rich, fertile soils called terra preta. The practice was abandoned around the time that European nations invaded South America, and relatively few farmers elsewhere have routinely used biochar. Scientists first took an interest in the material about a decade ago, when growing concerns over global warming led some to tout biochar as a way to store huge amounts of carbon underground. Hope for that application has faded somewhat due to the high cost of biochar, but soil scientists are now exploring its use in agriculture and in remediating soil pollution (Cernansky, 2015)

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New technologies for remediation involve the application of nanoparticles for remediating polluted soils (Pan and Xing, 2012). The most widely recognized nanotechnology in soil remediation is the application of nano-zero-valent iron (nZVI) for reducing the impact of both organic and inorganic pollutants. For example, nZVI can effectively degrade chlorinated hydrocarbons and organochlorine pesticides (Singh et al., 2011; Zhanqiang, 2010). Carbon nanotubes have been demonstrated to be a feasible remediation material because of their large sorption capacity for metal ions (Rao, Lu and Su, 2007), radionuclides (Ren et al., 2011) and organic compounds (Pan and Xing, 2008). Integrated approaches and emerging technologies, such as electrokinetic remediation, enzyme-mediated bioremediation, multi-process phytoremediation and vermiremediation have been employed in the treatment of PAH-contaminated soils (Kuppusamy et al., 2016). The selection of the best available techniques and their success in remediating polluted soils will depend on physical, economical, regulatory and technical factors (Figure 21) (Kuppusamy et al., 2017)

The critical factor affecting remediation of PCBs, PAHs and PBDEs is the strong sorption of these molecules on soil and sediments, as demonstrated by their long persistence despite heavy restrictions on their use for over 30 years. The ability to desorb these contaminants determines, in most cases, the effectiveness of remediation technologies (Gomes, Dias-Ferreira and Ribeiro, 2013). The most commonly used remediation technique for these polluted soils is “dig-and-dump,” but this is not sustainable. Other techniques such as bioremediation, thermal desorption, and anaerobic dechlorination have been tested in recent years with good results (Gomes, Dias-Ferreira and Ribeiro, 2013). The technologies previously described, although aiming to destroy or transform PCB, operate in very different ways and consequently have different clean-up times, costs, breakdown products and environmental impacts. Their effectiveness is also site-specific, since each technology depends on the contaminants, the aging of the contamination, the type of soil and geomorphologic conditions, and other environmental factors such as mobility of the contaminants or sorption to soil particles (Gomes, Dias-Ferreira and Ribeiro, 2013; Wang and He, 2013).

CASE STUDIES ON SOIL POLLUTION AND REMEDIATION

REMEDIATION BY ENHANCED NATURAL ATTENUATION OF POL POLLUTED SITES IN UN FIELD MISSIONS: A CASE STUDY ON THE UNITED NATIONS OPERATION IN CÔTE D'IVOIRE (ONUCI)18

The consumption of petroleum oil and lubricants (POL) in field missions is inevitable due to their use in generating electricity and operating mechanical equipment to support peacekeeping operations. Through these processes, which have a major environmental footprint, the potential of soil contamination arises. This section presents a case study of remediation work conducted by Global Service Centre/Environmental Technical Support Unit on POL polluted sites during the liquidation of a United Nations field operation in Côte d'Ivoire (ONUCI)

The goal of the project was to reduce the level of total petroleum hydrocarbon (TPH) in polluted soil (36 000 to 75 000 mg/kg) to a background TPH level of 400 to 1 000 mg/kg, providing an enabling environment for revegetation of plants. The project entailed the removal of over 1 200 tonnes of POL contaminated soil from sites and replacing it with fresh soil. The excavated contaminated soil was treated using naturally occurring materials derived locally.

The contaminated soil was deposited in a large concrete mixer to tumble and aerate in order to promote microbial growth and the breaking down of POL. Two ingredients (poultry waste and naturally occurring surface active materials (NOSAM) or palm ash soap (also known as black soap)) were added to the mix to improve the condition of the soil and to accelerate the microbial remediation.

The result showed a reduction of over 95 percent in TPH levels immediately after remediation, with natural microbial activities ensuring more reduction in TPH within a 14-day period. Native grasses were planted in the restored areas. The case study highlights the importance of implementing low cost remediation techniques in mitigating POL polluted sites within the UN field missions

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CONTEMPORARY APPROACHES TO REMEDIATION OF OIL-POLLUTED LANDS IN THE TAIGA ZONE OF WESTERN SIBERIA19

The Russian Federation occupies one of the leading places in oil production over the globe. More than 70 percent of Russian Federation oil is extracted in the Taiga zone of western Siberia. In the 1990s oil-production enterprises of this region experienced a drastic increase in pipeline accidents and oil pollution of ecosystems. Under conditions of insufficient state control over statutory compliance of environmental protection legislation, this led to a significant number of oil-polluted lands that have not been remediated for a long time, forming a so-called "historical heritage" for new companies that are currently producing oil on this territory.

Oil companies have made significant efforts to restore oil-polluted lands in the last 10–15 years, but this problem has not been completely resolved. This is mostly due to the special environmental conditions of the region: the average annual temperature ranges from -0.1 °C to -5 °C, the average temperature in January is -18 °C to -24 °C (with the recorded minimum as -62 °C); the duration of the period with a stable snow cover achieves 180–200 days; and precipitation significantly exceeds evaporation. The West Siberian lowland is a vast, weakly dissected plain, which experienced active development of swamp formation during the Holocene epoch: in some areas, swamps cover 90 percent of the territory. Spills therefore occur mainly in wetland ecosystems, which greatly complicates the use of machinery for reclamation operations.

Not only were there unfavourable weather conditions, but remediation technologies were applied that were not appropriate for wetland soils, as they were originally developed for mineral soils. Basic technological solutions included surface oil pickup (if any), agrotechnical practices (liming, mineral fertilization), biostimulation (activation of native oil-oxidizing microorganisms) or bioaugmentation (application of commercial bio-products with oil-oxidizing action), periodic loosening and phyto-melioration (sowing of meadow grasses). However, for remediation of oil-contaminated peat bog soils, some other approaches were needed.

Peat soils have a very high sorption capacity to oil. It is therefore difficult to collect spilled oil even immediately after the spill, and after thickening of the oil it is impossible. At the same time, the concentration of oil hydrocarbons in the upper, most contaminated part of the peat bog soil profile can reach 80 percent or more, which is significantly higher than the levels that oil-destructive microorganisms can consume. The above-described traditional technological solutions are therefore ineffective, even after being repeated for several processing seasons

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Effectiveness of reclamation is significantly increased if mechanical removal (shearing) of the uppermost contaminated layer (usually 10–15 cm) is performed in the oil-contaminated area first. In this layer, in addition to heavy oil hydrocarbons, a large number of resins and asphaltenes accumulate. This accumulation effectively seals the soil, preventing water and gas transfer. This in turn drastically decreases microbiological activity in the contaminated soil. At the initial stage of implementation of this technological operation, manual labour was used. This explains why despite the high efficiency of remediation on certain oil-contaminated sites, the total area of reclaimed land remained low.

Later, when this technological operation started being conducted using excavators (Figure 22), it became possible to multiply the total area of oil-contaminated lands reclaimed annually. After the removal of the upper layer, the concentration of oil hydrocarbons in soils usually does not exceed the levels at which activity of microbial oil destructors is impossible; this allows using the traditional methods of biological reclamation. However, a further decrease in oil hydrocarbons concentration up to acceptable levels is still a difficult task. One of the most important problems is the optimization of soil acid–base regime. It is known that the optimal pH values for the activity of bacterial oil destructors are 6–8. But peat soils, as a rule, have pH values of 3.5–4.5 and are characterized by high values of exchangeable and pH-dependent acidity. The amount of lime that must therefore be added to achieve optimal pH values is so great that it makes this task technically and economically unfeasible and unreasonable.

One of the ways to solve this problem is by using biodegradation agents, which are capable of oxidizing hydrocarbons at pH 4–4.5. For effective oil destruction, however, it is necessary to provide a proper aeration of bog peat soils, which is extremely difficult to achieve in practice. To overcome this problem, it seems very promising to use a combination of bioaugmentation and phyto-melioration technologies (Glick, 2003; Khan et al., 2013). This combination will provide a symbiotic interaction between microorganisms in biodegradation agent and bog plants, which have an ability to transport air to the root system via arenchyma, followed by diffusion of air oxygen into the rhizosphere, which would provide the possibility for oil oxidation by oil-destructive bacteria

In addition to providing oxygen, plants can stimulate functioning of microbiota in the rhizosphere via root exudates (Bais et al., 2006). In turn, bacteria can stimulate plant development by producing various phytohormones and anti-stress substances (Safronova et al., 2006), thus allowing plants to grow even in conditions of heavy oil pollution. Moreover, bacteria can fix molecular nitrogen, mobilize hydrolysable phosphates, and produce siderophores, which can also promote plant development. Currently, however, the biodegradation agents possessing all the above functions have not been produced. This makes the task of development and practical implementation of appropriate biodegradation agents extremely urgent, as is the development of seed breeding of bog plants typical for the Taiga zone of Western Siberia

CONCLUSION

In Muzaffarnagar, Uttar Pradesh, the paper industry plays a significant role in the local economy, providing employment and contributing to industrial growth. However, like many industrial sectors, it also brings challenges related to environmental impact, particularly concerning soil pollution. The chemical remediation methods employed by the paper industry aim to manage and reduce these impacts, yet they themselves can introduce complexities and risks to soil health.

Throughout this exploration, we have delved into various aspects of chemical remediation and its effects on soil in Muzaffarnagar. The paper industry utilizes chemical processes that generate effluents containing pollutants such as organic compounds, heavy metals, and other contaminants. These effluents, if not properly managed, can lead to soil contamination through leaching and runoff, affecting agricultural productivity and posing risks to human health and ecosystem integrity. Chemical remediation techniques such as neutralization, precipitation, oxidation-reduction reactions, and adsorption are commonly employed to treat industrial effluents before discharge. These methods are designed to remove or reduce the concentration of pollutants, thereby minimizing their impact on the environment. In Muzaffarnagar, these practices are essential for compliance with environmental regulations and for maintaining operational sustainability. However, the effectiveness of these remediation techniques can vary depending on several factors, including the specific pollutants involved, the efficiency of treatment processes, and the characteristics of the receiving environment. While they mitigate immediate pollution risks, they can also introduce new challenges. For instance, the use of chemicals in remediation processes may alter soil pH levels, leading to soil acidification or alkalization. Additionally, the residual by-products of treatment processes, if not managed properly, can themselves become sources of secondary contamination.

Furthermore, the presence of heavy metals in industrial effluents poses a significant concern. These metals, such as lead, cadmium, mercury, and chromium, are persistent in the environment and can accumulate in soils over time. Their toxicity can adversely affect soil microbial communities, plant growth, and ultimately, human health through food chain contamination. Effective remediation strategies must therefore focus not only on removing pollutants but also on preventing their long-term impact on soil quality and ecosystem resilience.

In Muzaffarnagar, the integration of sustainable practices and technological advancements in chemical remediation is crucial for addressing these challenges. Innovations such as bioremediation, which utilizes biological organisms to degrade or immobilize pollutants, offer promising alternatives to conventional chemical treatments. By harnessing the natural processes of microorganisms and plants, bioremediation can enhance the efficiency of pollutant removal while minimizing environmental disturbance.

Moreover, the monitoring and assessment of soil quality are fundamental aspects of sustainable remediation practices. Regular soil testing and analysis provide insights into the effectiveness of remediation efforts and the persistence of contaminants in the environment. This data-driven approach enables stakeholders, including regulatory bodies, industries, and local communities, to make informed decisions regarding environmental management and policy development.

Community engagement and public awareness also play pivotal roles in promoting responsible environmental stewardship. By fostering dialogue and collaboration among stakeholders, including industry representatives, government agencies, academia, and civil society organizations, it becomes possible to implement holistic solutions that balance economic development with environmental protection. Education initiatives aimed at raising awareness about soil health, pollution prevention, and sustainable practices can empower individuals to contribute to positive environmental outcomes.

Furthermore, regulatory frameworks and enforcement mechanisms are essential for ensuring compliance with environmental standards and holding industries accountable for their environmental footprint. Effective regulation promotes transparency, accountability, and continuous improvement in industrial practices. It encourages the adoption of cleaner production technologies and the implementation of pollution prevention measures, thereby reducing the need for remediation and minimizing environmental impacts. Looking forward, the future of chemical remediation in Muzaffarnagar and similar industrial regions lies in innovation, collaboration, and adaptive management. Embracing emerging technologies and best practices will enhance the efficiency and effectiveness of remediation efforts while safeguarding soil health and ecosystem integrity. Integrating principles of circular economy and resource efficiency can further minimize waste generation and maximize the reuse of materials within industrial processes.

In conclusion, the chemical remediation of the paper industry in Muzaffarnagar, Uttar Pradesh, India, presents both challenges and opportunities for environmental management. While remediation techniques are essential for mitigating pollution and ensuring regulatory compliance, they must be implemented with caution to prevent unintended consequences such as soil contamination and ecosystem disruption. Sustainable remediation practices, informed by scientific research, technological innovation, and stakeholder engagement, offer pathways towards achieving environmental sustainability and resilient communities. By fostering collaboration among stakeholders and promoting responsible environmental stewardship, we can collectively work towards a future where industrial development coexists harmoniously with ecological preservation in Muzaffarnagar and beyond.

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

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Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

TIN No . 09372800455
C.S.T. No : MZ-05122531

BINDLAS DUPLUX LIMITED

Manufacturers of KRAFT PAPER & DUPLEX BOARD

PROJECT ACCEPTANCE LETTER

DATE-8/JULY/2022

SUBJECT- Proposal acceptance letter of a project with the partnership of our industry.

To

Er. Rajdeep Saharawat
Basic Science Department
(Shri Ram College Muzaffarnagar)

With reference to the proposed project scope that you have shared after a meeting held between us on May,10 2022 about a project you decided to deliver with the partnership of our industry named as **"CHEMICAL REMEDIATION OF PAPER INDUSTRY AND EFFECT ON SOIL"** we positively accept the proposal according to the term outline within. Kindly commence the work upon the delivery of 1,05000/- as the settlement of advance payment as per the project terms and condition , project should be initiate from 12/july2022 & completed up to 12/january2023 within a time period of 6 months as per the terms and conditions discussed.

Thanks

Mayank

Director BINDLAS DUPLUX
Pvt. Ltd. Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar.

Regd. Office & Works :10.6 Km. Bhopa Road, Jat Muhjhera, Muzaffarnagar - 251 001 (U. P.) INDIA
Phone : +91-131-2460589, 2460590, 2460593 Fax : +91-131-2460588, e-mail: dbindlas@yahoo.co.in
Corres. Add.: 47, South Bhopa Road, New Mandi, Muzaffarnagar-251 001 Phone : +91-131-2605889

SHRI RAM COLLEGE

(Affiliated To CCS University, Meerut & Approved By NCTE) CIRCULAR ROAD, MUZAFFARNAGAR

'A' Grade Accredited by NAAC

SHRI RAM COLLEGE MUZAFFARNAGAR
तमसो माँ ज्योतिर्गमय

PROJECT PROPOSAL LETTER

DATE-9/JUNE/2022

SUBJECT- Proposal letter of a project in district Muzaffarnagar with the partnership of your industry.

To
Director BINDAL DUPLEX
Pvt. Ltd. Muzaffarnagar

With reference to the proposed project scope that we have shared during a meeting held between us on May,10 2022 & a careful studying and consideration by my team visited in your industry, I want to inform you about the innovative and affordable project we decided to deliver with the partnership of your industry named as **"CHEMICAL REMEDIATION OF PAPER INDUSTRY AND EFFECT ON SOIL"** kindly accept the proposal according to the term outline within.

Work will be commencing upon the delivery of 1,60000/- and the settlement of advance payment as per the project term and condition looking forward. We assure you that the project will be in a clean manner and under the guidance principle investigator & surely will be completed in the time period of 6 months as per the terms and conditions discussed.

We are positively waiting for you response and willingly looking forward as a future partner.

Regards

Rajdeep
9/June/2022

Er. Rajdeep Saharawat
Basic Science Department
(Shri Ram College Muzaffarnagar)

Chairman
IQAC Shri Ram College,
Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Phone No.: 0131-2660738, 2620899, 9927028908
Web: www.srgcmzn.com E-mail: src_mzn@rediffmail.com

INDIAN INDUSTRIES ASSOCIATION
AN APEX BODY OF MICRO, SMALL & MEDIUM ENTERPRISES
(IN THE SERVICE OF MSME SINCE 1985)
Muzaffarnagar Chapter : 159/A-8, 15, Prakash Market, Lala Lajpat Rai Chowk, Muzaffarnagar-251001 (U.P.)
Tel. : 0131-2623762 • E-mail : iia.mznchapter@gmail.com

To,

15-11-2022

The Principal
Shri Ram College, Muzaffarnagar

Respected Madam,

With reference to your letter dated 9-11-2022, we are pleased to inform you that IIA, Muzaffarnagar Chapter sanctioning the fund of Rs. 1, 55,000/- (One Lac, Fifty Thousand Only) for conduction of the discussed research. We are sure that Shri Ram College will complete the research in stipulated time and submit the report of the research and the statement of the expenditure to the office of the undersigned as early as possible.

We wish all the very best to the Shri Ram College and the Investigators of the research.

Thanking you

Secretary
IIA, Muzaffarnagar Chapter

Central Office : IIA Bhawan, Vibhuti Khand, Phase-II, Gomti Nagar, Lucknow - 226010
Tel. : +91-522-2720090, 24004350, 9335904257 • Fax : +91-522-2720097 • E-mail : iia@iiaonline.in
Website : www.iiaonline.in

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College

Approved by UGC, NCTE and Affiliated to MS University, Saharanpur

Muzaffarnagar - 251001, NCR (U.P.)

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Date: 09-11-2022

To

The Secretary IIA

Muzaffarnagar Chapter

Respected Sir

With reference to your letter dated 31, October 2022, it gives me immense pleasure to informed you that Shri Ram College will be grateful to participate in social contribution with IIA through the conduct of this research. We nominate **Dr. Ashfaq Ali & Dr M S Khan** Associate Professor in the Department of Commerce, as the Principal Researcher for the research.

Both is distinguished academician with extensive experience in teaching and research. His expertise in research "Accounting, Finance, and Human Resources aligns perfectly with the objectives of this project. As the Principal Investigator & Co Investigator, they will responsible for overseeing the project, ensuring adherence to the proposed timeline and objectives, and contributing to the advancement of knowledge in the field. You are also requested to discuss regarding project expenses duration and total expected budget with him.

We extend our best wishes to him for the successful execution of this research endeavour.

Regards,

(Dr Prerna Mittal)

Principal, SRC

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

INDIAN INDUSTRIES ASSOCIATION
AN APEX BODY OF MICRO, SMALL & MEDIUM ENTERPRISES
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Tel. : 0131-2623762 • E-mail : iia.mznchapter@gmail.com

To,

31-10-2022

The Principal

Shri Ram College, Muzaffarnagar

Respected Madam,

The IIA (Indian Industries Association) Muzaffarnagar chapter is a local branch of the national industrial organization. It is involved in various activities, including promoting industry and providing resources for businesses in the Muzaffarnagar region. The IIA Muzaffarnagar chapter also includes a board of patrons comprised of prominent industrialists and IIA members.

In continuation of the various outreach activities, IIA offering the Shri Ram College, Muzaffarnagar to conduct a mini research to assess the impact of micro-finance on the development of the MSMEs belonging to the Muzaffarnagar region. The findings of the research may be beneficial for the future planning for the sustainable development of the MSMEs, academicians and as well as for the society. IIA is also ready to bear the expenditure for conducting this research.

We are waiting for the positive response from your side.

Secretary

IIA, Muzaffarnagar Chapter

Central Office : IIA Bhawan, Vibhuti Khand, Phase-II, Gomti Nagar, Lucknow - 226010
Tel. : +91-522-2720090, 24004350, 9335904257 • Fax : +91-522-2720097 • E-mail : iia@iiaonline.in
Website : www.iiaonline.in

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Impact of Microfinance on Development of Micro & Small Business Enterprises in Muzaffarnagar

Dr Ashfaq Ali & Dr M S Khan
Associate Professor, Department of Commerce, Shri Ram College, MZN

ABSTRACT

This paper will analyze the important role of microfinance in fostering business development in small businesses. Microfinance in Muzaffarnagar, as a financial service, aims at extending credit, savings, and insurance to people without access to conventional banking; it is proving to be a very powerful tool for entrepreneurship and economic empowerment. This paper discusses the transformational effect of microfinance on micro and small businesses with regard to resultant opportunities and challenges. Accordingly, this paper aims at analyzing the role of microfinance as regards its contribution towards propelling the growth and sustainability of micro and small enterprises. It reviews and analyzes the financial constraints from among such firms and shows how microfinance helps raise a capital of an enterprise to begin, expand, and invest in their companies. It also researches on the role of MFIs in delivering appropriately developed products including microloans, and business training that addressed the respective specific needs of the micro and small business owners. The paper also explores the extended impacts of microfinance on micro and small business development. Thus, it moves on to examine how microfinance could help trigger job generation, poverty reduction, and economic growth through its benefits of income generation and entrenchment of local economies. On the social and empowerment effects of microfinance, the social paper engages in discussions around financial inclusion expansion, improvement of livelihoods, and enhancement of gender equality. However, this paper addresses challenges and limitations of microfinance in micro and small business development. The issues are on high interest rates, constrained access for capital to specific sectors, and lack of efficient skills in the management of business by entrepreneurs. Strategies suggested in overcoming the challenges of microfinance would include enhancing financial literacy among entrepreneurs, strengthening the capacities of MFIs, and encouraging collaborative services between microfinance providers and relevant stakeholders. In a nutshell, this paper concludes that microfinance actually acts as a bridge in helping micro and small-scale businesses to sustain growth and development of Muzaffarnagar. It provides access to financial resources and further entrepreneurial activities as a critical determinant of opportunities, poverty reduction, and eventually economic empowerment. Thus, the outcome of this paper continues to emphasize support and innovation of microfinance for maximum impact in the development of micro and small businesses.

Keywords: microfinance, micro and small businesses, entrepreneurship, economic empowerment, financial inclusion, microfinance institutions.

INTRODUCTION

A. Background and Context of Micro and Small Businesses

Micro and small businesses constitute a significant segment of economies worldwide. These enterprises are often characterized by their limited size, local operations, and diverse range of activities. They play a crucial role in generating employment, fostering innovation, and contributing to local economic growth. In many developing economies, micro and small businesses serve as the backbone of the informal sector, offering essential goods and services to communities.

B. Importance of Micro and Small Businesses in Economic Development

The vitality of micro and small businesses in driving economic development cannot be overstated. These enterprises contribute to GDP growth, enhance income distribution, and promote grassroots entrepreneurship. Furthermore, they facilitate regional development by reducing regional disparities and encouraging rural-urban migration. In addition to economic benefits, micro and small businesses often reflect the cultural and social fabric of their communities, embodying local values and traditions.

C. Introduction to Microfinance and Its Significance

Microfinance, a financial service catering to the financial needs of low-income individuals and microenterprises, has emerged as a potent instrument for fostering inclusive economic growth. It encompasses a range of financial products, such as microloans, savings accounts, and microinsurance, tailored to the unique circumstances of marginalized populations. Microfinance institutions (MFIs), non- governmental organizations (NGOs), and community-based initiatives are at the forefront of delivering these services to the underserved.

D. Research Objectives and Questions

Against this backdrop, in this paper seeks to explore the role of microfinance in promoting the development and growth of micro and small businesses in Muzaffarnagar. The research aims to address the following questions:

1. How does microfinance facilitate access to capital and financial services for micro and small businesses in Muzaffarnagar?
2. To what extent does microfinance contribute to the expansion and sustainability of these enterprises?
3. What are the socio-economic implications of microfinance-driven business development, particularly in terms of job creation and poverty reduction?

By delving into these questions, this paper aims to shed light on the intricate relationship between microfinance and the empowerment of micro and small businesses, thereby offering insights for policymakers, practitioners, and researchers alike.

LITERATURE REVIEW

A. Definition and Characteristics of Micro and Small Businesses

Micro and small businesses hold a vital place in economies, particularly in developing countries, due to their potential for employment generation, local economic development, and poverty reduction (Arun, 2018). These enterprises are often defined by factors such as limited capital, small workforce, local market focus, and varying degrees of informality (Mead & Liedholm, 1998).

B. Theoretical Frameworks for Understanding Microfinance Impact

1. Financial Inclusion Theories

Financial inclusion theories emphasize the importance of providing access to financial services to marginalized populations, including micro and small businesses. This access is seen as a means to enhance economic opportunities and reduce inequalities (Beck et al., 2007).

2. Agency Theory and Borrower-Lender Relationship

Agency theory highlights the dynamic between borrowers and lenders, emphasizing the role of information asymmetry and moral hazard. Microfinance transactions are shaped by the borrower's need for capital and the lender's concern for repayment (Armendariz & Morduch, 2010).

3. Social Capital and Community Development

Social capital theories emphasize the role of social networks and relationships in economic development. Microfinance institutions often leverage social ties within communities to facilitate credit access and promote entrepreneurial activities (Saxton et al., 2012).

C. Historical Development of Microfinance and Its Evolution

The origins of modern microfinance can be traced back to the pioneering work of Muhammad Yunus and the Grameen Bank in Bangladesh in the 1970s. Yunus's innovative approach of providing small loans to impoverished individuals without collateral challenged conventional banking norms (Yunus, 2003).

D. Microfinance Models and Institutions

1. Grameen Bank Model

The Grameen Bank model, characterized by group-based lending and social collateral, has inspired numerous microfinance initiatives globally. It aims to empower borrowers through self-help groups and foster a sense of collective responsibility (Khandker, 1998).

2. Village Savings and Loan Associations (VSLAs)

VSLAs operate on a communal savings and lending model, relying on regular contributions from members. These associations offer a simple yet effective mechanism for pooling resources and providing access to credit (Dichter & Harper, 2007).

3. Non-governmental Organizations (NGOs) and Microfinance Institutions (MFIs)

NGOs and MFIs have emerged as key players in microfinance delivery. Their diverse approaches, ranging from subsidized credit to sustainable lending, cater to the financial needs of micro and small businesses (Armendariz & Labie, 2011).

E. Empirical Studies on the Impact of Microfinance on Small Business Growth

Numerous empirical studies have explored the impact of microfinance on business growth. For instance, a study by Karlan and Valdivia (2011) in Peru found that access to microloans led to increased business investments and higher revenues among small entrepreneurs.

F. Criticisms and Challenges of Microfinance in Small Business Development

1. Over-indebtedness and Repayment Challenges

Over-indebtedness among borrowers, often due to multiple loans from different sources, has raised concerns about repayment capacity (Bateman & Chang, 2012). Borrowers may face challenges in managing multiple debts, impacting their business sustainability.

2. Interest Rates and Sustainability

High interest rates charged by some microfinance institutions have sparked debates about their impact on borrowers' financial viability (Morduch, 1999). Balancing financial sustainability with affordable credit remains a critical challenge.

3. Gender Disparities in Access to Microfinance

Gender disparities persist in access to microfinance, with women often facing barriers such as limited mobility, social norms, and biases (Duflo, 2012). Efforts to address these disparities are essential for promoting equitable business development.

METHODOLOGY

This research utilizes a secondary data analysis approach to investigate the role of microfinance in micro and small business development. Secondary data refers to pre-existing data collected by other researchers or organizations for purposes other than the current study. The data used in this research is derived from reputable sources, such as academic articles, reports, and databases, which provide valuable insights into the subject matter. The secondary data analysis approach is chosen for its cost-effectiveness, efficiency, and the ability to leverage existing data to answer research questions.

Study Area: Muzaffarnagar district, Uttar Pradesh.

Sample Size: Approximately 200 MSEs across various sectors.

Insights for Muzaffarnagar Context

- **Micro Loan**: A strong positive correlation (r = 0.789) with enterprise growth suggests that access to micro loans significantly enhances business expansion
- **Micro Savings**: Also positively correlated (r = 0.756), indicating that savings programs help build financial resilience among MSEs.
- **Micro Insurance**: While the correlation is slightly lower (r = 0.670), it still plays a vital role in mitigating risks and ensuring business continuity.
- **Demographics**: A significant proportion of MSE owners are male (65%), aged between 41–50 years (40%), and have less than 2 years of business experience (80%). This demographic profile may influence the types of microfinance services needed.

A. Data Collection

1. **Source Selection**: The selection of appropriate sources is paramount to ensure the quality and reliability of the data. Reputable academic databases, research institutions, and government agencies are the primary sources of data for this study.

2. **Data Identification**: Relevant datasets, reports, and scholarly articles focusing on microfinance's impact on micro and small business development are identified through systematic keyword searches and review of academic literature.

B. Data Evaluation and Selection

1. **Inclusion Criteria**: Only studies that provide comprehensive insights into the role of microfinance in micro and small business development are included. Studies must have a clear focus on empirical analysis, methodology, and findings related to the research objectives.

2. **Exclusion Criteria**: Studies lacking empirical data, those with insufficient methodological details, and those not directly aligned with the research questions are excluded.

C. Data Extraction and Processing

1. **Data Extraction**: Pertinent information, such as research methodology, sample characteristics, key findings, and statistical analyses, is extracted from the selected sources.

2. **Data Synthesis**: Extracted data is organized and synthesized to address the research objectives. Themes related to microfinance impact, challenges, and outcomes in micro and small business development are identified.

D. Data Analysis

1. Content Analysis: The synthesized data is subjected to content analysis to identify recurring patterns, trends, and thematic insights related to the research questions.

2. Quantitative Analysis: Where applicable, quantitative data from the selected sources are aggregated and analyzed to generate quantitative insights into the impact of microfinance on micro and small business development.

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

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MICROFINANCE IMPACT ON MICRO AND SMALL BUSINESS DEVELOPMENT

A. Financial Inclusion and Access to Capital

Numerous studies demonstrate that microfinance has significantly enhanced financial inclusion for micro and small businesses (Gonzalez et al., 2019; Ledgerwood, 2018). Access to microloans, savings accounts, and insurance products has enabled entrepreneurs to overcome capital constraints and invest in their businesses. This increased access to capital has led to improved business stability and the ability to exploit growth opportunities.

B. Entrepreneurial Skills Development and Training

Microfinance institutions often offer targeted training programs to enhance the entrepreneurial skills of borrowers (Sinha & Ghosh, 2020). These programs cover various aspects of business management, marketing, and financial literacy. The acquisition of these skills has empowered entrepreneurs to make informed decisions, optimize resource utilization, and adapt to changing market dynamics.

C. Business Growth and Expansion

Empirical evidence suggests a positive correlation between microfinance utilization and business growth (Karlan & Valdivia, 2011). Microfinance borrowers frequently experience higher revenue generation, increased production capacities, and expanded product lines. The provision of timely and affordable credit has allowed these businesses to invest in machinery, inventory, and marketing, thereby fostering growth.

D. Job Creation and Poverty Reduction

Micro and small businesses supported by microfinance initiatives have contributed significantly to job creation and poverty reduction (Banerjee et al., 2015). As businesses expand, they hire more employees from the local community, thereby contributing to employment generation. This, in turn, aids poverty reduction by increasing household income and improving living standards.

E. Social and Community Development

Microfinance interventions have demonstrated the potential to stimulate social and community development (Hossain, 2007). By empowering individuals to establish and grow businesses, microfinance indirectly enhances social capital within communities. Borrowers often engage in collaborative initiatives, share resources, and support local development projects, thereby contributing to a sense of community cohesion.

F. Case Studies Illustrating Successful Microfinance-Driven Business Development

Several notable case studies underscore the transformative impact of microfinance on micro and small business development. For instance, the Grameen Bank's model of group lending has empowered women entrepreneurs in rural Bangladesh, resulting in increased incomes, improved living conditions, and the creation of a thriving local economy (Yunus, 2003). Similarly, Village Savings and Loan Associations (VSLAs) in sub-Saharan Africa have facilitated cooperative efforts among community members, leading to the growth of various microenterprises and agricultural ventures (Dichter & Harper, 2007).

Variable	Mean	Standard Deviation	Interpretation
Micro Loan	3.07	0.85	High level
Micro Savings	3.15	0.83	High level
Micro Insurance	3.32	0.93	Very high level
Enterprise Growth	3.27	0.74	Very high level

Table 1: Descriptive Statistics of Microfinance Variables

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

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IQAC, Shri Ram College,
Muzaffarnagar

Construct	Micro Loan	Micro Savings	Micro Insurance	Enterprise Growth
Micro Loan	1	0.676**	0.754**	0.789**
Micro Savings	0.676**	1	0.416**	0.756**
Micro Insurance	0.754**	0.416**	1	0.670**
Enterprise Growth	0.789**	0.756**	0.670**	1

Table 2: Correlation Matrix of Microfinance Constructs and Enterprise Growth

*Note: *Correlation is significant at the 0.01 level (2-tailed).*

Source: Adapted from a study on Pune's MSEs

Model Summary	Value
R	0.863
R^2 (Adjusted)	0.743
F-Statistic	303.592
p-value	0.000

Table 3: Regression Analysis Summary

Demographic Variable	Frequency	Percentage
Gender		
- Male	205	65%
- Female	110	35%
Age Group		
- 21–30 years	32	10%

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Demographic Variable	Frequency	Percentage
- 31–40 years	95	30%
- 41–50 years	125	40%
- Above 50 years	63	20%
Education Level		
- Higher Secondary	296	94%
- Graduation	18	6%
- Master's Degree	1	0.003%
- PhD	0	0%
Experience in Business		
- <2 years	252	80%
- 2–4 years	44	14%
- 4–6 years	12	4%
- >6 years	7	2%

Table 4: Demographic Profile of MSE Owners
Source: Adapted from a study on Pune's MSEs.

CONCLUSION

A. Summary of Key Findings

The analysis of existing literature on microfinance and its impact on micro and small business development has revealed a range of significant insights. Microfinance plays a crucial role in promoting financial inclusion and providing access to capital for entrepreneurs. It contributes to the development of entrepreneurial skills and fosters business growth, leading to job creation and poverty reduction. Additionally, microfinance initiatives have demonstrated the potential to enhance social capital within communities. Case studies highlight the successful integration of microfinance in various regions, showcasing its transformative effects on businesses and livelihoods.

B. Revisiting Research Objectives and Questions

This study successfully addressed the research objectives by examining the multifaceted impact of microfinance on micro and small business development. The role of microfinance in providing financial resources, enhancing skills, and fostering growth has been explored comprehensively. The empirical evidence and theoretical insights presented contribute to a nuanced understanding of the intricate relationship between microfinance and business development.

C. Contributions to the Understanding of Microfinance Impact on Small Business Development

This paper has contributed to the literature by synthesizing and analyzing existing research to provide a holistic view of microfinance's impact on micro and small business development. The paper highlights the multi-dimensional advantages of microfinance, emphasizing its potential to drive economic growth, reduce poverty, and enhance community development. By identifying challenges and opportunities this study offers practical insights for policymakers, practitioners, and researchers interested in harnessing the potential of microfinance for sustainable business development.

D. Future Research Directions

While this paper has shed light on various aspects of microfinance and its impact on small business development, several avenues for future research remain open. Future studies could delve deeper into the specific mechanisms through which microfinance influences different types of businesses, industries, and geographical contexts. Furthermore, research could focus on exploring innovative approaches to addressing the challenges associated with microfinance, such as over-indebtedness and gender disparities. Comparative analyses of various microfinance models and their effectiveness in diverse settings could also contribute to a more nuanced understanding of this field.

In conclusion, the findings presented in this paper underscore the substantial role of microfinance in empowering micro and small businesses, thereby making notable contributions to economic development and poverty reduction. With ongoing research and policy support, microfinance holds the potential to continue fostering sustainable business growth and community well-being in various parts of the world.

RECOMMENDATIONS FOR MUZAFFARNAGAR MSES

1. **Tailored Financial Products**: Develop microfinance products that cater to the specific needs of MSEs in Muzaffarnagar, considering factors like business type, size, and owner

demographics.

2. **Financial Literacy Programs**: Implement training sessions to enhance the financial literacy of MSE owners, enabling them to make informed decisions regarding loans, savings, and insurance.
3. **Risk Mitigation Strategies**: Promote micro insurance schemes to help MSEs manage risks associated with unforeseen events.
4. **Gender Inclusivity**: Encourage female entrepreneurship by providing targeted support and resources, addressing the gender disparity observed in the current demographic data.

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Project Fund Utilisation Certificate

Date: 24-02-2023

1. Title of Project: **"Impact of Micro Finance on Developing Micro and Small Business Enterprises in Muzaffarnagar"**
2. Principal Investigator and Co-Investigator: **Dr. Ashfaq Ali & Dr. M S Khan, Department of Commerce, Shri Ram College, Muzaffarnagar.**
3. Implementing College and Sponsored Body: **Department of Commerce, Shri Ram College & Indian Industries Association Muzaffarnagar Chapter**
4. Sanctioned Project Amount by **Indian Industries Association Muzaffarnagar** Chapter: **Rs. 155,000/-**
5. Project Duration: **December 2022 to February 2023 (Three Months)**
6. Project Completion Date: **February 15th 2023**

Statement of Expenditure

Amount Received		**Rs.155,000/-**
Less Expenditure:		
1. 32Surveyor Stipends for one-month Rs.3000*32	96,000/-	
2. Stationaries	8,950/-	
3. Local Travelling	17,150/-	
4. Refreshments	14,955/-	
5. Printing & Typing	7,725/-	
6. Miscellaneous expenses	11,635/-	156,415/-
Balance:		**- 1415/-**

(Dr. Ashfaq Ali)
Research Project Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

(Dr. Prerna Mittal)
Principal Shri Ram College

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

"To Whom it May Concern"

Date: 24-02-2023

It is certified that the research project sponsored by non-government agency **'Indian Industries Association Muzaffarnagar Chapter'**, entitled **"Impact of Micro Finance on Developing Micro and Small Business Enterprises in Muzaffarnagar"** is done by **Dr. Ashfaq Ali**, Principal Investigator & **Dr. M S Khan**, Co-investigator, during the academic year 2022-2023. This project has not previously formed on the basis for the award any degree, diploma, associateship or similar other titles and that is an independent work done investigators.

I wish him every success in life.

(Dr. Prerna Mittal)
Principal, SRC

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College
Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)
A++ Grade Accredited by NAAC

Request Letter

Date 6-10-2022

To,
The Director
IIMT, Saharanpur

Respected Sir,

With due respect and honour it is to state that as you know this era is an era of modernization. We have to meet up with the existing standard and for that reason personality is must to professionally develop our students for better placements and to meet the industries demand.

We wish to collaborate with you in organizing a Course of 30 Hours (30 days) on Personality Development. We assure you that expert in this area will guide our students in such a way that will surely develop their personality. The contents of the course are enclosed for your reference.

Thank you.

With Regards

Principal
Shri Ram College,
Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Contact @ 9927028908, 9927011422
Website : www.srgcmzn.com E-Mail : src_mzn@rediffmail.com

IIMT SAHARANPUR

Indraprastha

Institute of Management & Technology

Approved by NCTE & Affiliated to Ch Charan Singh University, Meerut

Consent Letter

Date 8-10-2022

To,
The Principal
Shri Ram College, Muzaffarnagar

Subject: Consent regarding conduction of personality development course

Respected Sir,

We feel privileged to associate with you for conduction of a Personality Development Course for the students. Thank you for the conference schedule and the information packet that you sent me.

Dr. Subhash Yadav, Associate Professor and expert in this field will be available as resource person for this program. Please share with us the schedule dates of the course.

Thankyou

With Regards

Director
Indraprastha Institute of Management & Technology
District Saharanpur

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

INTERNAL QUALITY ASSURANCE CELL
S.R.C.
M.Z.N.

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Notice

Date 10-10- 2022

All the students of Shri Ram College are hereby informed that Department of Commerce is organizing 30 Hours (30 Days) value added course on "Personality Development" in collaboration with Indraprastha Institute of Management & Technology, District Saharanpur on "Personality Development". Interested students may give their name to the coordinator on or before 17 Oct. 2022 through their Head of Department. It is further informed that seats are limited to 50 and will be allotted on first come first serve basis. The content of course and other information is displayed on notice board of the IQAC. For any query students may contact to the IQAC office of the college.

Course Coordinator
Department of Commerce

Coordinator, IQAC
Shri Ram College, Muzaffarnagar

Copy to:

Principal, Shri Ram College, Muzaffarnagar
HOD, Department of Business Administration
HOD, Department of Journalism and Mass Communication
HOD, Department of Computer Application
HOD, Department of Basic Science
HOD, Department of Physical Education
HOD, Department of Agriculture
HOD, Department of Bio-Science
HOD, Department of Technical Education
HOD, Department of Fine arts

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

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IQAC, Shri Ram College,
Muzaffarnagar

A

VALUE ADDED COURSE

ON

PERSONALITY DEVELOPMENT

Code: BB2204PB

"Success is a Journey and it is not the destination. Disappointments, Rejections, Unsuccessful attempts and Criticisms are not failures to the Successful people. Failures are the Part of success. Winners use failures as stepping stones to success. This is the only difference between people who win and people who don't! "

(Session 2022-23)

Organized by

Department of Commerce

Shri Ram College, Muzaffarnagar

In collaboration with Indraprastha Institute of Management & Technology, Distt Saharanpur

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Value Added Course

on

Personality Development

Registration Form

Student's Name: ....

Father's Name: ....

Mother's Name: ....

Class: ....

Address: ....

....

....

....

Mobile No: ....

Email Id: ....

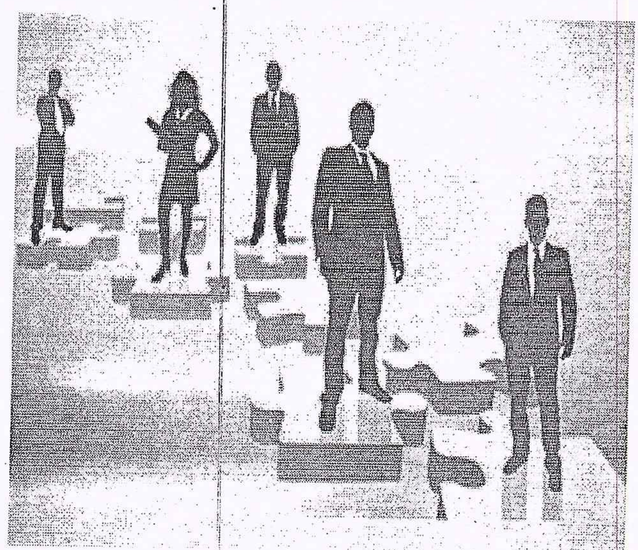
Date: ....   **Student's Signature**

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Value Added Course

on

Personality Development



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in Collaboration with

Indraprastha Institute of Management and Technology

District Saharanpur

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Muzaffarnagar

Shri Ram College, Muzaffarnagar

SRC is a part of Shri Ram Group of Colleges, which is the culmination of the dream of one man who had the vision to reform destiny, an eminent educationalist Dr. S.C. Kulshreshtha. He formed 'Shri Ram Charitable Trust, with an aim of promoting quality education at an affordable fee. SRGC is one of the leading educational institute of West UP of India. SRGC has more than 13000 students with great brilliance, academic vigor and competitive spirit. SRGC caters to the knowledge and skill set as per the industry needs and in tune with time. In this regard college has collaborated with the leading International Institute MIT (US) and ITB, Ireland.

SRGC has built up the world class learning resources which consists of the focused learning space in the form of lecture halls, series of computer centers, digital centralized library, laboratories, residential accommodation in campus for boys and girls, sports facilities, cafeteria, canteen and Wi-Fi campus with 24x7 Internet facilities. SRGC is running 5 distinct campuses at Muzaffarnagar. SRGC institutions have brilliance and believe in igniting minds, making Independent and learned intellectuals. SRGC has been acclaimed and honored at various events and occasions with numerous awards which speak volumes about the brilliance that is taught at SRGC.

Course Description

Personality development plays an essential role not only in an individual's professional but also personal life. It makes an individual disciplined and an asset for the organization. Personality development teaches you to respect not only your teachers, boss and fellow workers but also family members, friends, neighbours, relatives and so on. With this course you can literally stop wondering about why you or someone you know behaves a particular way. By the time you complete this course, you will know how you can develop your own personality.

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Contents of course

- **Introduction to Personality Development**
  - The concept of personality
  - Dimensions of personality
  - Significance of personality development
- **The concept of success and failure**
  - What is success?
  - Hurdles in achieving success
  - Overcoming hurdles
  - Factors responsible for success
  - What is failure
  - Causes of failure. SWOT analysis.
- **Attitude**
  - Concept, Significance
  - Factors affecting attitudes
  - Positive attitude – Advantages
  - Negative attitude- Disadvantages
  - Ways to develop positive attitude
- **Motivation**
  - Concept of motivation, Significance
  - Internal and external motives
  - Importance of self-motivation
  - Factors leading to de-motivation

Duration of Course -

30 Hours

Number of Seats -

50

Eligibility -

The students will have to fill the registration form and submit it to the department. The criteria of the selection will be first come, first serve basis.

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Course Contents

- **Introduction to Personality Development** — 6 Hours

  The concept of personality

  Dimensions of personality

  Significance of personality development

- **The concept of success and failure** — 8 Hours

  What is success? - Hurdles in achieving success - Overcoming hurdles - Factors responsible for success –

  What is failure - Causes of failure. SWOT analysis.

- **Attitude** — 8 Hours

  Concept - Significance - Factors affecting attitudes –

  Positive attitude – Advantages

  Negative attitude- Disadvantages

  Ways to develop positive attitude

  Differences between personalities having positive and negative attitude

- **Motivation** — 8 Hours

- Concept of motivation - Significance – Internal and external motives - Importance of self-motivation- Factors leading to de-motivation

Total Duration of the course: 30 Hours (30 Days)

Co-ordinator
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Muzaffarnagar

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IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

Certificate of Completion

This is to certify that Mr. /Ms.______________________________________

S/D/O ____ Student of this college successfully completed a 30 hours Value Added Course on Personality Development organized by the Department of Commerce, Shri Ram College, Muzaffarnagar in collobration with IIMT, Saharanpur From 18 of October, 2022 to 24 of November, 2022.

We wish him/her the best of success in his/her future endeavors.

(Dr. M. S. Khan)	**(Dr. Saurabh Mittal)**	**(Dr. Prerna Mittal)**
Course Coordinator	Head, Department of Commerce	Principal
Co-ordinator IQAC, Shri Ram College, Muzaffarnagar		Chairman IQAC, Shri Ram College, Muzaffarnagar

Shri Ram College, Muzaffarnagar

Internal Quality Assurance Cell

List of Enrolled students 2022-23

Value Added Course On Personality Development

In Collaboration with Indraprastha Institute of Management & Technology

S.No.	Students Name	Father's Name	Course
1	YASHTI VERMA	Mr SOMPAL SINGH	B.COM III
2	MOHD SHAKIB	Mr YASEEN	B.COM III
3	MOHD JAVED	Mr SHAMEEM	B.COM III
4	VISHAL SINGH	Mr KUNWAR PAL	B.COM III
5	RITIKA PAL	Mr ANIL PAL	B.COM III
6	MOHD SALMAN	Mr MOHD ISLAM	B.COM III
7	ARYAN	Mr AJAY PAL	B.COM III
8	SANSKAR VERMA	Mr RAKESH VERMA	B.COM III
9	AASHISH DAGAR	Mr JUGMENDRA	B.COM III
10	MOHD AHATASHAM	Mr MEHRAZ ALI	B.COM III
11	ADIL	Mr UMARJAN	B.COM III
12	VISHANK	Mr YOGENDRA	B.COM III
13	MERUL KHAIWAL	Mr AJAY KHAIWAL	B.COM III
14	UDIT KUMAR	Mr OMPAL	B.COM III
15	MOHD SHAHROOKH	Mr JAMIL	B.COM III
16	SHAILI CHAUDHARY	Mr SHEESH PAL SINGH	B.COM III
17	ANUJ RATHI	Mr MUKESH RATHI	B.COM III
18	TUSHAR	Mr VIJAY PARTAP	B.COM III
19	TANIYA TYAGI	Mr RAJKUMAR TYAGI	B.COM III
20	MOHD SAHIL	Mr MOHD JAVED	B.COM III
21	ANKUSH	Mr DEVENDRA	B.COM III
22	ASHU	Mr SANJAY KUMAR	B.COM III
23	ANJALI GIRI	Mr SUNIL GIRI	B.COM III
24	GAUTAM KUMAR SAH	Mr SIKINDRA SAH	BCA III
25	BRAHMDEV CHOURASHIA	Mr HARI KRISHNA CHOURASHIA	BCA III
26	AJEET KUMAR	Mr HARISHCHANDRA SHAH	BCA III
27	MOHD SUHEL	Mr VARISH AHMAD	BCA III
28	JITENDRA KUMAR	Mr ANIL CHAURASIYA	BCA III
29	MITHUN KUMAR	Mr RANGIL SINGH	BCA III

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Muzaffarnagar

30	HARSH RAJPUT	Mr ANIL KUMAR	BCA III
31	SANJEEV KUMAR MEHTA	Mr DILEEP KUMAR MEHTA	BCA III
32	RUPALI KUMARI	Mr ASHOK KUMAR PRASAD	BCA III
33	ANISH KUMAR	Mr MITHILESH KUMAR	BCA III
34	DHIRAJ KUMAR	Mr RAJENDRA DAS	BCA III
35	BIPIN KUMAR	Mr YOGENDRA MAHTO	BCA III
36	SRINATH KUMAR	Mr PASHUPATI MANDAL	BCA III
37	ROSHAN KUMAR	Mr JITENDRA SINGH	BCA III
38	SACHIN PUNDIR	Mr NARENDRA SINGH	BCA III
39	SHUBHAM SHARMA	Mr SHIV SHANKAR KUMAR	BCA III
40	ANANT TYAGI	Mr PRADUMAN TYAGI	BCA III
41	RITTIK KUMAR	Mr DEVI SINGH	BCA III
42	ANKUR KUMAR	Mr MOHAR SINGH	BCA III
43	KAREENA	Mr JARNAIL SINGH	BCA III
44	HARIOM SHARMA	Mr RAVINDER KUMAR SHARMA	BCA III
45	AYUSH GOYAL	Mr VINAY KUMAR GOYAL	BCA III
46	MOHANTI	Mr DESHBANDHU	BCA III
47	MOHIT KUMAR	Mr SUSHIL KUMAR	BJMC III
48	TANUJA KUMARI	Mr ASHOK KUMAR GUPTA	BJMC III
49	ANU	Mr PRATAP SAINI	BJMC III
50	NIRAJ KUMAR RAM	Mr RAMAKABAL RAM	BJMC III

Dr. M.S. Khan
Course Coordinator

HOD, Department of Commerce
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

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SHRI RAM COLLEGE, MUZAFFAR NAGAR

VALUE ADDED COURSE ON PERSONALITY DEVELOPMENT

ATTENDANCE SHEET (SESSION 2022-23)

Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-1 18/10/2022	Lecture-2 19/10/2022	Lecture-3 20/10/2022	Lecture-4 21/10/2022	Lecture-5 22/10/2022	Lecture-6 27/10/2022	Lecture-7 28/10/2022	Lecture-8 29/10/2022	Lecture-9 31/10/2022	Lecture-10 1/11/2022
1	YASHTI VERMA	B.COM III	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti
2	MOHD SHAKIB	B.COM III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib
3	MOHD JAVED	B.COM III	Javed	Javed	Javed	Javed	Javed	Javed	AB	Javed	Javed	Javed
4	VISHAL SINGH	B.COM III	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal
5	RITIKA PAL	B.COM III	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
6	MOHD SALMAN	B.COM III	Sal	Sale	Sale	Sale	Sale	Sale	Sale	Sale	Sale	Sale
7	ARYAN	B.COM III	A	A	Ar	Ar	Ar	Ar	Ar	Ar	Ar	Ar
8	SANSKAR VERMA	B.COM III	Sanl	Sanl	Sanl	Sanl	Sanl	Sal	Sanl	Sanl	Sanl	Sanl
9	AASHISH DAGAR	B.COM III	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
10	MOHD AHATASHAM	B.COM III	AB	Ahatz	AB	AB	AB	AB	AB	AB	Ahatz	AB
11	ADIL	B.COM III	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil
12	VISHANK	B.COM III	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram	Ram
13	MERUL KHAIWAL	B.COM III	M	M	AB	M	M	M	M	M	M	M
14	UDIT KUMAR	B.COM III	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit
15	MOHD SHAHROOKH	B.COM III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	SHAILI CHAUDHARY	B.COM III	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili
17	ANUJ RATHI	B.COM III	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj
18	TUSHAR	B.COM III	T	T	T	T	T	T	T	T	T	T
19	TANIYA TYAGI	B.COM III	AB	Taniya	AB	AB	AB	AB	AB	Tanny	AB	AB
20	MOHD SAHIL	B.COM III	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	[illegible]	[illegible]
21	ANKUSH	B.COM III	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank
22	ASHU	B.COM III	Ashu	Ashu	Ashu	Ashu	AB	Ashu	Ashu	Ashu	Ashu	Ashu

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFAR NAGAR

VALUE ADDED COURSE ON PERSONALITY DEVELOPMENT

ATTENDANCE SHEET (SESSION 2022-23)

Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-1 18/10/2022	Lecture-2 19/10/2022	Lecture-3 20/10/2022	Lecture-4 21/10/2022	Lecture-5 22/10/2022	Lecture-6 27/10/2022	Lecture-7 28/10/2022	Lecture-8 29/10/2022	Lecture-9 31/10/2022	Lecture-10 1/11/2022
23	ANJALI GIRI	B.COM III	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali
24	GAUTAM KUMAR SAH	BCA III	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gatam	Gautam
25	BRAHMDEV CHOURASHIA	BCA III	B	B	B	B	B	B	B	B	B	B
26	AJEET KUMAR	BCA III	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet
27	MOHD SUHEL	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	AB	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	JITENDRA KUMAR CHAURASIYA	BCA III	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule
29	MITHUN KUMAR	BCA III	M	M	M	M	M	M	M	M	M	M
30	HARSH RAJPUT	BCA III	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh
31	SANJEEV KUMAR MEHTA	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	RUPALI KUMARI	BCA III	R	R	R	R	R	R	R	R	R	R
33	ANISH KUMAR	BCA III	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish
34	DHIRAJ KUMAR	BCA III	Dhij	Dhij	Dhij	Dhij	Dhij	Dhij	Dhij	Dhij	Dhij	Dhij
35	BIPIN KUMAR	BCA III	B	B	B	B	B	B	B	B	B	B
36	SRINATH KUMAR	BCA III	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri
37	ROSHAN KUMAR	BCA III	Rosh	Rosh	Rosh	Rosh	Rosh	Rosh	Rosh	AB	Rosh	Rosh
38	SACHIN PUNDIR	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	SHUBHAM SHARMA	BCA III	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
40	ANANT TYAGI	BCA III	Anant	Anant	AB	Anant	Anant	Anant	Anant	Anant	Anant	Anant
41	RITTIK KUMAR	BCA III	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik
42	ANKUR KUMAR	BCA III	A	A	A	A	A	A	A	A	A	A
43	KAREENA	BCA III	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena
44	HARIOM SHARMA	BCA III	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom

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ATTENDANCE SHEET (SESSION 2022-23)

Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-1	Lecture-2	Lecture-3	Lecture-4	Lecture-5	Lecture-6	Lecture-7	Lecture-8	Lecture-9	Lecture-10
			18/10/2022	19/10/2022	20/10/2022	21/10/2022	22/10/2022	27/10/2022	28/10/2022	29/10/2022	31/10/2022	1/11/2022
45	AYUSH GOYAL	BCA III	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush
46	MOHANTI	BCA III										
47	MOHIT KUMAR	BJMC III	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit
48	TANUJA KUMARI	BJMC III	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja
49	ANU	BJMC III	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu
50	NIRAJ KUMAR RAM	BJMC III	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj
TEACHER'S SIGNATURE			[signature]	Garima	[signature]	[signature]	[signature]	[signature]	[signature]	Garima	[signature]	[signature]

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Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-11	Lecture-12	Lecture-13	Lecture-14	Lecture-15	Lecture-16	Lecture-17	Lecture-18	Lecture-19	Lecture-20
			2/11/2022	3/11/2022	4/11/2022	5/11/2022	7/11/2022	8/11/2022	9/11/2022	10/11/2022	11/11/2022	1211/2022
1	YASHTI VERMA	B.COM III	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti
2	MOHD SHAKIB	B.COM III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib
3	MOHD JAVED	B.COM III	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed
4	VISHAL SINGH	B.COM III	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal
5	RITIKA PAL	B.COM III	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
6	MOHD SALMAN	B.COM III	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal
7	ARYAN	B.COM III	A	A	A	A	A	A	A	A	A	A
8	SANSKAR VERMA	B.COM III	Sansk	Sansk	Sansk	Sansk	Sansk	Sansk	Sansk	Sansk	Sansk	Sansk
9	AASHISH DAGAR	B.COM III	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
10	MOHD AHATASHAM	B.COM III	Ahataz	AB	AB	Ahataz	AB	AB	Ahataz	AB	AB	AB
11	ADIL	B.COM III	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil
12	VISHANK	B.COM III	Vish	Vish	Vish	Vish	Vish	Vish	Vish	Vish	Vish	Vish
13	MERUL KHAIWAL	B.COM III	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer
14	UDIT KUMAR	B.COM III	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit
15	MOHD SHAHROOKH	B.COM III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	SHAILI CHAUDHARY	B.COM III	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili
17	ANUJ RATHI	B.COM III	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj
18	TUSHAR	B.COM III	T	T	T	T	T	T	T	T	T	T
19	TANIYA TYAGI	B.COM III	AB	Taniya	AB	AB	AB	AB	AB	AB	AB	AB
20	MOHD SAHIL	B.COM III	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil
21	ANKUSH	B.COM III	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank
22	ASHU	B.COM III	ashu	ashu	ashu	ashu	ashu	ashu	ashu	ashu	Ashu	ashu

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Sr. No.	Student Name	Class	Lecture-11 2/11/2022	Lecture-12 3/11/2022	Lecture-13 4/11/2022	Lecture-14 5/11/2022	Lecture-15 7/11/2022	Lecture-16 8/11/2022	Lecture-17 9/11/2022	Lecture-18 10/11/2022	Lecture-19 11/11/2022	Lecture-20 1211/2022
23	ANJALI GIRI	B.COM III	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali
24	GAUTAM KUMAR SAH	BCA III	Gautam	AB	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam
25	BRAHMDEV CHOURASHIA	BCA III	B	B	B	B	B	B	B	B	B	B
26	AJEET KUMAR	BCA III	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet
27	MOHD SUHEL	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	JITENDRA KUMAR CHAURASIYA	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	AB	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	MITHUN KUMAR	BCA III	M	M	M	M	M	M	M	M	M	M
30	HARSH RAJPUT	BCA III	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh	harsh
31	SANJEEV KUMAR MEHTA	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	RUPALI KUMARI	BCA III	R	R	R	R	R	R	R	R	R	R
33	ANISH KUMAR	BCA III	Anish	Anish	Anish	Anish	Anish	Anish	Anish	AB	Anish	Anish
34	DHIRAJ KUMAR	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	BIPIN KUMAR	BCA III	B	B	B	B	B	B	B	B	B	B
36	SRINATH KUMAR	BCA III	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri
37	ROSHAN KUMAR	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	SACHIN PUNDIR	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	SHUBHAM SHARMA	BCA III	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
40	ANANT TYAGI	BCA III	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant
41	RITTIK KUMAR	BCA III	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	AB	Rittik	Rittik	Rittik
42	ANKUR KUMAR	BCA III	A	A	A	A	A	A	A	A	A	A
43	KAREENA	BCA III	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena
44	HARIOM SHARMA	BCA III	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom

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45	AYUSH GOYAL	BCA III	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush
46	MOHANTI	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	MOHIT KUMAR	BJMC III	Mohit	Mohit	Mohit	Mohit	Mohit	AB	Mohit	Mohit	Mohit	Mohit
48	TANUJA KUMARI	BJMC III	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja
49	ANU	BJMC III	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu
50	NIRAJ KUMAR RAM	BJMC III	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj
TEACHER'S SIGNATURE			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Sr. No.	Student Name	Class	Lecture-21	Lecture-22	Lecture-23	Lecture-24	Lecture-25	Lecture-26	Lecture-27	Lecture-28	Lecture-29	Lecture-30
			14/11/2022	15/11/2022	16/11/2022	17/11/2022	18/11/2022	19/11/2022	21/11/2022	22/11/2022	23/11/2022	24/11/2022
1	YASHTI VERMA	B.COM III	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti
2	MOHD SHAKIB	B.COM III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib
3	MOHD JAVED	B.COM III	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed
4	VISHAL SINGH	B.COM III	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal
5	RITIKA PAL	B.COM III	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
6	MOHD SALMAN	B.COM III	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal
7	ARYAN	B.COM III	Ar	Ar	Ar	Ar	Ar	Ar	Ar	Ar	Ar	Ar
8	SANSKAR VERMA	B.COM III	Sank	Sank	Sank	Sank	Sank	Sank	Sank	Sank	Sank	Sank
9	AASHISH DAGAR	B.COM III	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
10	MOHD AHATASHAM	B.COM III	AB	AB	AB	AB	AB	Ahata	AB	AB	AB	AB
11	ADIL	B.COM III	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil
12	VISHANK	B.COM III	Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven	Ven
13	MERUL KHAIWAL	B.COM III	M	M	M	M	M	M	M	M	M	M
14	UDIT KUMAR	B.COM III	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit
15	MOHD SHAHROOKH	B.COM III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	SHAILI CHAUDHARY	B.COM III	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili	Shaili
17	ANUJ RATHI	B.COM III	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj
18	TUSHAR	B.COM III	T	T	T	T	T	T	T	T	T	T
19	TANIYA TYAGI	B.COM III	AB	Tany	AB	AB	AB	Tanu	AB	AB	AB	AB
20	MOHD SAHIL	B.COM III	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil
21	ANKUSH	B.COM III	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank	Ank
22	ASHU	B.COM III	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu

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23	ANJALI GIRI	B.COM III	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali	Anjali
24	GAUTAM KUMAR SAH	BCA III	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	Gautam	AB	Gautam	Gautam
25	BRAHMDEV CHOURASHIA	BCA III	B	B	B	B	B	B	B	B	B	B
26	AJEET KUMAR	BCA III	Ajeet	Ajeet	AB	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet	Ajeet
27	MOHD SUHEL	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	JITENDRA KUMAR CHAURASIYA	BCA III	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule	Jule
29	MITHUN KUMAR	BCA III	M	M	M	M	M	M	M	M	M	M
30	HARSH RAJPUT	BCA III	Harsh	Harsh	Harsh	Harsh	Harsh	Harsh	Harsh	Harsh	Harsh	Harsh
31	SANJEEV KUMAR MEHTA	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	RUPALI KUMARI	BCA III	R	R	R	R	R	R	R	R	R	R
33	ANISH KUMAR	BCA III	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish	Anish
34	DHIRAJ KUMAR	BCA III	Dhiraj	Dhiraj	Dhiraj	Dhiraj	Dhiraj	Dhiraj	AB	Dhiraj	Dhiraj	Dhiraj
35	BIPIN KUMAR	BCA III	B	B	AB	B	B	B	B	B	B	B
36	SRINATH KUMAR	BCA III	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri	Sri
37	ROSHAN KUMAR	BCA III	Roshan	Roshan	Roshan	Roshan	Roshan	Roshan	Roshan	Roshan	Roshan	Roshan
38	SACHIN PUNDIR	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	SHUBHAM SHARMA	BCA III	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
40	ANANT TYAGI	BCA III	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant	Anant
41	RITTIK KUMAR	BCA III	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik	Rittik
42	ANKUR KUMAR	BCA III	A	A	A	A	A	A	A	A	A	A
43	KAREENA	BCA III	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	Kareena	AB	Kareena	Kareena

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44	HARIOM SHARMA	BCA III	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom	Hariom
45	AYUSH GOYAL	BCA III	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush	Ayush
46	MOHANTI	BCA III	[illegible]	[illegible]	[illegible]	AB	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	MOHIT KUMAR	BJMC III	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit	Mohit
48	TANUJA KUMARI	BJMC III	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja	Tanuja
49	ANU	BJMC III	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu	Anu
50	NIRAJ KUMAR RAM	BJMC III	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj	Niraj
TEACHER'S SIGNATURE			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Internal Quality Assurance Cell

Oral Test for Certificate Distribution-2022-23

Value Added Course On Personality Development

In Collaboration with Indraprastha Institute of Management & Technology

S.No.	Students Name	Father's Name	Course	Grade
1	YASHTI VERMA	Mr SOMPAL SINGH	B.COM III	A+
2	MOHD SHAKIB	Mr YASEEN	B.COM III	B
3	MOHD JAVED	Mr SHAMEEM	B.COM III	B+
4	VISHAL SINGH	Mr KUNWAR PAL	B.COM III	A
5	RITIKA PAL	Mr ANIL PAL	B.COM III	A+
6	MOHD SALMAN	Mr MOHD ISLAM	B.COM III	B
7	ARYAN	Mr AJAY PAL	B.COM III	A
8	SANSKAR VERMA	Mr RAKESH VERMA	B.COM III	B+
9	AASHISH DAGAR	Mr JUGMENDRA	B.COM III	A
10	MOHD AHATASHAM	Mr MEHRAZ ALI	B.COM III	AB
11	ADIL	Mr UMARJAN	B.COM III	A
12	VISHANK	Mr YOGENDRA	B.COM III	A+
13	MERUL KHAIWAL	Mr AJAY KHAIWAL	B.COM III	B
14	UDIT KUMAR	Mr OMPAL	B.COM III	B+
15	MOHD SHAHROOKH	Mr JAMIL	B.COM III	A+
16	SHAILI CHAUDHARY	Mr SHEESH PAL SINGH	B.COM III	A
17	ANUJ RATHI	Mr MUKESH RATHI	B.COM III	B
18	TUSHAR	Mr VIJAY PARTAP	B.COM III	B+
19	TANIYA TYAGI	Mr RAJKUMAR TYAGI	B.COM III	AB
20	MOHD SAHIL	Mr MOHD JAVED	B.COM III	A+
21	ANKUSH	Mr DEVENDRA	B.COM III	A
22	ASHU	Mr SANJAY KUMAR	B.COM III	B+
23	ANJALI GIRI	Mr SUNIL GIRI	B.COM III	B
24	GAUTAM KUMAR SAH	Mr SIKINDRA SAH	BCA III	A
25	BRAHMDEV CHOURASHIA	Mr HARI KRISHNA CHOURASHIA	BCA III	A+
26	AJEET KUMAR	Mr HARISHCHANDRA SHAH	BCA III	B
27	MOHD SUHEL	Mr VARISH AHMAD	BCA III	B+
28	JITENDRA KUMAR CHAURASIYA	Mr ANIL CHAURASIYA	BCA III	A

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

29	MITHUN KUMAR	Mr RANGIL SINGH		BCA III	B+
30	HARSH RAJPUT	Mr ANIL KUMAR		BCA III	B
31	SANJEEV KUMAR MEHTA	Mr DILEEP KUMAR MEHTA		BCA III	A
32	RUPALI KUMARI	Mr ASHOK KUMAR PRASAD		BCA III	A
33	ANISH KUMAR	Mr MITHILESH KUMAR		BCA III	A+
34	DHIRAJ KUMAR	Mr RAJENDRA DAS		BCA III	B
35	BIPIN KUMAR	Mr YOGENDRA MAHTO		BCA III	B+
36	SRINATH KUMAR	Mr PASHUPATI MANDAL		BCA III	B
37	ROSHAN KUMAR	Mr JITENDRA SINGH		BCA III	A+
38	SACHIN PUNDIR	Mr NARENDRA SINGH		BCA III	A
39	SHUBHAM SHARMA	Mr SHIV SHANKAR KUMAR		BCA III	A+
40	ANANT TYAGI	Mr PRADUMAN TYAGI		BCA III	B
41	RITTIK KUMAR	Mr DEVI SINGH		BCA III	B+
42	ANKUR KUMAR	Mr MOHAR SINGH		BCA III	A
43	KAREENA	Mr JARNAIL SINGH		BCA III	A+
44	HARIOM SHARMA	Mr RAVINDER KUMAR SHARMA		BCA III	B
45	AYUSH GOYAL	Mr VINAY KUMAR GOYAL		BCA III	B+
46	MOHANTI	Mr DESHBANDHU		BCA III	A
47	MOHIT KUMAR	Mr SUSHIL KUMAR		BJMC III	A+
48	TANUJA KUMARI	Mr ASHOK KUMAR GUPTA		BJMC III	B
49	ANU	Mr PRATAP SAINI		BJMC III	B+
50	NIRAJ KUMAR RAM	Mr RAMAKABAL RAM		BJMC III	A

Dr. M.S. Khan
Course Coordinator

HOD, Department of Commerce
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Internal Quality Assurance Cell

Certificate Distribution Sheet 2022-23

Value Added Course On Personality Development

In Collaboration with Indraprastha Institute of Management & Technology

S.No.	Students Name	Father's Name	Course	Signature
1	YASHTI VERMA	Mr SOMPAL SINGH	B.COM III	Yashti
2	MOHD SHAKIB	Mr YASEEN	B.COM III	Shakib
3	MOHD JAVED	Mr SHAMEEM	B.COM III	Javed
4	VISHAL SINGH	Mr KUNWAR PAL	B.COM III	Vishal
5	RITIKA PAL	Mr ANIL PAL	B.COM III	RP
6	MOHD SALMAN	Mr MOHD ISLAM	B.COM III	Salm
7	ARYAN	Mr AJAY PAL	B.COM III	Ar
8	SANSKAR VERMA	Mr RAKESH VERMA	B.COM III	Sanskar
9	AASHISH DAGAR	Mr JUGMENDRA	B.COM III	AD
10	MOHD AHATASHAM	Mr MEHRAZ ALI	B.COM III	AB
11	ADIL	Mr UMARJAN	B.COM III	Adil
12	VISHANK	Mr YOGENDRA	B.COM III	Vish
13	MERUL KHAIWAL	Mr AJAY KHAIWAL	B.COM III	Mer
14	UDIT KUMAR	Mr OMPAL	B.COM III	Udit
15	MOHD SHAHROOKH	Mr JAMIL	B.COM III	SH
16	SHAILI CHAUDHARY	Mr SHEESH PAL SINGH	B.COM III	Shaili
17	ANUJ RATHI	Mr MUKESH RATHI	B.COM III	Anuj
18	TUSHAR	Mr VIJAY PARTAP	B.COM III	T
19	TANIYA TYAGI	Mr RAJKUMAR TYAGI	B.COM III	AB
20	MOHD SAHIL	Mr MOHD JAVED	B.COM III	Sahil
21	ANKUSH	Mr DEVENDRA	B.COM III	Ank
22	ASHU	Mr SANJAY KUMAR	B.COM III	ashu
23	ANJALI GIRI	Mr SUNIL GIRI	B.COM III	Anjali
24	GAUTAM KUMAR SAH	Mr SIKINDRA SAH	BCA III	Gautam
25	BRAHMDEV CHOURASHIA	Mr HARI KRISHNA CHOURASHIA	BCA III	B
26	AJEET KUMAR	Mr HARISHCHANDRA SHAH	BCA III	Ajeet
27	MOHD SUHEL	Mr VARISH AHMAD	BCA III	Suhel
28	JITENDRA KUMAR CHAURASIYA	Mr ANIL CHAURASIYA	BCA III	Jiten

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

29	MITHUN KUMAR	Mr RANGIL SINGH	BCA III	
30	HARSH RAJPUT	Mr ANIL KUMAR	BCA III	Harsh
31	SANJEEV KUMAR MEHTA	Mr DILEEP KUMAR MEHTA	BCA III	Sanjeev
32	RUPALI KUMARI	Mr ASHOK KUMAR PRASAD	BCA III	R
33	ANISH KUMAR	Mr MITHILESH KUMAR	BCA III	Anish
34	DHIRAJ KUMAR	Mr RAJENDRA DAS	BCA III	Dhiraj
35	BIPIN KUMAR	Mr YOGENDRA MAHTO	BCA III	B
36	SRINATH KUMAR	Mr PASHUPATI MANDAL	BCA III	Sri
37	ROSHAN KUMAR	Mr JITENDRA SINGH	BCA III	Rosh
38	SACHIN PUNDIR	Mr NARENDRA SINGH	BCA III	S
39	SHUBHAM SHARMA	Mr SHIV SHANKAR KUMAR	BCA III	SS
40	ANANT TYAGI	Mr PRADUMAN TYAGI	BCA III	Anant
41	RITTIK KUMAR	Mr DEVI SINGH	BCA III	Rittik
42	ANKUR KUMAR	Mr MOHAR SINGH	BCA III	A
43	KAREENA	Mr JARNAIL SINGH	BCA III	Kareena
44	HARIOM SHARMA	Mr RAVINDER KUMAR SHARMA	BCA III	Hariom
45	AYUSH GOYAL	Mr VINAY KUMAR GOYAL	BCA III	Ayush
46	MOHANTI	Mr DESHBANDHU	BCA III	M
47	MOHIT KUMAR	Mr SUSHIL KUMAR	BJMC III	Mohit
48	TANUJA KUMARI	Mr ASHOK KUMAR GUPTA	BJMC III	Tanuja
49	ANU	Mr PRATAP SAINI	BJMC III	Anu
50	NIRAJ KUMAR RAM	Mr RAMAKABAL RAM	BJMC III	Niraj

Dr. M.S. Khan
Course Coordinator

HOD, Department of Commerce
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Department of Commerce

Shri Ram College, Muzaffarnagar

Certificate Course on Personality Development

Report

Date 26-11-2022

The Department of Commerce arranged an incredible 30-day program on "Personality Development" for the 2022–2023 Session, started on 18 October, 2022. There were fifty students enrolled in the program in starting. Dr. M.S. Khan worked as a coordinator and the trainer in this program. Dr. S.C. Kulshreshtha, the Honorable Chairman of the Shri Ram Group of Colleges in Muzaffarnagar, attended the inaugural event and inspired all of the students with his experiences.

The primary aim of the training was to familiarize participants with Personality Development. The program's goal is to educate the participants to the Personality Development in detail in theory as well as practical aspect. Topics covered in this program are such as what should be the best strategy to approach a Personality, how should we behave in an Personality, body language, conversation skills etc. He also discussed what type of questions may be asked in a Personality, how to improve Personality questions. This program is very beneficial for all students. This training program was enriched by many practical and examples. In this program, personal counseling and personality training experiences were shared to make students understand the importance of developing Personality skills. All the students provided feedback at the end of the course. Few students shared their personal experiences. 48 students received certificates upon successfully finishing the course.

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Dr. Saurabh Mittal
HOD, Department of Commerce

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE MUZAFFARNAGAR
तमसो मा ज्योतिर्गमय

Shri Ram College

Approved by UGC, NCTE and Affiliated to MS University, Saharanpur
Muzaffarnagar - 251001, NCR (U.P.)

A++ Grade Accredited by NAAC

Request Letter

To,

Date 14-12-2022

The Secretary
Indian Industries Association (IIA)
Muzaffarnagar (Chapter)

Dear Sir.

With due respect and honour it is to state that as you know this era is an era of modern technology and globalization. We have to meet up with existing and for that reason training are must to professionally develop our students for better placements and to meet the industries demand.

We wish to collaborate with you in organizing a course of 30 Hours (30 Days) on Interview Skill. We expect to have industry personnel to interact with our students. The contents of the course are enclosed for your preference.

Thank You.

With Regards

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

Principal
Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Contact @ 9927028908, 9927011422
Website : www.srgcmzn.com E-Mail : src_mzn@rediffmail.com

INDIAN INDUSTRIES ASSOCIATION
AN APEX BODY OF MICRO, SMALL & MEDIUM ENTERPRISES
(IN THE SERVICE OF MSME SINCE 1985)
Muzaffarnagar Chapter : 159/A-8, 15, Prakash Market, Lala Lajpat Rai Chowk, Muzaffarnagar-251001 (U.P.)
Tel. : 0131-2623762 • E-mail : iia.mznchapter@gmail.com

Consent Letter

To,
The Principal
Shri Ram College
Muzaffarnagar

Date- 16-12-2022

Dear Sir,

We are already associated with you since last 4 years for conducting the Value Added Course on Interview Skills. For the current year, we again give our consent to be associated with you.

We are getting a nice response from your students. The institution is achieving new heights day by day. We appreciate your efforts which you are doing for the students.

Now the students are very fruitful for the society and industry as well.

Kindly share the course contents, data and plan of commencing the course.

Thank you

With Regards

Secretary
Indian Industries Association
(IIA- Muzaffarnagar Chapter)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Central Office : IIA Bhawan, Vibhuti Khand, Phase-II, Gomti Nagar, Lucknow - 226010
Tel. : +91-522-2720090, 24004350, 9335904257 • Fax : +91-522-2720097 • E-mail : iia@iiaonline.in
Website : www.iiaonline.in

Shri Ram College, Muzaffarnagar

Notice

Date 17-12-2022

All the students of Shri Ram College are hereby informed that Department of Commerce is organizing 30 Hours (30 Days) value added course on "Interview Skills" in collaboration with Indian Industries Association, Muzaffarnagar Chapter (IIA). Interested students may give their name to the coordinator on or before 21st of December 2022, through their Head of Department. It is further informed that seats are limited to 50 and will be allotted on first come first serve basis. The content of course and other information is displayed on notice board of the IQAC. For any query students may contact to the IQAC office of the college.

Course Coordinator
Department of Commerce

Coordinator, IQAC
Shri Ram College, Muzaffarnagar

Copy to:

Principal, Shri Ram College, Muzaffarnagar
HOD, Department of Business Administration
HOD, Department of Journalism and Mass Communication
HOD, Department of Computer Application
HOD, Department of Basic Science
HOD, Department of Physical Education
HOD, Department of Agriculture
HOD, Department of Bio-Science
HOD, Department of Technical Education

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

A

VALUE ADDED COURSE

ON

"INTERVIEW SKILLS"

CODE- BB2206IS

"The way to get started is to quit talking and begin doing"

(Session 2022-23)

Organized by

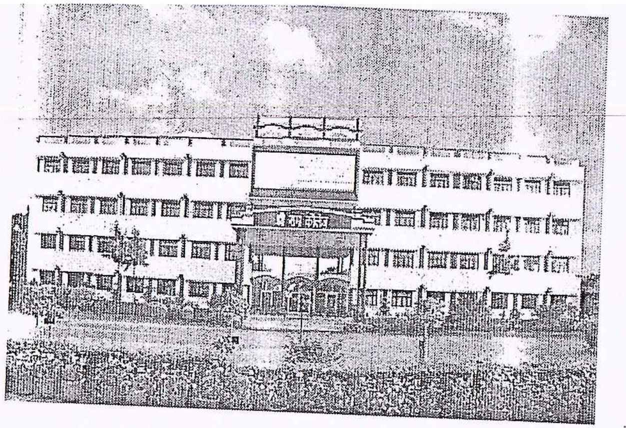
Department of commerce

Shri Ram College, Muzaffarnagar

In Collaboration with Indian Industries Association-Muzaffarnagar Chapter

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar



Shri Ram Group of Colleges, Muzaffarnagar comprises of:

- Shri Ram College of Engineering (Affiliated to AKTU, Lucknow and Approved by AICTE)
- Shri Ram School of Architecture (Affiliated to AKTU, LKO and Approved by COA, AICTE)
- Shri Ram College of Management (Affiliated to AKTU, Lucknow and Approved by AICTE)
- Shri Ram College (Affiliated to CCS University, Meerut and Approved by UGC, NCTE)
- Shri Ram Girls College (Affiliated to CCS University, Meerut and Approved by UGC)
- Shri Ram College of Law (Affiliated to CCS University, Meerut and Approved by UGC, BCI)
- Shri Ram Polytechnic(Affiliated to UP Board of Tech Education, LKO and App by AICTE)
- Shri Ram College of Education (Affiliated to SCERT, Lucknow and Approved by NCTE)

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

About SRGC

Under the visionary leadership of eminent educationist Dr. S. C. Kulshreshtha, about one and half decades back, acclaimed academicians, leading industrialists and prominent bureaucrats came together to form Shri Ram Charitable Trust. The vision behind was to promote and fulfill the need of technical and professional higher education, skill development and entrepreneurship inculcation among young students of India and neighboring underdeveloped countries.

In a very short span of time, the family of Shri Ram Group of Colleges has grown tremendously. At present more than 13000 students are studying in the group. Today Dr. S. C. Kulshreshtha has spread his educational empire in three districts of Uttar Pradesh.

VALUE ADDED COURSE ON INTERVIEW SKILLS
Shri Ram College, Muzaffarnagar

VALUE ADDED COURSE ON INTERVIEW SKILLS

Organized by:

Department of Commerce,

Shri Ram College, Muzaffarnagar in collaboration with Indian Industries Associations (IIA), Muzaffarnagar Chapter.

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Registration Form

Value Added Course on " Interview Skills" Organized by

Department of Commerce in Collaboration with Indian Industries Association (IIA), Muzaffarnagar Chapter

Name of the Student...............................

Father's Name...

Mother's Name...

Class...

Address...

....

....

....

Mobile Number.......................................

E-mail ID..

Signature of Student..............................

Co-ordinator
IQAC. Shri Ram College,
Muzaffarnagar

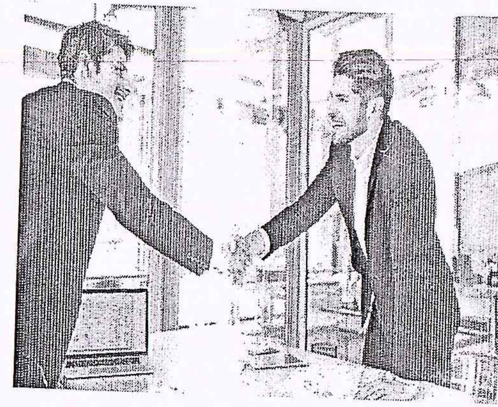
Objective of the Course

The target of this course is to develop the interview skills among the students so that they could face the interview without any hesitant.

"The way to get started is to quit talking and begin doing".

Contents of the Course

- What is the best strategy to approach an interview?
- What goes in the mind of an Interviewer?
- How should you behave at an interview?
- How to structure your conversations?
- What are the most effective strategies?
- What are the most common questions asked in interviews?
- What is the best way to answer these questions?
- How to close an interview and leave a good impression of yourself.



Duration of the Course:

30 Hours

Number of Seats: 50

Eligibility:

The student will have to fill the registration form and submit it to the Department. The criteria of selection will be first come, first serve basis.

Value Added Course on Interview Skills,

Department of Commerce, Shri Ram College, Muzaffarnagar in collaboration with Indian Industries Associations (IIA), Muzaffarnagar

Chairman
IQAC. Shri Ram College,
Muzaffarnagar

Value Added Course

on

Personality Development

Registration Form

Student's Name: ....

Father's Name: ....

Mother's Name: ....

Class: ....

Address: ....

....

....

....

Mobile No: ....

Email Id: ....

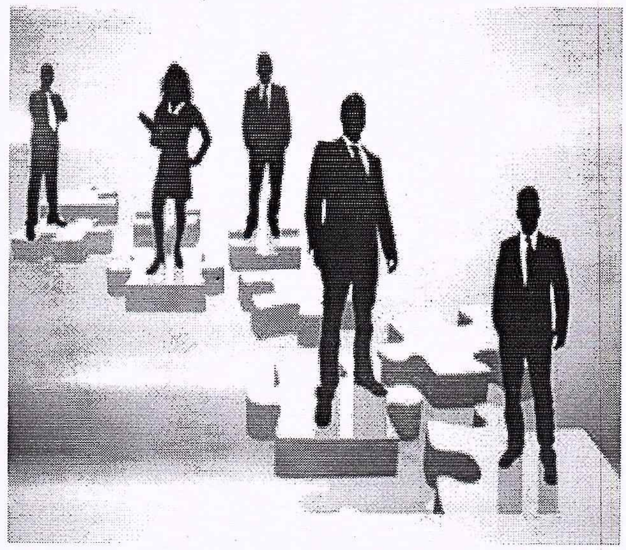
Date: .... **Student's Signature**

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Value Added Course

on

Personality Development



Organised by:

Department of Commerce

Shri Ram College, Muzaffarnagar

in Collaboration with

Indraprastha Institute of Management and Technology

District Saharanpur

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

SRC is a part of Shri Ram Group of Colleges, which is the culmination of the dream of one man who had the vision to reform destiny, an eminent educationalist Dr. S.C. Kulshreshtha. He formed 'Shri Ram Charitable Trust, with an aim of promoting quality education at an affordable fee. SRGC is one of the leading educational institute of West UP of India. SRGC has more than 13000 students with great brilliance, academic vigor and competitive spirit. SRGC caters to the knowledge and skill set as per the industry needs and in tune with time. In this regard college has collaborated with the leading International Institute MIT (US) and ITB, Ireland.

SRGC has built up the world class learning resources which consists of the focused learning space in the form of lecture halls, series of computer centers, digital centralized library, laboratories, residential accommodation in campus for boys and girls, sports facilities, cafeteria, canteen and Wi-Fi campus with 24x7 Internet facilities. SRGC is running 5 distinct campuses at Muzaffarnagar.SRGCinstitutionshavebrillianceandbelieveinigniting minds, making Independent and learned intellectuals. SRGC has been acclaimed and honored at various events and occasions with numerous awards which speak volumes about the brilliance that is taught at SRGC.

Course Description

Preparing for your job interview could very well be one of the most important moments of your career. Landing the perfect job can be a challenge but with the determination and passion, you can easily overcome this challenge and bring a lot of valuable experience with you to the next interview if you don't get the job.

Just a little preparation and thought ahead of time can have wondrous effects on your interviewing skills. This course will go over the issues and provide an in-depth analysis of the interviewing process. This course can help you prepare successfully for *any* job interview!

Objective of the Course:

The target of this course is do develop the interview skills among the students so that they could face the interview without any hesitant.

"The way to get started is to quit talking and begin doing"

Contents of Course -

- What is the best strategy to approach an interview?
- What goes in the mind of an Interviewer?
- How should you be having at an interview?
- How to structure your conversations?
- What are the most effective strategies?
- What are the most common questions asked in interviews?
- What is the best way to answer these questions?
- How to close an interview and leave a good impression of yourself?

Duration of Course -

30 Hours

Number of Seats -

50

Eligibility-

The students will have to fill the registration form and submit it to the department. The criteria of the selection will be first come, first serve basis.

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGAR

Certificate of Completion

This is to certify that Mr. /Ms.______________________________

S/D/O ____Student of this college successfully completed a 30 hours Value Added Course on Interview Skills organized by the Department of Commerce, Shri Ram College, Muzaffarnagar in collobration with IIA, Muzaffarnagar From 22 of Dec, 2022 to 25 of Jan, 2023.

We wish him/her the best of success in his/her future endeavors.

Chairman
IQAC, Shri Ram College.
Muzaffarnagar

(Dr. M. S. Khan)
Course Coordinator

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

(Dr. Saurabh Mittal)
Head, Department of Commerce

(Dr. Prerna Mittal)
Principal

Shri Ram College, Muzaffarnagar

Internal Quality Assurance Cell

List of Enrolled students 2022-23

Value Added Course On Interview Skills

In Collaboration With Indian Industries Association- Muzaffarnagar Chapter

S.No.	Students Name	Father's Name	Course
1	SAKSHI	Mr MANGERAM	B.Com III
2	SAHIL ABBAS	Mr SHABI HAIDER	B.Com III
3	SHIVMILAN PATHAK	Mr INDRESH PATHAK	B.Com III
4	MASOOM	Mr SHAUKEEN	B.Com III
5	HASAN AHMAD	Mr ABDUL JABBAR	B.Com III
6	VIBHOR BANSAL	Mr PAWAN BANSAL	B.Com III
7	KHIZAR	Mr MOHD NAEEM	B.Com III
8	BHARAT	Mr BHEEM SINGH	B.Com III
9	MOHD SUHAIL	Mr MOHD NAZAR	B.Com III
10	VISHAL	Mr MANOJ KUMAR	B.Com III
11	ANUFA MASHKOOR	Mr MASHKOOR ALAM	B.Com III
12	ANSHUL	Mr MAIN PAL	B.Com III
13	SANCHI MEHTA	Mr MADAN MEHTA	B.Com III
14	AMAN TYAGI	Mr SHIVOM TYAGI	B.Com III
15	NEHA	Mr ISTAKHAR	B.Com III
16	MOHD. SHAHBAZ RANA	Mr MOHD. AKIL	B.Com III
17	CHIRAG VERMA	Mr RAJ KUMAR	B.Com III
18	VARISHT	Mr SATENDRA	B.Com III
19	SAGAR BALIYAN	Mr SAMAR PAL	B.Com III
20	ABHISHEK GARG	Mr RAJKUMAR GARG	B.Com III
21	MOHD SHAKIB	Mr YASEEN	BBA III
22	SALMAN	Mr SABIR	BBA III
23	MOHD AREEB	Mr NAEEM UL ZAFAR	BBA III
24	YASH RANA	Mr RAJEEV	BBA III
25	SOMYA ARORA	Mr TULSI ARORA	BBA III
26	NAINA RANA	Mr SATISH KUMAR	BBA III
27	GUNJAN SAINI	Mr SATYAVEER SINGH	BBA III
28	SATYAM TYAGI	Mr AMIT TYAGI	BBA III
29	GARV	Mr SANJAY KUMAR	BBA III

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

30	NARAYAN KAUSHIK	Mr RAMPRAKASH KAUSHIK	BBA III
31	RANDEEP SINGH	Mr PAWAN CHAUDHARY	BBA III
32	ALISHA ANSARI	Mr MOHD FAKHRE AALAM	BCA III
33	RUDRA TYAGI	Mr PANKAJ TYAGI	BCA III
34	DEEPAK KUMAR	Mr RAM KISHAN	BCA III
35	SHISHT SHARMA	Mr BRIJPAL SHARMA	BCA III
36	HRITIK SAINI	Mr RAM KUMAR SAINI	BCA III
37	SANOJ KUMAR	Mr LALAN CHAUHAN	BCA III
38	ANANT TYAGI	Mr PRADUMAN TYAGI	BCA III
39	SHIVAM RANA	Mr VEERSAIN RANA	BCA III
40	KM GEETA	Mr RAJENDRA KUMAR	BJMC III
41	KM DIVYA	Mr BIRJESH SINGH	BJMC III
42	AAYUSH GOEL	Mr RAMKISHORE GOEL	BJMC III
43	MANASVI SINGH	Mr Susheel Kumar	BJMC III
44	NIKSHEY DHIMAN	Mr SHASHIKANT DHIMAN	BJMC III
45	TUSHAR MARATHA	Mr BALESH MARATHA	BJMC III
46	ADARSH KUMAR TIWARI	Mr MUNNA TIWARI	BJMC III
47	PRADEEP KUMAR	Mr PRABHUNATH SAH	BJMC III
48	RAJANI DEVI	Mr SHOBHA RAM	BJMC III
49	SAHIBA KHATOON	Mr IRFAN	BJMC III
50	BIKASH KUMAR KESHRI	Mr RATAN KESHRI	BJMC III

Dr. M.S. Khan
Course Coordinator

HOD, Department of Commerce
Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
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SHRI RAM COLLEGE, MUZAFFAR NAGAR

VALUE ADDED COURSE ON INTERVIEW SKILLS

ATTENDANCE SHEET (SESSION 2022-23)

Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-1	Lecture-2	Lecture-3	Lecture-4	Lecture-5	Lecture-6	Lecture-7	Lecture-8	Lecture-9	Lecture-10
			22/12/2022	23/12/2022	24/12/2022	26/12/2022	27/12/2022	28/12/2022	29/12/2022	30/12/2022	31/12/2022	2/1/2023
1	SAKSHI	B.Com III	S	S	S	S	S	S	S	S	S	S
2	SAHIL ABBAS	B.Com III	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB
3	SHIVMILAN PATHAK	B.Com III	SHIV	शिव	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV
4	MASOOM	B.Com III	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम
5	HASAN AHMAD	B.Com III	H	H	H	AB	H	H	H	H	H	H
6	VIBHOR BANSAL	B.Com III	V	V	V	V	V	V	V	V	V	V
7	KHIZAR	B.Com III	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH
8	BHARAT	B.Com III	भारत	भारत	भारत	भारत	भारत	भारत	भारत	भारत	भारत	भारत
9	MOHD SUHAIL	B.Com III	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail
10	VISHAL	B.Com III	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल
11	ANUFA MASHKOOR	B.Com III	A	A	A	A	A	A	A	A	A	AB
12	ANSHUL	B.Com III	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul
13	SANCHI MEHTA	B.Com III	AB	AB	Sanchi	AB	AB	AB	AB	AB	AB	Sanchi
14	AMAN TYAGI	B.Com III	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन
15	NEHA	B.Com III	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha
16	MOHD. SHAHBAZ RANA	B.Com III	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh
17	CHIRAG VERMA	B.Com III	Chirag	Chirag	Chirag	Chirag	Chirag	Chirag	Chirag	Chirag	Chirag	Chirag
18	VARISHT	B.Com III	AB	V	V	V	V	V	V	V	V	V
19	SAGAR BALIYAN	B.Com III	Sagar	Sagar	Sagar	Sagar	Sagar	AB	Sagar	Sagar	Sagar	Sagar
20	ABHISHEK GARG	B.Com III	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
21	MOHD SHAKIB	BBA III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib
22	SALMAN	BBA III	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman

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VALUE ADDED COURSE ON INTERVIEW SKILLS
ATTENDANCE SHEET (SESSION 2022-23)

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Sr. No.	Student Name	Class	Lecture-1 22/12/2022	Lecture-2 23/12/2022	Lecture-3 24/12/2022	Lecture-4 26/12/2022	Lecture-5 27/12/2022	Lecture-6 28/12/2022	Lecture-7 29/12/2022	Lecture-8 30/12/2022	Lecture-9 31/12/2022	Lecture-10 2/1/2023
23	MOHD AREEB	BBA III	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A
24	YASH RANA	BBA III	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash
25	SOMYA ARORA	BBA III	Sn	Sn	Sn	Sn	Sn	Sn	Sn	Sn	Sn	AB
26	NAINA RANA	BBA III	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना
27	GUNJAN SAINI	BBA III	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan
28	SATYAM TYAGI	BBA III	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam
29	GARV	BBA III	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv
30	NARAYAN KAUSHIK	BBA III	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K
31	RANDEEP SINGH	BBA III	AB	R	AB	AB	AB	R	AB	AB	AB	AB
32	ALISHA ANSARI	BCA III	A	A	A	A	A	A	A	A	A	A
33	RUDRA TYAGI	BCA III	R	R	R	R	R	R	R	R	R	R
34	DEEPAK KUMAR	BCA III	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar
35	SHISHT SHARMA	BCA III	S	S	S	S	S	S	S	S	S	S
36	HRITIK SAINI	BCA III	Hr	Hr	Hr	Hr	Hr	Hr	HR	Hr	Hr	HR
37	SANOJ KUMAR	BCA III	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K
38	ANANT TYAGI	BCA III	A	A	A	A	A	A	A	A	A	A
39	SHIVAM RANA	BCA III	Shivam	Shivam	Shivam	AB	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam
40	KM GEETA	BJMC III	G	G	G	G	G	G	G	G	G	G
41	KM DIVYA	BJMC III	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya
42	AAYUSH GOEL	BJMC III	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G
43	MANASVI SINGH	BJMC III	M	M	M	M	M	M	M	M	M	M
44	NIKSHEY DHIMAN	BJMC III	N	N	N	N	N	N	N	N	N	N

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ATTENDANCE SHEET (SESSION 2022-23)

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Sr. No.	Student Name	Class	Lecture-1	Lecture-2	Lecture-3	Lecture-4	Lecture-5	Lecture-6	Lecture-7	Lecture-8	Lecture-9	Lecture-10
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45	TUSHAR MARATHA	BJMC III	T	T	T	T	T	T	T	T	T	T
46	ADARSH KUMAR TIWARI	BJMC III	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh
47	PRADEEP KUMAR	BJMC III	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep
48	RAJANI DEVI	BJMC III	R	R	R	R	R	R	R	R	R	R
49	SAHIBA KHATOON	BJMC III	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK
50	BIKASH KUMAR KESHRI	BJMC III	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash
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ATTENDANCE SHEET (SESSION 2022-23)

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Sr. No.	Student Name	Class	Lecture-11	Lecture-12	Lecture-13	Lecture-14	Lecture-15	Lecture-16	Lecture-17	Lecture-18	Lecture-19	Lecture-20
			2/11/2022	3/11/2022	4/11/2022	5/11/2022	7/11/2022	8/11/2022	9/11/2022	10/11/2022	11/11/2022	1211/2022
1	YASHTI VERMA	B.COM III	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti	Yashti
2	MOHD SHAKIB	B.COM III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib
3	MOHD JAVED	B.COM III	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed	Javed
4	VISHAL SINGH	B.COM III	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal	Vishal
5	RITIKA PAL	B.COM III	RP	RP	RP	RP	RP	RP	RP	RP	RP	RP
6	MOHD SALMAN	B.COM III	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal	Sal
7	ARYAN	B.COM III	A	A	A	A	A	A	A	A	A	A
8	SANSKAR VERMA	B.COM III	Sanl	Sanl	Sanl	Sanl	Sanl	Sanl	Sanl	Sanl	Sanl	Sanl
9	AASHISH DAGAR	B.COM III	AD	AD	AD	AD	AD	AD	AD	AD	AD	AD
10	MOHD AHATASHAM	B.COM III	Ahata	AB	AB	Ahata	AB	AB	Ahata	AB	AB	AB
11	ADIL	B.COM III	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil	Adil
12	VISHANK	B.COM III	Vm	Vm	Vm	Vm	Vm	Vm	Vm	Vm	Vm	Vm
13	MERUL KHAIWAL	B.COM III	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer	Mer
14	UDIT KUMAR	B.COM III	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit	Udit
15	MOHD SHAHROOKH	B.COM III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	SHAILI CHAUDHARY	B.COM III	Shali	Shali	Shali	Shali	Shali	Shali	Shali	Shali	Shali	Shali
17	ANUJ RATHI	B.COM III	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj	Anuj
18	TUSHAR	B.COM III	T	T	T	T	T	T	T	T	T	T
19	TANIYA TYAGI	B.COM III	AB	Tanya	AB	AB	AB	AB	AB	AB	AB	AB
20	MOHD SAHIL	B.COM III	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil	Sahil
21	ANKUSH	B.COM III	Ankush	Ankush	Ankush	Ankush	Ankush	Ankush	Ankush	Ankush	Ankush	Ankush
22	ASHU	B.COM III	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu	Ashu

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			3/1/2023	4/1/2023	5/1/2023	6/1/2023	7/1/2023	9/1/2023	10/1/2023	11/1/2023	12/1/2023	13/1/2023
23	MOHD AREEB	BBA III	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A
24	YASH RANA	BBA III	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash	Yash
25	SOMYA ARORA	BBA III	S	S	AB	S	S	S	S	S	S	S
26	NAINA RANA	BBA III	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना
27	GUNJAN SAINI	BBA III	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan
28	SATYAM TYAGI	BBA III	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam
29	GARV	BBA III	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv
30	NARAYAN KAUSHIK	BBA III	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K
31	RANDEEP SINGH	BBA III	AB	AB	R	AB	AB	AB	AB	AB	AB	AB
32	ALISHA ANSARI	BCA III	A	A	A	A	A	A	A	A	A	A
33	RUDRA TYAGI	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	DEEPAK KUMAR	BCA III	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar
35	SHISHT SHARMA	BCA III	S	S	S	S	S	S	S	S	S	S
36	HRITIK SAINI	BCA III	HK	HK	HK	HK	HK	HK	HK	HK	HK	HK
37	SANOJ KUMAR	BCA III	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K
38	ANANT TYAGI	BCA III	A	A	A	A	A	A	A	A	A	A
39	SHIVAM RANA	BCA III	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	AB	Shivam	Shivam
40	KM GEETA	BJMC III	G	G	G	G	G	G	G	G	G	G
41	KM DIVYA	BJMC III	Divya	AB	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya
42	AAYUSH GOEL	BJMC III	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G
43	MANASVI SINGH	BJMC III	M	M	M	M	M	M	M	M	M	M
44	NIKSHEY DHIMAN	BJMC III	N	N	N	N	N	N	N	N	N	N

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			3/1/2023	4/1/2023	5/1/2023	6/1/2023	7/1/2023	9/1/2023	10/1/2023	11/1/2023	12/1/2023	13/1/2023
45	TUSHAR MARATHA	BJMC III	T	T	T	T	T	T	T	T	T	T
46	ADARSH KUMAR TIWARI	BJMC III	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh
47	PRADEEP KUMAR	BJMC III	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep
48	RAJANI DEVI	BJMC III	R	R	R	R	R	R	R	R	R	R
49	SAHIBA KHATOON	BJMC III	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh	Sh
50	BIKASH KUMAR KESHRI	BJMC III	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash
TEACHER'S SIGNATURE			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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1	SAKSHI	B.Com III	S	S	S	S	S	S	S	S	S	S
2	SAHIL ABBAS	B.Com III	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB	SAB
3	SHIVMILAN PATHAK	B.Com III	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV	SHIV
4	MASOOM	B.Com III	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम	मासूम
5	HASAN AHMAD	B.Com III	H	H	AB	H	H	H	H	H	H	H
6	VIBHOR BANSAL	B.Com III	V	V	V	V	V	V	V	V	V	V
7	KHIZAR	B.Com III	KH	KH	KH	KH	KH	KH	KH	KH	KH	KH
8	BHARAT	B.Com III	भारत	भारत	भारत	भारत	भारत	भारत	AB	भारत	भारत	भारत
9	MOHD SUHAIL	B.Com III	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail	Suhail
10	VISHAL	B.Com III	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल	विशाल
11	ANUFA MASHKOOR	B.Com III	A	A	A	A	A	A	A	A	A	A
12	ANSHUL	B.Com III	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul	Anshul
13	SANCHI MEHTA	B.Com III	AB	AB	AB	AB	AB	Sanchi	AB	AB	AB	AB
14	AMAN TYAGI	B.Com III	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन	अमन
15	NEHA	B.Com III	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha	Neha
16	MOHD. SHAHBAZ RANA	B.Com III	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
17	CHIRAG VERMA	B.Com III	Chirag.	Chirag.	Chirag	Chirag.	Chirag.	Chirag.	Chirag.	Chirag	Chirag.	Chirag.
18	VARISHT	B.Com III	V	V	V	V	V	V	V	V	V	V
19	SAGAR BALIYAN	B.Com III	Sagar	Sagar	AB	Saggr	Sagar	Sagar	Sagar	Sagg.	Saggr	Saggr
20	ABHISHEK GARG	B.Com III	AB	AB	AB	AB	AB	AB	AB	AB	AB	AB
21	MOHD SHAKIB	BBA III	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib	Shakib

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Sr. No.	Student Name	Class	Lecture-21	Lecture-22	Lecture-23	Lecture-24	Lecture-25	Lecture-26	Lecture-27	Lecture-28	Lecture-29	Lecture-30
			14/1/2023	16/1/2023	17/1/2023	18/1/2023	19/1/2023	20/1/2023	21/1/2023	23/1/2023	24/1/2023	25/1/2023
22	SALMAN	BBA III	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman	Salman
23	MOHD AREEB	BBA III	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A	M.A
24	YASH RANA	BBA III	Yash	yash	Yash	Yash	Yash	AB	Yash	Yash	Yash	yash
25	SOMYA ARORA	BBA III	S	S	S	S	S	S	S	S	S	S
26	NAINA RANA	BBA III	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना	नैना
27	GUNJAN SAINI	BBA III	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan	Gunjan
28	SATYAM TYAGI	BBA III	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam	Satyam
29	GARV	BBA III	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv	Garv
30	NARAYAN KAUSHIK	BBA III	NK	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K	N.K
31	RANDEEP SINGH	BBA III	AB	[illegible]	AB	AB	AB	AB	AB	AB	AB	AB
32	ALISHA ANSARI	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	RUDRA TYAGI	BCA III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	DEEPAK KUMAR	BCA III	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar	Kumar
35	SHISHT SHARMA	BCA III	S	S	S	S	S	S	S	S	S	S
36	HRITIK SAINI	BCA III	HR	HR	HR	HR	HR	HR	HR	HR	HR	HR
37	SANOJ KUMAR	BCA III	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K	S.K
38	ANANT TYAGI	BCA III	A	A	A	A	AB	A	A	A	A	A
39	SHIVAM RANA	BCA III	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam	Shivam
40	KM GEETA	BJMC III	G	G	G	G	G	G	G	G	G	G
41	KM DIVYA	BJMC III	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya	Divya
42	AAYUSH GOEL	BJMC III	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G	A.G
43	MANASVI SINGH	BJMC III	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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SHRI RAM COLLEGE, MUZAFFAR NAGAR

VALUE ADDED COURSE ON INTERVIEW SKILLS

ATTENDANCE SHEET (SESSION 2022-23)

Time: 02:30 PM To 3:30 PM

Sr. No.	Student Name	Class	Lecture-21	Lecture-22	Lecture-23	Lecture-24	Lecture-25	Lecture-26	Lecture-27	Lecture-28	Lecture-29	Lecture-30
			14/1/2023	16/1/2023	17/1/2023	18/1/2023	19/1/2023	20/1/2023	21/1/2023	23/1/2023	24/1/2023	25/1/2023
44	NIKSHEY DHIMAN	BJMC III	N	N	N	N	N	N	N	N	N	N
45	TUSHAR MARATHA	BJMC III	T	T	T	T	T	T	T	T	T	T
46	ADARSH KUMAR TIWARI	BJMC III	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh	Adarsh
47	PRADEEP KUMAR	BJMC III	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep
48	RAJANI DEVI	BJMC III	R	R	R	R	R	R	R	R	R	R
49	SAHIBA KHATOON	BJMC III	SK	SK	SK	SK	SK	SK	SK	SK	SK	SK
50	BIKASH KUMAR KESHRI	BJMC III	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash	Bikash
TEACHER'S SIGNATURE												

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Internal Quality Assurance Cell

Oral Test for Certificate Distribution-2022-23

Value Added Course On Interview Skills

In Collaboration With Indian Industries Association- Muzaffarnagar Chapter

S.No.	Students Name	Father's Name	Course	Grade
1	SAKSHI	Mr MANGERAM	B.Com III	A+
2	SAHIL ABBAS	Mr SHABI HAIDER	B.Com III	A+
3	SHIVMILAN PATHAK	Mr INDRESH PATHAK	B.Com III	B+
4	MASOOM	Mr SHAUKEEN	B.Com III	A
5	HASAN AHMAD	Mr ABDUL JABBAR	B.Com III	A
6	VIBHOR BANSAL	Mr PAWAN BANSAL	B.Com III	B+
7	KHIZAR	Mr MOHD NAEEM	B.Com III	A+
8	BHARAT	Mr BHEEM SINGH	B.Com III	A
9	MOHD SUHAIL	Mr MOHD NAZAR	B.Com III	B
10	VISHAL	Mr MANOJ KUMAR	B.Com III	B+
11	ANUFA MASHKOOR	Mr MASHKOOR ALAM	B.Com III	B
12	ANSHUL	Mr MAIN PAL	B.Com III	A+
13	SANCHI MEHTA	Mr MADAN MEHTA	B.Com III	AB
14	AMAN TYAGI	Mr SHIVOM TYAGI	B.Com III	A+
15	NEHA	Mr ISTAKHAR	B.Com III	A+
16	MOHD. SHAHBAZ RANA	Mr MOHD. AKIL	B.Com III	A
17	CHIRAG VERMA	Mr RAJ KUMAR	B.Com III	A
18	VARISHT	Mr SATENDRA	B.Com III	B+
19	SAGAR BALIYAN	Mr SAMAR PAL	B.Com III	A
20	ABHISHEK GARG	Mr RAJKUMAR GARG	B.Com III	A
21	MOHD SHAKIB	Mr YASEEN	BBA III	A+
22	SALMAN	Mr SABIR	BBA III	B+
23	MOHD AREEB	Mr NAEEM UL ZAFAR	BBA III	B+
24	YASH RANA	Mr RAJEEV	BBA III	B+
25	SOMYA ARORA	Mr TULSI ARORA	BBA III	A
26	NAINA RANA	Mr SATISH KUMAR	BBA III	A+
27	GUNJAN SAINI	Mr SATYAVEER SINGH	BBA III	A+
28	SATYAM TYAGI	Mr AMIT TYAGI	BBA III	A

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29	GARV	Mr SANJAY KUMAR	BBA III	B+
30	NARAYAN KAUSHIK	Mr RAMPRAKASH KAUSHIK	BBA III	B+
31	RANDEEP SINGH	Mr PAWAN CHAUDHARY	BBA III	AB
32	ALISHA ANSARI	Mr MOHD FAKHRE AALAM	BCA III	B
33	RUDRA TYAGI	Mr PANKAJ TYAGI	BCA III	B
34	DEEPAK KUMAR	Mr RAM KISHAN	BCA III	A+
35	SHISHT SHARMA	Mr BRIJPAL SHARMA	BCA III	A+
36	HRITIK SAINI	Mr RAM KUMAR SAINI	BCA III	A
37	SANOJ KUMAR	Mr LALAN CHAUHAN	BCA III	B
38	ANANT TYAGI	Mr PRADUMAN TYAGI	BCA III	A+
39	SHIVAM RANA	Mr VEERSAIN RANA	BCA III	A+
40	KM GEETA	Mr RAJENDRA KUMAR	BJMC III	A+
41	KM DIVYA	Mr BIRJESH SINGH	BJMC III	A
42	AAYUSH GOEL	Mr RAMKISHORE GOEL	BJMC III	B
43	MANASVI SINGH	Mr Susheel Kumar	BJMC III	B
44	NIKSHEY DHIMAN	Mr SHASHIKANT DHIMAN	BJMC III	A
45	TUSHAR MARATHA	Mr BALESH MARATHA	BJMC III	A
46	ADARSH KUMAR TIWARI	Mr MUNNA TIWARI	BJMC III	A
47	PRADEEP KUMAR	Mr PRABHUNATH SAH	BJMC III	B+
48	RAJANI DEVI	Mr SHOBHA RAM	BJMC III	A+
49	SAHIBA KHATOON	Mr IRFAN	BJMC III	B
50	BIKASH KUMAR KESHRI	Mr RATAN KESHRI	BJMC III	B+

Dr. M.S. Khan
Course Coordinator

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Shri Ram College, Muzaffarnagar

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Shri Ram College, Muzaffarnagar
Internal Quality Assurance Cell
Certificate Distribution Sheet 2022-23

Value Added Course On Personality Development

In Collaboration with Indraprastha Institute of Management & Technology

S.No.	Students Name	Father's Name	Course	Signature
1	YASHTI VERMA	Mr SOMPAL SINGH	B.COM III	Yashti
2	MOHD SHAKIB	Mr YASEEN	B.COM III	shakib
3	MOHD JAVED	Mr SHAMEEM	B.COM III	Javed
4	VISHAL SINGH	Mr KUNWAR PAL	B.COM III	Vishal
5	RITIKA PAL	Mr ANIL PAL	B.COM III	RP
6	MOHD SALMAN	Mr MOHD ISLAM	B.COM III	Sal
7	ARYAN	Mr AJAY PAL	B.COM III	Az
8	SANSKAR VERMA	Mr RAKESH VERMA	B.COM III	Sanskar
9	AASHISH DAGAR	Mr JUGMENDRA	B.COM III	AD
10	MOHD AHATASHAM	Mr MEHRAZ ALI	B.COM III	AB
11	ADIL	Mr UMARJAN	B.COM III	Adil
12	VISHANK	Mr YOGENDRA	B.COM III	Vish
13	MERUL KHAIWAL	Mr AJAY KHAIWAL	B.COM III	Mer
14	UDIT KUMAR	Mr OMPAL	B.COM III	Udit
15	MOHD SHAHROOKH	Mr JAMIL	B.COM III	[illegible]
16	SHAILI CHAUDHARY	Mr SHEESH PAL SINGH	B.COM III	Shaili
17	ANUJ RATHI	Mr MUKESH RATHI	B.COM III	Anuj
18	TUSHAR	Mr VIJAY PARTAP	B.COM III	[illegible]
19	TANIYA TYAGI	Mr RAJKUMAR TYAGI	B.COM III	AB
20	MOHD SAHIL	Mr MOHD JAVED	B.COM III	Sahil
21	ANKUSH	Mr DEVENDRA	B.COM III	Ank
22	ASHU	Mr SANJAY KUMAR	B.COM III	ashu
23	ANJALI GIRI	Mr SUNIL GIRI	B.COM III	Anjali
24	GAUTAM KUMAR SAH	Mr SIKINDRA SAH	BCA III	Gautam
25	BRAHMDEV CHOURASHIA	Mr HARI KRISHNA CHOURASHIA	BCA III	B
26	AJEET KUMAR	Mr HARISHCHANDRA SHAH	BCA III	Ajeet
27	MOHD SUHEL	Mr VARISH AHMAD	BCA III	Suhel
28	JITENDRA KUMAR CHAURASIYA	Mr ANIL CHAURASIYA	BCA III	Jiten

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29	MITHUN KUMAR	Mr RANGIL SINGH	BCA III	
30	HARSH RAJPUT	Mr ANIL KUMAR	BCA III	Harsh
31	SANJEEV KUMAR MEHTA	Mr DILEEP KUMAR MEHTA	BCA III	
32	RUPALI KUMARI	Mr ASHOK KUMAR PRASAD	BCA III	
33	ANISH KUMAR	Mr MITHILESH KUMAR	BCA III	Anish
34	DHIRAJ KUMAR	Mr RAJENDRA DAS	BCA III	Dhiraj
35	BIPIN KUMAR	Mr YOGENDRA MAHTO	BCA III	
36	SRINATH KUMAR	Mr PASHUPATI MANDAL	BCA III	
37	ROSHAN KUMAR	Mr JITENDRA SINGH	BCA III	Rosh
38	SACHIN PUNDIR	Mr NARENDRA SINGH	BCA III	
39	SHUBHAM SHARMA	Mr SHIV SHANKAR KUMAR	BCA III	
40	ANANT TYAGI	Mr PRADUMAN TYAGI	BCA III	Anant
41	RITTIK KUMAR	Mr DEVI SINGH	BCA III	Rittik
42	ANKUR KUMAR	Mr MOHAR SINGH	BCA III	
43	KAREENA	Mr JARNAIL SINGH	BCA III	Kareena
44	HARIOM SHARMA	Mr RAVINDER KUMAR SHARMA	BCA III	Hariom
45	AYUSH GOYAL	Mr VINAY KUMAR GOYAL	BCA III	Ayush
46	MOHANTI	Mr DESHBANDHU	BCA III	M.
47	MOHIT KUMAR	Mr SUSHIL KUMAR	BJMC III	Mohit
48	TANUJA KUMARI	Mr ASHOK KUMAR GUPTA	BJMC III	Tanuja
49	ANU	Mr PRATAP SAINI	BJMC III	Anu
50	NIRAJ KUMAR RAM	Mr RAMAKABAL RAM	BJMC III	Niraj

Dr. M.S. Khan
Course Coordinator

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Shri Ram College, Muzaffarnagar

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

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IQAC, Shri Ram College,
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Department of Commerce

Shri Ram College, Muzaffarnagar

Certificate Course on Personality Development

Report

Date 26-11-2022

The Department of Commerce arranged an incredible 30-day program on "Personality Development" for the 2022–2023 Session, started on 18 October, 2022. There were fifty students enrolled in the program in starting. Dr. M.S. Khan worked as a coordinator and the trainer in this program. Dr. S.C. Kulshreshtha, the Honorable Chairman of the Shri Ram Group of Colleges in Muzaffarnagar, attended the inaugural event and inspired all of the students with his experiences.

The primary aim of the training was to familiarize participants with Personality Development. The program's goal is to educate the participants to the Personality Development in detail in theory as well as practical aspect. Topics covered in this program are such as what should be the best strategy to approach a Personality, how should we behave in an Personality, body language, conversation skills etc. He also discussed what type of questions may be asked in a Personality, how to improve Personality questions. This program is very beneficial for all students. This training program was enriched by many practical and examples. In this program, personal counseling and personality training experiences were shared to make students understand the importance of developing Personality skills. All the students provided feedback at the end of the course. Few students shared their personal experiences. 48 students received certificates upon successfully finishing the course.

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Dr. Saurabh Mittal
HOD, Department of Commerce

Chairman
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Muzaffarnagar

Shri Ram College

Approved by UGC, NCTE and Affiliated to MS University, Saharanpur

Almaspur Telephone Exchange, Circular Road (Parikarma Marg), Muzaffarnagar - 251001, NCR (U.P.)

A++ Grade Accredited by NAAC

Dated- 09/08/2022

To
Director
Bindals Papers Mills Ltd.
Muzaffarnagar

Subject- Acceptance letter for the proposal for a project

Dear Sir

I am beyond excited to write this response to your offer and firstly I would like to pay my gratitude on behalf of our department for having faith in our organization and sending us an offer. Bindals Papers Mills Ltd. has earned a big name in the marketplace having dedication in the field of paper industry and we are glad you have reckoned it.

As I have reviewed your offer thoroughly and discussed with my superiors and we believe it is quite smoothly crafted. All the details are compatible with the service we can provide thus we shall carry it out the way you want. For the successful completion of the project please sanction the required amount Rs.55000 so that the work can be started within time. None the less, we would also like to bring this into your attention that all the proposed methods are subject to change as per the situation. However, our team will make sure to inform you prior to any amendments.

Hoping for a healthy relationship.

Mudra Mittal

Assistant Professor

Department of Business Administration

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Bindals Papers Mills Limited

MANUFACTURERS OF WRITING & PRINTING PAPER
8th Km., Bhopa Road, Muzaffarnagar - 251 001 UP, INDIA
Tel. : +91-131-2468381, 2468382, +91-9917055355
E-mail : info@bindalpapers.com, technical@bindalpapers.com
Corporate Identity Number : U21011DL2006PLC148926

ISO 9001 CERTIFIED ORGANIZATION | ISO 14001 CERTIFIED ORGANIZATION | An OHSAS 18001 Certified Organization HEALTH & SAFETY AWARE

www.bindalpapers.com

12/08/2022

To,
Ms. Mudra Mittal
Assistant Professor, Department of Business Administration
Shri Ram College, Muzaffarnagar

Subject: Sanction of Funds for Project on "A Study of Brand Awareness towards the Products of Bindal Paper Mills"

Dear Sir,

With reference to **our offer letter dated 26/07/2022 and your accepted letter dated 09/08/2022**, we are here with sanctioning an amount of Rs. 50000/- for the above mentioned Project under Corporate Social Responsibility (CSR) head.

You are requested to carry on the work. All terms and conditions mentioned in our earlier letter shall be applying to this project.

Thanking You

Yours faithfully

For Bindal Papers Mills Limited

Enclosed: As above.

Mayank

(Mayank Bindal)

Director

Date: 12/08/2022

Co-ordinator
IQAC, Shri Ram College,
Muzaffarnagar

Marketing Office : 212, Aggarwal City Mall, Road No. 44, Near M2K Cinema, Pitampura, Delhi-110034, INDIA
Tel. : +91-11-47537700 • Fax : +91-11-47537777 • E-mail : marketing@bindalpapers.com
Regd. Office : NP-151 B, Maurya Enclave, Pitampura, Delhi-110088, INDIA

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Muzaffarnagar

Shri Ram College, Muzaffarnagar

Department of Business Administration

Industrial Project for Bindals Papers Mills Ltd, Muzaffarnagar titled

"A Study of Brand Awareness towards the Products of Bindal Paper Mills"

SUMMARY REPORT

INTRODUCTION

Bindals Papers Mills Limited emerges as part of the extremely dynamic and rapid growing Bindal Group. Bindal's has a diversified Business Portfolio in Manufacturing of Cut pack A4 Copier paper, Writing & Printing grades, and its Notebooks. The ever-increasing demands of the consumer for high-quality products, supported by a strong service culture and affordable prices, determine the core business philosophy of the group. Bindals' significant Investment in the high-end Printing and Writing Paper sector in the year 2009 is a modern Greenfield plant in Muzaffarnagar, UP with a manufacturing capacity exceeding 1,00,000 TPY. More importantly, its participation is in Branded Copier Paper (cut-size) segment, the fast-growing High Bright SS Maplitho Paper (uncoated wood free paper) and Notebooks makes it a one-stop-shop paper group, enabling customers to source the widest range of papers and boards.

The installed technology is completely up to date and in line with the growing demands of the markets for high-quality, globally competitive papers. Backing this is an excellent network of distributors who offer customized services and solutions and a workforce that is both talented and dedicated.

The Company's Sales and Marketing is headquartered in New Delhi which clearly results in closer and more personalized service, being in the heart of the country's biggest and fastest growing market. The Team of sales and marketing professionals has the right blend of experience and youth who service the customers with utmost passion and humility.

The organization always seeks to improve itself through research projects, even with a vast customer base and overall good performance. For the fulfillment of this objective company joined hands with Shri Ram College to conduct research to find out the perception of consumer towards the products of Bindals Papers Ltd.

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RESEARCH OBJECTIVES

- To identify the key factors affecting brand awareness forBindals Papers Ltd. Products.
- To investigate thecustomer preference and brand loyalty towards Bindals Papers Ltd. Products
- To analyze the factors influencing customer decision making Bindals Papers Ltd. Products.

RESEARCH METHODOLOGY

Sampling: The sample of 120 consumers selected from Muzaffarnagar, Shamli, Saharanpur and Meerut districts by using simple random sampling method to select the sample.

Tools used for the study: The study is carried out with the help of both primary and secondary data. Primary data was collected through well-structured questionnaire provided to the consumers. Secondary data was collected from internet, Journals, and articles.

NEED FOR THE STUDY

Conducting a research survey on brand awareness allows Bindals Papers Ltd. to get a clear picture of how familiar people are with their products. By understanding this, they can assess the impact of their marketing strategies and identify any areas that may need improvement. Plus, it helps them make informed decisions to better serve their customers and it is an exciting journey of growth and customer satisfaction.

HYPOTHESIS

H0: There is no significant difference between consumer brand awareness and their decision making.

H1: There is significant difference between consumer brand awareness and their decision making.

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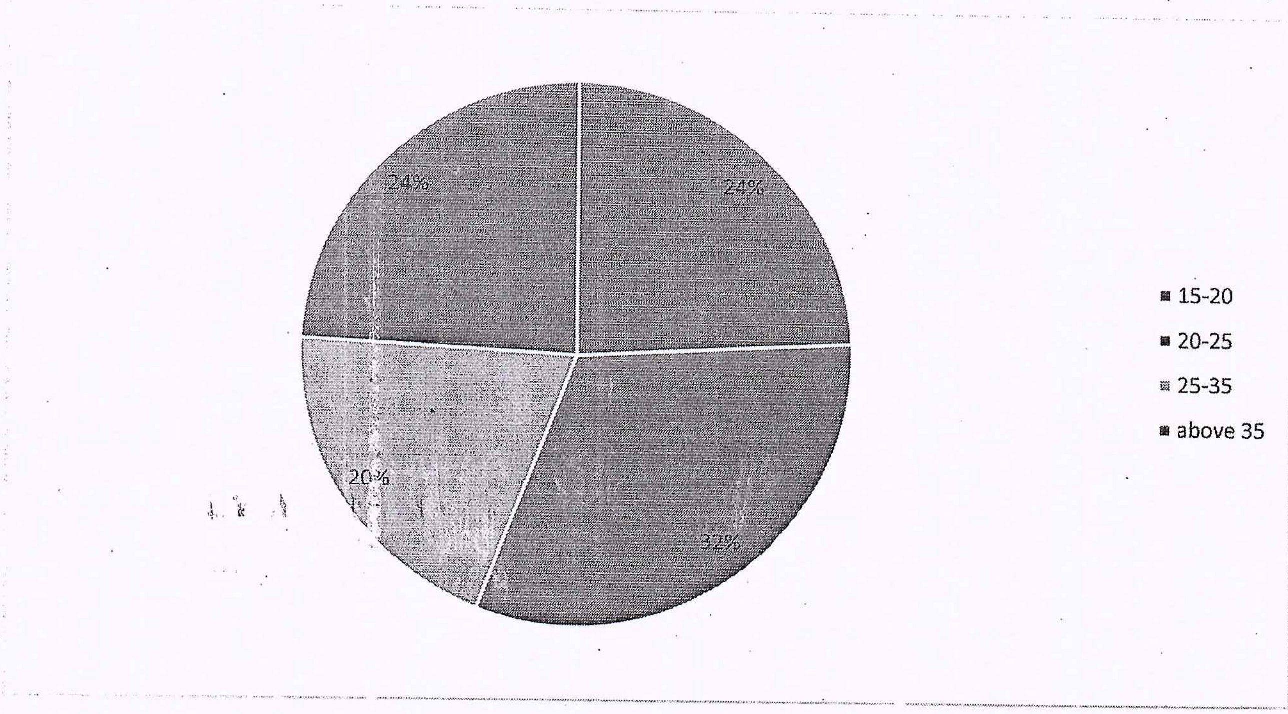
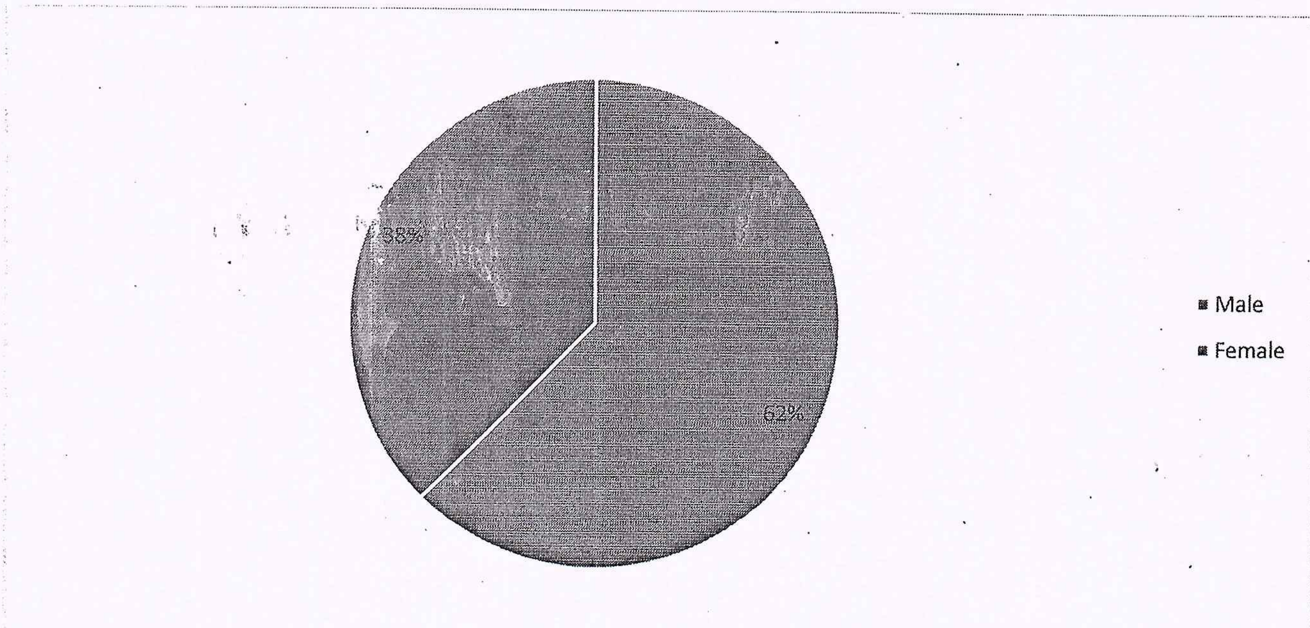
DATA ANALYSIS AND INTERPRETATION

1. Age...................... (in Years)



32% were of the age between 20-25, 24% were of the age between 15-20 and above 35, 20% were of the age between 25-35.

2. Gender



62% people were the male and 38% people were the female.

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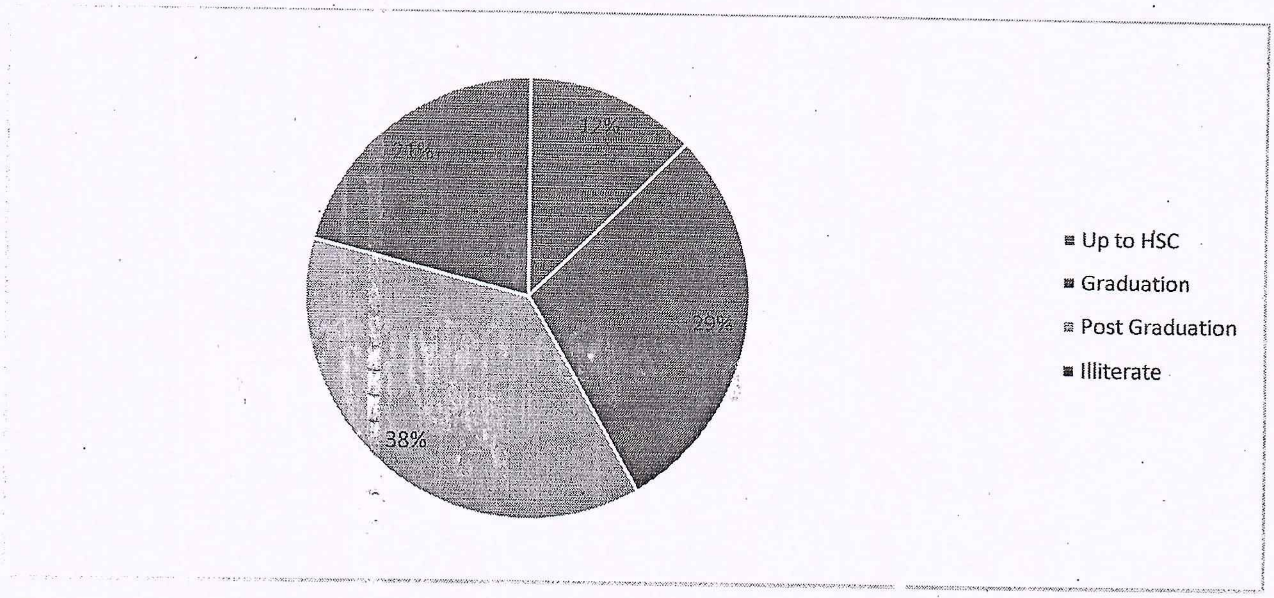
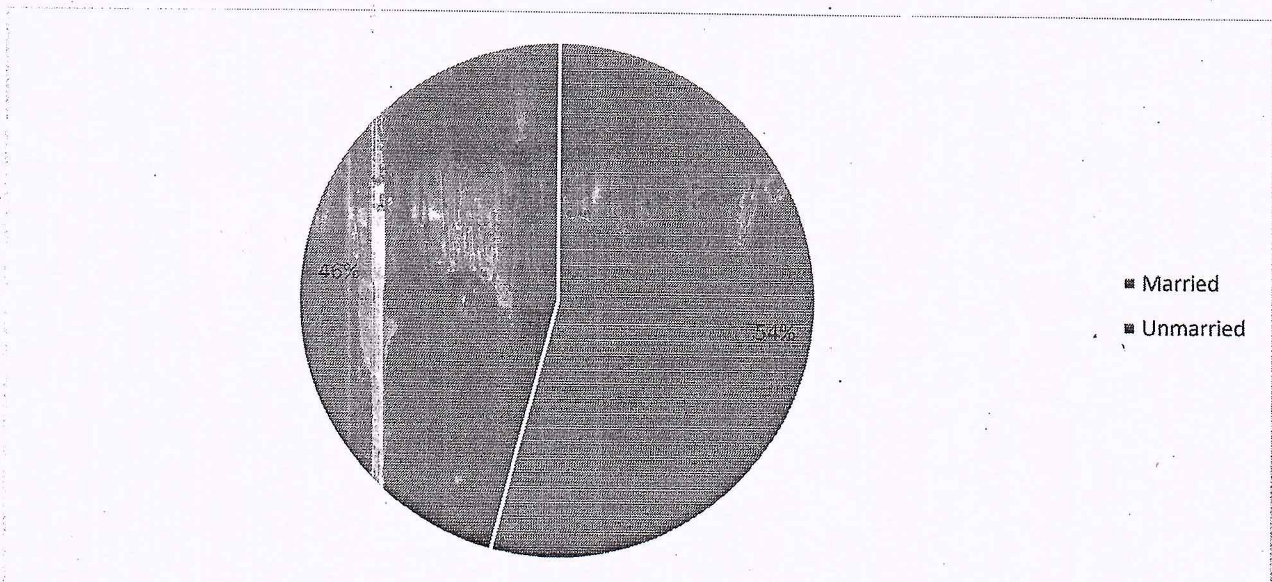
3. Qualification



38% people were educated upto post graduation, 29% people were educated upto graduation, 21% people were illiterate, 12% people were educated upto HSC.

4. Marital Status



54% people were married and 46% people were unmarried.

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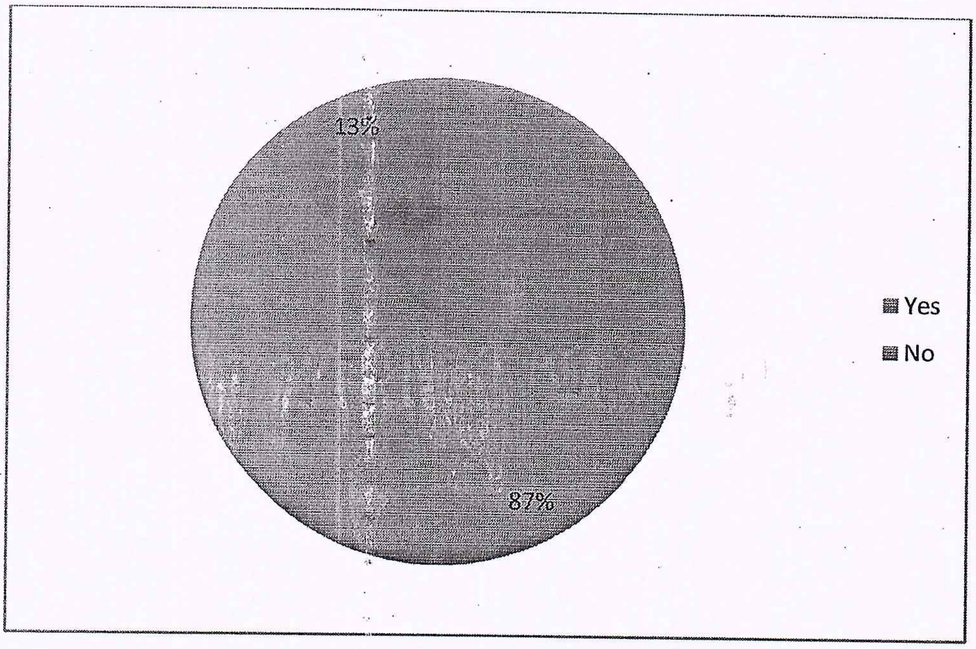
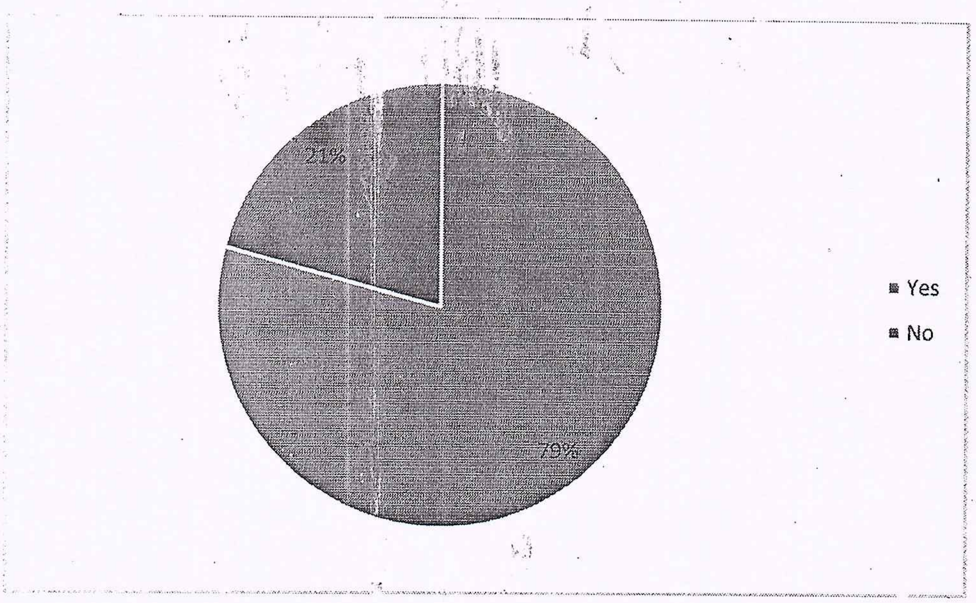
5. Are you aware of Bindal Papers Products ?



87% people were aware of Bindal Paper Product and 13% people were not aware of Bindal Paper Product.

6. Have you used any product of Bindal Papers Ltd ?



79% people were used Bindal Papers Product and 21% people were not used Bindal Papers Product.

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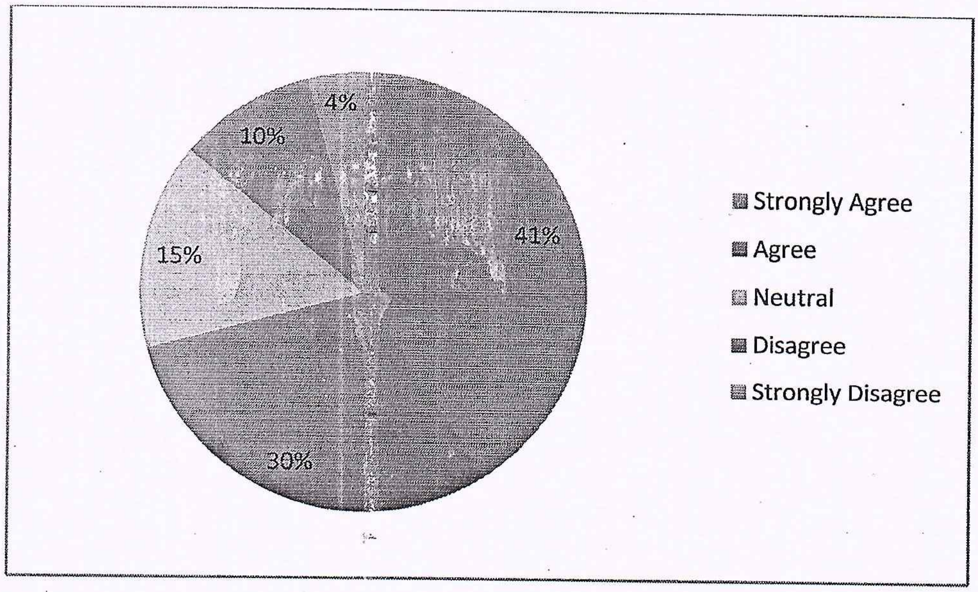
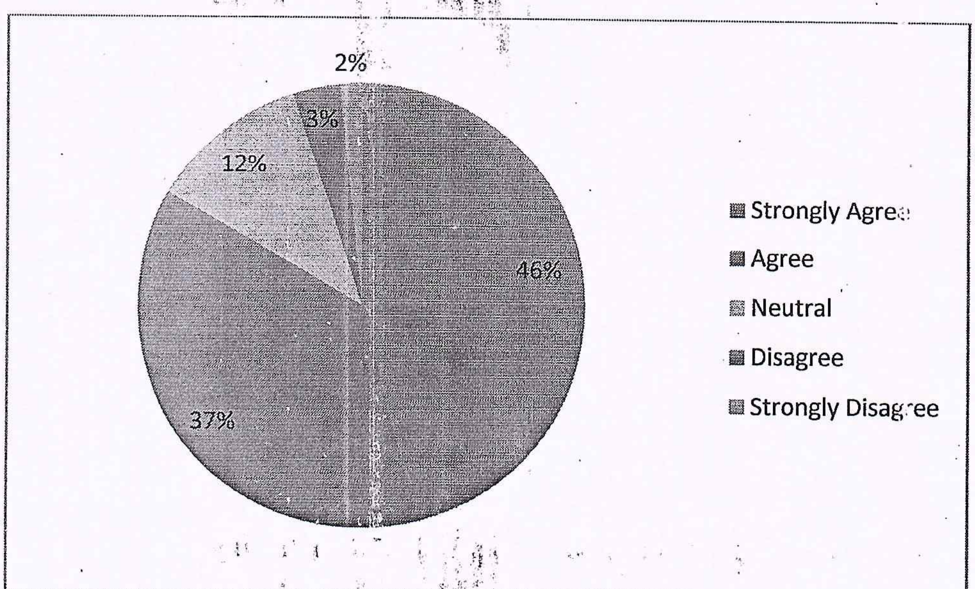
7. Do you agree Bindals Papers Ltd offers a large variety of products?



41% people were strongly agree, 30% people were agree, 15% people were neutral, 10% people were disagree, 4% people were strongly disagree.

8. Do you agree that Bindals Papers Ltd products are of high quality?



46% people were strongly agree, 37% people were agree, 12% people were neutral, 3% people were disagree, 2% people were strongly disagree.

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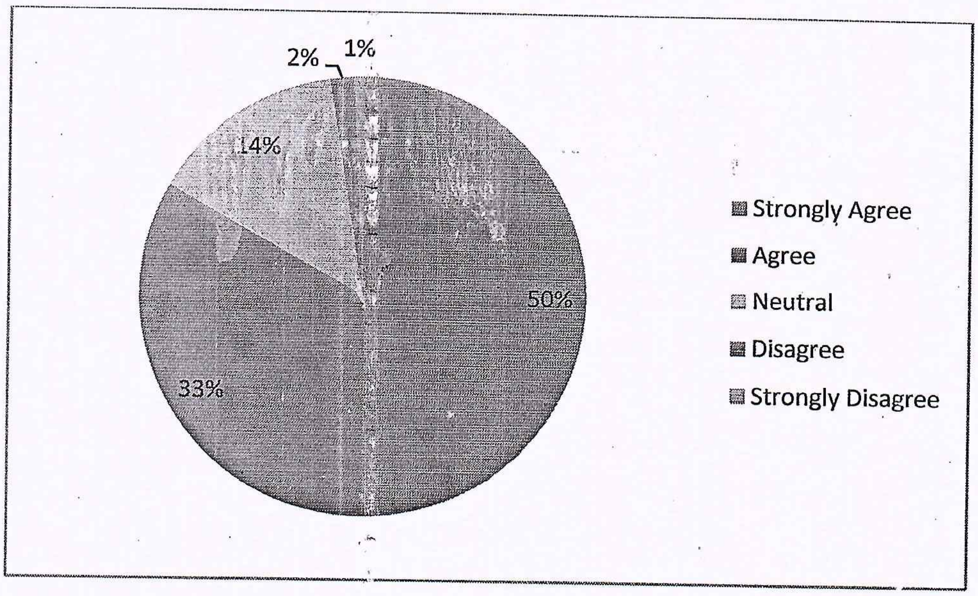
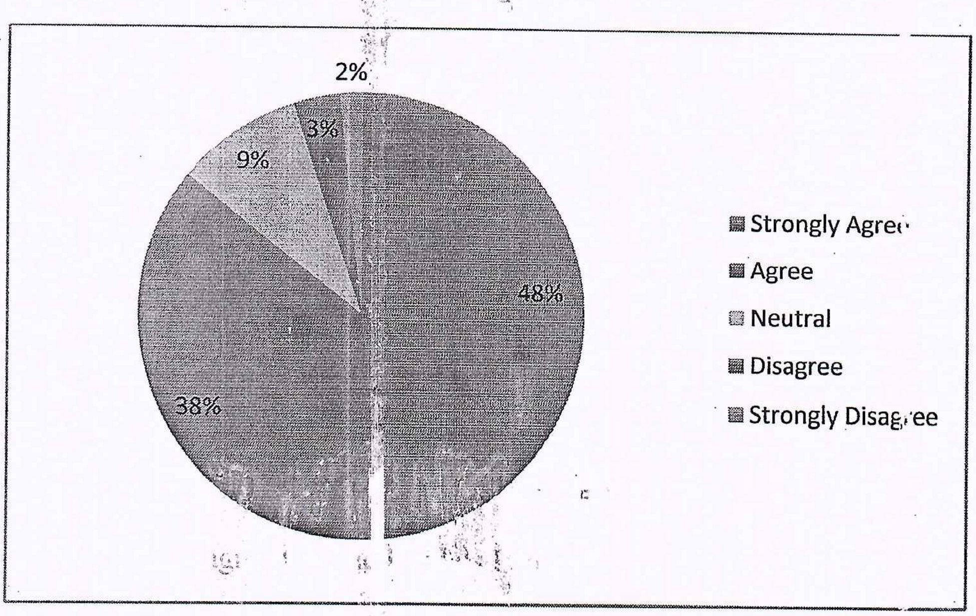
9. Do you agree the prices of the Bindals Papers Ltd products are fair?



50% people were strongly agree, 33% people were agree, 14% people were neutral, 2% people were disagree, 1% people were strongly disagree.

10. Do you agree that the Bindals Papers Ltd products have appealing packaging?



48% people were strongly agree, 38% people were agree, 9% people were neutral, 3% people were disagree and 2% strongly disagree.

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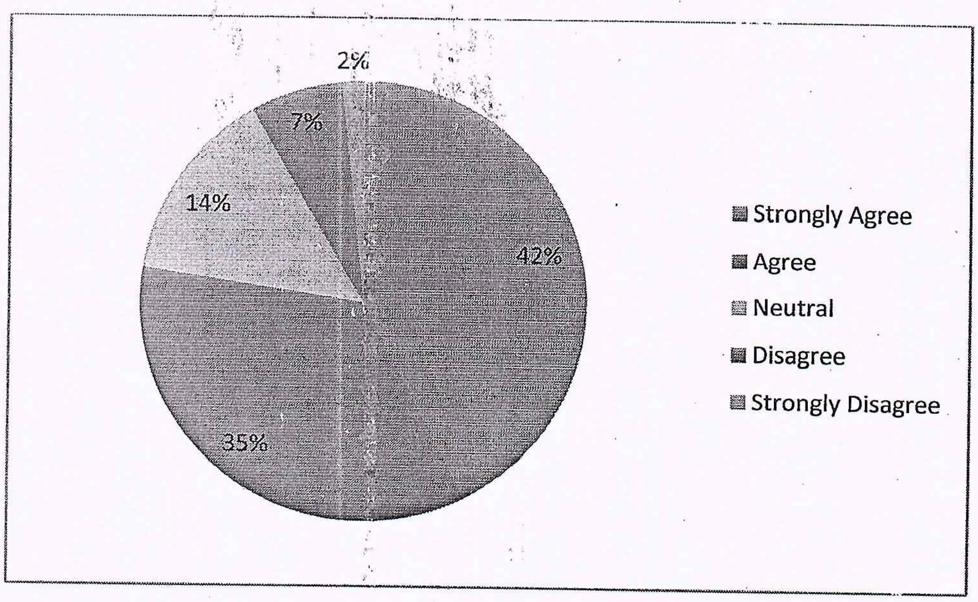
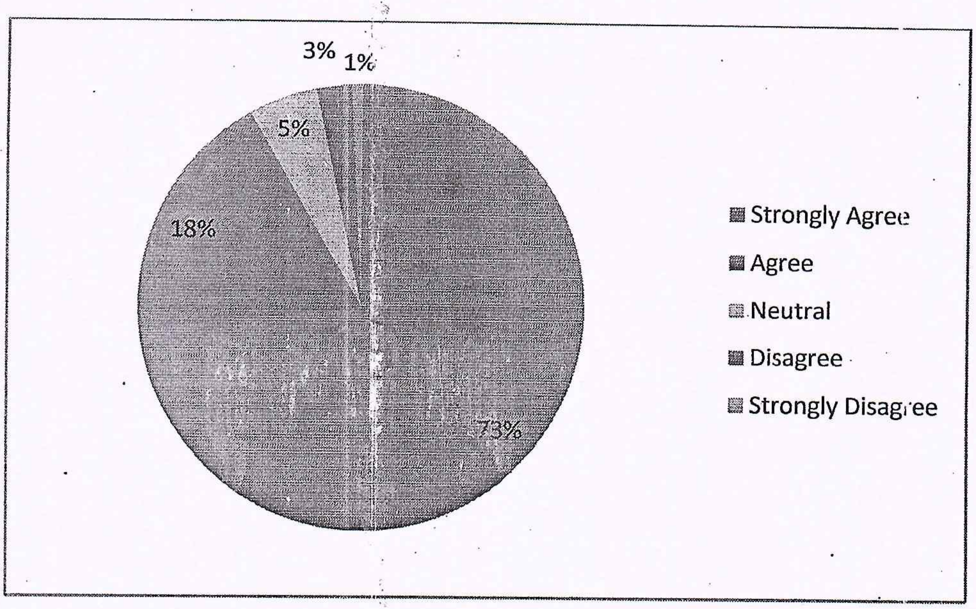
11. Do you agree that Bindals Papers Ltd products are ecofriendly?



42% people were strongly agree, 35% people were agree, 14% people were neutral, 7% people were disagree and 2% people were strongly disagree.

12. Do you agree that you are satisfied with the Bindals Papers Ltd product?



73% people were strongly agree, 18% people were agree, 5% people were neutral, 3% people were disagree and 1% people were strongly disagree.

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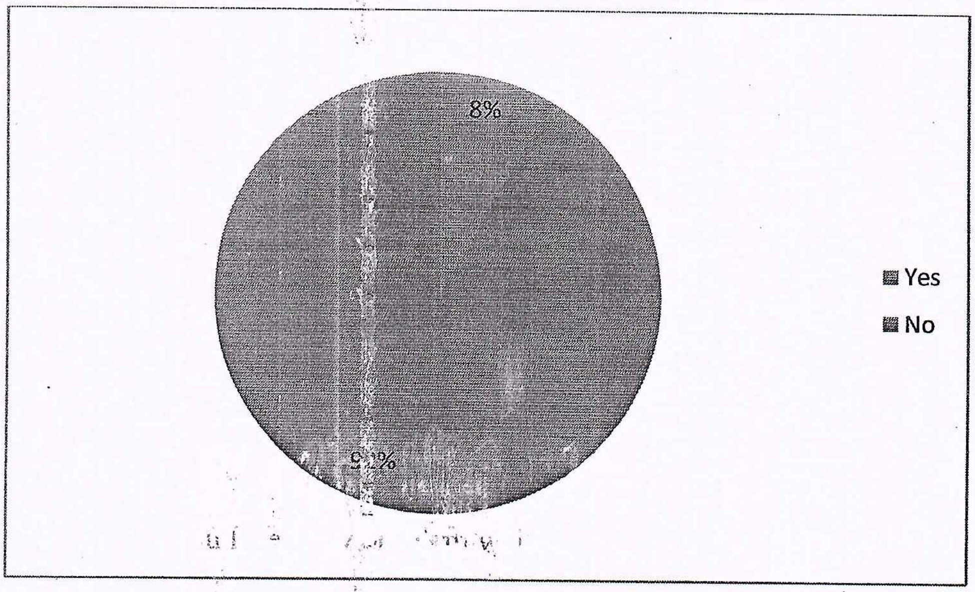
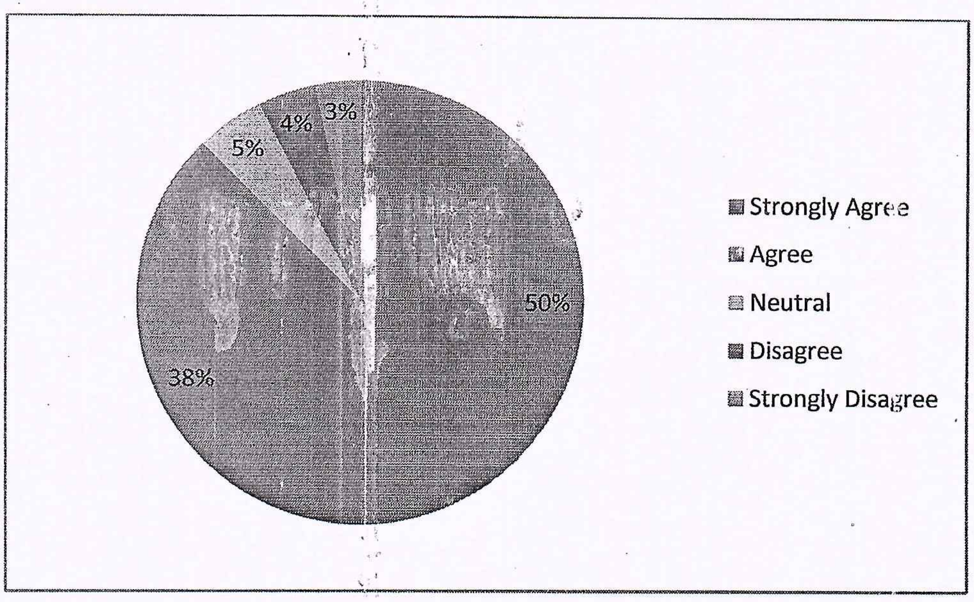
13. Have you faced any problem while using the product?



92% people were not faced problems while using the Bindal Papers Product and 8% people were faced problems while using the Bindal Papers Product.

14. Do you agree that Bindals Papers Ltd products are chemical-free?



50% people were strongly agree, 38% people were agree, 5% people were neutral, 4% people were disagree and 3% people were strongly disagree.

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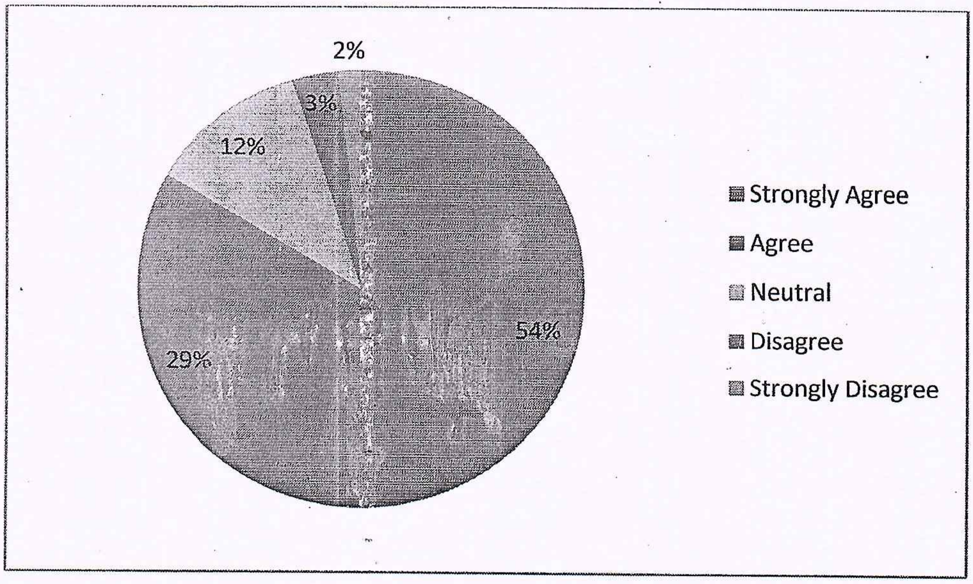
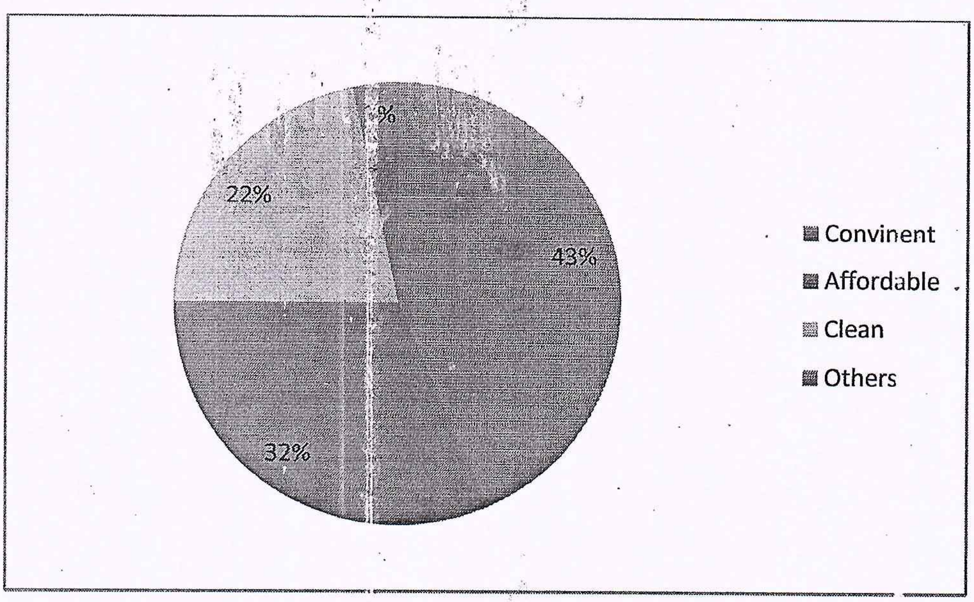
15. Do you agree that Bindals Papers Ltd products have made a good brand image?



54% people were strongly agree, 29% people were agree, 12% people were neutral, 3% people were disagree, 2% people were strongly disagree.

16. Please indicate the reason why you prefer Bindals Papers Ltd product?



43% people were prefer to convinent, 32% people were prefer to affordable, 22% people were prefer to clean and 3% people were prefer to others.

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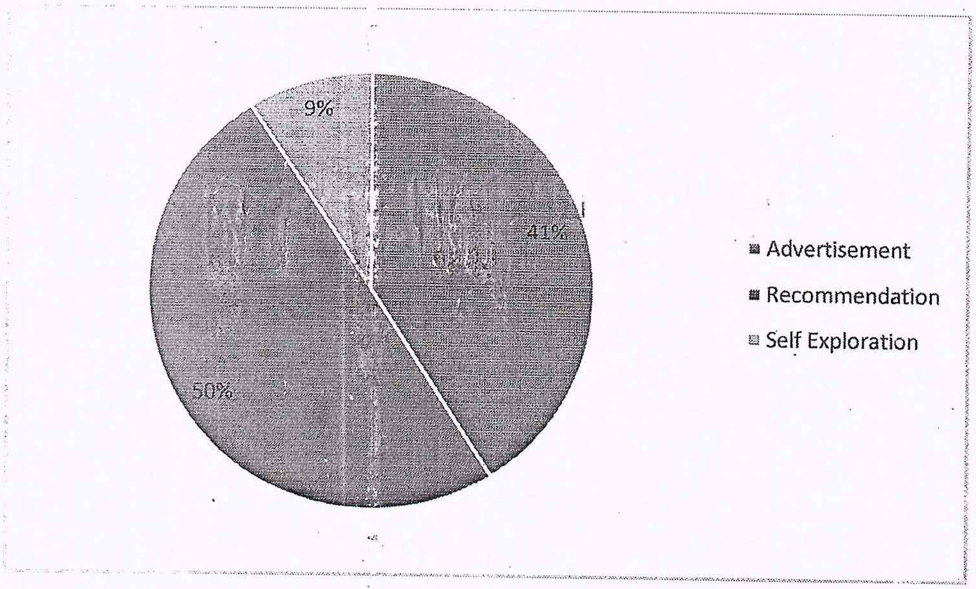
17. How do you come to know about the product?



50% people were came to recommendation, 41% people were came to advertisement, 9% people were came to self exploration.

FINDINGS

- 32% were of the age between 20-25, 24% were of the age between 15-20 and above 35, 20% were of the age between 25-35.
- 62% people were the male and 38% people were the female.
- 38% people were educated upto post graduation, 29% people were educated upto graduation, 21% people were illiterate, 12% people were educated upto HSC.
- 54% people were married and 46% people were unmarried.
- 87% people were aware of Bindal Paper Product and 13% people were not aware of Bindal Paper Product.
- 79% people were used Bindal Papers Product and 21% people were not used Bindal Papers Product.
- 41% people were strongly agree, 30% people were agree, 15% people were neutral, 10% people were disagree, 4% people were strongly disagree.
- 46% people were strongly agree, 37% people were agree, 12% people were neutral, 3% people were disagree, 2% people were strongly disagree.

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- 50% people were strongly agree, 33% people were agree, 14% people were neutral, 2% people were disagree, 1% people were strongly disagree.
- 48% people were strongly agree, 38% people were agree, 9% people were neutral, 3% people were disagree and 2% strongly disagree.
- 42% people were strongly agree, 35% people were agree, 14% people were neutral, 7% people were disagree and 2% people were strongly disagree.
- 73% people were strongly agree, 18% people were agree, 5% people were neutral, 3% people were disagree and 1% people were strongly disagree.
- 92% people were not faced problems while using the Bindal Papers Product and 8% people were faced problems while using the Bindal Papers Product.
- 50% people were strongly agree, 38% people were agree, 5% people were neutral, 4% people were disagree and 3% people were strongly disagree.
- 54% people were strongly agree, 29% people were agree, 12% people were neutral, 3% people were disagree, 2% people were strongly disagree.
- 43% people were prefer to convinent, 32% people were prefer to affordable, 22% people were prefer to clean and 3% people were prefer to others.
- 50% people were came to recommendation, 41% people were came to advertisement, 9% people were came to self exploration.

RECOMMENDATIONS

- Bindal papers may increase advertising efforts across various platforms to maintain brand awareness.
- They can expand their avenues of distribution.
- They can continue efforts to build and maintain a positive brand image.
- Implementstrategies to enhance customer loyalty and retention. Highlight unique features of Bindal paper products in marketing campaigns.
- Evaluate pricing strategy to remain competitive in the market.
- Conduct further market research to understand preferences and adjust product offerings accordingly.

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CONCLUSION

Bindal Paper Products hold a prominent position in the market, with a vast majority of consumers being aware of the brand. The primary sources of this awareness are advertisements and recommendations from retailers. A significant portion of customers view Bindal's products favorably, citing their convenience and fair pricing. While there is a strong perception of the brand's eco-friendliness and unique product features, such as whiteness, smoothness, thickness, and good ink absorption, some consumers still opt for other paper mill products. However, a considerable number exhibit brand loyalty, preferring to stick with Bindal despite the possibility of switching to other brands for lower prices. Overall, Bindal Paper Products have established a positive brand image, albeit with some competition from alternative options in the market.

ANNEXURE

QUESTIONNAIRE:

1) Name ....

2) Age.......................

(a) 15-20 ( ) (b) 20-25 ( ) (c) 25-35 ( ) (d) above 35 ( )

3) Gender

(a) Male ( ) (b) Female ( )

4) Qualification

(a) upto HSC ( ) (b) Graduation ( ) (c) Post Graduation ( ) (d) Illiterate ( )

5) Marital Status

(a) Married ( ) (b) Unmarried ( )

6) Are you aware of Bindal Papers Products?

(a) Yes ( ) (b) No ( )

7) Have you used any product of Bindal Papers Ltd?

(a) Yes ( ) (b) No ( )

8) Do you agree Bindals Papers Ltd offers a large variety of products?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

9) Do you agree that Bindals Papers Ltd products are of high quality?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

10) Do you agree the prices of the Bindals Papers Ltd products are fair?

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(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

11) Do you agree that the Bindals Papers Ltd products have appealing packaging?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

12) Do you agree that Bindals Papers Ltd products are ecofriendly?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

13) Do you agree that you are satisfied with the Bindals Papers Ltd product?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

14) Have you faced any problem while using the product?

(a) Yes ( ) (b) No ( )

15) Do you agree that Bindals Papers Ltd products are chemical-free?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

16) Do you agree that Bindals Papers Ltd products have made a good brand image?

(a) Strongly agree ( ) (b) Agree ( ) (c) Neutral ( ) (d) Disagree ( ) (e) Strongly disagree ( )

17) Please indicate the reason why you prefer Bindals Papers Ltd product?

(a) Convenient ( ) (b) Affordable ( ) (c) Clean ( ) (d) Others ( )

18) How do you come to know about the product?

(a) Advertisement ( ) (b) Recommendation ( ) (c) Self Exploration ( )

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PROJECT COMPLETION REPORT

The project was funded by Bindals Papers Mills Ltd. Project was exclusively conducted for Bindals Papers. The Company had paid Rs.35000/- in advance and remaining Rs. 15000/- after the submission of the report. The project undertaken was started on19/08/2022 and it was completed on 21/02/2023. Seven students of BBA final year were involved to assist the principal investigator throughout the project.They collected primary data through questionnaire and assisted from starting to the completion of the project.Students were also provided with reasonable stipend.People dedicated to the project were as follows-

Principal Investigator- Ms. Mudra Mittal (Asst. Prof., Department of Business Administration)

SN	Roll Number	Name of the student	Remuneration (inRs.)	TA(in Rs.)
1	200855105029	AYUSHI GARG	5500	1800
2	200855105050	HARSH BANSAL	5500	1000
3	200855105075	MEGHNA GAGNEJA	5500	1800
4	200855105064	NAINA RANA	5500	1500
5	200855105138	SATYAM TYAGI	5500	1500
6	200855105143	SHEKHAR GUPTA	5500	900
7	200855105178	VIKAS VERMA	5500	1000
		Total	**38500**	**9500**
Remuneration Paid				Rs. 38500
Travelling Allowances Paid				Rs. 9600
Miscellaneous expenses				Rs. 2200
Total				**Rs. 50300/-**

Mudra

Mudra Mittal

Principal Investigator to the Project

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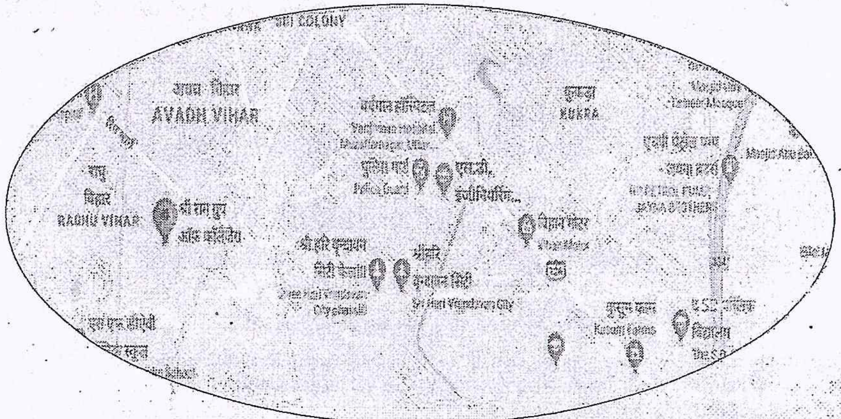
Certificate Course

on

Developing Communication Skills & Understanding Body Language



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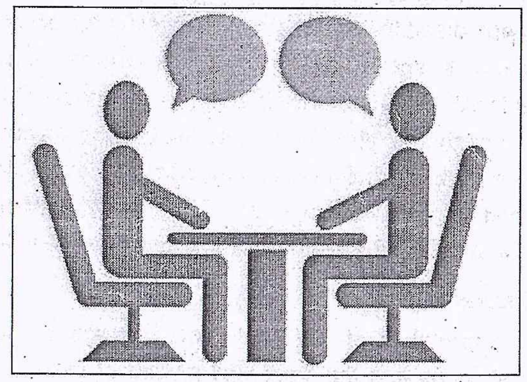
Session 2022-23

Certificate Course

on

Developing Communication Skills & Understanding Body Language



Organised by:

Department of Business Administration

Shri Ram College, Muzaffarnagar

in association with

Himalayan Management & Development Resource Institute (HIMADRI), Rishikesh

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SRC is a part of Shri Ram Group of Colleges, which is the culmination of the dream of one man who had the vision to reform destiny, an eminent educationalist Dr. S.C. Kulshreshtha. He formed 'Shri Ram Charitable Trust, with an aim of promoting quality education at an affordable fees. SRGC is one of the leading educational institute of West UP of India. SRGC has more than 13000 students with great brilliance, academic vigor and competitive spirit.SRGC caters to the knowledge and skill set as per the industry needs and in tune with time. In this regard college has collaborated with the leading International Institute MIT (US) and ITB, Ireland.

SRGC has built up the world class learning resources which consists of the focused learning space in the form of lecture halls, series of computer centers, digital centralized library, laboratories, residential accommodation in campus for boys and girls, sports facilities, cafeteria ,canteen and Wi-Fi campus with 24x7 Internet facilities.SRGC is running 9 distinct campuses Muzaffarnagar Saharanpur and Bulandshahar districts. SRGC institutions have brilliance and believe in igniting minds, making Independent and learned intellectuals. SRGC has been acclaimed and honoured at various events and occasions with numerous awards which speak volumes about the brilliance that is taught at SRGC.

Introduction:

Importance of communication has always been realized all times in organisation as it is the most vital means of making people connect with one another. It is widely accepted fact that communication plays significant role in starting, developing and maintaining relations, however, organisations seem least bothered on how to develop good communication skills of the employees. Today, not only in corporate but in almost all aspects of social life, communication plays a crucial role. Thinking of effectiveness of any piece of work whether in business, government or social sector it is almost impossible to be successful without having good communication skills. People have to communicate with one other, exchange ideas, emotions, information, take decisions and talk about innovations. Developing communication skills, be it verbal or non-verbal is very-very important at a stage of student life itself.

Understanding Body Language is also equally or you can say sometimes more important than having good verbal communication. It provides you with an extra advantage in your daily life if you understand what a person want to communicate with its Body Language. Body Language Basics will provide you with a great set of skills to understand that 'what is not said' is just as important as 'what is said'. It will also give you an ability to see and understand how your own Body Language is being seen. You will be able to adjust and improve the way you communicate through non-verbal communications.

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Course Objective -

The main objective of the course is to assist the students developing their communication competence by providing information regarding different forms of communication and their appropriate use along with good understanding of body language.

Learning Outcomes -

By the end of this program, participants will be able, to communicate more effectively and efficiently by:

i. Listening, and responding with an open mind in a more effective way.
ii. Using appropriate communication methods.
iii. Minimizing communication barriers.
iv. Using verbal and non-verbal messages appropriately.
v. Relating and networking with others.
vi. Giving and receiving instruction correctly
vii. Use of two-way communication feedback.
viii. Recognize and appreciate cultural and gender difference in communication.

Eligibility	Starting date	Duration	Fee
Pursuing UG/PG (On first come first serve basis)	17-10-2023	60 Hrs	NIL
Organizing Committee			
Coordinator	Dr. Vivek Kumar Tyagi	9927729646,vivekkumartyagi09@gmail.com	
Member	Mr. Vikas Kumar	8868939703,vikasgotsyou001@gmail.com	
Member	Ms. Pooja Pal	8630603204,palpooja130@gmail.com	
Venue			
Department of Business Administration, Shri Ram College, Muzaffarnagar			

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Shri Ram College, Muzaffarnagar

Department of Business Administration

Notice

Dated-26/09/2022

All the students are hereby informed that a certificate course named, **"Developing Communication skills and understanding Body Language"** is being introduced by Department of Business Administration, Shri Ram College, Muzaffarnagar in association with Himalayan Management and Development Resource Institute (HiMADRI), Rishikesh. Duration of the course is 60 hours and starting date of course will be 17/10/2022. Students pursuing any undergraduate course or above can join this course on first come first serve basis due to limited availability of seats.

Dr. Vivek Kumar Tyagi
Course Coordinator

cc:

1. Principal/Director, SRC
2. Coordinator, IQAC
3. All the HODs of SRC

Dr. Vivek Kumar Tyagi
Course Coordinator

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

SHRI RAM COLLEGE, MUZAFFARNAGR

List of students for certificate course (DCS&UBL)

Batch 1 (2022-23)

S.No.	NAME	FATHER'S NAME	YEAR
1	ABHAY SHARMA	DUSHYANT SHARMA	BBA II
2	ABHI CHOUDHARY	MANOJ CHOUDHARY	BBA II
3	ABHINAV SAINI	POORAN SINGH	BBA II
4	ADESH KUMAR	KIRANPAL SINGH	BBA II
5	ADITYA GOEL	AMIT GOEL	BBA II
6	ADITYA GUPTA	VIKAS GUPTA	BBA II
7	ADITYA NIRANJAN SAHU	SURJIT SAHU	BBA II
8	CHANDAN TYAGI	SHARVAN TYAGI	BBA II
9	DEVANSH JAIN	AMIT JAIN	BBA II
10	DEVANSH TYAGI	NITESH TYAGI	BBA II
11	DEVANSH VERMA	ANIL VERMA	BBA II
12	DIKSHANT MALIK	UMESH MALIK	BBA II
13	DIPANDER	SUDHIR KUMAR	BBA II
14	GUNGUN	PRAVEEN	BBA I
15	HARSHA	PANKAJ GOYAL	BBA I
16	HIMANI SHARMA	VINOD SHARMA	BBA I
17	HITAKSHI SINGHAL	RAJESH SINGHAL	BBA I
18	IQRA SIDDIQUI	SHAHNAWAJ SIDDIQUI	BBA I
19	IRTAQA BATOOL	HUSAIN MEHDI	BBA I
20	ISHIKA	GAURAV KUMAR	BBA I
21	ISHIKA	VINIT KUMAR	BBA I
22	KANHAIYA	SANJAY	BBA I
23	KARAN KUMAR	RAMAJEE RAM	BBA I
24	KARAN KUMAR	BHARAT CHOUDHARY	BBA I
25	DIGVIJAY CHAUHAN	BRAJVIR SINGH	BCA II
26	DILEEP KUMAR	DAROGA PRASAD	BCA II
27	DILNAWAZ	ISRAR	BCA II
28	DIVYANSH GROVER	HARISH KUMAR GROVER	BCA II
29	AMIT ANAND	BIRENDRA RAY	BCA I
30	AMIT KUMAR	SHASHI BHUSHAN KUMAR	BCA I
31	AMIT KUMAR	PARAMESHVAR MAHTO	BCA I
32	ANAND KUMAR	MANGAT SINGH	BCA I
33	ANAND KUMAR MAHATO	KRISHNA MAHATO	BCA I
34	ANAS KHAN	SARDAR ALI KHAN	BCA I
35	ANUBHAV	DEVENDRA KUMAR	BAJMC II
36	DIVAKAR KUMAR SINGH	SHARWAN KUMAR SINGH	BAJMC II
37	GOURAV SHARMA	ASHOK SHARMA	BAJMC II
38	RAJU KUMAR	VIRGU NATH PANDEY	BAJMC II
39	SAJID KHAN	MOHAMAD SAEED KHAN	BAJMC II
40	AJAY KUMAR	DALEEP SINGH	BAJMC I
41	SHREYA AGARWAL	AKHIL AGARWAL	MFA II
42	SHUMAILA AFROZ	ALI AFROZ	MFA II
43	SWATI	JAIKUMAR SHARMA	MFA II
44	TANIYA TYAGI	MAHESH KUMAR TYAGI	MFA II
45	TANU GOEL	SANJEEV GOEL	MFA II
46	MEENAKSHI BALIYAN	PAWAN SINGH BALIYAN	MAJMC II
47	MONIKA	NAR SINGH PAL	MAJMC II
48	SHRUTI RATHOUR	ROOPCHAND RATHOUR	MAJMC II
49	SNEHA SHARMA	YOGENDRA SHARMA	MAJMC II
50	KM GRACY RAJ	SUNIL KUMAR	MAJMC I

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List of students for certificate course (DCS&UBL)

Batch 2 (2022-23)

S.No.	NAME	FATHER'S NAME	Class
1	AYUSHI SHARMA	NEERAJ SHARMA	BCOM II
2	BHANU SAINI	SHIVKUMAR SAINI	BCOM II
3	CHANCHAL	VIKAS GARG	BCOM II
4	CHHAVI	BIJENDRA	BCOM II
5	DEEPALI	PRAMOD KUMAR	BCOM II
6	DEEPANSHI TAYAL	NISHANT TAYAL	BCOM II
7	EITIKA	SANDEEP KUMAR	BCOM II
8	PRASHANT CHAUHAN	PAVAN KUMAR	BCOM II
9	PRINCE VERMA	SHORAJ SINGH	BCOM II
10	PRINSH SHARMA	BIJENDRA SHARMA	BCOM II
11	RAKSHAK TYAGI	ASHISH KUMAR TYAGI	BCOM II
12	RAMAN BALIYAN	PAWAN KUMAR	BCOM II
13	RAVISH JAMAL	MOD JAMAL ARIF	BCOM II
14	RISHABH	ANUJ CHAUDHARY	BCOM II
15	RITIK	VIPIN KUMAR	BCOM II
16	VIPIN KUMAR	RAM KUMAR	BPES II
17	YASH SHANDILYA	VIJAY KUMAR SHARMA	BPES II
18	YUVANK	SANJAY CHAUDHARY	BPES II
19	HARSHIT VERMA	KISHAN CHAND VERMA	BSC II
20	INSAF ALI	MOHD AFZAAL	BSC II
21	ISHITWA SHARMA	RAVINDRA KUMAR SHARMA	BSC II
22	KAMAL SAINI	MANOJ KUMAR	BSC II
23	LAKKI	AJEET SINGH	BSC II
24	MOHD AMAN	NAZAR MOHAMMAD	BSC II
25	AKSHAT RAJ	AJAY PRASAD	BSC (AG) II
26	AMAN KUMAR THAKUR	HARSHIV THAKUR	BSC (AG) II
27	ANIKET KUMAR	KADAM SINGH	BSC (AG) II
28	ANKIT KUMAR	MUKESH PANDIT	BSC (AG) II
29	ANKUSH KUMAR	CHAITU MANDAL	BSC (AG) II
30	ARYA TYAGI	MAHESH TYAGI	MCOM II
31	CHANDAN	KULDEEP SINGH	MCOM II
32	GURMEET RATHOR	NARESH	MCOM II
33	HARSH VERMA	HARENDER KUMAR	MCOM II
34	MOHAMMAD SHAHID	SHOKEEN	MCOM II
35	JITIN	JASBEER	MCOM I
36	MOHD ASIF	SHAMMU	MCOM I
37	MOHD MUSTAFA ANSARI	MOHD HASIM	MCOM I
38	MOHD SHARAD	VALEDIN	MCOM I
39	MOHD ZABAK	JAAN MOHAMMAD	MCOM I
40	POVIN	ASHOK KUMAR	MCOM I
41	AYUSHI MITTAL	PRADEEP MITTAL	BBA III
42	BABY VANI TYAGI	GUNWANT TYAGI	BBA III
43	CHANCHAL	PARVENDER KUMAR	BBA III
44	DEEPAK MALIK	ANIRUDH MALIK	BBA III
45	DEVANSH CHOUDHARY	DHARMENDRA KUMAR	BBA III
46	DEVANSH TYAGI	SURYAKANT TYAGI	BBA III
47	GUNJAN SAINI	SATYAVEER SINGH	BBA III
48	HARSH BANSAL	RAVI KANT BANSAL	BBA III
49	HARSH KUCCHAL	MANOJ KUCCHAL	BBA III
50	HARSH SAINI	MEHKAR SINGH	BBA III

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Lecture Register Subject DCS4 UBL

Class .... Section .... Month .... 20. . . .

Sr. No.	Name of Student	FI	17/10/22	18/10/22	19/10/22	20/10/22	28/10/22	29/10/22	30/10/22	31/10/22	1/11/22	2/11/22
1.	Abhay Sharma	DS	P	P	A	P	P	P	P	P	P	P
2.	Abhi Choudhary	MC	P	P	P	P	A	P	P	P	P	P
3.	Abhinav Saini	PS	P	P	P	P	P	A	P	P	P	P
4.	Adarsh Kumar	KS	A	P	P	P	P	P	P	A	P	P
5.	Aditya Goel	AG	P	A	P	P	P	P	A	P	P	P
6.	Aditya Gupta	VG	P	P	P	P	P	A	P	P	P	A
7.	Aditya Niranjan Sahu	SS	A	A	A	A	A	A	A	A	A	A
8.	Chandan Tyagi	ST	P	P	P	P	P	P	P	P	P	P
9.	Devansh Jain	AJ	P	P	A	P	P	P	A	P	P	P
10.	Devansh Tyagi	NT	P	A	P	P	P	P	P	P	A	P
11.	Devansh Verma	AV	P	P	P	P	P	A	P	P	P	P
12.	Dikshant Malik	UM	P	P	P	A	P	P	P	P	P	A
13.	Dipander	SK	P	P	P	P	P	P	P	A	P	P
14.	Gunjan	P	P	A	P	P	P	P	A	P	P	P
15.	Harsha	PG	P	P	P	P	A	P	P	P	P	A
16.	Himani Sharma	VS	P	A	P	A	P	P	P	A	P	P
17.	Hitakshi Singhal	RS	P	P	P	P	P	P	A	P	P	P
18.	Tanya Siddiqui	SS	P	P	P	A	P	P	P	P	A	P
19.	[illegible]	HM	P	P	P	P	P	A	P	P	P	P
20.	Tulika	GK	A	P	P	P	P	P	A	P	P	A
21.	Tulika	VK	P	P	P	P	P	P	P	A	P	P
22.	Kanaiya	S	P	A	P	P	P	P	P	P	P	P
	Karan Kumar	RR	P	P	A	P	P	P	P	P	A	P
24.	Karan Kumar	BC	P	P	P	P	A	P	P	P	P	P
25.	Digvijay Chauhan	BS	P	P	P	A	P	P	P	P	P	P
26.	Dilip Kumar	DP	P	P	P	P	P	P	P	P	P	P
27.	Dilnawaz	I	P	P	P	P	A	P	P	P	P	A
28.	Devansh Grover	HKG	P	P	P	P	P	P	A	P	P	P
29.	Amit Anand	BR	A	A	A	A	A	A	A	A	A	A
30.	Amit Kumar	SBK	P	P	P	P	P	P	P	A	P	P
31.	Anil Kumar	PM	P	A	P	P	P	P	P	P	P	A
32.	Anand Kumar	MS	P	P	A	P	P	P	P	P	P	P
33.	Anand Kumar Mahato	KM	P	P	P	A	P	P	P	P	A	P
34.	Aman Khan	SAK	A	P	P	P	A	P	P	P	P	P
35.	[illegible]	DK	P	P	P	P	P	P	P	A	P	P
36.	Dinkar Kumar Singh	SKS	P	A	P	A	P	P	P	P	P	P
37.	Gaurav Sharma	AS	P	P	P	P	P	A	P	P	P	P
38.	Raju Kumar	VNP	P	P	A	P	P	P	P	A	P	P
39.	Sajid Khan	MSK	P	P	P	P	P	P	A	P	P	P
40.	Vijay Kumar	DS	P	P	P	P	A	P	P	P	P	P
	Sig. of Lecturer											

Sr. No.	3/11/22	4/11/22	5/11/22	7/11/22	9/11/22	10/11/22	11/11/22	12/11/22	14/11/22	15/11/22	16/11/22	17/11/22	18/11/22	19/11/22	21/11/22	22/11/22	23/11/22	25/11/22	26/11/22	28/11/22	29/11/22	TOTAL
	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	
	P	P	P	A	P	P	P	A	P	A	P	P	P	P	P	A	P	P	P	P	P	
	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	
	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	
	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	
	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	P	P	P	A	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	
	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	
	A	P	P	P	P	A	P	P	P	A	P	P	P	P	P	A	P	P	P	A	P	
	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	
	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	
	P	P	P	P	P	A	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	
	A	P	P	P	P	P	P	A	P	A	P	P	P	P	P	A	P	P	P	P	P	
	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	A	P	P	P	
	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	
	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	
	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	
	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	
	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	
	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	
	A	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	A	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	
	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	
	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	
	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	
	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	

Co-ordinator
IQAC, Shri Ram College
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IQAC, Shri Ram College,
Muzaffarnagar

Lecture Register Subject ....

Sr. No.	Name of Student	FI	17/10/22	18/10/22	19/10/22	20/10/22	28/10/22	29/10/22	30/10/22	31/10/22	1/11/22	2/11/22
41.	Shreya Agarwal	AA	P	A	P	P	P	P	P	A	P	P
42.	Shumaila Afroz	AA	P	P	P	P	A	P	P	P	P	P
43.	Swati	JKS	A	P	P	P	P	P	A	P	P	P
44.	Taniya Tyagi	MKT	P	P	P	A	P	P	P	P	A	P
45.	Teena Goel	SG	P	A	P	P	P	P	P	P	P	P
46.	Meenakshi Baliyan	PSB	P	P	P	P	A	P	P	P	P	P
47.	Monika	NSP	A	P	P	P	P	P	A	P	P	P
48.	Shruti Rathour	RR	P	P	P	A	P	P	P	P	P	P
49.	Sneha Sharma	YS	P	A	P	P	P	P	P	P	A	P
50	Km. Gracy Raj	SK	P	P	P	P	A	P	P	P	P	P
	Sig. of Lecturer											

Class .... Section .... Month 20

Sr. No.	3/11/22	4/11/22	5/11/22	7/11/22	9/11/22	10/11/22	11/11/22	12/11/22	14/11/22	15/11/22	16/11/22	17/11/22	18/11/22	19/11/22	21/11/22	22/11/22	23/11/22	25/11/22	26/11/22	28/11/22	29/11/22	TOTAL
	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	
	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	
	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	
	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	
	A	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	
	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	
	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

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Muzaffarnagar

Lecture Register Subject DCS4ULB

Class .... Section .... Month 20

Sr. No.	Name of Student	FI	30/11/22	1/12/22	2/12/22	3/12/22	5/12/22	7/12/22	8/12/22	9/12/22	10/12/22	12/12/22
1.	Abhay Sharma	DS	P	P	P	P	P	P	P	P	A	P
2.	Abhi Choudhary	MC	P	P	P	A	P	P	P	P	P	P
3.	Abhinav Saini	PS	P	P	A	P	P	P	P	A	P	P
4.	Adesh Kumar	KS	P	A	P	P	P	P	A	P	P	P
5.	Aditya Goel	AG	P	P	P	P	A	P	P	P	P	P
6.	Aditya Gupta	VG	P	P	P	P	P	A	P	P	P	P
7.	Aditya Narayan Sahu	SS	A	A	A	A	A	A	A	A	A	A
8.	Chandan Tyagi	ST	P	P	A	P	P	P	A	P	P	P
9.	Devansh Jain	AJ	P	P	P	P	P	A	P	P	P	P
10.	Devansh Tyagi	NT	P	P	P	P	P	P	A	P	P	P
11.	Devansh Verma	AV	P	P	A	P	P	P	P	A	P	P
12.	Dikshant Malik	UM	P	P	P	A	P	P	P	P	P	P
13.	Dipander	SK	P	P	P	P	A	P	P	P	P	P
14.	Gunjan	P	P	P	P	P	P	P	P	P	A	P
15.	Harsha	PG	P	P	P	P	A	P	P	P	P	P
16.	Himani Sharma	VS	P	A	P	P	P	P	A	P	P	P
17.	Hitakshi Singhal	RS	P	P	P	P	A	P	P	P	P	A
18.	Iqra Siddiqui	SS	P	P	A	P	P	P	P	P	P	P
19.	Iqlaqa Batool	HM	P	P	P	A	P	P	P	P	A	P
20.	Ituka	GK	P	P	P	P	A	P	P	P	P	P
21.	Ituka	VK	P	P	P	P	P	A	P	P	P	P
22.	Kanhaiya	S	P	P	A	P	P	P	P	A	P	P
23.	Karan Kumar	RR	P	P	P	A	P	P	P	P	A	P
24.	Karan Kumar	BC	P	A	P	P	P	A	P	P	P	P
25.	Digvijay Chauhan	BS	P	P	P	P	A	P	P	P	P	P
26.	Dileep Kumar	DP	A	P	P	P	P	P	A	P	P	P
27.	Dilnawaz	I	P	P	P	A	P	P	P	P	A	P
28.	Divyansh Grover	MKG	P	P	P	P	A	P	P	P	P	A
29.	Amit Anand	BR	A	A	A	A	A	A	A	A	A	A
30.	Amit Kumar	SBK	P	A	P	P	P	P	A	P	P	P
31.	Amit Kumar	PM	P	P	P	P	P	P	P	P	P	P
32.	Anand Kumar	MS	P	P	P	A	P	P	P	P	P	P
33.	Anand Kumar Mahato	KM	P	P	P	P	A	P	P	P	A	P
34.	Anas Khan	SAK	P	P	A	P	P	P	P	P	P	A
35.	Anubhav	DK	P	P	P	P	A	P	P	P	P	P
36.	Diwakar Kumar Singh	SKS	A	P	P	P	P	P	P	P	P	P
37.	Gaurav Sharma	AS	P	P	P	P	A	P	P	P	P	P
38.	Raju Kumar	VNP	P	A	P	P	P	P	A	P	P	P
39.	Sajid Khan	MSK	P	P	P	P	P	A	P	P	P	P
40.	Ajay Kumar	DS	P	P	P	A	P	P	P	P	A	P
	Sig. of Lecturer											

Sr. No.	13/12/22	14/12/22	15/12/22	16/12/22	17/12/22	19/12/22	20/12/22	21/12/22	22/12/22	23/12/22	24/12/22	26/12/22	9/1/23	10/1/23	11/1/23	12/1/23	13/1/23	14/1/23	16/1/23	30	31	TOTAL
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P			
	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P			
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P			
	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P			
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P			
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	A	P	A			
	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P			
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P			
	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A			
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P			
	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P			
	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P			
	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P			
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P			
	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	A	P			
	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P			
	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P			
	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P			
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P			
	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P			

Co-ordinator
IQAC, Shri Ram College
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Lecture Register Subject ....

Class .... Section .... Month 20

Sr. No.	Name of Student	FI.	30/11/22	1/12/22	2/12/22	3/12/22	6/12/22	7/12/22	8/12/22	9/12/22	10/12/22	12/12/22
41.	Shreya Agarwal	AA	P	A	P	P	P	A	P	P	P	P
42.	Shumaila Afroz	AA	A	P	P	P	A	P	P	P	P	P
43.	Swati	JKS	P	P	A	P	P	P	P	P	P	A
44.	Tanya Tyagi	MKT	P	P	P	A	P	P	P	P	P	P
45.	Tanu Goel	SG	P	A	P	P	P	P	P	P	P	A
46.	Meenakshi Baliyan	PSB	P	P	A	P	P	P	P	P	P	P
47.	Monika	NSP	P	P	P	A	P	P	P	P	P	P
48.	Shruti Rathour	RR	P	P	P	P	A	P	P	P	P	P
49.	Sneha Sharma	YS	P	P	A	P	P	P	A	P	P	P
50.	Km. Gracy Raj	Sk	P	P	P	A	P	P	P	P	A	P
	Sig. of Lecturer											

Sr. No.	13/12/22	14/12/22	15/12/22	16/12/22	17/12/22	19/12/22	20/12/22	21/12/22	22/12/22	23/12/22	24/12/22	26/12/22	9/1/23	10/1/23	11/1/23	12/1/23	13/1/23	14/1/23	16/1/23	30	31	TOTAL
41.	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P			
42.	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P			
43.	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
44.	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P			
45.	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P			
46.	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P			
47.	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P			
48.	P	P	P	A	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P			
49.	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P			
50.	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P			

Co-ordinator
IQAC, Shri Ram College
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Lecture Register Subject DCS4ULB   Class .... Section .... Month .... 20........

Sr. No.	Name of Student	FI	17/10/22	18/10/22	19/10/22	20/10/22	28/10/22	29/10/22	30/10/22	31/10/22	01/11/22	02/11/22
1	Ayushi Sharma	NS	P	A	P	P	P	P	P	P	P	A
2	Bhanu Saini	SS	P	P	P	A	P	A	P	P	A	P
3	Chanchal	VG	A	P	P	P	P	P	P	A	P	P
4	Chhavi	B	P	P	A	P	P	A	P	A	P	P
5	Deepali	PK	P	A	P	P	P	P	P	P	P	P
6	Deepanshi Tyagi	NT	P	P	A	P	A	P	P	A	P	P
7	Ettika	SK	P	P	P	P	P	P	P	P	A	P
8	Prashant chauhan	PK	A	A	A	A	A	A	A	A	A	A
9.	Prince verma	SS	P	A	P	P	A	P	P	P	P	P
10	Prinsh sharma	BS	P	P	A	P	P	P	P	P	A	P
11	Rakshak Tyagi	AKT	P	A	P	P	A	P	P	P	P	A
12	Raman Baliyan	PK	P	P	P	P	P	A	P	P	P	P
13	Ravish Jamal	MTA	P	P	P	P	P	P	P	A	P	P
14	Rishabh	AC	P	P	P	P	P	A	P	P	P	P
15	Ritik	VK	P	A	P	P	P	P	P	P	P	P
16	Vipin Kumar	RK	P	P	P	P	P	P	P	P	P	P
17	Yash Shandilya	VKS	P	P	P	P	A	P	P	P	P	P
18	Yuvank	SC	P	A	P	P	P	P	P	P	P	P
19	Harshit Verma	KCV	P	P	A	P	P	P	P	P	P	P
20	Talal Ali	MA	P	A	P	P	P	P	P	P	P	P
21	Ishita Sharma	RKS	A	P	P	P	A	P	P	P	P	A
22	Kamal Saini	MK	P	P	A	P	P	P	P	P	P	P
23	Lakki	AS	A	P	P	P	P	P	P	P	P	A
24	Mohd Aman	NM	P	A	A	A	P	P	P	P	P	P
25	Akshat Raj	AP	P	P	P	P	P	P	P	P	P	P
26	Aman Kumar Thakur	HT	A	A	A	A	A	A	A	A	A	A
27	Aniket Kumar	KS	P	A	P	P	P	P	P	P	P	P
28	Ankush Kumar	CM	P	P	P	P	P	P	P	P	P	P
29	Ankit Kumar	MP	P	A	P	A	P	P	P	P	P	P
30	Anya Tyagi	MT	A	P	P	P	P	P	P	P	P	A
31	Chandan	KS	P	P	P	P	P	P	P	P	P	P
32	Gurmeet Rathor	N	P	P	P	A	P	P	P	P	P	P
33	Harsh Verma	HK	P	P	P	P	A	P	P	P	P	P
34	Mohammad Shahid	S	P	A	P	P	P	P	P	P	P	A
35	Jatin	J	P	P	P	P	P	P	P	P	P	P
36	Mohd Asif	S	A	P	P	P	P	P	P	P	P	A
37	Mohd Aneeq Ansari	MH	P	P	P	A	P	P	P	P	P	P
38	Mohd Shavad	V	P	A	P	P	P	P	P	P	A	P
39	Mohd Zaheek	JM	A	P	P	P	P	P	P	P	P	A
40	Pravin	AK	P	P	P	P	P	P	P	P	A	P
	Sig. of Lecturer											

Sr. No.	03/11/22	04/11/22	05/11/22	07/11/22	09/11/22	10/11/22	11/11/22	12/11/22	14/11/22	15/11/22	16/11/22	17/11/22	18/11/22	19/11/22	21/11/22	22/11/22	23/11/22	25/11/22	26/11/22	28/11/22	29/11/22	TOTAL
	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	
	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	
	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	P	P	A	P	P	P	A	P	A	P	P	A	P	
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
	P	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	
	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	A	
	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	
	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	A	P	A	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P	
	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	
	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	
	P	P	A	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	
	A	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	
	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P	P	P	
	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	A	
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	
	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	A	
	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	A	P	P	P	
	P	P	P	A	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	
	A	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	A	P	P	P	P	
	P	P	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A	
	P	P	P	A	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	
	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	
	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	
	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	
	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	

Co-ordinator
IQAC, Shri Ram College
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Chairman
IQAC, Shri Ram College,
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Lecture Register Subject ....

Class .... Section .... Month .... 20.........

Sr. No.	Name of Student	FI	17/10/22	18/10/22	19/10/22	20/10/22	28/10/22	29/10/22	30/10/22	31/10/22	01/11/22	02/11/22
41	Ayushi mittal	PM	P	P	P	A	P	P	P	P	A	P
42	Bably Vani Tyagi	GiT	A	P	P	P	P	P	P	A	P	P
43	Chanchal	PK	P	P	P	A	P	P	P	P	P	P
44	Deepak malik	AM	A	A	A	A	A	A	A	A	A	A
45	Devansh choudhary	DK	P	A	P	P	A	P	P	P	P	P
46	Devansh Tyagi	ST	P	P	P	P	P	A	P	P	P	P
47	Gunjan Saini	SS	P	P	P	P	A	P	P	P	P	P
48	Harsh Bansal	RKB	P	P	P	P	P	P	P	P	P	A
49	Harsh Kaushal	MK	P	P	P	P	P	A	P	P	P	P
50	Harsh Saini	MS	P	P	P	A	P	P	P	P	P	P
	Sig. of Lecturer											

Sr. No.	03/11/22	04/11/22	05/11/22	07/11/22	09/11/22	10/11/22	11/11/22	12/11/22	14/11/22	15/11/22	16/11/22	17/11/22	18/11/22	19/11/22	21/11/22	22/11/22	23/11/22	25/11/22	26/11/22	28/11/22	29/11/22	TOTAL
	A	P	P	P	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	
	P	P	P	P	P	P	P		P	P	P	P	P	P	A	P	P	P	P	P	P	
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
	P	P	P	P	A	P	P	P	A	P	P	P	P	A	P	P	A	P	P	P	P	
	P	P	P	P	P	A	P	P	P	P	P		P	P	P	P	P	P	P	P	P	
	P	P	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P	
	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	
	P	P	P	P	[illegible]	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	
	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P		

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Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

Lecture Register Subject ....D.C.S4-U.L.B.........

Class .... Section .... Month .... 20.........

Sr. No.	Name of Student	FI	30/11/22	01/12/22	02/12/22	03/12/22	06/12/22	07/12/22	08/12/22	09/12/22	10/12/22	12/12/22
1	Ayushi Sharma	NS	P	P	P	P	P	P	A	P	P	P
2	Bhanu Saini	SS	A	P	P	P	A	P	P	A	P	P
3	Chanchal	VG	P	P	A	P	P	P	P	P	P	P
4	Chhavi	B	P	P	P	P	A	P	P	P	P	
5	Deepali	PK	P	A	P	A	P	P	P	P	P	P
6	Deepanshi Tayal	NT	P	P	P	P	P	A	P	P	P	
7	Ritika	SK	P	P	P	P	A	P	A	P	P	P
8	Prashant chauhan	PK	A	A	A	A	A	A	A	A	A	A
9	Prince verma	SS	P	P	P	P	P	A	P	P	P	P
10	Prinsh sharma	BS	A	P	P	P	A	P	P	P	P	P
11	Rakshak Tyagi	AKT	P	P	A	P	P	P	P	P	P	P
12	Raman Baliyan	PK	P	P	P	A	P	P	A	P	P	P
13	Ravish Jamal	MJA	P	A	P	P	P	P	P	A	P	P
14	Rishabh	AC	P	P	P	P	A	P	P	P	P	A
15	Ritik	VK	A	P	P	P	P	P	P	A	P	P
16	Vipin Kumar	RK	P	P	P	P	P	P	A	P	P	P
17	Yash shandilya	VKS	P	A	P	P	P	P	P	P	P	P
18	Yuvank	SC	P	P	P	A	P	P	P	A	P	P
19	Harshit verma	KCV	P	P	P	P	A	P	P	P	P	P
20	Insaf Ali	MA	P	P	P	P	P	P	A	P	P	A
21	Ishika Sharma	RKS	P	P	A	P	P	P	P	P	A	P
22	Kamal Saini	MK	P	P	P	P	P	P	A	P	P	A
23	Lakki	AS	P	P	P	P	A	P	P	A	P	P
24	Mohd Aman	NM	P	P	P	P	P	P	A	P	P	A
25	Akshat Raj	AP	P	P	P	P	A	P	P	P	P	P
26	Aman Kumar Thakur	HT	A	A	A	A	A	A	A	A	A	A
27	Aniket Kumar	KS	P	P	P	P	A	P	P	P	A	P
28	Ankush Kumar	CM	P	P	P	A	P	P	P	P	P	A
29	Ankit Kumar	MP	A	P	P	P	P	P	P	A	P	P
30	Arya Tyagi	MT	P	A	P	P	P	P	P	P	P	P
31	Chandan	KS	P	P	A	P	P	P	P	P	A	P
32	Gurmeet Rathor	N	P	P	P	A	P	P	P	P	P	A
33	Harsh verma	HK	A	P	P	P	P	P	A	P	P	P
34	Mohammad shahid	S	P	P	P	P	P	P	P	A	P	P
35	Jitin	J	P	P	A	P	P	P	A	P	P	P
36	Mohd Asif	S	P	P	P	P	P	A	P	A	P	P
37	Mohd Mustafa Ansari	MH	P	A	P	P	P	P	P	P	P	P
38	Mohd Shavad	V	P	P	A	P	P	P	P	P	P	A
39	Mohd Zaid	JM	P	P	P	A	P	P	P	P	P	P
40	Pawan	AK	P	P	P	P	A	P	P	P	P	P
	Sig. of Lecturer											

Sr. No.	13/12/22	14/12/22	15/12/22	16/12/22	17/12/22	19/12/22	20/12/22	21/12/22	22/12/22	23/12/22	24/12/22	26/12/22	09/01/23	10/01/23	11/01/23	12/01/23	13/01/23	14/01/23	16/01/23	30	31	TOTAL
	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P			
	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P			
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	A	P			
	P	A	P	P	P	P	P	P	P	A	P	P	A	P	P	A	P	P	P			
	P	P	P	A	P	A	P	P	P	P	A	P	P	P	P	P	A	P	P			
	P	P	A	P	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P			
	P	A	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P			
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
	A	P	P	P	P	P	P	A	P	P	P	P	P	P		P	P	P	P			
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P			
	A	P	P	P	P	P	P	A	A	P	P	P	P	P	P	A	P	P	P			
	P	P	P	P	P	A	P	P	P	A	P	P	A	P	P	P	A	P	P			
	P	A	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	A			
	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P			
	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P			
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A			
	A	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	A	P	P			
	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P			
	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P			
	A	P	P	P	P	P	P	P	P		P	P	P	P	P	P	P	P				
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P			
	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P			
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	P	P	A	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P	P			
	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P			
	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	P	P	A			
	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	A	P			
	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	A	P	P	P			
	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P			
	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	P		P			
	P	P	P	P	P	P	P	A	P	A	P	P	A	P	P	P	P	P	P			
	P	P	P	P	A	P	P	P	P	P	A	P	P	P	P	P	P	P	P			
	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P			
	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P	P	P			
	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P	P	P	P	P			

Co-ordinator
IQAC, Shri Ram College
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Muzaffarnagar

Lecture Register Subject .... Class .... Section .... Month .... 20........

Sr. No.	Name of Student	FI	30/11/22	01/12/22	02/12/22	03/12/22	06/12/22	07/12/22	08/12/22	09/12/22	10/12/22	12/12/22
41	Ayushi Mittal	PM	P	P	A	P	P	P	A	P	P	P
42	Billy Vami Tyagi	GT	A	P	P	P	P	P	P	A	P	P
43	Chanchal	PK	P	P	P	A	P	P	P	P	P	A
44	Deepak Malik	AM	A	A	A	A	A	A	A	A	A	A
45	Devansh Choudhary	DK	P	A	P	P	P	P	P	P	A	P
46	Devansh Tyagi	ST	P	P	P	P	P	P	P	P	P	A
47	Gunjan Saini	SS	P	P	P	P	A	P	P	A	P	P
48	Harsh Bansal	RKB	P	P	P	A	P	P	A	P	P	P
49	Harsh Kuchhal	MK	P	A	P	P	P	P	P	P	A	P
50	Harsh Saini	MS	P	P	P	P	P	A	P	P	P	P
	Sig. of Lecturer											

Sr. No.	13/12/22	14/12/22	15/12/22	16/12/22	17/12/22	19/12/22	20/12/22	21/12/22	22/12/22	23/12/22	24/12/22	26/12/22	09/01/23	10/01/23	11/01/23	12/01/23	13/01/23	14/01/23	16/01/23	30	31	TOTAL
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P			
	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A	P	P	P			
	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P	P	A			
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
	P	A	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	P			
	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	P	A	P	P			
	P	P	A	P	P	P	A	P	P	P	A	P	P	P	P	A	P	P	P			
	P	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	A	P			
	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	P	A			
	P	P	P	P	P	P	P	P	A	P	P	P	A	P	P	A	P	P	P			

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IQAC, Shri Ram College,
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Accredited by NAAC with grade A++

Certificate

We are pleased to present this certificate to Mr/Ms.................................... Student of .... who has successfully completed a certificate course namely **"Developing Communication Skills and Understanding Body Language"** offered by Department of Business Administration, Shri Ram College, Muzaffarnagar in association with Himalayan Management and Development Resource Institute (HiMADRI), Rishikesh in Session 2022-2023.

We wish him/her a prosperous future.

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar

President, HiMADRI | Coordinator, IQAC | Course Coordinator

Shri Ram College, Muzaffarnagar

Department of Business Administration

Certificate Course (Developing Communication Skills and Understanding Body Language)

Summary of conduction of the course

Eligible students have participated and attended classes for developing their communication skills and better understanding of body language. The summary after conduction of the course is as follows-

S N	Particulars	Status
1	Course Duration	60 hrs
2	Date of Commencement	17/10/2022
3	No of students enrolled	100
4	No of students participated and provided with certificates	95

Dr. Vivek Kumar Tyagi

Course Coordinator

Co-ordinator
IQAC, Shri Ram College
Muzaffarnagar

Chairman
IQAC, Shri Ram College,
Muzaffarnagar