

## Design and Implementation of Two Tank Level Control System

**Dr Manoj Kumar Mittal**

Associate Professor, Shri Ram College, Muzaffar Nagar

### Abstract

This paper designs the electrically based solenoid control valve to controls the level, based on the error voltage from the MATLAB (Matrix Laboratory) control algorithm. Various control algorithms are derived for two tank system. Those algorithms are derived only on simulation data. Most of algorithms are coded using microcontroller. This proposed system is a live model of two tank level system controlled through MATLAB m-code. It consists of components such as level sensor, Digital-to-Analog Converter (DAC) Data acquisition module and solenoid control valve. The sensor used for level measurement is ultrasonic level sensor, to give level feedback of a system. The DAC module converts the digital output from the MATLAB into analog voltage to drive the solenoid control valve. The entire system is interfaced with MATLAB and suitable driver serial (RS-232) and parallel (LPT-1) lively connected. The system is applicable in many process industries such a Chemical industries, Fertilizer industries, Petroleum refineries, Pharmaceutical industries and Power plants.

**Keywords:** solenoid value, microcontroller, level control and sensor, control valve design, single tank system, interacting tank system

### I. INTRODUCTION

The Two tank interacting system shows sluggish response compared to non-interacting system [1]. The liquid level is sensed by the ultrasonic sensor and the data are compared with the MATLAB (Matrix Laboratory). The data are then taken as feedback and compared with data stored in the MATLAB tool to give error voltage. The output of the MATLAB is digital and need to convert in to analog in order to drive Solenoid Valve.

### Project Implementation

The Block diagram of PC based level control using MATLAB software is shown in Figure 1. The power amplifier and DAC converts digital signal into analog signal with amplification. The implementation of the project comprises of three sections, viz. Ultra Sonic Sensor, Data Acquisition from Matlab, Electrically Controlled Valve.

### ULTRA SONIC SENSOR

The transducer (Sensor) measures the length of time from the transmission to reception of the ultrasonic signal (pulse), reflected from an object that was transmitted from the sensor, thereby it calculates the distance and level between the sensor and the object its distance or level to be measured.

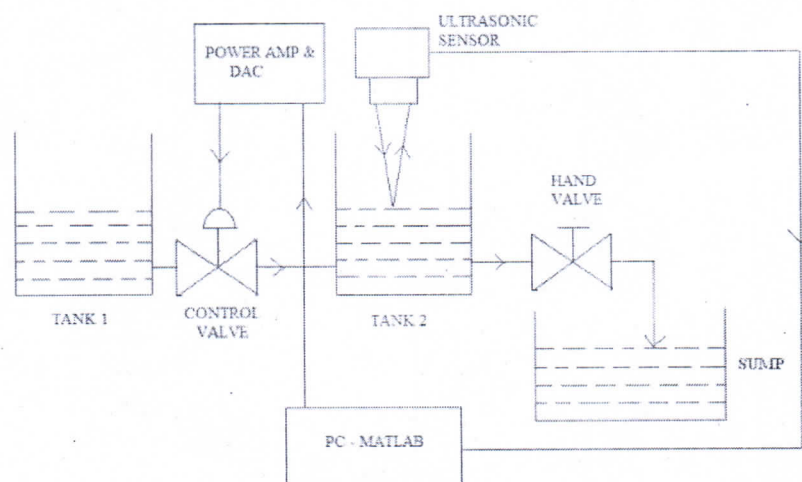
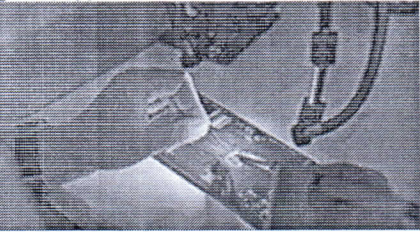


Fig. 1: Block Diagram of PC Based Level Control using MATLAB Software.

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**Dr. Manoj Kumar Mittal**  
Associate Professor, Shri Ram  
College Muzaffarnagar, Uttar  
Pradesh, India

## Simulation of camera motion paths and effect of different parameters of image stabilization including PSF and number of deconvolution iteration

**Dr. Manoj Kumar Mittal**

### Abstract

Different camera motion paths are simulated and effect of different parameters of image stabilization observed, which includes PSF or kernel sizing, PSF shape, PSF normalization and Number of deconvolution iteration. The PSF simulated here will be estimated in real time scenario by noting camera motion in 3D using different motion sensors including accelerometer, gyroscope etc. Also spatially varying blur simulation and deblurring is to be simulated.

**Keywords:** Kernel sizing, PSF shape, PSF normalization, image degradation

### Introduction

Image degradation takes place because of two factors <sup>[1]</sup>: Noise and Blurring. In image degradation image become glossy or lose clear vision of an image. It may add some type of additive noise like salt and pepper noise, Gaussian noise etc.

<sup>[2]</sup>. Image quality is a characteristic of an image that measures the perceived image degradation (typically, compared to an ideal or perfect image)

A blurred or degraded image can be approximately described by the equation given below:

$$g(x,y) = h(x,y) \otimes f(x,y) + \eta(x,y) \quad (1)$$

where,  $G$  is the degraded image,  $h$  is the distortion operator, also called the point spread function (PSF) or Kernel function. This function, when convolved with the image, creates the distortion,  $f$  is the original true image. The image  $f$  really doesn't exist. This image represents what you would have if you had perfect image acquisition conditions,  $\eta$  is the Additive noise, introduced during image acquisition, that corrupts the image  $\eta \sim N(0, \sigma^2)$  is the noise. As convolution in special domain is analogous to multiplication in frequency domain, hence Eq. (1) can be rewritten in frequency domain as <sup>[3-6]</sup>:

$$G(u,v) = H(u,v)F(u,v) + N(u,v) \quad (2)$$

Terms in capital are Fourier transforms of corresponding terms in Eq. (1). By using definition of convolution, we can express same equation in vector matrix form also <sup>[7-9]</sup>.

### Blur Image Degradation

Sometime intentional blur can be used to great artistic effect in photography or computer vision. However, in many common imaging situations, blur is a nuisance. Camera motion blur often occurs in light-limited situations and is one of the most common reasons for discarding a photograph. If the blur function is known, the image can be improved by deblurring it with a non-blind deconvolution method. However, for most images, the blur function is unknown and must be recovered. Recovering both the blur or "point-spread function" (PSF) and the desired deblurred image from a single blurred input (known as the blind-deconvolution problem) is inherently ill-posed, as the observed blurred image provides only a partial constraint on the solution. Prior knowledge about the image or kernel can disambiguate the potential solutions and make deblurring more tractable <sup>[5, 10, 11]</sup>. The blurring or degradation, of an image can be caused by many factors like:

**Correspondence**  
**Dr. Manoj Kumar Mittal**  
Associate Professor, Shri Ram  
College Muzaffarnagar, Uttar  
Pradesh, India

Co-ordinator  
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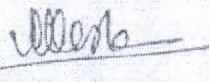
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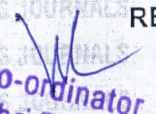
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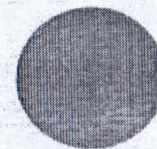
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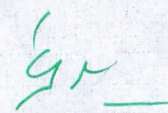
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# Synthesis of Zinc oxide nanoparticles (ZnO NPs) using aqueous leaf extract of Zanthoxylum armatum DC for photocatalytic degradation of Organic dye

Rishabh Bhardwaj<sup>1\*</sup>, Dr. Pankaj Gupta<sup>2</sup>

<sup>1</sup> Research Scholar, Sunrise University, Alwar, Rajasthan

<sup>2</sup> Professor (Dept. of Science), Sunrise University, Alwar, Rajasthan

**Abstract** - Plant-mediated production of ZnO NPs is explored in this study, namely the use of Zanthoxylum armatum DC. leaf extract as a reducing and capping agent. UV-Vis, UV-DRS, FTIR, FESEM, EDS, and TEM were all used to analyse the produced ZnO NPs. Degradation of a model organic dye pollutant (MB) was used to examine the photocatalytic activity of ZnO NPs when exposed to UV irradiation from a metal halide lamp (70.2 W·m<sup>-2</sup> UV and 452.5 W·m<sup>-2</sup> visible irradiation intensity). ZnO NPs produced in a lab were tested for their antioxidant properties using DPPH radical. In addition, Gram-positive (Bacillus subtilis) and Gram-negative (Escherichia coli) harmful bacteria were tested for susceptibility to green produced ZnO NPs antimicrobial activity.

**Keywords** - Zanthoxylum armatum DC, Photocatalytic Activity, Gram-positive (Bacillus subtilis) and Gram-negative (Escherichia coli).

## INTRODUCTION

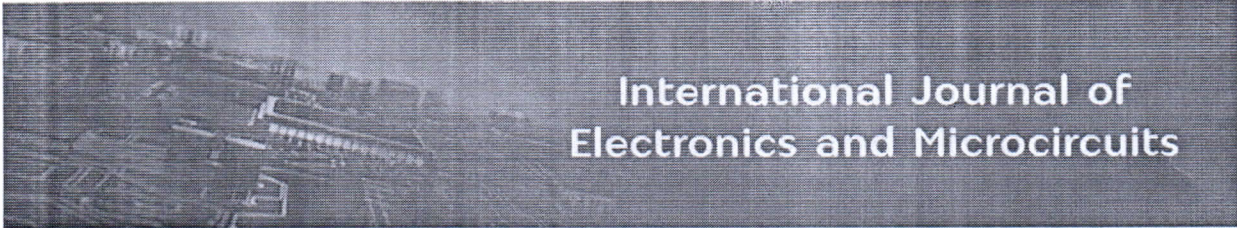
Using the aqueous leaf extract of Zanthoxylum armatum DC. as both a reducing agent and a capping agent, we describe here for the first time a green synthesis of ZnO NPs. The plant is in the family Rutaceae. Studies have shown that the aqueous leaf extract of Zanthoxylum armatum DC. includes phenols, tannins, alkaloids, flavonoid, terpenoids, and steroids, making it a valuable medicinal plant. Zanthoxylum armatum DC. leaf extract mostly contains phenolic acid, terpenoids, and flavonoid, all of which act as reducing agents. The direct reduction of Zn<sup>2+</sup> ions into their respective ZnO NPs is facilitated by phenolic acids, which are water-soluble phytochemicals. Stabilization of produced ZnO NPs is aided by the participation of numerous phenolic acid molecules. Antioxidant, antidiabetic, antibacterial, anticancer, and cytotoxic activities have been found in Zanthoxylum armatum DC. leaf extract [3-5]. The primary phenolic ingredient in Zanthoxylum armatum DC. leaf extract is gallic acid. In addition to its other uses, gallic acid is useful as a stabilising cap [3].

A typical approach would involve adding 10 mL of a 5 (W/V)% aqueous leaf extract of Zanthoxylum armatum DC. to a 250 mL Erlenmeyer flask along with 0.5 g of Zn (CH<sub>3</sub>COO)<sub>2</sub> and 80 mL of Milli-Q water. The reaction mixture was then heated to 70 degrees Celsius and stirred for 60 minutes. A white precipitate formed after gradually adding 10 mL of 1M NaOH to the reaction fluid; this is evidence of the creation of ZnO NPs.

## EXPERIMENTAL

### Material

Zinc acetate dihydrate extra pure (Zn (CH<sub>3</sub>COO)<sub>2</sub>·2H<sub>2</sub>O), sodium hydroxide pellets (NaOH) and MB were purchased from Merck (Mumbai, India) and used without further purification. The leaves of Zanthoxylum armatum DC. were collected from forest of Uttar Pradesh, India, in May 2020. Botanical aspects of collected plant materials were identified and authenticated by plant taxonomist Dr. Pankaj Gupta, Professor, Sunrise University,



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**Dr. Manoj Kumar Mittal**  
 Associate Professor, Shri Ram  
 College Muzaffarnagar, Uttar  
 Pradesh, India

## High speed data transmission through optical fiber of 1550 Nm InGaAsP/InP MQW semiconductor laser

**Dr. Manoj Kumar Mittal**

### Abstract

High speed lasers are usually used as data transmitter on fiber optic communication [3-7]. High power lasers are used in materials processing, nuclear fusion, medical field, defense etc. VCSELs are also used in fundamental researches. This is the main reason that's why semiconductor lasers are projected to grow at annual rate of 9 to 10% [8]. The effects of variation of injection current on the characteristics of a 1550 nm InGaAsP/InP MQW VCSEL have been presented in this work with the aim of obtaining high speed performance.

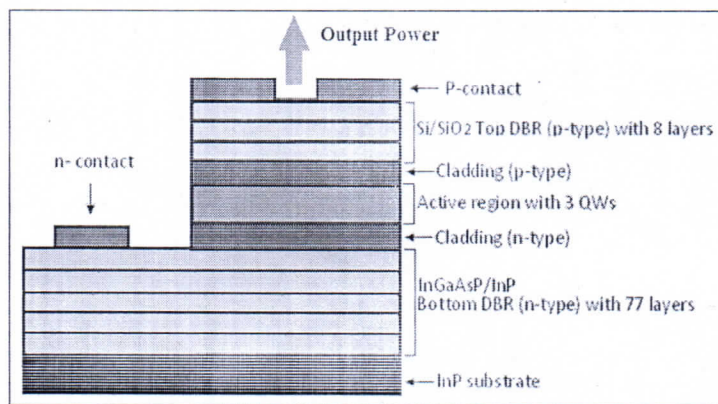
**Keywords:** InGaAsP/InP MQW Semiconductor, High Speed Data Transmission, Optical Fiber

### Introduction

The Vertical Cavity Surface Emitter Laser (VCSEL) is the latest technology of light source whose importance is increasing linearly in our optical communication system. Due to the development of advance semiconductor material, a remarkable change has been made in our communication engineering such as; using semiconductor laser sending high data transmission through single mode optical fiber. The VCSEL is a low-cost light source with attractive performance characteristics such as low power consumption, high speed capabilities [1, 2].

High speed lasers are usually used as data transmitter on fiber optic communication [3-7]. High power lasers are used in materials processing, nuclear fusion, medical field, defense etc. VCSELs are also used in fundamental researches. This is the main reason that's why semiconductor lasers are projected to grow at annual rate of 9 to 10% [8]. The effects of variation of injection current on the characteristics of a 1550 nm InGaAsP/InP MQW VCSEL have been presented in this work with the aim of obtaining high speed performance.

### Structure of a Semi-Conductor Laser



**Fig 1:** The Structure of a 1550 nm Top Emitting InGaAsP/InP MQW VCSEL.

The structure of a 1550 nm top emitting MQW VCSEL is presented in Figure 1. The active region of the device consists InGaAsP based 3QWs of 195 Å each, which are separated by InP barrier layers. The active layers are guided by p-type and n-type GaInP cladding layers in the VCSEL cavity.

**Correspondence**  
**Dr. Manoj Kumar Mittal**  
 Associate Professor, Shri Ram  
 College Muzaffarnagar, Uttar  
 Pradesh, India

Co-ordinator  
 IQAC, Shri Ram College  
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**CONSERVATION AND RESTORATION RESEARCH  
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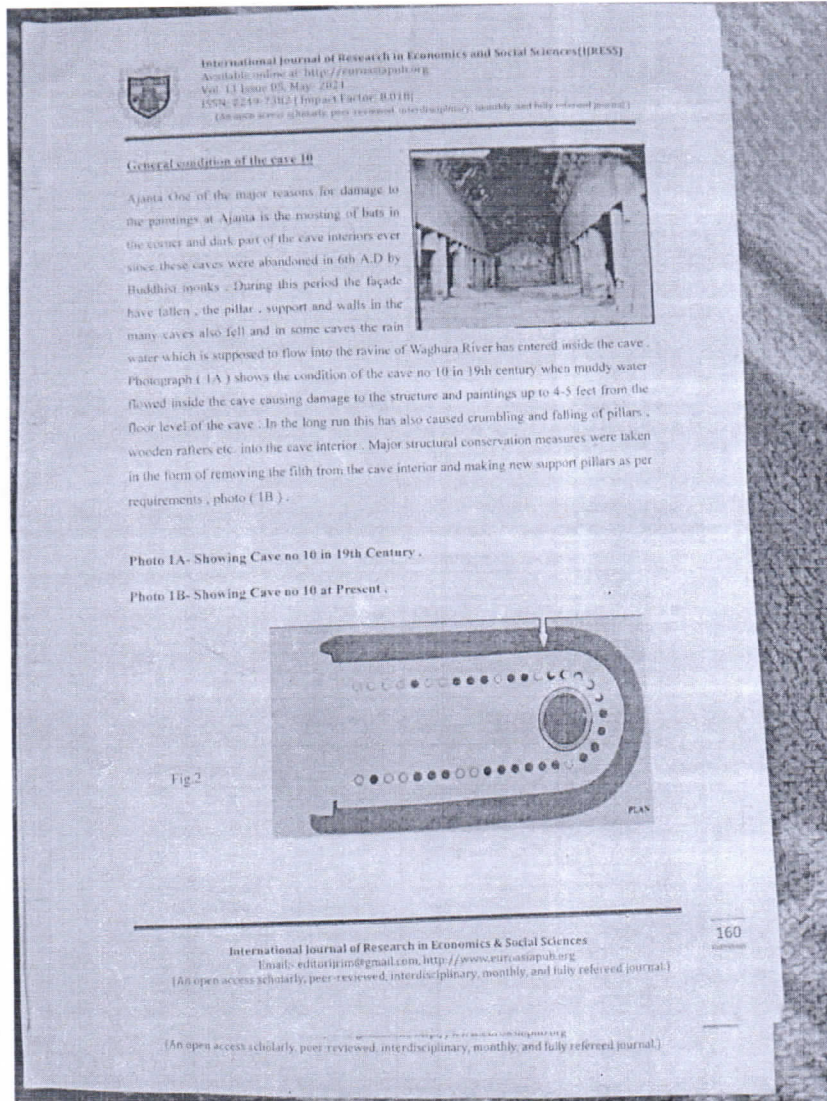
This paper outlines new approach for the removal of varnish coatings from the surface of wall paintings. Conservation and Restoration Research on 2<sup>nd</sup> Covered under very thick layers of different kinds of varnishes applied in the past for copying, the few sq.mt. 2BCE

Painted plaster still surviving in cave no 9 and 10, Ajanta pose most difficult task of cleaning the historic surfaces. The paintings diagnosed to be executed on a very thin lime plaster ground with inorganic colors by portable XRF; the FTIR spectra of the pigments and lime ground denote that varnishes have seeped through due to its repeated application in the past. The usual organic solvents mixture technique of graphite medium to verify their hardness where phosphorus or calcium are hard stone material form being used as well as the micro-emulsion technique applied for cleaning proved non-effective in the treatment of that part of the paintings covered with thick bats excreta. Microclimatic condition and state of conservation of painted plasters are also discussed by using adhesive and coating.

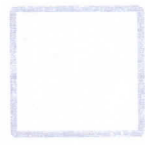
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[m\\_singh\\_asi@yahoo.com](mailto:m_singh_asi@yahoo.com)

*[Signature]*  
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 Muzaffarnagar

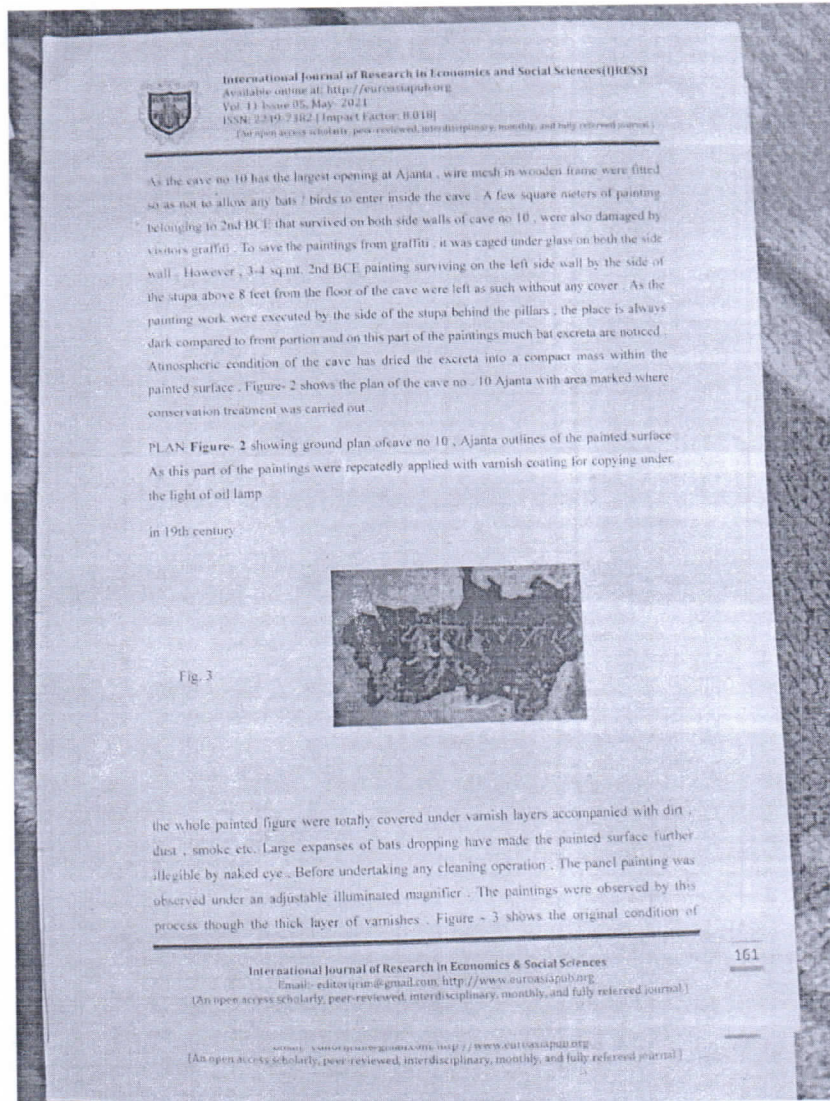


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Muzaffarnagar

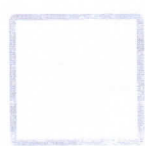


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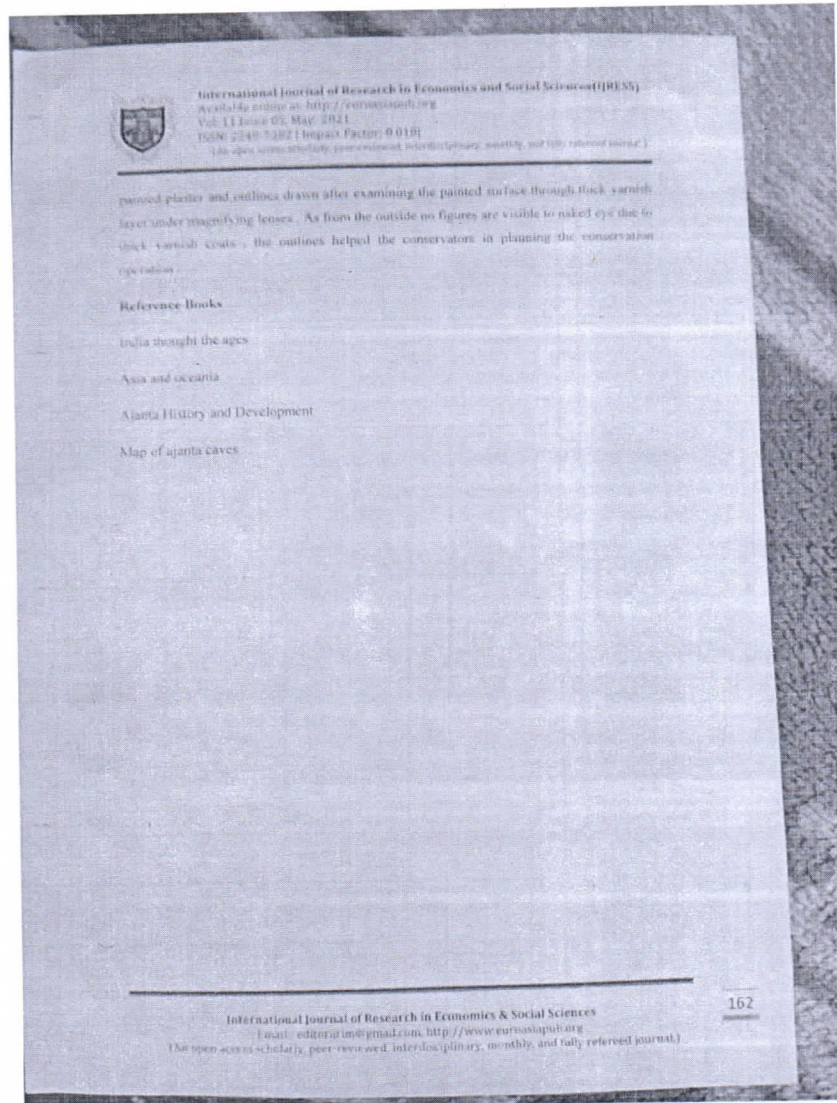




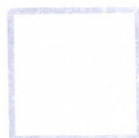
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*[Handwritten signature]*  
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 IQAC, Shri Ram College  
 Muzaffarnagar



*[Handwritten signature]*  
 Chairman  
 IQAC, Shri Ram College,  
 Muzaffarnagar



## MAXIMS OF FORMATIVE ASSESSMENT: A CRITICAL REVIEW

Dr. Pramod Kumar Rajput  
Associate Professor  
IP College, Campus-2  
Bulandshahar-UP

Jugmaheer Gautam  
Assistant Professor  
Shri Ram College,  
Muzaffarnagar-UP

Bhanu Pratap Verma  
Assistant Professor  
Shri Ram College,  
Muzaffarnagar-UP

### ABSTRACT

In a period that is apparently soaked with state sanctioned trial of all tints and stripes, it is anything but difficult to fail to remember that evaluations not just measure the execution of understudies, yet additionally unite and upgrade their learning. Evaluation for learning is best clarified as a cycle by which the appraisal data can be utilized by educators to change their instructing systems while understudies change and modify their learning draws near. Successfully executed, developmental evaluations can change over homeroom culture to one that resounds with the victory of learning. In this paper, we present 10 proverbs that show ways that developmental appraisals can be better comprehended, acknowledged, and actualized.

**Keywords:** Assessment; Formative Assessment; Maxims

### **INTRODUCTION:**

Evaluation is crucial to the complex woven artwork of instruction as it drives understudy learning. It is an intense instrument in the armamentarium of the instructor and, in this way, merits cautious thought. It is a broadly acknowledged standard that the part of evaluation isn't just to survey understudies on certain foreordained measures furthermore, make decisions, yet additionally to encourage understudies' learning through a consistent cycle of criticism and give them the occasion to improve.

Today, the move in accentuation from summative to developmental appraisal is the branch of the affirmation that evaluation is as ground-breaking in causing learning all things considered in estimating worth. Caroline Gipps depicts developmental appraisal as ". . . the way toward assessing, judging or assessing understudies' work or execution and utilizing this to shape and improve understudies' ability". It is the cycle utilized by educators to perceive and react to understudy's figuring out how to empower and improve it. Generally, developmental appraisal is the evaluation for learning.

The objective of this article is to plot manners by which developmental evaluation, as a technique, can be better perceived and drawn nearer. The key highlights that are significant of developmental appraisal can be caught as 10 F's and are introduced in the request for significance:

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Muzaffarnagar

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Muzaffarnagar

1. Anonymous
2. Encourages learning
3. Criticism
4. Feedforward
5. Zero in on learning
6. Adaptability
7. Quick
8. Successive
9. Neighborly
10. Fun

### **Maxim 1. Formative Assessment Remains Faceless**

Namelessness gives wellbeing and solace and gives understudies the transmission capacity to commit errors without being called out. Controlling a class test without the personality of the understudies being uncovered demonstrates where and why things are going wrong as opposed to who has turned out badly. While exactness in estimation of comprehension by the understudies is unimaginable, it is maybe not even vital in the developmental appraisal. Notwithstanding, if input is expected to be given at a person level, the developmental appraisal may not be anonymous.

### **Maxim 2. Formative Assessment Facilitates Active Learning**

Understudy association during the time spent appraisal has been examined as a compelling instrument in enlarging understudy learning. The article by Black and Wiliam, "Inside the black box," uncovered that study hall based developmental appraisal, when suitably utilized, can emphatically influence learning. As indicated by them, in opposition to the customary structures, students and their friends assume a crucial job during the time spent developmental evaluation. Stiggins et al. proposed that study hall evaluation that includes understudies can rouse their learning. Developmental evaluation ought to urge understudies to have a focal part and be dynamic in their own learning. Making understudies consider what they are realizing and giving a scope of occasions to investigate what has been realized will empower instructors to check the profundity of comprehension. The vast majority of the proof identified with developmental appraisal propounds its significance and suggestions for guidance and that evaluation ought to encourage "activity" in the homeroom to influence learning.

### **Maxim 3. Formative Assessment Encourages Feedback**

The most remarkable single factor that improves accomplishment is criticism, which decides the adequacy of developmental evaluation. Consequences of a meta-investigation set the job of giving criticism as a vital element of developmental evaluation. For criticism to be powerful, it should be valuable. It needs to depict as opposed to assess or pass judgment. Chappuis and Stiggins recommend that critical input not just holds less an incentive for development and understudy learning, yet in addition deters understudies from learning. Dark and Wiliam proposed that developmental criticism ought to draw out understudies' qualities, give recommendations to progress, and try not to contrast one understudy and another. This criticism might be especially accommodating to underachievers since it stresses that understudies can improve in light of exertion.

As Brookfield so suitably says, Feedback ought not leave understudies simply feeling better or terrible about what they've done; they ought to give direction also. On the off chance that understudies just feel warmed or embarrassed by our assessment then formative evaluation will come up short in its motivation to be educative. Criticism ought to give data about the current hole between the genuine and wanted degrees of execution. Explicit, exact, opportune, clear, and centered criticism will urge the understudies to consider their learning and feel the need to change. Developmental evaluation ought to be early and ideal enough to help the two instructors and understudies to make course amendments during the learning venture.

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IQAC, Shri Ram College  
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IQAC, Shri Ram College,  
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#### Maxim 4. Formative Assessment Engenders Feedforward

While criticism centers around an understudy's present presentation, feedforward looks forward to ensuing activities taken toward progress. A mix of review and imminent ways to deal with understudy learning will have a more unmistakable effect than either alone. The circle of viable input is finished just when important moves are made toward progress. Developmental evaluation ought to permit the students to reflect and consider. Kluger and DeNisi indicated that the best input for understudies is the point at which they are not just advised in which zones they need to improve, yet additionally guided on the most proficient method to approach improving those zones by the feedforward procedure. Feedforward tasks ought to be planned with a inherent open door for understudies to put the criticism to quick utilize. Instructors need to intently screen the activities taken to improve so they can be certain that the input was viable in its motivation. To underscore consistent learning and support self-managed learning and metacognition, where understudies gain from understanding their own point of view, they need to have occasions to commit errors and to gain from them before they experience summative evaluation; basically, developmental input and feedforward go before summative appraisal.

#### Maxim 5. Formative Assessment Reiterates Focus on Learning, Not on Grading Evaluation must be seen in an alternate point of view:

past grades, imprints, and acknowledgments. It should be seen as a measuring stick to test what the understudies have realized and to incite their deduction on what they have realized. Preferably, appraisal for learning happens best in a climate free of decisions and grades. Evaluation need not generally be reviewed and includes numerous ungraded proportions of understudy learning.

Developmental evaluations are "acceptable" when insignificantly reviewed and "best" when not evaluated by any stretch of the imagination. Just when evaluations are separated from developmental appraisal will the understudies get the opportunity to advance in the learning cycle. Fascinating cooperations instead of cross examination ought to be the foundation of developmental appraisal, wherein the understudy understands that learning is foremost as opposed to an evaluation or a mark. Developmental appraisal ought to evoke proof of understudies' learning status at a state of time. Simultaneously, developmental appraisal needs to empower instructors to zero in on instructional systems and understudies to zero in on learning draws near. Developmental evaluation should likewise guide the instructor on where to center their time. In the event that understudies show profound comprehension of a subject, the instructor can expand the trouble of the tasks to challenge their reasoning. On the off chance that understudies are battling with a specific ability or subject, the instructor can survey the material or show it in an alternate manner. Reteaching, substitute instructional methodologies, and more practice open doors can be endeavored by the mindful instructor who analyze the battles understudies are encountering. So, it causes the educator to change the instructing to the necessities of the understudy.

#### Maxim 6. Formative Assessment Provides Flexibility

There is as much assortment in actualizing developmental appraisals, as there is variety in instructional styles. In spite of the fact that educators utilize paper-and-pencil tests with the end goal of developmental evaluation, it very well may be led by a wide assortment of less conventional and significantly less proper appraisal strategies. The adaptability to pick between various sorts of exercises is the strength of developmental appraisal and should be investigated and misused to profit learning. Developmental appraisal permits us the opportunity to pick a combination of ways to deal with evaluate understudy comprehension of what has been educated. Similarly as dipsticks are utilized to gauge the profundity of oil in the motor of a vehicle, it is conceivable to utilize such dipsticks (mediations) to dunk into the psyches of the understudies to comprehend their comprehension of the point. These exercises in the homeroom, encourage learning, yet additionally strengthen ideas, break the repetitiveness, and license the educator to get a preview of understudy learning.

Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

Chairman  
IQAC, Shri Ram College,  
Muzaffarnagar

### **Maxim 7. Formative Assessment Happens Fast**

Developmental appraisals should be quick, which means they need to adhere to not long after guidance. In the event that it happens a little while or months after guidance, the effect of developmental appraisal is lost. This is particularly evident with authentic information and applied arrangement. Reviewing the theme instructed in the initial 24 h in the wake of learning data diminishes the measure of information failed to remember, and this can be accomplished by utilizing developmental evaluations.

### **Maxim 8. Formative Assessment Needs To Be Frequent**

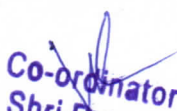
Routineness of developmental evaluation followed by a useful criticism is significant for understudy learning. Developmental evaluations ought not be rare. They ought to be sufficiently incessant to keep up, support, and hold the energy in learning. This guarantees that educators are persistently checking understudies' perception as learning unfurls. Progress checking starts with gathering winning information with respect to understudy execution and should be gathered regularly to screen understudy progress. Just when the developmental evaluation is considered as a persistent and regular cycle can an understudy explicit, remedial, and convenient criticism with respect to advance be given. Data learned is lost over the long run when there is no endeavor to hold it and is very much spoken to by the failing to remember bend. Murre and Dros cited Ebbinghaus, who proposed that the best strategy for expanding the strength of memory is redundancy dependent on dynamic review and recovery practice. Fusing developmental evaluation regularly will incredibly diminish the impacts of the failing to remember bend.

### **Maxim 9. Formative Assessment Propagates a Friendly Learning Environment**

Developmental appraisals impart trust in the understudies, yet in addition achieves a social change in the study hall climate. Making a solid, safe, and strong climate empowers figuring out how to occur in additionally suffering manners. Developmental evaluation ought to include commonly intuitive cooperation among educators and understudies, prompting a joint profitable action. Regard, respect, and common trust structure the bedrock of this groundbreaking cycle. As Ann Brown proposes, in developmental evaluation, educators and students are seen "as partaking in a shared dance of allotment of thoughts and activities" which is conceivable just when a climate helpful for learning is set up. Such a climate advances development, request, and danger taking. In the event that understudies don't feel upheld and safe, their brains will return to zeroing in on endurance. A suitable learning atmosphere, which is without dread, mortification, or derision, will empower more cooperation, since committing errors is seen as a venturing stone as opposed to a hindrance. While directing developmental evaluations, we should recognize the Socratic technique and cross examination: in the previous, keen inquiries are an upgrade to learning and disclosure, though in the last mentioned, forceful addressing causes belittlement or mortification of the student. Making conditions helpful for learning is as much an instructor's obligation as convincingly passing on his/her grant.

### **Maxim 10. Formative Assessment Generates Fun in Learning**

One should comprehend that play is the most elevated type of learning. Fun in developmental appraisal expands students' consideration and focus and can breath life into the two students and educators. As per Leo Buscaglia, "it is dumbfounding that numerous instructors guardians actually separate between a period for learning and a period for play without seeing the imperative association between them". Instructors need to grow out of the legend that fun in the homeroom will forfeit genuine learning, and that legitimate learning ought not be fun. Instead of fun being seen as an alleviation from learning, it should be imbued into the learning cycle. Making developmental evaluations fun with discontinuous instructional activities actualized innovatively will light understudy's advantage.

  
Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

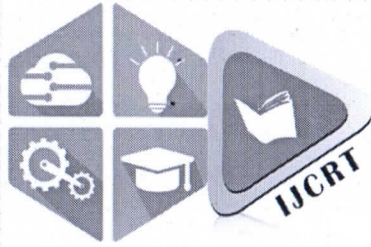
  
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IQAC, Shri Ram College,  
Muzaffarnagar

## Conclusion

The clear purpose behind developmental evaluation is express, to offer criticism to understudies; the incognito explanation is verifiable, to give a road to instructors to ponder their showing procedures and to sharpen them. With such a huge amount in question in the usage of summative appraisal, there is an obscuring impact on the instructor's valuable utilization of developmental evaluation. In our drive to summatively survey understudy learning, we should not fail to remember why and how to developmentally evaluate understudy learning in the homeroom (16). Learning turns out to be more utilitarian and suffering when the vital ascribes of developmental evaluation, for example, reflection, input, and self-appraisal, are allowed to sprout. Bridling the 10 adages introduced in this article will guarantee that developmental evaluation is actualized effortlessly and eagerness.

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IQAC, Shri Ram College  
Muzaffarnagar



# A Study Of computer And Practical Knowledge of Senior Secondary Schools Teachers: A Review

Jugmaheer Gautam  
Assistant Professor  
Faculty Of Education  
Shri Ram College,  
Muzaffarnagar-U.P.

Dr. Pramod Kumar Rajput  
Associate Professor  
Faculty Of Education  
IP College, Campus-2  
Bulandshahar, U.P.

Bhanu Pratap Verma  
Assistant Professor  
Faculty Of Education  
Shri Ram College,  
Muzaffarnagar-U.P.

## Abstract

The advanced period is the time of researcher. With this logical or innovative turn of events, there has been a constant improvement in the field of PCs, because of which new components of PCs are being added today, prior just a single PC which was accessible before the individual could be chipped away at however today the PC network The strategy is stylish. A PC network is a framework wherein at least two PCs are associated with one another with the assistance of some medium (wire or server), this is the aftereffect of logical revelation and improvement, and information and utilization of PC and internet is a Comparative investigation of Internet information and Prayag has been done among teachers of non-aided schools for teachers. For this, the determination of schools was finished utilizing arbitrary inspecting technique. In which 8 financed and 8 non-aided schools of Muzaffarnagar locale were chosen and teachers and teachers from each school were chosen by arbitrary testing strategy. Consequently, just 100 teachers and teachers have been chosen in the legal executive. As indicated by the investigation, the factual technique is utilized, subsequent to gathering the information given by the teachers and arranged them. At that point locate the mean, standard deviation and t value of each gathering. Therefore, it was discovered that teachers of non-aided schools utilize the Internet more than teachers of schools in higher secondary level.

**Key Words:** Network, Higher Secondary School, Aided Schools, Non-Aided Schools

## **Introduction:**

The current period is the time of science and innovation. Today, the world is changing quickly because of logical disclosures and developments. Regardless of whether it is school, office, emergency clinic or war field, nothing has stayed immaculate by the effect of science. The field of data is additionally one of these, which the logical developments of the current period have arrived at new statures. Similarly as the essential prerequisites of individual, bread, fabric and house are significant, similarly, data likewise enables people to accomplish more work. These progressions have likewise influenced human existence at a quick speed. On the off chance that we take a gander at the only remaining hundreds of years, we will locate that sooner than today it required some investment to send data or messages starting with one spot then onto the next. With the approach of data innovation, the trading of data or messages has gotten simple as of now and it requires some investment. PC is a gatherer of data, however these data can't be valuable except if these data are traded. In the event that we

take a gander at the only remaining hundreds of years, at that point we will find that on the off chance that we need to trade data or messages sooner than today, at that point our Many alternatives like fax, wire, wire and so forth are accessible.

With the improvement of innovation, new measurements are being added continually in the field of PCs, beforehand just a single PC which was accessible before the individual could be chipped away at, however today the arrangement of PC network is stylish. A PC network is a framework where at least two PCs are associated with one another with the assistance of some medium (wire or server). The sorts of PC network are as per the following:

**(A) Local Area Network; (LAN):** This organization is an advanced correspondence organization. This organization is restricted to a topographical territory. Regularly this organization is utilized by a structure, school, office or association.

**(B) Wide Area Network; (WAN):** This organization isn't restricted to any territory like SP. It tends to be set up at the divisional, local, public and global levels. For the most part, six work stations are associated by satellite.

**(C) Metropolitan Area Network; (MAN):**

MAN is a region of around 100 km or systems administration done in a major city. In this, numerous students are interlinked. Internet interfacing distinctive PC, nearby, region organization and wide region network in the entire world is called Internet, in like manner language Internet is called organization of organizations.

#### **Brief history of Internet:**

It has been just about 39 years for the advancement of the Internet. Educator Leonard Cleanrock of the University of California is viewed as the dad of the Internet. He and his partners prevailing with regards to conveying between the two PCs on 2 September 1969. This discourse was made through a cooler molded switch called an interface message processor. The US government's Advanced Research Project (II) was subsidizing to set up an organization that would permit chosen focuses and scientists the capacity to utilize each other's PCs. At first the organization that was framed was called Arpanet; Andambakkam Tammantabi Chatavarambaj. Dr. Klinik and his partners have scarcely foreseen that later on, there will be more prospects from the Internet. The undertaking, which started with the security prerequisites of the US during the Cold War, later formed into a mechanism of data, amusement, information, correspondence, and above all else it was an exchange and schooling medium. After the presentation of Gateway Internet Access Service (AP) by Videsh Sanchar Nigam Limited without precedent for India on 15 August 1995, the Internet opened up for use by the overall population. At first Internet was accessible just in Delhi, Mumbai, Kolkata, Chennai, Bangalore and Pune, however today its organization has extended extraordinarily and this administration is accessible in practically all urban communities of India. Today, because of the versatile insurgency, the Internet has extended in the towns also, as per the information got from the Internet and Mobile Accession of India (P.D.), Internet utilization in India is expanding step by step. The quantity of Internet clients is expanding at a pace of 54 percent. 51 percent of the individuals of this class utilize the Internet for search and 32 percent individuals for banking. The measurable subtleties of

Internet customers dependent on the report of Internet Use State and Telecommunication Market are given in the accompanying table. Today, e-training is being given spot in the greater part of the grounds, schools, universities of advanced education. In this mechanical age PC training has been begun in different schools of our nation. Numerous foundations, homegrown and unfamiliar, are running numerous projects through e-training. Today, e-schooling is not, at this point another assemblage. Its underlying foundations have spread to all the nations of the world and it is additionally spreading quickly in the Indian climate. In the period of this correspondence insurgency, an understudy can get training through internet sitting in his home. The structure of both society and instruction is being re-imagined because of e-schooling. The e-training being gotten through the internet is influencing each part of our lives. In the current setting, IGNOU is putting forth attempts to give computerized resettlement office (QHD) at more than 700 of its Research communities. These will be online so students will have the option to impart through email. Similar University Grants Commission is interfacing its grounds through the cross country network NB Pumbij. It is with an end goal to make a divert that is useful in globalizing training.

### Review Of Litrature:

Hann (1997) explored 2500 teachers from public and private establishments in the United States, in which he found that 90% of teachers are Internet clients. Around 68 prepared teachers use data got by the Internet in their exercise plans. Most teachers utilize 62 percent of internet indexes as data sources.

In an Research led by Babkutte and Salih (1999) at Calicut University, it was discovered that understudy research students utilize all the internet with the end goal of exploration studies and educating.

Kansler and others (2001) by their exploration, the Internet is getting more valuable for individuals with this careless nature of this end and its outcome isn't helpful for the thoughtful individuals who don't get a lot of help from society. A great many people are changing in accordance with get their every day profits by the internet.

Paris (2004) featured the way that uplifting perspectives towards higher internet right hand learning were found yet no certain distinction was found in the mentalities of male and female teachers.

Mulenberg and Burge (2005) distributed in their report such Researchs that found a positive distinction in learning, fitness, experience inspiration, and so forth, as far as capacity to utilize online innovation for sex age. Information on internet based learning through pictures influences their prosperity.

Vemkar (2006) utilized his Research LAPTOP in homeroom educating and found that PCs are presently effectively accessible even in schools with low financial status. The primary

purpose behind this is the low cost and improvement in innovation. Taking the above as a premise, the advantages of instructive utilization of PC in the study hall were considered. In this investigation, the accentuation was mostly on students' composing disability, understudy accomplishment non-appearance rate, and so forth

In Chen's (2007) article, The primary point of Chen's Research was in the improvement of such a worldview in displaying the elements of Internet use. Through which the utilization of Internet by teachers of English subjects can be assessed. In this Research, different factors have been dissected by the idea of Internet mix guidance in the utilization of interrelationship and technology. Research shows that educator preparing directly affects homeroom use, experience capacity, and other utilization of Internet. What's more, institutional help, innovative reasoning, conviction and mentality undetectably impact the utilization of internet by teachers.

### Need Of Study:

The historical backdrop of Indian schooling is antiquated. Indian instruction has been on the way of nonstop advancement from the Vedic time frame till today. Changes and alterations have been made as instruction also with the changing social conditions over the long run. As of now, the idea of instruction has changed a ton, presently the motivation behind training isn't restricted to information just, yet schooling has become a significant piece of the cycle of public turn of events. As of now, the significant assignment of training is to create HR. This advancement positively affects the utilization of different assets. After freedom, endeavors were made to create training through its improvement projects and to adjust its multifaceted nature to social requirements. Training extended from autonomous India, however its quality and level kept on declining. Today, there are numerous difficulties before the Indian training framework. The instructor has a significant spot in change and upheaval in any country, so it is an observer that Napoleon took the help of the teachers in actualizing their strategies. Similarly, it is significant for teachers to be dynamic in acquiring data and specialized upheaval our nation. An instructor resembles the fire of a light which delivers light without anyone else and with this fire many new lights are enlightened, however today our nation can't build up the field of schooling and preparing at the necessary speed. The arrangement producers and private associations have had broad conversations to take care of the issues of this district. The answer for every one of these issues is plainly obvious in e-training. At the point when an instructor knew about the internet, he would have the option to change the e-training in his group through it which would profit many students. E-training is right now in earliest stages in India. E-training, e-administration, internet and so on are new ideas yet these are our future alternatives. The primary target of the thesis introduced in this point of view is to discover the way that the educator knows about the internet or not, on the off chance that it is recognizable, at that point use it How and how much would you say you are doing? Exclusively in the wake of realizing this reality would one be able to arrive at the choice that what sort of changes and new plans ought to be remembered for the instructor's program, through which teachers can create mindfulness about the Internet and the capacity to profit by it.

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IQAC, Shri Ram College,  
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**Statement Of Problem:**

"A Study Of PC And Practical Knowledge of Senior Secondary Schools Teachers: A Review"

**Definition Of Words Used In Research:**

**Higher Secondary Teachers** - Teachers educating in higher auxiliary level schools have been incorporated as upper optional.

**Aided schools**- Aided schools are those schools which rely upon government awards for teachers' compensation, showing related materials, school development, and different costs identified with testing and investigation. In the introduced research, teachers from class 11 to 12 have been taken.

**Non- Aided Schools** - Non-Aided schools are those schools which don't rely upon government awards for teachers' compensation, showing related material, school consummation, and different costs identified with private testing and assessment. These whole costs are borne by the private organization or private individual. In the introduced research, teachers from class 11 to 12 have been taken.

**Knowledge** - The goals of training were ordered by BS Bloom in which Bloom Sir isolated the targets into three sections. Bloom partitioned the intellectual reason into six sections. In which information is first and most minimal level. Bloom kept information to memory-level educating. Which is identified with earlier information. In which recitation and distinguishing proof include two mental exercises. According to the information on the Internet, how much information the instructors have about the Internet and the amount they recollect and distinguish and answer the survey.

**Examination**- Bloom has set third the arrangement explore for psychological purposes. In which a few realities, thoughts, occasions, rules, standards and so on are utilized. As indicated by these exploration work, how much instructors utilize the Internet with information on the Internet in schooling and different fields. Instruction related substance and new data, email, e-banking; e-tagging, e-farming, and so forth, utilize the Internet in the field.

**Objectives Of The Study:**

The fundamental goals of the Research study introduced depend on-

1. Near investigation of information on teachers of upper secondary level award and non-award schools.
2. Near investigation of utilization of internet in teachers of upper secondary level award and non-award schools.

**Hypothesis Of The Study:**

The Research contemplates introduced center around the accompanying theories:

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Muzaffarnagar

1. There is no significant distinction in the information on the Internet among teachers of upper secondary level award and non-financed schools.
2. There is no significant contrast in the utilization of Internet among teachers of upper secondary level award and non-award schools.

### Limitations Of The Study:

The exploration study introduced is restricted by the Nyayadarsha technique because of absence of time and cash.

1. Research study is restricted to teachers working in upper optional level schools.
2. The Research study is restricted to higher optional level schools in region Muzaffarnagar in metropolitan and rustic zones as it were.
3. With the end goal of riches, 100 (provincial and metropolitan) teachers of higher optional level have been chosen.

### Methodology:

The Research introduced is mostly separated into two sections. In the primary stage, an exertion was made to contemplate the information and utilization of the Internet among the teachers of the secondary and supported schools at the more elevated level, and in the second section a relative investigation of the assessments got. Study in all metropolitan and country climate supported higher optional level schools of region Muzaffarnagar subsidiary to Uttar Pradesh Secondary Education Council Allahabad has been considered as populace in exploration study introduced to teachers and teachers, everything being equal.

### Sampling:

Determination of judges is a significant spot in Research considers. Logical exploration is outlandish without the appointed authorities, in light of the fact that without the adjudicators the investigation of the present and the future can't be anticipated. Essentially it is hard to deal with the whole populace. Consequently, work is done on Nyasadhar for accumulating the information. Kinds of Research Studies Presented: Selection of schools Using the arbitrary examining strategy, 8 sponsored (4 country territorial and 4 metropolitan local) and 8 non-supported (4 rustic local and 4 metropolitan local) schools were chosen in each school. Teachers and teachers were chosen by arbitrary technique, accordingly just 100 teachers and teachers were chosen in the representation.

### Tool Of Study-

Effective investigation of the issue of any exploration study relies upon the determination, assembling and organization of gear. Care ought to be taken in the determination, assembling and utilization of proper gear for the investigation of the issue of exploration and for accomplishing certain targets. Recognizing the hardware with the perspective on gathering information for the investigation introduced, it has been discovered that no gear was accessible to satisfy the ideal destinations. So for aggregating the materials, the Research analyst chose to make an "Internet Knowledge and Experiment Questionnaire".

## Statistics

The target of the exploration issue introduced is to lead near investigation of information and utilization of internet in teachers of upper optional level, financed and non-supported schools. With the issue of this Research study, an endeavor was made to discover how much significance is there in the information and utilization of the teachers of the sponsored and non-financed schools in Muzaffarnagar region, since the measurable strategy has been utilized similarly as the investigation, first the exploration specialist has distinctive The information given by the teachers was gathered and classified. At that point locate the mean standard deviation and t-value of each gathering.

**Median** - The mean is the worth that is acquired by separating by the quantity of transferable positions. The mean is likewise called the number juggling mean or middle.

**Standard Deviation** - Standard deviation is the square foundation of the squares of deviations from the mean of the given scores.

**T-test**- Working on the whole populace is a troublesome undertaking, so the specialist has chosen Sample. There is a chance of certain mistakes in any legal executive which should be learned. Accordingly, for the importance of the mean of any two gatherings, value of t-test is fundamental. With the end goal of this reason, the specialist has utilized the T-test recipe.

### Analysis And Interpitation-

The information and utilization of teachers has been investigated and tried by hypothesis.

**First Hypothesis** - The hypothesis is that "there is no important distinction in the information on the Internet among the teachers of upper secondary level schools.

**Table-1**

Group	Sample	Mean	S.D.	T-Value
Knowledge Of Teachers Of Aided Schools	50	9.24	1.75	8.61
Knowledge Of Teachers Of Non-Aided Schools	50	12.34	1.91	

From the investigation of the suitable table, it is discovered that the normal score of information on Internet among teachers of the schools is 9.24 and standard deviation is 1.75 and the mean of the signs of information among teachers of non-award schools is 12.34 and standard deviation is 1.91. The t value is 8.61 and the table an incentive at 98 is 1.96 at the importance level .05 and the table an incentive at 0.01 is 2.63. Consequently the value of calculative T is higher at the two levels. There is a critical distinction in the information scores of the Internet among the teachers of secondary level subsidized and non-financed schools. It tends to be said that teachers of non-supported schools have more information on the Internet than teachers of schools in higher optional level.

**Second Hypothesis**-Hypothesis proclamation is that "there is no important contrast in the utilization of the Internet among teachers of upper and optional secondary and non-subsidized schools."

**Table-2**

Group	Sample	Mean	S.D.	T-Value
Experimentation In Aided School Teachers	50	4-84	1-68	8-99
Experimentation In Non-Aided School Teachers	50	8-96	2-77	

From the investigation of fitting table number-2, it is discovered that the mean score of Internet information among teachers of schools is 4.84 and standard deviation is 1.68 and that of teachers of non-financed schools is the mean of 8.96 and standard deviation is 2.77. The t value of both the classes is 8.99 and the table an incentive at level 98 is 1.96 at .05 and the table worth is 2.63 at .01 so the value of computational t-value is higher at the two levels so the theory is dismissed higher. There is a critical distinction in the signs of utilization of the Internet among teachers of optional level, supported and independent schools. It tends to be said that teachers of non-sponsored schools utilize the Internet more than teachers of schools in higher secondary level.

### Conclusion:

The finishes of the theories built by the hypothesis are as per the following:

1. The main hypothesis of the exploration study introduced was detailed as the invalid theory. There is a critical distinction in the information on the Internet among teachers of upper secondary level supported and independent schools and thus the invalid theory was dismissed. Based on which it was presumed that the teachers of the financed and non-subsidized schools know about internet.
2. The second hypothesis of the Research study introduced was figured as the invalid theory. There is definitely not a critical distinction in the utilization of Internet among teachers of upper secondary level award and non-subsidized students. The investigation demonstrated that there is a huge contrast in the utilization of the Internet among teachers of upper optional level award and non-financed schools. Based on this exploration study it very well may be said that teachers of non-financed schools utilize more than the supported schools.

### Educational Implications Of The Study-

At the point when internet programming was created in 1991, scarcely anybody would expect that it would turn into the world's best data framework. Email, talking, shopping, examines, composing, reporting, railroad booking, banking, claims, sales, choices and grievances and so forth have all been on the internet. Today, the Internet has become a methods for Bahujan Hitay and Bahujan Sukhaya. In the Research study introduced, the



current states of information and utilization of Internet by teachers have been evaluated. Today the Internet has become a significant wellspring of data and information. As of now, in the event that it is said that the world has become "blurred", Google won't not be right. Considering the discoveries of the Research study introduced, the information on the Internet by the teachers is adequate yet the quantity of clients who are utilizing it additionally should be made productive to utilize the information on this medium appropriately. The discoveries from the Research study are plainly showing that when our teachers avoid advancements like instructive utilization of the Internet, at that point how might we drive a mission to profit different segments of the general public. With regards to teachers' aloofness to internet use and absence of effectiveness, the recommendations given in this exploration study can assume a significant job. Through this, teachers can be propelled to accomplish more instructive destinations through internet.

### Suggestions-

The Internet is still in its infancy, but its popularity and prevalence provide opportunities for new research studies based on and related to it. In this regard, the following suggestions are presented for future research researchers-

1. The research study presented has been edited on only 100 teachers, it can be done on a large sample.
2. In this research study only teachers of higher secondary level are included, it can also include university teachers.
3. Educational studies related to the use of the Internet can be done in general courses such as (BA, B.Sc, B.Com.) And students studying in technical courses.
4. This type of research study can also be done on secondary level students.
5. This type of research study work can also be done on secondary level teachers and teachers.

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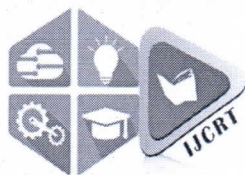


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# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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## THE EFFECT OF CURRENT EDUCATION ON INDIAN SOCIETY

**Dr. Pramod Kumar Rajput**  
Associate Professor  
PG Department Of Teacher Education  
I.P. College, Campus-2, Bulandshahar

**Jugmaheer Gautam**  
Assistant Professor  
Faculty Of Teacher Education  
Shri Ram College, Muzaffarnagar

**Bhanu Pratap Verma**  
Assistant Professor  
Faculty Of Teacher Education  
Shri Ram College, Muzaffarnagar

### ABSTRACT

Instruction these days has become conspicuous thing as it affects a great many people to partake in this matter. Furthermore, it can't be isolated from human's existence. The two guys and females should be taught. Training assumes a significant part in the advancement of a country. In the event that a nation doesn't have legitimate instruction, it could be abandoned by different nations which support schooling. There are many components that influence the schooling framework. Culture, innovation, and efficient issue give a lot of effect on the instruction arrangement of a country. The guideline made by the public authority influences how the instruction framework functions in a country. The training framework in India actually utilizes the single direction correspondence. The educators remain before in the class and clarify every one of the materials, while the understudies simply plunk down on their seats and pay attention to the instructors. Single direction correspondence effects affects the understudies. They become unconfident to impart their insights or even pose an inquiry. The public authority ought to work on this schooling to a superior one. Two-way correspondence is considered as a superior way in instructing technique. The advancement of innovation contributes a lot of effect on the instruction. It very well may be extremely helpful for some individuals to get the instruction. Instruction is fundamental in human's existence. As time passes by, arrangement of instruction changes progressively following the necessities of people.

**KEYWORDS:** Education, Education System, School, Students.

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## INTRODUCTION:

Instruction these days has become unmistakable thing as it affects a great many people to partake in this matter. Furthermore, it can't be isolated from human's existence. The two guys and females should be taught. They have a similar right to get schooling however much they need in light of the fact that there is no impediment for training. Regardless of how old an individual is, he/she can in any case take training during the remainder of their lives. Subsequently, there is nothing of the sort as past the point where it is possible to get schooling. Schooling is the lone scaffold that leads individuals to their better prospects. Instruction assumes a significant part in the advancement of a country. On the off chance that a nation doesn't have appropriate schooling, it very well might be abandoned by different nations which support training. The advancement of a nation can be dictated by if its residents have well-rounded schooling. The better the nature of training that a nation has, the quicker it is probably going to create. Regardless worldwide issues that a nation is confronting, whether it's the disposal of destitution, the production of harmony, or natural energy issues, the arrangements will consistently incorporate training. It is never managed without instruction. The vast majority concur that schooling is vital in their lives. Many individuals contend to improve instruction. A large number of them pick a promising organization that is viewed as the best for them to get instruction. The more excellent of organization they pick, the higher the instructive charge they need to pay. They ought to go through cash for instruction more than those for some other things. They should put training first on the rundown of their costs.

## METHODS:

This exploration is led fully intent on discovering the impact of training in a general public. The author might want to show how a general public becomes in the wake of being worked with to get instruction well, and how it is without schooling. The objects of this exploration are a few youngsters taken from two distinct towns in India. The two towns have an alternate degree of training. To keep the protection of the two towns, the author will name the informed "Town A", and the other one, the town which absences of schooling "Town B". The author takes 30 members from every town, 15 guys and 15 females. They are in the 13-18 age range. The essayist gives every member a poll that they need to fill in. The vast majority of the inquiries are about the overall information. There are additionally a few inquiries concerning their own data, for example, regardless of whether they smoke. The essayist likewise sees how they act when they converse with me and do the survey. At long last, the author attempts to sort out what factors that cause the two towns to have diverse degree of instruction.

## RESULTS:

Subsequent to noticing their conduct, the author tracks down that the perspectives of the members in town A are superior to the ones in town B. While doing the survey the members in town B is viewed as very rude as the author discovers a few members putting their feet on their table, talking noisily, meandering, and surprisingly smoking in the room. Unexpectedly, the room wherein the members of town A doing the survey, is very. No one meanders nor talks. We can presume that instruction plays a significant part in working on somebody's mentality. Coming up next are the consequences of their own data as per their answers.

**Table 1: Some Characteristics of the Study Participants**

No.	Personal Information	Town A	Town B	Total
1	Smoking	4	25	29
2	Drinking habit	-	10	10
3	Having a job	28	3	31
4	Married	-	4	4

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As the table above has referenced, the personal satisfaction of the members in the two towns is unique. The ones who live in town A live significantly more viably than they are in town B. As they have been educated about the danger of smoking, drinking liquor, and underage marriage, the members in town A figures out how to keep away from them. The majority of the members in town An are morning person and as of now have some work. They likewise can speak Indian well as the instructors in their schools speak India, and some of them say that they should speak Indian in the school. Subsequently, as per the outcome expressed before, the author will presume that schooling carries attention to them to carry on with a compelling life. Coming up next is the consequence of the overall information on the two members in the two towns.

**Table 2: General Knowledge of the Study Participants**

No.	Town	No. Of Participants	Persons With Good Score	
			N	%
1	A	30	28	93
2	B	30	5	17
	Total	60	33	55

The outcome uncovers that the members in town A have preferable information over those in town B. There are additionally a few members of town B who don't have the foggiest idea when the Independence Day of India is. It shows that instruction is significant in a town to work on its general public's information.

#### DISCUSSIONS:

Instruction turns out to be very notable to individuals. Maybe, a few group can't express the meaning of training correctly, anyway they probably known what schooling is overall. Lexically, training implies a cycle of instructing and figuring out how to further develop information. The primary reason for schooling is to carry individuals to edification, so they realize what is correct and what's going on. We should recollect that knowledge isn't sufficient. Insight in addition to character - - that is the objective of genuine instruction. The total instruction gives one force of focus, yet commendable destinations whereupon to think. For the most part, individuals get their first instruction since they are 3 or 4 years of age. Then, at that point, they go through each degree of instruction with their endeavors. The time that they spend for getting instruction isn't pretty much nothing. It frequently requires some investment than different exercises do. A few group some way or another think about instruction as an unquestionable requirement thing to have, and they can't live without it. Consequently, they can spend nearly their entire lives to get schooling from certain organizations. There are many variables that influence the instruction framework. Culture, innovation, and conservative issue give a lot of effect on the training arrangement of a country. And furthermore, the guideline made by the public authority influences how the schooling framework functions in a country.

Brown and White (2013) even focused on the requirement for understudies since youth to get comfortable with elective practices in different nations. As time passes by, instruction framework changes progressively fully intent on further developing it. There are many benefits and weaknesses of the difference in training framework. In some cases it functions admirably and is suitable for the residents of a nation, and some of the time it even aggravates the interaction. At the point when instruction framework doesn't appear to work out positively, the public authority will propose a superior one to further develop it, with the thought of certain researchers and associations engaged with changing the schooling framework. The public authority once in a while embraces the training framework from different nations which they consider it is the awesome the country. These days, most understudies will in general zero in just on their objectives, regardless of whether finishing an assessment, graduating, or finding a new line of work that they need. They will take the necessary steps to accomplish their objectives rapidly.

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Be that as it may, they don't actually realize what they should realize. At the point when the understudies breeze through an assessment or graduate, they probably mastered something that causes them to prevail to accomplish their objectives. However, they didn't actually become familiar with every one of the things that they ought to have truly learned. Maybe, they just figured out how to remember names, places, and dates, since they needed to finish an assessment, without truly getting what they were realizing. Then, at that point, after the test, they will fail to remember the materials that they have retained, to clear their psyche for the following test. The present moment, a school is a spot for a great many people to confirm that they will probably get out at the earliest opportunity. The understudies consider that the quicker the completion the school, the better it will be. They will be glad for themselves when they get a decent imprint in a test, or graduate with a high GPA. However, they might fear what will occur next after they graduate since they understand that they have not taken in the significant issue that are vital and required when they find a new line of work a lot. Indeed, many organizations out there don't consider an individual from how high his GPA is, however regardless of whether he is adequately qualified to do the work that he applies.

In this way, understudies ought to realize what is significant regarding what capability they ought to have after graduation to find a new line of work. Rather than remembering the material before tests, the understudies should attempt to see and see each material that they learn on the grounds that later on they might require that data. Say, they get the most elevated position when they graduate. In the event that they just endeavored to accomplish it, and didn't actually learn, they might get lost in the wake of leaving the organization on the grounds that there are possible no organizations that will acknowledge them to work there, just dependent on their positions. Your high GPA amounts to nothing when you don't have the expertise. Thus, the understudies must have the right stuff that are important to land the position. At the point when understudies of English writing move on from the college, they might go after certain positions that are in connection with their major. They need to realize that to land the position, they should have the option to communicate in English well. Regardless of how high their insight about English is, or how high their GPAs are, there are just the understudies who are competent to communicate in English well who will probably be acknowledged to land the position. Thus, we need to realize the main thing and do it so indeed, that we won't lament later on and find a decent line of work. Talking is the main part of a language.

In the event that we can't talk in English, we can't speak with the local speaker straightforwardly. Individuals might consider that it is pointless to have a significant in English writing and learn numerous speculations about English, yet we don't communicate in English well. One thing that separates the understudies of English writing from those of different majors is the capacity to communicate in English well. There are a few parts of instruction that ought to be improved. The vast majority begin going to preschool, similar to kindergarten or playgroup to get their first training. The students are acquainted with the training fully intent on making them intrigued to concentrate before they go to the primary school. Despite the fact that it's anything but an unquestionable requirement to go to a preschool, it is essential for the kids between the age of 2 and 5 to go there. The guardians send their youngsters to the preschool so their kids can realize what is important to have when they learn at grade school. At the point when they go to the primary degree of grade school, they are confronted for certain exercises that in the event that they don't have any earlier information about it, they will think that its hard to comprehend the exercise. In some cases, the instructors of primary school don't show their understudies how to retain the letters in order, how to peruse, and how to find out about numbers.

Actually, the educators simply proceed with the exercises from secondary school, such as tallying numbers. So they need to learn it before they go to primary school, since they must have the option to peruse to comprehend the exercise. While they achieve grade by grade, they are approached to learn and dominate many subjects. From the primary school until senior secondary school, the understudies are not offered to pick their major explicitly dependent on their advantage. Furthermore, after they move on from senior secondary school, they might pick their significant that they are keen on. Such an arrangement of instruction isn't viable and working around. They learn many subjects which they are really not keen on.



Notwithstanding, they actually need to learn them all to have the option to get past the higher grade. Indeed, they don't actually learn and dominate the subjects well, despite the fact that they get high scores regarding the matters. They burn through their time by examining subjects that they don't care for. For instance, they are really keen on learning English, however in school they likewise need to learn Physics, Biology, History, and so forth. Thusly they don't actually focus regarding the matters. It will be considerably more compelling if the understudies if the understudies are coordinated to the field which they like. The understudies ought to be offered a chance to pick their own major dependent on their energy. Also, the guardians ought to energize their a task and work. Truth be told, many organizations out there don't consider an individual from how high his GPA is, yet regardless of whether he is adequately qualified to do the work that he applies. Consequently, understudies ought to realize what is significant regarding what capability they ought to have after graduation to find a new line of work. Rather than remembering the material before tests, the understudies should attempt to see and see each material that they learn on the grounds that later on they might require that data. Say, they get the most noteworthy position when they graduate. On the off chance that they just endeavored to accomplish it, and didn't actually learn, they might get lost subsequent to leaving the foundation on the grounds that there are probable no organizations that will acknowledge them to work there, just dependent on their positions. Your high GPA amounts to nothing when you don't have the expertise.

Subsequently, the understudies must have what it takes that are important to land the position. At the point when understudies of English writing move on from the college, they might go after certain positions that are in connection with their major. They need to realize that to land the position, they should have the option to communicate in English well. Regardless of how high their insight about English is, or how high their GPAs are, there are just the understudies who are able to communicate in English well who will probably be acknowledged to land the position. In this way, we need to realize the main thing and do it so indeed, that we won't lament later on and find a decent line of work. Talking is the main part of a language. On the off chance that we can't talk in English, we can't speak with the local speaker straightforwardly. Individuals might consider that it is futile to have a significant in English writing and learn numerous hypotheses about English, yet we don't communicate in English well. One thing that separates the understudies of English writing from those of different majors is the ability to communicate in English well. There are a few parts of instruction that ought to be improved. The vast majority begin going to preschool, similar to kindergarten or playgroup to get their first schooling. The understudies are acquainted with the training determined to make them intrigued to concentrate before they go to the primary school. Despite the fact that it's anything but an unquestionable requirement to go to a preschool, it is fundamental for the kids between the age of 2 and 5 to go there. The guardians send their youngsters to the preschool so their kids can realize what is important to have when they learn at grade school. At the point when they go to the primary degree of grade school, they are confronted for certain exercises that in the event that they don't have any earlier information about it, they will think that its hard to comprehend the exercise.

Here and there, the instructors of primary school don't show their understudies how to retain the letters in order, how to peruse, and how to find out about numbers. Despite what might be expected, the educators simply proceed with the exercises from secondary school, such as tallying numbers. So they need to learn it before they go to primary school, since they must have the option to peruse to comprehend the exercise. While they achieve grade by grade, they are approached to learn and dominate many subjects. From the grade school until senior secondary school, the understudies are not offered to pick their major explicitly dependent on their advantage. What's more, after they move on from senior secondary school, they might pick their significant that they are keen on. Such an arrangement of training isn't powerful and fooling around. They learn many subjects which they are really not inspired by. Be that as it may, they actually need to learn them all to have the option to overcome the higher grade. Truth be told, they don't actually learn and dominate the subjects well, despite the fact that they get high scores regarding the matters. They burn through their time by contemplating subjects that they don't care for. For instance, they are really keen on learning English, yet in school they likewise need to learn Physics, Biology, History, and so forth. Consequently they don't actually focus regarding the matters. It will be significantly more viable if the

understudies if the understudies are coordinated to the field which they like. The understudies ought to be offered a chance to pick their own major dependent on their energy. Also, the guardians ought to support their If the understudies are put dependent on their divisions, they will be more sure to contemplate due to similar degree of insight as different understudies. It is likewise useful to the educators since they will utilize various strategies in showing every division. At the point when the instructors educate in a class wherein the understudy with low knowledge are put, they ought not instruct rigorously, in any case the understudies will fault themselves for their absence of comprehension of the exercise, and furthermore they will concentrate inactively with no cooperation with the educators. The improvement of innovation contributes a lot of effect on the instruction. The utilization of specialized contraptions has diverted the understudy age from their book study and hypothesis situated examination. Subsequently, instructive organization should accept innovation to upgrade their schooling example and showing techniques (Montoya, 2013).

Technology can be extremely helpful for some individuals to get the schooling. It makes the way toward acquiring information simpler. For instance, the utilization of the Internet empowers individuals to look and share anything, so we can acquire a lot of data that we might want to have. In any case, it some way or another has burdens that can deteriorate the way toward teaching. For instance, understudies these days don't become accustomed to composing the materials that they are learning in study hall. They become apathetic to compose on the grounds that they are accustomed to composing anything on their workstations that is viewed as a lot quicker than composing it.

## CONCLUSIONS

Taking everything into account, schooling is fundamental in human's existence. As time passes by, arrangement of training changes progressively following the necessities of individuals. There are as yet numerous things that should be worked on to get a decent arrangement of training. Consequently, the entirety of individuals should be engaged with further developing it, so the training framework improves and better each year. The principle factor is the means by which great the help given by the nearby government to get instruction is.

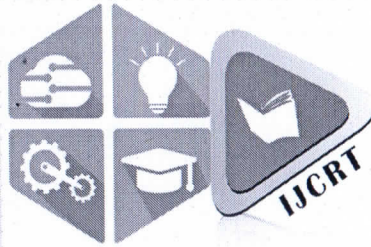
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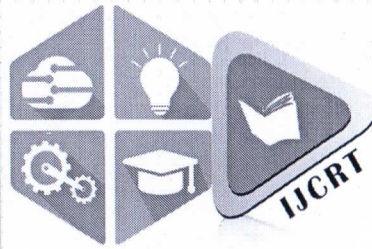
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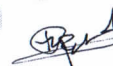
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## INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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# A COMPARATIVE STUDY OF VALUES AMONG HINDI MEDIUM AND ENGLISH MEDIUM SENIOR SECONDARY LEVEL STUDENTS

**DR.Pramod Kumar Rajput**

Associate Professor

PG Department of Teacher Education  
IP (PG) College, Campus -2, Bulandshahr

**Jugmaheer Gautam**

Assistant Professor

Faculty Of Teacher Education  
Shri Ram College, Muzaffarnagar

### Abstract

Man is a social being. He decides same aims and objectives for his future. To obtain these aims and objectives he makes a lot of efforts following social, moral and religious norms. These are generally known as values, viz social values, moral values, political values and religious values. Values are those which produce belief, faithfulness, responsibility, kindness, gratitude, honesty and regularity in the heart of human being. Values followed by different people particularly different cultures differ sharply. An object of belief valuable for one person may not be valuable for the others. Society has different set of values according to their socio-cultural set-up and these values change from time to time with influx of new technologies and new opportunities. In this study it is tried to find out the values of the students of senior secondary level. Survey method, random sampling technique and self made tool for data collection are used to conduct the study.

**Key words:** Comparative Study, Values, Senior Secondary Level Students

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**Introduction:** Social values are most important part of the culture of the society. They provide the stability social order and general guidelines for social conduct. Values such as fundamental rights, patriotism, respect for human dignity, rationality, sacrifice, individuality, equality, democracy etc. determine, guide and control our behavior. Values are the criteria people use in assessing their daily lines, arrange their priorities and choosing between alternative way of action. Values are general standards and higher order norm. They are largely unconscious assumption of what is right and important. A value is belief that something is good and worth while. We can say that values are standards of social behavior derived from social interaction they are objects that social conditions desire. These are culturally stated goals, have sentiments and significance. Values guide our belief, attitudes and behaviors values are ordered by priority. Some one may value freedom over comfort and comfort over equality.

The present study can be stated in specific terms as - **“A COMPARATIVE STUDY OF VALUES AMONG HINDI MEDIUM AND ENGLISH MEDIUM SENIOR SECONDARY LEVEL STUDENTS”**

Researcher found that the society has become narrow minded and selfish, each member is concerned with his own good. The impact of this is that the corruption, rivalry, jealousy, ignoring of one duties and conflicting ideas are rising in human mind. They want to do many things at same time students are loosing co-operation, fellow feeling, brotherhood, social service, self discipline, self study and some other values. They are influenced by modern life and materialism. There are many students who are taking opposite steps like committing suicide. We realized that in all field erosion of values are going on.

**Key terms used:**

**Comparative study:** Present study refers a comparative and careful examination of the level of the value among senior secondary level students of Hindi and English Medium Schools.

**Values:** Values are does which produce belief, faithfulness, reasonability, kindness, gratitude, honesty in the heart of human being.

**Senior Secondary Level Students:** In this study senior secondary level students refer to the studding in Intermediate class of both Hindi and English Medium Schools during session.

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**Objectives of the study:** Following are the main objectives of the study –

- 1- To find out whether there is any significant difference between the level of values among Hindi medium senior secondary level boys and girls.
- 2- To determine whether there is any significant difference between the level of values among English medium senior secondary level boys and girls.
- 3- To check whether there is any significant difference between the level of values among English and Hindi medium senior secondary level boys.
- 4- To find out whether there is any significant difference between the level of values among Hindi and English medium senior secondary level girls.
- 5- To determine whether there is any significant difference between the level of values among Hindi and English medium senior secondary level students.

#### **Review of Literature:**

1. Govind Rajan Krishnamoorthi & Jai Murugan Srinivasan 2012 found in their study “A study of values among student teachers” that theoretical & religious values of Boys and Girls were different but economical, social & aesthetic values of Boys & Girls were same.
2. Yojana Yatin Patil 2013 found in this study “Role of value based education in society” that value based education must be imparted to the students so that they may emerge as good citizens & leaders in their chosen fields.
3. Veenam 2017 found in her study “A study of value among school teachers at secondary level in relation to their gender, local & marital status” that married teachers possess more economical and social values than the unmarried teachers.

#### **Hypothesis Of The Study-**

The accompanying speculations were formed for the current review-

- 1- There is no significant difference between the level of values among Hindi medium senior secondary level boys and girls.
- 2- There is no significant difference between the level of values among English medium senior secondary level boys and girls.
- 3- There is no significant difference between the level of values among English and Hindi medium senior secondary level boys.

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- 4- There is no significant difference between the level of values among Hindi medium secondary level girls and English medium senior secondary level girls.
- 5- There is no significant difference between the level of values among Hindi and English medium senior secondary level students.

### Research Design:

**Methodology:** In this study survey method is used. The problem concerning this study is related to Hindi and English medium senior secondary Level Students (Boys and Girls) Sample and Sampling Technique: In this study stratified random and purposive sampling is used.

**Tool used:** A self made tool named “**value scale**” consists of 70 items in the forms of statements is used.

**Statistical Technique used:** For the analysis and interpretation of the data means (M), Standard Deviation (SD) and CR or t-Test are used.

**Statistical Analysis and Interpretation of Data:**

**Table 1**

**Mean scores of Hindi Medium Senior Secondary Level Boys and Girls on values**

Sample	No. of Students (N)	Mean (M)	S.D.	C.R.	Significance of difference at 0.05 level
H.M.B*	50	55.58	6.35	0.52	Not Significant
H.M.G.*	50	55.00	4.57		

\* Hindi Medium Boys \* English Medium Girls.

Calculated value of C.R. is 0.52 while the tabulated value at 0.05 level is 1.98 which indicates that the difference is not significant. Thus, we accept our null hypothesis that “there is no significant difference between the level of values among Hindi Medium Senior Secondary level boys and girls.”

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Table 2

## Mean scores of English Medium Senior Secondary Level Boys and Girls on values

Sample	No. of Students (N)	Mean (M)	S.D.	C.R.	Significance of difference at 0.05 level
E.M.B*	50	55.12	6.09	1.76	Not Significant
E.M.G.*	50	57.30	6.34		

\* Hindi Medium Boys \* English Medium Girls.

Calculated value of C.R. is 1.76 while the tabulated value at 0.05 level is 1.98 which indicates that the difference is not significant. Thus, we accept our null hypothesis that “there is no significant difference between the level of values among English Medium Senior Secondary level boys and girls.”

Table 3

## Mean scores of English and Hindi Medium Senior Secondary Level Boys on values

Sample	No. of Students (N)	Mean (M)	S.D.	C.R.	Significance of difference at 0.05 level
E.M.B*	50	55.12	6.09	0.37	Not Significant
H.M.G.**	50	55.58	6.35		

\* English Medium Boys \*\*Hindi Medium Girls.

Calculated value of C.R. is 0.37 while the tabulated value at 0.05 level is 1.98 which indicates that the difference is not significant. Thus, we accept our null hypothesis that “there is no significant difference between the level of values among English and Hindi Medium Senior Secondary level boys.”

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Table 4

Mean scores of Hindi and English Medium Senior Secondary Level Girls on values

Sample	No. of Students (N)	Mean (M)	S.D.	C.R.	Significance of difference at 0.05 level
H.M.B*	50	55.00	5.57	2.09	Not Significant
E.M.G.**	50	57.30	6.09		

\* Hindi Medium Boys \*\*English Medium Girls.

Calculated value of C.R. is 2.09 while the tabulated value at 0.05 level is 1.98 which indicates that the difference is not significant. Thus, we accept our null hypothesis that "There is no significant difference between the level of values among Hindi Medium Senior Secondary level girls and English medium senior secondary level girls."

Table 5

Mean scores of Hindi Medium students and English Medium students on values

Sample	No. of Students (N)	Mean (M)	S.D.	C.R.	Significance of difference at 0.05 level
H.M.B*	100	55.29	6.22	1.17	Not Significant
E.M.G.**	100	56.21	6.31		

\* Hindi Medium Boys \*\*English Medium Girls.

Calculated value of C.R. is 1.17 while the tabulated value at 0.05 level is 1.98 which indicates that the difference is not significant. Thus, we accept our null hypothesis that "There is no significant difference between the level of values among Hindi and English Medium Senior Secondary level students."

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**Major findings of the study:**

1. No significant difference was found between the level of values among Hindi Medium Senior Secondary level boys and girls students.
2. No significant difference was found between the level of values among English Medium Senior Secondary level boys and girls students.
3. No significant difference was found between the level of values among English and Hindi medium Senior Secondary level boys students.
4. A significant difference was found between the level of values among Hindi and English medium Senior Secondary level girls. The level of values is higher among English medium girls students than Hindi Medium Senior Secondary level girls students.
5. No significant difference was found between the level of values among Hindi Medium Senior Secondary level students.

**Education Implications of the study:**

A youngster isn't brought into the world with a bunch of values. He cannot inherit values from his parents. All values are acquired only after the birth of the child. The parents and the school authorities can organize various activities and functions for inculcating values among students some of them may be as follows-

1. The text books prescribed for the students should contain stories with certain moral lessons.
2. Prizes may be given to the deserving students for showing honesty, bravery, truth, etc. The prizes should be given to the students in social gathering.
3. The head of the institution and the teaching staff can play an important role to develop values among students through a number of programmes like educational tour, cultural activities, N.C.C., N.S.S., painting, exhibitions, book fair etc.
4. One religious book should be compulsory in all the institutions which should contain all religious moral thoughts. Morning assembly should be made compulsory in all the educational institutions. It can be of half an hour duration. A part from morning prayer, good thoughts may be read out by some students and staff members, religious (related to all religions) and national songs may be sung or such poems may be recited.
6. Good health is a source of happiness and prosperity so the institutions should organize physical exercise and yoga in the morning every day.

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- 7 An individual becomes a citizen when he feels that he is a part of the community and that he is there to share its burdens. In educational institutions, attempt should be made to give education for citizenship in order to promote the cause of liberty and democracy.
- 8 School ought to give exercises like discussions and conversations of the issues and issues of our nation like fake parliament. mock-panchayats, mock-congregations and so on In request to teach appropriate city values and perspectives.

### Suggestions for Further Study:

Some suggestions are given below for further studies:-

- 1 A study can be conducted by taking a large sample of secondary level students.
- 2 A comparative study can be carried out to check the level of values among Hindi and English medium secondary level students parents.
- 3 A study can be conducted to know the level of values among English medium teachers
- 4 A study can be conducted to know the level of values among Hindi medium teachers.
- 5 A comparative study can be carried out by taking the sample from Vidya Bharati's schools and Governments schools.
- 6 A comparative study can be conducted by taking sample from hill areas and plain areas.
- 7 A comparative study can be carried out to check the level of values among secondary level students of various states.
- 8 A comparative study can be carried out to check the level of values among secondary level students of various districts in U.P.
- 9 A comparative study can be carried out by taking the sample from Muslim schools, Christian schools and Vidya Bharati's school.
10. A comparative study can be carried out to check the level of values among secondary level students of B.P.L. (Below poverty line) and All (Above poverty line) families students.

  
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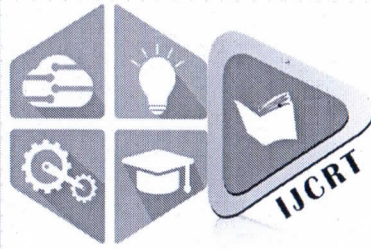
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## The Job of Harmony Training In Community Education in India

Dr. Pramod Kumar Rajput

Associate Professor

PG Department of Teacher Education  
IP (PG) College, Campus -2, Bulandshahr

Jugmaheer Gautam

Assistant Professor

Faculty of Teacher Education  
Shri Ram College, Muzaffarnagar

### Abstract:

Various struggles across the globe including India has prompted the misery, relocation and even demise of millions of youngsters, youth and grown-up because of political thuggery, rebellion, strict contentions, monetary implosions, hostility, hijacking, burglary, murder, etc., which represents an incredible danger to harmony. Harmony education assumes an extraordinary part in upgrade of harmony and public improvement through one or the other formal, non-formal and casual training. Harmony education is pointed toward creating trust, security and social attachment inside networks and look to impact perspectives and behaviours through advancement of upsides of harmony and resilience. The term harmony training covers a few regions like promotion, regulation, change, fundamental instruction and social judges.

**Keywords:** instruction, harmony education, community, community advancement

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### I. Introduction:

It is obvious that no community, state or Nation can accomplish a quick development where it is confronted with series of emergencies and clashes; it is on this reason that, harmony training is upheld as the premise of improvement locally. Beginning around 1960, India as a country has experienced various types of savagery going from intercommunal, to strict, hostility, Islamic factions, banditry, etc. There is a becoming simultaneous among researchers that, these emergencies are upheld by sad disappointments in administration and democratization by our political chiefs (Alabi, 2007).

Epelle (2011) contended that, a majority rule government has expanded the way of life of exemption in some political office holders, while political contrasts are accepted to have powered a portion of the viciousness and clashes that have emitted in India. In May 1999, when India got back to vote based rule, the political progress was invited with new expectation and good faith. This new expectation was predicated on the way that, a majority rules system would ensure work for the jobless young people, opportunity for the minimized gatherings, freedom, regard for a few tumults, help to the unfortunate masses and enthronement of an economical harmony that would upgrade fast public advancement.

Unfortunately, this trust is by all accounts a nebulous vision as India is as of now compromised with emergencies and clashes going from horrendous conflicts between the Fulani herders and the host networks in Agatu, Logo and Gwer nearby government areas of Benue State, ethno-strict emergency in (Jos) Plateau State, common turmoil occasioned by the exercises of the Oduduwa People's Congress (OPC) in the South-Western India, psychological warfare and rebellion executed by Islamic strict gathering (Boko Haram aggressors) in the North East of India among others (Annan and Danso, 2013).

That's what the most disturbing issue is, religion which teaches harmony and love, and ought to be on the vanguard of keeping up with harmony and struggle free society, has itself, become one of the significant

\*Corresponding Author: Dr. Pramod Kumar Rajput

reasons for struggle in India. This is described by unfeeling bombarding of spots of loves, homes, markets, parks, schools and hostagetaking by the Islamic assailants.

However, the Government, Military, and NGO's have put forth impressive attempt to checkmate these emergencies and viciousness through a few harmony gatherings and cycles. Regardless of these honourable endeavors, brutality and clashes have kept on rising cosmically in limits and widths of India. It is on this reason that this paper inspected the significance of harmony instruction as an apparatus for community improvement.

### **Idea of Education**

The word training is gotten from the Latin word 'educare' significance to draw or lead, to direct, and to educate (Bass, 2012). Okafor in Nzeneri (2012) characterizes training as to embrace all encounters through which an individual gets information or thoughts, fosters his mind and fortifies his will.

Aminigo (2002) sees training as a cycle that fosters the human psyche, the character, the possibilities and instills helpful and pertinent abilities to people subsequently upgrading the development of the general public. It readies the human brain to empower it adapt to future difficulties by meeting people and public requirements being the means through which social change can be accomplished and the means through which required social change can be presented. There are three types of training, formal, casual and non-formal in however it is being obtained, it stays a stunner and a freeing force. Freeing man from limitation, from obliviousness and from abuse. It is an extraordinary bringing together power for people, networks and the countries at large.

Ogunode (2020) characterizes the term training as an empowering organization by which the Africans could restore their self-assurance, and make the people who questioned the humankind of Africans start to reexamine their perspectives and figure out how to regard Africans. In this way, education is a way of preparing given to a person that makes him/her helpful in the community or setting they track down themselves.

Ogoh (2008) considers education to be the methodical course of procuring information for the advantages of person what's more, society in general. That's what he battles, the idea of instruction should give the development of a wide partnership of entertainers, which can all in all handle issues connecting with minimization, treachery, narrow mindedness as well as savagery.

Education as revered in the National Policy on Education (NPE) report should be visible as an instrument for change for the country overall, given its grand objectives (Federal Republic of India, 2004). For reason for explanation, the objectives are framed as follows; a free and majority rule society, just and libertarian culture, joined together solid and independent country, incredible and dynamic economy and land loaded with brilliant open doors for all residents (FRN, 2004).

It depends on these objectives that the Federal Government of India in 2012 kept up with that, training is a genuine apparatus for social change, National combination and improvement. Instruction should look to advance harmony, kinship, normal qualities, civil rights, equivalent open door, regard for nature and resistance as this will become instrument of freedom and liberation of individuals from the grasp of clashes and viciousness. Vitality, instruction is normally custom fitted to address the issues of a grown-up who is willing to get a sense of ownership with his advancing necessities. Learning groundbreaking thoughts is critical to human and worldwide advancement as information is power and the ability to achieve positive change in the manner grown-up thinks, acts and obviously perspective about individual human. The idea of education implies, a training where students participate in deliberate and supported self-teaching exercises to acquire new types of abilities, information, perspectives or values (Meremi, 2002). The focal implication here is, the securing of new inspirational perspective and values on the most effective method to relate maturely and calmly with others.

Without a doubt, the derivations gathered from the different talk above, surmised that, the objective of training and of course, harmony instruction might be for the development of the general public to empower its residents stay aware of cultural change what's more, keeping great social control. Harmony training in India as of now, is equipped towards public advancement. The goal of the course of education and public improvement is to get the residents either as individual or gathering (shared) to learn and through learning, they secure solid changes in their perspectives and behaviour. The focal thought here is "helpful change in mentality and behaviour" to a responsive resident that is destined to be valuable to the individual and society at large. Be that as it may, education establishes an empowering climate vital for serene concurrence and public turn of events.

This idea is obviously caught in the National Policy on Education which sums up the goal of education as the need might have arisen to be pertinent in his general public. In such manner, education is imagined as a genuine instrument of fostering the human brain, information, mentality, abilities, behavioural example and fundamental thoughts fit for taking care of human and social issues to accomplish serene concurrence.

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### **What is Peace?**

To have a profound comprehension of the issue, realizing its actual meaning is essential. Harmony is utilized in a wide circle. It appears to be that harmony has various implications that are different as per the setting of utilization. In a real sense, the word harmony is gotten from the Latin word 'pax', and that implies a settlement, a control or consent to end war or any debate and struggle between two individuals, two countries or two opposing gatherings of individuals. (Bloomsbury, 1995). Harmony could likewise be viewed as a tranquil and quiet perspective. Arrangement and amicability among individuals. A condition of safety or request inside a community given by regulation or custom.

Albert Einstein sees harmony as a shortfall of war, yet incorporates the presence of equity, regulation, request or government in the general public (Vesilind, 2005). Martin Luther depicted harmony as the shortfall of the miserable circumstances. In his view, harmony should incorporate equity in the public eye too as in his adage genuine harmony isn't only the shortfall of pressure: It is the presence of equity. (Coretta, 2008).

### **Community Development:**

Like the idea of society, the idea of community is approximately characterized and utilized in sociologies. It is a term having various implications both humanistic and non-humanistic. It is utilized to allude to a wide assortment of explicit social units. In like manner speech, the word 'community' is utilized for an assortment of individuals who do related sorts of work, for example, the "instructors community" or the "specialists community". It is likewise used to mean an assortment of individuals who share something in like manner as the "Hindu people group", the "Parsi people group", or the "Christian people group" without essentially living in a specific region. Once in a while, it is utilized to portray as far as anyone knows intelligible gathering, for example, 'worldwide community'. Such free utilization of the word community is generally deluding and demonstrate just to nebulous mass.

The term has been utilized in the humanistic writing to allude straightforwardly to sorts of populace settlements, like country community or metropolitan community, to evidently ideal-normal lifestyles in such places; and to informal organizations whose individuals share normal qualities separated from or notwithstanding normal area. It has likewise been utilized to concentrate essentially social contrasts as customary networks and modern networks.

A nineteenth century social scientist, Tonnies, sees it "as a natural, 'regular' sort of friendly collectivity whose individuals are bound together by a feeling of having a place, made out of ordinary contacts covering the entire scope of human exercises". which is deliberately coordinated for explicit purposes and whose individuals are bound together by normal guidelines or interests. Frankenberg in Onyeozu (2007) characterizes community as a regionally limited social framework inside which individuals live, sharing normal social, financial and social qualities. Louisiana people group organization (2021) sees community as individuals who live in similar territory, share normal interests, together own or partake in something, share normal qualities or have common connections. Oni and Bello in Onyeozu (2007) recorded four attributes of community as

- Populace, whatever the size
- Topographical limits, whatever the size
- Normal financial issues or attributes like destitution or abundance, exceptionally industrialized or rural, lacking infrastructural or having heaps of infrastructural offices, profoundly mingled or extremely indifferent.
- The sensation of unity among individuals or an incredible feeling of having a place, which empower them to seek after shared objectives like improvement of individuals and their actual climate.

A people group might have in excess of an ethnic gatherings, which might have various lifestyles, the social and financial issues which they face and corporately settle stays the normal security that integrate them.

While improvement is a consistent course of positive change in the quality and length of life of an individual or gathering of people. It is dynamic as in it includes a change from one condition of condition to a superior condition of condition, an improvement or positive change as such contributory elements are financial, social, political, mechanical, social, harmony and so on. Improvement as per Louisiana people group network connected with understanding possibilities, development or extension of something or making something more powerful. Community improvement implies the demonstration of developing, growing or making more viable gatherings who have normal interest.

Mbuba (2021) characterizes community advancement as cycle where community part meet up to make an aggregate move, produce answer for normal issue and work on the different parts of the community zeroing in on major areas of strength for building versatile community. Improvement could likewise be viewed as the change of social, social, financial improvement of a community to an ideal standard that would make the occupants of such community agreeable.

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### **Outline of Peace education**

By and large, harmony education is the most common way of obtaining the qualities, information, mentalities, abilities and ways of behaving to live as one with oneself, others and the regular habitat (UNESCO, 2014).

UNICEF (1999) considers harmony training to be a course of advancing the information, abilities mentalities and values expected to achieve conduct changes that will empower kids adolescents and grown-ups forestall struggle. calmly also, make the condition helpful for harmony, whether at an intra-individual, between private, between bunch, public or on the other hand worldwide level.

Grown-up teachers render administration leading backing visits to different networks and starting discussions and conversations on components of harmony training and keys for advancing harmony and peacefulness. Harmony training as interaction including abilities, including tuning in, reflecting, critical thinking, participation and compromise. The cycle includes enabling individuals with the abilities, perspectives and information to make a protected world and fabricate a feasible climate. The way of thinking of harmony educates peacefulness, love, empathy and adoration for all life. Harmony training is shown in a wide range of settings from nursery school to universities and then some. Local gatherings show harmony instruction to grown-up and youngsters (Harris and Morrison 2003).

The Asian gathering on education (2013) on harmony training, community advancement and public thriving illuminates that the partook understudies announced the accompanying ten most significant learning result in their declarations.

1. Creating social connection on more profound level, the right to speak freely of discourse, no biases.
2. Building extensions and limits with others in light of normal places.
3. Regarding others in any event, while contradicting them or misreading them.
4. Partaking in living respectively enduring as well as completely embracing the others.
5. Broadening information about other strict tolerating various thoughts and discernments.
6. Valuing variety, common freedom and ladies' right.
7. Significance of exchange for tackling issues.
8. There is tire need to convey regardless of whether we are distinction. Distinction doesn't mean clash.
9. Variety doesn't need to prompt debate yet to concurrence and regard.
10. What makes a difference is our insight and conduct in any case what we have faith in.

Harris and synot in Ugwu and Mbalisi (2016) illuminate that harmony training ought to stress the craving for harmony, peaceful option for overseeing clashes and abilities for basic examination of underlying game plans that produce and legitimize equity, correspondence and bring issues to light on common freedoms. This show that harmony education teach in the students abilities, information, values, and perspectives that block viciousness, shameful acts and advance culture of harmony.

Ogoh (2008) attests that, harmony education teaches in the students, the requirement for aggregate liabilities, which should incorporate great administration by the political authority and successful faithfulness by individuals. In this association consequently, it is proposed that, harmony training ought to be consolidated in the National Education Reforms and Curriculum Reviews as a different subject-content, not the same as municipal and citizenship education.

The consideration of harmony training in our public school educational plan will empower the students to decipher information, abilities, values and demeanor gained through formal, non-formal and casual growing experience right into it to empower participation among individuals. Harmony instruction as per UNICEF (2010) ought to be important for each nation's school educational program content. The ramifications of this order by UNICEF is that, harmony education ought to have a spot in all social orders, not just in nations that are going through equipped struggles and crises.

Harmony education endeavors to chip away at the students' brain against the malicious impacts of savagery by instructing abilities that are essential for overseeing clashes in a peaceful way, subsequently making the longing to look for quiet goals to clashes. This likewise includes the comprehensive course of instructing and figuring out how to stop savagery by fostering a harmony cognizance that can give the premise to an equitable and supportable future.

Toward this path, the Global Peace Educators (UN) play a significant part to play in tending to and fighting contentions and savagery in the worldwide community. Harmony teachers have extra time represented a 3-way test questions consequently, must it be like this? Aren't there peaceful approaches to settling struggle among individuals? How would we get to these alternate ways? In the event that these inquiries are appropriately taken care of, harmony will be engraved effectively in the personalities of residents and in the hearts of world pioneers forever.

Harmony instruction frequently addresses the wellsprings of quick contentions and gives the information and procedures to battle these struggles for tranquil concurrence. Harmony education has both long and transient objectives. Taking a gander at the drawn out objective, it will in general form in the student's

psyche a guarantee to participate in peaceful exercises from young age to adulthood. While on the momentary objectives, harmony instruction empowers students to basically investigate the very main drivers of savagery, wars, and clashes and foster options in contrast to viciousness (Kadiri, 2007). Harmony education assists with bringing harmony and concordance into the personalities of the young people, kids, and grown-up for quiet concurrence and economical public turn of events. There is a change in perspective in the educating and learning of harmony education as of late. In the start of the 21st hundred years, the mainstays of harmony development (The UN) moved consideration from natural training with its orderly outcomes in biological fiasco to harmony education with a serious worry of settling common and abusive behavior at home through compromise education.

Curiously, this large number of various types of harmony training have shared objectives with regards to instructing and learning the foundation of savagery and taking on techniques for economical harmony development. In any case, the significant fundamental of harmony training is to address the intricacy of contention through strengthening, backing, peaceful interventionism, de-radicalization of aggressors gatherings, giving accentuation to esteem re-direction and influence through the instrumentality of harmony education. It is trusted that, when harmony training is successfully educated, it will address the avoidance and goal of all types of contentions and savagery, in this way finishing the pattern of viciousness and emergency in our nearby networks and society, and obviously at the worldwide community.

#### **Motivation behind Peace Education:**

The motivation behind integrating harmony training into the educational program at essential, optional, grown-up proficiency schools and promotion in networks is to raise the familiarity with harmony as a solid ideal for youngsters, youth and grown-up to try to better the social climate in the countries.

To persuade the students to assume liability of their own way of behaving and activities; to deal with compromise and settle on great manageable decisions in their ordinary climate that adds to a tranquil concurrence. This is an essential for a decent growing experience.

#### **Significance of Peace Education:**

1. Harmony instruction is significant for everybody, except especially for youngsters who are as yet fabricating their character and the qualities they hold. At the point when youngsters are instructed to be tranquil, it permits them to be a positive good example for grown-ups around them.
2. Harmony training can be a fundamental piece of education due to the monstrous effect it has on understudies in their homeroom and in the networks around them.
3. At the point when we show youth the worth of harmony alongside the abilities they should be sound struggle resolvers, we outfit the cutting edge with the devices they should be a general public that values relationship over rivalry and prosperity over accomplishment, When these qualities are shared, some voice worry that society is turning out to be delicate and unmotivated to succeed, however when we work with people around us to team up, we can accomplish more prominent things while as yet keeping up with our individual and aggregate wellbeing.
4. Harmony training can give youth substantial abilities to use in bunch work and in discussion with everyone around them so they are partners rather than rivals in school and then some.

## **II. Conclusion:**

The coordination and implantation of a powerful harmony training program in the public school educational plan and harmony support in networks are unavoidable, given the high paces of revolt, social shamefulfulness, common conflicts and hostility in our networks in India. The training system would fill socially valuable need to plan, residents to effectively partake during the time spent social, social and financial advancement. Harmony instruction contributes decidedly towards building a culture of harmony, fortitude and resiliences inside a structure of multi-identity, social and phonetic variety. Where the substance of harmony training and compromises are taught and too rehearsed by people, there will be material degree of improvement to advance public safety and improvement in networks and the country at enormous, there should be harmony which advances a climate of resistance, uniformity, judges, amicability, reasonableness, conjunction and common turn of events.

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**IQAC, Shri Ram College**  
**Muzaffarnagar**

**Chairman**  
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Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

  
Chairman  
IQAC, Shri Ram College,  
J Palis Muzaffarnagar  
Editor-in-Chief,  
Strad Research

## The Study of Use and Effectiveness of Teaching Aids at Upper Primary Level in Science Teaching

Dr. Pramod Kumar Rajput  
Associate Professor

PG Department of Teacher Education  
IP (PG) College, Campus -2,  
Bulandshahr

Jugmaheer Gautam  
Assistant Professor

Faculty Of Teacher Education  
Shri Ram College, Muzaffarnagar

### Abstract

Having the force of reasoning, man has been interested about whatever he might not comprehend. He is constantly, intrigued to realize whatever occurs around him. To find the solutions of his inquiries, man attempt to procure information, Information can be gained from various sources. Information might be methodical or non-precise. In the more extensive sense any orderly information is known as Science. Prior just physical science, science and math were considered as science yet presently a days sociologies, financial matters and so on are otherwise called a piece of science. At the point when we in a real sense go for the significance of science the term science emerges from the Latin word 'SCIRE' which means to be aware. Science is known as the orderly and coordinated group of information (Mangal 1990) and the means of knowing universe through information gathered by perception and controlled trial and error (Singh and Nayak 1997). At the point when the technique for educating was controlled, no huge contrast between the accomplishment of young men and young ladies was found who were instructed either with the utilization of showing helps or without the utilization of educating helps. In this manner, one might say that it was the utilization of showing helps which has affected the accomplishment level of the understudies and their sex no affects their accomplishment.

Keywords: Effectiveness, Teaching Aids, Knowledge, Teaching etc.

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

### Introduction:

As Narendra Vaidya Composes, The portrayal of science as a collection of organized information likewise lacking on the grounds that it is quiet on its procedure and nature of development. It is the information which is all around as level headed as the prevailing conditions permit it as than specific second. It worldview more forward while looking in reverse. It is consistently open to scrutiny. It is in this way, a human movement and mentality for unfurling the secrets of nature (Vaidya 1999, P. 58) As per Cedric Griggs (1960), "Science infact is in excess of a subject. It is a technique for getting information and of need the methodology should be remedied".

To make sense of the significance of science a few significant definitions are cited beneath -

The columbia Encylopedia characterizes science, as, "a collected and arranged learning overall use limited to normal peculiarities".

As indicated by Einstein, "Science is an endeavor to make the choatic variety of our sense experience compare to uniform arrangement of thought coherently."

As per W.C. Dampier, "Science might be characterized as requested information on regular peculiarities and the normal investigation of the connection between the ideas in which those peculiarities are communicated".

In this manner from the above meanings of science it is all evident that science isn't just a subject however it is a method for grasping the world. It is a method for procuring the information with the assistance of logical strategy. Here it is critical that every single information isn't science however the information procured exclusively by logical strategy is considered as science.

Since, we are living during a time of logical and innovative progression everyone ought to have some essential information on science for making a viable and valuable commitment to life at any rate. Taking into account this, Science has been remembered for the school educational plan beginning from essential stage.

About this need Richardson (1959) states, "Logical education is required most importantly by every individual from a culture, for example, our own that is so completely founded on innovation and logical Undertaking. We trust that to pursue powerful choices in private, Urban and public undertakings, the residents should have a few information on cycles and item by which he is taken care of and dressed, engaged and enlivened and protected from foes, unfamiliar and homegrown".

**Co-ordinator**  
**IQAC, Shri Ram College**  
**Muzaffarnagar**

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

In such a period of quick logical progression everyone should have some information on science, on the grounds that for guaranteeing government assistance of individuals, a nation needs to embrace many program for accomplishing expanded rural creation, industrialization, local area improvement including different social administrations furnishing individuals with better nourishment, better houses, legitimate dress and further developed wellbeing. For execution of these projects an exceptionally huge number of researchers and professionals are required.

As Richardson (1959) says, "Science is instructed in light of the perceived requirement for general logical education, our reliance upon researchers and designers and the worth that we place upon decisive idea". Since, we are living during a time of fast change.

Since, India is a non-industrial nation, so the developing requirement for researchers, specialists and technologists in our nation has made it even more basic to give a science-based training. As the optional training commission (1953) has suggested, "Each optional school student ought to concentrate on broad science as an obligatory subject, so he acquires a fundamental quantum of logical information as a piece of his overall training, for instance, it is not difficult to set up another production line and the occupation can maybe be achieved with help from a high level country in a couple of years. In any case, it requires a lot more years to prepare the right kind of man who can deal with this production line, so there is an earnestness for creating researcher, designers and technologists in an emerging nation like India, which is conceivable just when science is given significant spot in with the assistance of the significant spot of science in school educational plan. Auxiliary school stage is the fitting stage for the inception representing things to come researchers. For this the Kothari commission likewise has suggested (1964), "At the optional level, science as the discipline of the psyche and the groundwork for advanced education merits an exceptional accentuation. One more significance of science in school educational plan lies in making an illuminated citizenship and in preparing our residents to comprehend the logical world wherein we live as well as in getting ready enough of them to have the option to pass the outskirts of information important for adding new data expected to keep up with and grow science innovation, industry and the prosperity of man and our human progress. In our current school educational plan science has been given a significant spot and is made mandatory subject.

  
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Chairman  
IQAC, Shri Ram College,  
Muzaffarnagar



### IMPORTANCE OF TEACHING LEARNING MATERIALS IN SCIENCE

Educating is absolutely a scholarly movement which is invigorated by our faculties, i.e, by eye, ear, nose, tongue and skin which are the doors of information and experience. The essential weight of laying out all over contact between an individual and his environmental elements is carried by the faculties. Thusly instructing may likewise be portrayed as healthyscholarly movement of sense insight.

Sense insight is only initiating a singular's learning capacity and visual intensity and afterward remix both for mental imaging of a given reality. In this unique situation, the actual contraption which dazzle our sense discernment and assist with finishing up our reflective enquiries are called Showing Learning Materials.

Each second we are in steady connection with the physical, natural and social conditions and acquired assortments of encounters. learning through the receptors. So we learn numerous things through direct or coordinate encounters. Learning through direct experience becomes long-lasting, that is one recollects that it all through their life.

Hence Showing Learning Materials in Science utilitarian sense might be characterized as the educational material, hardware or gadgets which help an educator in powerful acknowledgment of his instructing dispassionately by calling upon the hear-able and visual feelings of his understudies.

### NEED AND IMPORTANCE OF TEACHING LEARNING MATERIALS IN TEACHING AT UPPER PRIMARY LEVEL:

Showing Learning Materials to the educators and the students expects to furnish fundamental abilities and information alongside the teaching of appropriate interests and perspectives among them for the successful use of the general media help material and supplies during the time spent instructing and learning. The need and significance of granting Showing Learning material instruction to the instructors as well as, understudies really rest with the multimensional pertinence and purposes that can be served through different kinds of Showing Learning Materials.

*[Signature]*  
Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

*[Signature]*  
Chairman  
IQAC, Shri Ram College,  
Muzaffarnagar

### 1. Clearness of the topic

Showing Learning Materials in Science are useful in carrying clearness to the troublesome and unique idea and peculiarities connected with different parts of science. Rather than endeavoring hard with the verbal encounters or clarifications. Assuming the educator utilizes some proper guide material, he can make the things more understood and significant to his understudies in regards to any subject. For instance, if while making sense of the development and working arrangement of the cycle siphon, water siphon, eye, ear and so on, an educator utilizes some fitting guide materials as diagrams, models, photos he can make the things more understood and significant to his understudies.

### 2. Accommodating in the positive exchange of learning and preparing

What is realized by the understudies in various subjects all at once might be supposed to be significant provided that it tends to be used by them in their between related ideas with different subjects or meeting their everyday requirements and tackling the issues of their life utilization of Showing Learning Materials help toward this path by making conceivable the fitting positive exchange to gaining and preparing starting with one circumstance then onto the next.

### 3. Viable utilization of Showing Learning Material detects

In any plan of educating and learning the tangible impressions assume the vital part and for that reason faculties are normally named as the door of information. The utilization of showing learning materials during the time spent schooling give significant open doors to the students to utilize their five receptors i.e., eye, ear, nose, tongue and skin for acquiring important information and data.

### 4. Supportive in creating interest and consideration

Interest as well as a consideration are supposed to be the critical variables during the time spent instructing and learning. Showing Learning Materials help in eliminating the weariness and dullness of the study hall by change up the homeroom exercises. They likewise demonstrate a generally excellent consideration in getting gadget. The understudies check out tuning in and watching the things and occasions told that appears through these guides and in

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this manner a reasonable learning climate including the interest and consideration of the students can be appropriately made using showing learning materials.

#### **5. A decent substitute for direct encounters**

The base of all understanding reasoning and demeanor arrangement lies in genuine encounters and to that end experience is supposed to be the best educator. Out of the two sorts of encounters, immediate and circuitous, the previous has no equal. Nonetheless, while showing in the homeroom it isn't generally imaginable to give the direct immediate encounters to the understudies particularly in the circumstances when the articles are too huge, too little, excessively far concerning distance or time, excessively quick or excessively delayed to be caught for homeroom study. In such a circumstance, Showing Learning Materials give a decent substitute to genuine items or peculiarity for acquiring the significant encounters as sensible as could really be expected.

#### **6. Accommodating in lessening fiendish impacts of verbalism**

Viable learning relies on powerful correspondences language might have a critical impact in such correspondence yet may likewise produce a few difficult issues. Remarking upon the worth and fiendish impacts on this kind of correspondence (verbalism).

The utilization of Showing Learning Materials other than the utilization of printed and verbally expressed word might help the educator of different subjects in such a circumstance by giving an extra or elective media for successful correspondence with his understudies.

#### **7. Functioning as a decent persuading force**

Youngsters are very dynamic ordinarily and appreciate tuning in and noticing the things and peculiarities. Utilization of general media help material draws in them well to the homeroom exercises, fulfills the requirements of their urges, senses, fundamental and propels and consequently demonstrate a powerful spurring power to empower their learning conduct.

#### **8. Accommodating in demonstrating sufficient impressions or pictures**

Each experience acquired at the hour of learning has behind a picture or effect in the personalities of students. The viability of the learning relies on the nature of this picture or

  
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IQAC, Shri Ram College  
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impression Showing Learning Materials in Science give such encounters that make behind an extremely durable imprint as satisfactory impressions or picture and subsequently help to great maintenance and generally long-lasting learning.

#### 9. Giving support to the students

Showing Learning Materials in Science demonstrate viable supporting specialist by expanding the likelihood of the reoccurrence of the reactions related with them. The encounters are so much associated and connected with the important involved helps that the student get adequate support for keeping these encounters associated with quite a while. In addition the guides like program learning material, showing machines, PC helped directions and so on, are known for their job in giving sufficient all around controlled support to the student in his endeavors of self learning or auto guidance.

#### 10. Accommodating in addressing the requirements of remarkable

The utilization of general media supports Science subject might help the educator in gathering out of the unique learning prerequisite of the remarkable youngsters. For instance, the youngsters with learning hardships might be helped using different important visual guide material. Also those experiencing the visual troubles might be helped through. The sluggish students and intellectually restarted might be given substantial encounters through utilization of some very much outlined, basic and significant guide material and talented or virtuoso might be raised to a place of higher mental reasoning and working by the utilization of fitting showing learning helps.

#### 11. Supportive in the improvement of intellectual capacities

Addressing and reception of reading material technique in the class by the educator can't help in the appropriate improvement of the scholarly resources of the kids. It can just prompt job remembrance with respect to the understudies without having any knowledge and comprehension of the things and occasions. Then again the utilization.

Showing Learning Material is equipped for giving such learning amazing open doors which might mix the creative mind, thinking cycle and thinking force of the understudies. It might likewise require the creativity, imagination, imaginativeness and other higher mental

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exercises with respect to the understudies and consequently they help in the sustenance and advancement of the intellectual capacities of the understudies of rudimentary level.

#### **12. Supportive for proper study hall cooperation and instructive climate**

The outcome of a showing educational experience relies on the sound study hall collaboration and appropriate instructive climate of the class. Showing Learning Materials, through its wide assortment of boosts, arrangement of dynamic cooperation and sufficient encounters demonstrate accommodating in the foundation of appropriate instructive climate and sound study hall association for the successful acknowledgment of the showing learning goals.

#### **13. Supportive in taking care of the issue of indiscipline**

The issue of homeroom indiscipline in numerous ways has its underlying foundations in the disagreeable and unfortunate study hall climate. On the off chance that the students are kept latent beneficiaries of the information and are assaulted through outrageous verbalism, they will undoubtedly get exhausted, exhausted or lose interest in learning. A significant number of these in such a circumstance might produce indiscipline in the study hall. With the Showing Learning Materials, there is next to no degree left for the production of a detached dull and tiresome climate in the homeroom. Besides it gives an assortment imaginative channels to the understudies to use their colossal energy which may be in any case use for making naughtiness and making indiscipline in the homeroom.

#### **14. Accommodating in creating request propensity and logical disposition**

Utilization of the Showing Learning Materials during the time spent educating and learning might help the educators of rudimentary level In creating request propensity and developing logical mentality among his understudies. Subsequently they never again stay a uninvolved audience and don't completely accept that just in here saying however attempt to notice and trials these realities through there own speculations arrived at using Showing Learning Materials.

#### **15. Accommodating in the fulfillment of individual contrasts**

Wide individual contrasts are found among the students of essential level as far as their capacities to learn and the techniques for learning. Some are ear disapproved, some can

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advance effectively through impersonation, while other inclines toward self endeavors and self doing. Subsequently there emerges an incredible need of meeting such changing prerequisites of the student. Showing Learning Material might help the educator at rudimentary level in this present circumstance by fulfilling the prerequisite of the student. Concerning individual contrasts among the various kinds of understudies.

### CLASSIFICATION OF INSTRUCTIONAL AIDS FOR TEACHING LEARNING MATERIALS IN SCIENCE

Educational Innovation alludes to the deliberate utilization of classification of Informative material. As a substitute of direct insight, we utilize a wide assortment of informative guides materials and supplies in the field of training. For acquiring understanding of these guides and types of gear they might be grouped in as given underneath.

#### The Main Methodology:

##### (I) Visual Guides

In this class we might incorporate those helps which call upon the visual faculties and hence assist the students with learning through survey. For accommodation this class might be additionally partitioned in following classifications.

##### (ii) Projected Aids

Under the projection help class we incorporate all such visual guides, materials and supplies that can be used for acquiring data about an item or occasion by getting it projected on a screen.

##### (iii) Non-Projected Aids

Under the non projective and class we incorporate such visual guide materials and supplies that help us in advancing straight by approaching our visual faculties without being fundamentally projective the connected items and occasions on same screen. For instances of such guides are blackboard, feltboard, pictures, graphs photos, banners, maps, globes, models, example and course book delineations and so on.

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## OBJECTIVES OF THE STUDY

The objectives of the study depend on the frame work of the problem. The problem attempts to find out the effectiveness of teaching aids used in science teaching as compared to the traditional method. (Usual Chalk and talk method.)

1. To Find out the relative effectiveness of the two methods of teaching viz. teaching through the use of teaching aids and teaching without any use of teaching aids i.e. through traditional method in science teaching to the students of VIII class.
2. To study the relative effectiveness of two teaching methods in relation to sex of the students of Class VIII.
3. To assess the impact of two methods used for teaching science and their effectiveness in relation to different boards of Examination i.e. C.B.S.E. Board, U.P. Board and I.C.S.E. Board.
4. To Know the impact of various teaching aids in science teaching.

## HYPOTHESIS

A hypothesis is an informed guess or inference with a reasonable chance of being right, formulated and tentatively adopted to explain observed facts or conditions and to guide in further investigations. Charles Darwin Said, "Without speculation there is no good and original observation". To give empirical shape to any stage and before making any decision about the design of experiment. It is essential to make a tentative solution of the problem.

The following hypothesis were formulated and tested -

1. There is no significant difference in teaching science without the use of teaching aids and with the use of teaching on the basis of achievement of the students.
2. There is no significant difference in the achievement of boys and girls taught without teaching aids and with teaching aids in science teaching.

  
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## METHOD OF STUDY

The purpose of the present study was to know the effectiveness of teaching aids used in science teaching in relation to the traditional method of chalk and talk. Since it involves conduct of an experiment therefore the experimental method with Two Group Randomized subjects, Post test only Design has been used.

## SAMPLE:

Following table shows the number of sample selected after measure.

S.No.	Board	School	Total Number of Students	Students Selected
1.	C.B.S.E.	K.V. No. 2	67	65
		S.S.M.V.	68	66
2.	U.P.	St. H.N. Public School	64	60
		St. Paul Public School	63	61
3.	I.C.S.E.	Holy angels	66	60
		Don & Dona Public School	50	48

## TOOLS USED FOR THE STUDY

**Ahuja's Group Test of Verbal Intelligence** - This test was constructed and standardized by Dr. (Mrs.) Pramila Ahuja specifically for children of English speaking areas. This test has been found to be most suitable to satisfy the sample chosen under study.

## STATISTICAL TREATMENT

In order to compare the effectiveness of teaching with teaching aids and teaching without teaching aids t-test was applied. As the matched group design in used to compare these two groups the formula for t-test was used accordingly.

## ANALYSIS AND INTERPRETATION OF DATA

The present chapter deals with the analysis and interpretation of data obtained from the experimentation. The researcher has attempted to analyze the effectiveness of use of teaching aids in Science teaching on the achievement of students and also to see whether sex play significant role regarding the enhancement of achievement or not. The data was analyzed with the help of 't' test.

**Co-ordinator**  
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**IQAC, Shri Ram College,**  
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For the sake of convenience the data has been analyzed in three phases.

- Phase I - Comparison of C.B.S.E. Board students taught with teaching aids (experiment group) and without teaching aids (control group)
  - Part A - Comparison of total students of control and experimental group
  - Part B - Comparison on controlling the sex and varying the method of teaching
  - Part C - Comparison on controlling the method of teaching and varying the sex
- Phase II - Comparison of U.P. board students taught with teaching aids (Experimental group) and without teaching aids (Control group)
  - Part A - Comparison of total students of control and experimental group
  - Part B - Comparison on controlling the sex and varying the method of teaching
  - Part C - Comparison on controlling the method of teaching and varying the sex
- Phase III - Comparison of I.C.S.E. board students taught with teaching aids (Experimental group) and without teaching aids (control group)
  - Part A - Comparison of total students of control and experimental group
  - Part B - Comparison on controlling the sex and varying the method of teaching
  - Part C - Comparison on controlling the method of teaching and varying the sex

**PHASE-I**

Comparison of C.B.S.E. Board students taught with teaching aids (experiment group) and without teaching aids (control group)

**Part - A**

Comparison of total students of control and experimental group

**Table-I**

Mean scores on achievement test scored by students of control group and experimental group of C.B.S.E. Board.

Subjects	N	M	S.D.	't'
Control group*	65	11.10	2.07	5.45
Experimental group**	66	13.43	2.17	
				Significant

\* Control group - taught without teaching aids.

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\*\* Experimental group - taught with teaching aids.

In above table, mean and S.D. of control group is shown as 11.47 and 2.07 respectively where as of the experimental group, the values are given as 13.43 and 2.17 respectively. The calculated 't' value ( $t = 5.45$ ,  $p = 0.01$ ) was highly significant. It indicates that students taught with the use of teaching aids were able to understand the taught content more clearly. Therefore, the gain in achievement score of experimental group was higher than their counterparts who were taught without teaching aids.

### Part-B

Comparison on controlling the sex and varying the method of teaching

**Table-2**

Mean score on achievement test on controlling the sex and varying the method of teaching.

Subjects	Control group			Experimental group			
	N	M	S.D.	N	M	S.D.	't'
Boys	40	11.17	2.28	42	13.28	2.11	4.35 Significant
Girls	25	11.25	1.70	24	13.78	2.45	4.09 Significant

Table 2 shows the mean of achievement test scored by boys of control group and experimental group were 11.17 and 13.28 respectively. The difference in the mean value was found significant ( $t = 4.35$ ,  $p = 0.01$ ).

Similar findings were obtained for the girls of control group and experimental group, their mean scores were 11.25 and 13.78 respectively. The 't' value ( $t = 4.09$ ,  $p = 0.01$ ) is significant. These findings confirms that in teaching science subject use of teaching aids have played significant role in enhancing the achievement of the boys as well as girls. Thus it can be concluded that the sex of the student does not influenced their achievement in science.

### PART-C

Comparison on controlling the method of teaching and varying the sex.

  
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**Table-3**

Mean score on achievement test on controlling the method of teaching and varying the sex.

Subjects	Boys			Girls			
	N	M	S.D.	N	M	S.D.	't'
Control group	40	11.17	2.28	25	11.08	1.70	1.80 not significant
Experimental group	42	13.28	2.11	24	13.15	2.45	0.69 not significant

On varying the sex and controlling the method of instruction, the data shown in table 3 revealed that mean of scores on achievement test scored by boys and girls of the control group (taught without any teaching aids) were 11.17 and 11.08 respectively. On comparing these mean values no remarkable difference was yielded ( $t = 1.80, N.S.$ ).

Similar findings were obtained for the boys and girls of experimental group (taught with teaching aids). The difference in their mean value ( $t = 0.69, N.S.$ ) was found insignificant.

Thus, table concludes that there is no significant variation in the achievement of boys and girls when taught either without the teaching aids or with the teaching aids.

On making a comparison of table 2 and 3 it can be said that it was the use of teaching aids which has significantly influenced the achievement level of the students where as sex of the student has no impact on their achievement in science teaching. Thus, it can be concluded that girls can perform as better as boys can do.

**Phase-II**

Comparison of U.P. board students taught with teaching aids (Experimental group) and without teaching aids (Control group)

**Part-A**

Comparison of total students of control and experimental group

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**Table-4**  
Mean score on achievement test by students of control groups and experimental group of U.P. Board

Subjects	N	M	S.D.	't'
Control group*	60	11.25	1.69	8.61
Experimental group**	61	14.09	1.93	

\* Control group - taught without teaching aids.

\*\* Experimental group - taught with teaching aids.

In table 3 the mean achievement scores of control group and experimental group are given as 11.25 and 14.09 respectively. The difference in mean value was found significant ( $t=8.61$ ,  $p=0.01$ ). It concludes that teaching with the use of teaching aids is effective in science teaching. Use of teaching aids develops interest among the students and they are able to understand the subject matter quite easily.

#### Part-B

Comparison on controlling the sex and varying the method of teaching

**Table-5**

Mean score on achievement test on controlling the sex and varying the method of teaching.

Subjects	Control group			Experimental group			
	N	M	S.D.	N	M	S.D.	't'
Boys	43	10.69	1.69	45	13.84	1.73	7.87 Significant
Girls	17	11.47	1.68	16	13.62	1.31	4.08 Significant

It is evident from the data presented above in table that there is a significant difference in the mean score of boys of control group and experimental groups on achievement test ( $t=7.87$ ,  $p=0.01$ ).

In case of girls of control group and experimental group, significant difference in their mean scores ( $t=4.08$ ,  $p=0.01$ ) were obtained.

On comparing the boys or girls of control group and experimental group significant variation in their mean score on using teaching aids in teaching science was found. This

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**IQAC, Shri Ram College**  
**Muzaffarnagar**

**Chairman**  
**IQAC, Shri Ram College,**  
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infers that the use of teaching aids has influenced the level of achievement of boys as well as girls.

### Part-C

Comparison on controlling the method of teaching and varying the sex

Table-6

Mean score on achievement test on controlling the method of teaching and varying the sex.

Subjects	Boys			Girls			
	N	M	S.D.	N	M	S.D.	't'
Control group	43	10.97	1.69	17	11.42	1.68	0.19 not significant
Experimental group	45	13.84	1.73	16	13.62	1.31	0.96 not significant

When boys and girls were taught without the use of teaching aids no significant difference in their mean value was obtained ( $t=0.19$ , N.S.)

Consistent findings were obtained for the boys and girls taught with the use of teaching aids (experimental group) the difference in their mean value ( $t=0.96$ , N.S.) was found insignificant. This infers that the sex of the student does not influence their achievement in teaching science. Both boys and girls have scored almost similar mean values when taught either without the use of teaching aids or with the use of teaching aids in science teaching.

**Phase- III:** Comparison of I.C.S.E. board students taught with teaching aids (Experimental group) and without teaching aids (control group)

**Part-A:** Comparison of total students of control and experimental group

Table-7

Mean scores on achievement test by students of control group and experimental group of I.C.S.E. Board.

Subjects	N	M	S.D.	't'
Control group*	54	11.37	1.86	4.79 Significant
Experimental group**	54	13	1.67	

\* Control group - taught without teaching aids.

\*\* Experimental group - taught with teaching aids.

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It is clear from the table-7, that mean of scores on achievement test obtained by controlled group students and experimental group students are 11.37 and 13 respectively. The difference in the mean scores between these two groups was significant ( $t=4.79$ ,  $p=0.01$ ). This shows that use of teaching aids help the students to understand the concept clearly, when compared to the students taught without the use of teaching aids. Thus we can say that use of teaching aids is effective in science teaching.

**Part-B:** Comparison on controlling the sex and varying the method of teaching

**Table-8**

Mean score on achievement test on controlling the sex and varying the method of teaching.

Subjects	Control group			Experimental group			
	N	M	S.D.	N	M	S.D.	't'
Boys	39	11.34	2.06	39	12.57	1.94	2.71 Significant
Girls	15	10.86	1.40	14	12.72	1.80	2.98 Significant

In table 8 mean of achievement test scored by boys of control and experimental group were shown as 11.34 and 12.57 respectively. The 't' value ( $t=2.71$ ,  $p=0.01$ ) was significant.

Similar findings were obtained in case of girls of control and experimental group where significant difference in mean value was found ( $t=2.98$ ,  $p=0.01$ ).

Being a novice idea of giving instruction with the use of teaching aids it more effectively accepted by the boys and girls of experimental group and hence they had scored higher mean values than their counterparts who were taught without the use of teaching aids. It confirms that the achievement of both boys and girls are better when they are taught by using teaching aids.

**Part-C**

Comparison on controlling the method of teaching and varying the sex

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**Table-9**

Mean score on achievement test on controlling the method of teaching and varying the sex.

Subjects	Boys			Girls			
	N	M	S.D.	N	M	S.D.	't'
Control group	39	11.34	2.06	15	10.86	1.40	1.96 not significant
Experimental group	39	12.73	1.94	14	12.72	1.80	1.70 not significant

The above table 9 revealed that in control group the mean achievement of boys (11.34) as well as of girls (10.86) was found almost similar. The difference in the mean values was found insignificant ( $t=1.96$ , N.S.).

The mean of achievement tes scored by the boys and girls of experimental group were shown as 12.73 and 12.72 respectively. The 't' value ( $t=1.70$ , N.S.) was found insignificant.

From above, it can be said that when both boys and girls were taught either without the use of teaching aids or with the use of teaching aids no significant variation was found in their level of achievement.

Further, a perusal of table 8 and 9 revealed that the sex of the student does not affect their achievement level in Science, but it was the use of teaching aids in teaching science which has played significant role in enhancing their achievement level significantly.

Thus, from above discussion it can be said that the girls can perform as better as boys can in science.

#### CONCLUSIONS

In relation to the hypothesis formed for the achievement test, some were proved true others have been rejected. The data collected on the achievement test has indicated various facts about the effectiveness of use of teaching aids in science teaching. The findings of the study are summarized in brief as follows-

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1. When the students of class VIII were taught 'vegetative propagation' and 'Chemical cells' in science, either with teaching aids or without teaching aids, in both the cases significant difference was found in their achievement scores. The findings were found similar for all the students regardless of their sex.

Hence, it is concluded that use of teaching aids is quite effective for teaching 'vegetative propagation' and 'chemical cells' to class VIII students.

2. The first null hypothesis that there is no significant difference in teaching science without use of teaching aids and with the use of teaching aids on the basis of the achievement of the students was rejected. As significant difference in the achievement of students was found when they were taught without teaching aids and with teaching aids.

Thus, the researcher concluded that use of teaching aids is quite effective in improving the achievement level of students of class VIII in science teaching.

3. The second hypothesis that there is no significant difference in the achievement of boys and girls when taught without teaching aids and with teaching aids in science teaching have been accepted.

- a) When the sex of the students was controlled significant difference between the mean scores of boys and girls taught with the teaching aids was found in comparison to their counterparts who were taught without teaching aids.

- b) When the method of teaching was controlled, no significant difference between the achievement of boys and girls was found who were taught either with the use of teaching aids or without the use of teaching aids. Thus, it can be said that it was the use of teaching aids which has influenced the achievement level of the students and their sex has no impact on their achievement.

The above findings conclude that to provide the knowledge of 'Vegetative Propagation' and 'Chemical cells' to class VIII with teaching aids is more effective. The findings were found consistent for all the students regardless of their sex.

  
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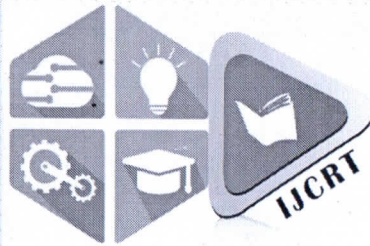


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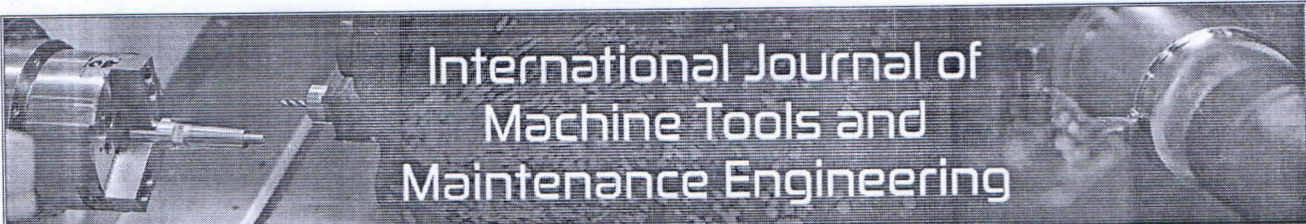
  
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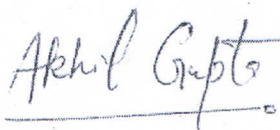
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Muzaffarnagar



## SOIL TEST BASE FERTILIZER RECOMMENDATION BY SOIL FERTILITY RATING FOR MAJOR FIELD CROPS AND VEGETABLES IN UTTAR PRADESH FOR FOOD SECURITY OF INDIA

Ashok Kumar, B.P. dhyani, Satendra Kumar, Yogesh Kumar, S.P. Singh,  
U.P. Shahi, Ashok Kumar and Bijendra Singh

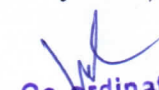
Sardar Vallabhbhai Patel University of Agriculture and Technology Meerut-250110

### Abstract

Production potential of a soil depends upon inherent capacity of soil to supply the nutrients, addition of nutrients through chemical fertilizers and organic and bio-sources. Continuous growing of crop since long time with imbalance use of fertilizers declined its use efficiency. Fertilizer application on the basis of soil testing rating has been the practices of farmers from the inception of green revolution. These recommendation are suitable for medium soil fertility condition irrespective of wide variation that occurs in soil fertility status. Hence under high or low fertility condition application of fertilizer become a wasteful expenditure or insufficient, respectively. In both the cases optimum fertilizer use efficiency cannot be achieved. Fertilizer recommendation on the basis of each value of soil test can be better approach than earlier approach. Under this study regression equation equating different soil test value and nitrogen, phosphorus and potassium dose to be applied in field are developed for different crops. To facilitates the analyst for the easy recommendation ready reckoner was also developed. With the help of equation and ready recknor, fertilizer recommendation for different crops and vegetables for each soil test value will certainly be economically cost effective.

### Introduction

India will require more than 333 mt food grain by the end of 2025 to maintain its food security. Agriculture production depends upon soil fertility, climate, genetic material (varieties) and crop management practices. Out of these soils fertility is most important factor. Liebig's law of minimum states that the growth of plant is limited by the plant nutrient element present in the smallest amount, all others being in adequate quantities. From this it can be concluded that knowledge about the nutrients status in soil is essential. Nutrient uptake and removal by crop is influenced strongly by the variety, season, nature and composition of the soil and the yield level. According to an estimate, to produce 4.6 tonnes grains + 6.9 tonnes straw, wheat crop in sub tropical Indian condition absorbed 128 kg N, 46 kg P<sub>2</sub>O<sub>5</sub>, 219 kg K<sub>2</sub>O, 27 kg Ca, 19 kg Mg, 22 kg S, 1.8 kg Fe, 0.5 kg Zn, 0.5 kg Mn and 0.15 kg Cu. Similarly to produce 1 tonne of paddy (rough rice), the rice crop absorbs an average of 20 kg N, 11 kg P<sub>2</sub>O<sub>5</sub>, 30 kg K<sub>2</sub>O, 3 kg S, 7 kg Ca, 3 kg Mg, 675 g Mn, 150 g Fe, 40 g Zn, 18 g Cu, 15 g B, 2 g Mo and 52 kg Si. A Pulse crop like chick pea producing 1.5 tonnes of grain remove 91 kg N, 14 kg P<sub>2</sub>O<sub>5</sub>, 60 kg K<sub>2</sub>O, 18 kg MgO, 39 kg CaO and 9 kg S/ha and 302g Fe, 57g Zn, 105 g Mn and 17g Cu/ha (2). In subtropical north India, the nutrient removal per tonne of mustard seed was 32.8 kg N, 16.4 kg P<sub>2</sub>O<sub>5</sub>, 41.8 kg K<sub>2</sub>O, 8.7 kg Mg, 42.0 kg, 17.3kg S per hectare and 123 g Fe, 100 g Zn, 95 g Mn and 17g Cu per hectare (2). In the past 50 years, advances in agricultural technology led to a quantum leap in food production of India. However, in many states this intensive crop production has depleted the soil jeopardizing scope of maintaining production in future. With a huge population that is projected to exceed 130 billion by 2050, compounded by competition for land and water resources and the

  
Co-ordinator  
IQAC, Shri R College  
Muzaffarnagar

  
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impact of climate change, our current and future food security depends farmers efforts to increase yields and food quality using the soils that are already under production today. Continuity of cereals based rotation like rice-wheat in recent days without judicious use of chemical fertilizer put agricultural sustainability and environmental safety under trouble. The response to fertilizers use has decreased from 17 kg grain /kg nutrient in 1951 to 5-6 kg grains/kg nutrients during 2017-18, which ideally should be in the range of 18-25 kg kg-1 nutrient. Data from farmers' fields (1999-2003) showed cereals responding around 8-10 kg grain kg-1 fertilizer (average). Traditional practices of organic manuring and growing of soil fertility restoring crops are no more in practice while nutrient outflows through intensive crop production indicated an apparent negative balance of nearly 10 million tons at the national level. The recovery of fertilizer nutrients is about 20-40, 15-20 and 40-50% for N, P and K, respectively while for secondary and micronutrients, it is substantially low ranging 5-12%. Major factors contributing to the low and declining crop responses to fertilizer nutrients are continuous nutrient mining from the soil due to imbalanced nutrient use (6:2.9:1 NPK) leading to depletion of some of the major, secondary and micro nutrients like N, K, S, Zn, Mn, Fe, B etc. Limited application of organic sources of nutrients such as FYM, compost and integration of green manures in the cropping systems leading to serious soil degradation qualitatively(1). Site specific nutrient management and use of customized fertilizers integrated with organic sources could be the best option to minimize the multi nutrient deficiencies and similar problems arising due to application of imbalance chemical fertilizers and maximize the sustainability and farmers income by reducing the cost of production and finally food security of India (6).

Soil testing has been accepted as an unique tool for rational fertilizer use. It helps to assess the soil fertility status and recommend suitable and economic nutrient dose through chemical fertilizer and organic manure for different crops and cropping system (5). The soil testing and fertility management practices could be best option for sustaining crop production and balanced fertilization in Indian agriculture. Balanced fertilization is a key input for achieving the estimated food grain production goal of the country. A farmer who follows only the soil test

based fertilizer recommendations is assured of a good crop. Soil testing is essential and is the first step in obtaining high yields and maximum returns from the money invested in fertilizers. Several workers have documented many fertilizer adjustment equation for different crops under different climatic condition to prescribe the fertilizers .To facilitate the soil test laboratory of the Uttar Pradesh a ready reckoner and an equation for prescription of fertilizers is highly required . Present study is an attempt to develop equations and ready reckoner for different crops to prescribed fertilizers especially nitrogen, Phosphorus and potash on the basis of soil test.

## Material and Methods

Fertilizer recommendation by soil fertility rating concept has been used for the development of equations and ready reckoner for different crops and vegetables grown in Uttar Pradesh under this study. Generally fertilizer recommendations are based on multi location trials conducted with different dose of N,P,K fertilizers and their economic evaluation obtained at an optimum dose of a particular crop (Table-1-3).These recommendation are suitable for medium soil fertility condition irrespective of wide variation that occurs in soil fertility status . Hence under high or low fertility condition, the applied nutrients often prove to be wasteful expenditure or insufficient, respectively. In both the cases optimum fertilizer use efficiency cannot be achieved. In this approach , medium soil fertility is equated with general recommended dose (GRD) .Soil test rating based on soil fertility evaluation experiment( Muhr et al., 1965) are present in Table-4. Soil testing provides information regarding nutrients availability in soil which forms the basis for the fertilizer recommendation for maximizing crop yield. On the basis of soil testing results, the recommended fertilizer dose for the crop are modified for making fertilizer recommendations to the farmers. At low nutrients level (Table.4), the recommended fertilizer dose for the crop is increased by 25 % of general recommended dose (GRD), at medium level the GRD is recommended as such and at higher level of nutrient recommended dose is reduced by 25 % (3). However some states like Maharashtra is following 6 classes of the nutrient status (Table 5) Based on these classes the fertilizer dose for

Co-ordinator  
IQAC, Shri F College  
Muzaffarnagar

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IQAC, Shri F College,  
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different crops and vegetables grown in Uttar Pradesh have been estimated over general recommended doses and presented in table 6-8.

**Table-1.** General recommended dose for nitrogen for different crops and vegetables grown in Uttar Pradesh

S.No	Crops and Vegetables	GRD N
1	Sugar Cane , Hybrid tomato	180
2	Wheat, late potato, Hybrid paddy, Mentha	150
3	High yielding paddy, Hybrid maize, Composite maize, Mustard, Rajma, Timely potato, cauliflower	120
4	Basmati paddy, Desi maize, hybrid bajra, toria, tomato (high yield variety), onion, garlic okra, brinjal	100
5	Hybrid Jawar, Late wheat, yellow mustard	80
6	Barley	60
7	Deshi Bajra	50
8	Till	30
9	Ground Nut, soybean, Gram, Lentil, Pea, Arhar, Moong, Urd	20

**Table-2.** General recommended dose for Phosphorus for different crops and vegetables grown in Uttar Pradesh

S.No	Crops and Vegetables	GRD (Kg/ha)	
		P <sub>2</sub> O <sub>5</sub>	P
1	Sugar Cane , Hybrid tomato, Soybean	80	35
2	Hybrid paddy	75	32.8
3	Hybrid maize, composite maize, wheat, mustard, Gram, Lentil, Pea rajma, Mentha, potato, tomato (high yield variety), cauliflower, onion, garlic	60	26.2
4	Toria, okra, brinjal	50	21.8
5	Arhar	45	19.7
6	Basmati Paddy, Bajra, hybrid Jawar, Urd, Moong, Late wheat, Yellow mustard	40	17.5
7	Groundnut, Barley,	30	13.1
8	deshi Bajra,	25	10.9
9	Till	15	6.5

**Table-3.** General recommended dose for Potassium for different crops and vegetables grown in Uttar Pradesh

S.No	Crops and vegetables	GRD (Kg/ha)	
		K <sub>2</sub> O	K
1	Sugarcane, Late Potato, Hybrid Tomato	100	83.3
2	Timely Potato, high yielding Tomato, cauliflower	80	66.7
3	Hybrid Paddy	75	62.5
4	High yield Paddy, Maize hybrid & Composite, Mustard, Onion, Garlic	60	50.0
5	Toria, Okra, Brinjal	50	41.7
6	Groundnu	45	37.5

7	Maize local, Bajra Hybrid, Soybean, Wheat, Yellow mustard, Pea, Mentha	40	33.4
8	Paddy basmati, Rajma,	30	25.0
9	Deshi Bajra, Till,	25	20.8
10	Hybrid Jawar, Arhar, Moong , Urd, Barley, Gram, Lentil	20	16.7

**Table-4.** Rating limits for soil test values used in India

Parameters	Rating of soil		
	Low	Medium	High
Organic Carbon (%)	>0.50	0.50-0.75	> 0.75
Available N ( Kg/ha)	>280	280-560	>560
Available P ( Kg/ha)	>12.5	12.5-25	>25
Available K( Kg/ha)	>135 (Deficient)	135-335 (Sufficient)	>335
Recommendation	125% of GRD	100 % of GRD	75 % of GRD

**Table-5.** Rating limits for soil test values used in Maharashtra

Parameters	Rating of soil					
	Very low	Low	Medium Low	Medium	High	Very high
Organic Carbon (%)	<0.20	0.21-0.40	0.41-0.6	0.61-0.8	0.81-1.0	>1.0
Available N ( Kg/ha)	<140	141-280	281-420	421-560	561-700	>700
Available P ( Kg/ha)	<7.0 ( <16)	7-14 (16-32)	14-21 (32-48)	21- 28 (48-64)	28-35 (64-80)	>35 ( >80)
Available K( Kg/ha)	>100 ( >120 )	101-150 (121-180)	151-200 (181-240)	200-250 (241-300)	251-300 (301-360)	>301 ( >360 )
Recommendation	150-140 % of GRD	140-120 % of GRD	120-101 % of GRD	100-80 % of GRD	80-50 % of GRD	< 50 % of GRD

( Methods Manual, 8)

## Results and Discussion

Higher dose of fertilizer application at higher level of fertility is wasteful expenditure while inadequate recommendation at low fertility level may lead to yield loss. To improve income by avoiding extra expenditure or yield loss soil has been classified into 6 classes (Table 5) .Fertilizer dose for different crops have been calculated on the basis of 6 classes and presented in Table 6-8. Fifty percent fertilizer is either extra recommended or reduced with the very low or very high soil fertility.

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Muzaffarnagar

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Muzaffarnagar

Data presented in Table 6 shows that soil test value of OC (%) is inversely related with fertilizer dose for nitrogen. Additional 50 % nitrogen is recommended over GRD if the OC level is very low while 50 % nitrogen over GRD is reduced at very high level of OC . A regression equation was developed between OC (%) and dose of nitrogen to be applied in a crop. Different equation for estimation of dose for nitrogen and test value of OC (%) are presented in table 9. Through the equation we can calculate the dose of nitrogen required for a crop. Similar equation were developed by several workers (4, 7, 9).

Similarly data presented in Table 7 shows that soil test value of available P<sub>2</sub>O<sub>5</sub> kg /ha is inversely related with fertilizer dose for phosphorus. Additional 50 % P<sub>2</sub>O<sub>5</sub> is recommended over GRD with low available P<sub>2</sub>O<sub>5</sub> while 50 % P<sub>2</sub>O<sub>5</sub> is reduced over GRD with very high available P<sub>2</sub>O<sub>5</sub>. A regression equation was also developed between available P<sub>2</sub>O<sub>5</sub> kg/ha and dose of phosphorus to be

applied in a crop. Different equation for estimation of dose for phosphorus and available P<sub>2</sub>O<sub>5</sub> kg/ha are presented in table 10. Through the equation we can calculate the dose of phosphorus required for a crop. Similar equation were developed by several workers (4, 7, 9).

Similarly data presented in Table 8 shows that soil test value of available K<sub>2</sub>O kg /ha is inversely related with fertilizer dose for potassium . Additional 50 % K<sub>2</sub>O is recommended over GRD with low available K<sub>2</sub>O while 50 % is reduced over GRD with high available K<sub>2</sub>O. A regression equation was developed between available K kg/ha and dose of potassium to be applied in a crop. Different equation for estimation of dose for potassium and available K kg/ha are presented in table 11. Through the equation we can calculate the dose of potassium required for a crop. Similar equation were developed by several workers (4, 7, 9).

**Table 6.** Nitrogen Recommendation (Kg/ha) in different crops and Vegetables on the basis of Soil test report of OC (%) grown in Uttar Pradesh

OC %	Recommendation (% of GRD)	S Cane, Tomato Hybrid	wheat, Late Potato, Hybrid paddy , Mantha	Paddy high yield , Hybrid Maize / composite, Mustard, Rajma , Timely Potato, Cauliflower	Basmati Paddy , Maize, Hhybrid Bajra , Toria , Tomato high yield , Onion Garlic , Okra, Brinjal	Hybrid Jawar, late Wheat, Yellow Mustard	Barley	Deshi Bajra	Till	Groundnut , Soybean, Gram, Lentil, Pea, Arhar , Moong, Urd
		180 kg/ha	150 kg/ha	120 kg/ha	100 kg/ha	80 kg/ha	60 kg/ha	50 kg/ha	30 kg/ha	20 kg/ha
0.1	150	270	225	180	150	120	90	75	45	30
0.2	140	252	210	168	140	112	84	70	42	28
0.3	130	234	195	156	130	104	78	65	39	26
0.4	120	216	180	144	120	96	72	60	36	24
0.5	110	198	165	132	110	88	66	55	33	22
0.6	100	180	150	120	100	80	60	50	30	20
0.7	90	162	135	108	90	72	54	45	27	18
0.8	80	144	120	96	80	64	48	40	24	16
0.9	70	126	105	84	70	56	42	35	21	14
1	60	108	90	72	60	48	36	30	18	12
1.1	50	90	75	60	50	40	30	25	15	10
1.2	40	72	60	48	40	32	24	20	12	8
1.3	30	54	45	36	30	24	18	15	9	6
1.4	20	36	30	24	20	16	12	10	6	4
1.5	10	18	15	12	10	8	6	5	3	2

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**Table 7.** Phosphorus Recommendation (Kg/ha) in different crops and vegetables on the basis of Soil test report of P /P<sub>2</sub>O<sub>5</sub> kg/ha grown in Uttar Pradesh

P kg/ha	P <sub>2</sub> O <sub>5</sub> Kg /ha	Recom mendat ion (% of GRD)	Sugarca ne, Soybean , Hybrid Tomato,	Hybrid Paddy,	Hybrid Maize /composite/ simple, Wheat, Mustard, Gram, Lentil, Pea, Rajma, Mentha, Potato, Tomato high yield , Cauliflower, Onion, Garlic,	Toria, Okra , Brinjal	Arhar	Basmati Paddy, Bajra Hybrid Jwar, Urd, Moong, Late wheat, Yellow Mustard,	Groundnu, Barley	Deshi Bajra	Till,
			80kg/ha	75kg/ha	60kg/ha	50kg/ha	45kg/ha	40kg/ha	30kg/ha	25kg/ha	15kg/ha
1	2.29	150	120	112.5	90	75	67.5	60	45	37.5	22.5
2	4.59	147.5	118	110.625	88.5	73.75	66.375	59	44.25	36.875	22.125
3	6.88	145	116	108.75	87	72.5	65.25	58	43.5	36.25	21.75
4	9.18	142.5	114	106.875	85.5	71.25	64.125	57	42.75	35.625	21.375
5	11.47	140	112	105	84	70	63	56	42	35	21
6	13.76	137.5	110	103.125	82.5	68.75	61.875	55	41.25	34.375	20.625
7	16.06	135	108	101.25	81	67.5	60.75	54	40.5	33.75	20.25
8	18.35	132.5	106	99.375	79.5	66.25	59.625	53	39.75	33.125	19.875
9	20.65	130	104	97.5	78	65	58.5	52	39	32.5	19.5
10	22.94	127.5	102	95.625	76.5	63.75	57.375	51	38.25	31.875	19.125
11	25.23	125	100	93.75	75	62.5	56.25	50	37.5	31.25	18.75
12	27.53	122.5	98	91.875	73.5	61.25	55.125	49	36.75	30.625	18.375
13	29.82	120	96	90	72	60	54	48	36	30	18
14	32.12	117.5	94	88.125	70.5	58.75	52.875	47	35.25	29.375	17.625
15	34.41	115	92	86.25	69	57.5	51.75	46	34.5	28.75	17.25
16	36.7	112.5	90	84.375	67.5	56.25	50.625	45	33.75	28.125	16.875
auto17	39	110	88	82.5	66	55	49.5	44	33	27.5	16.5
18	41.29	107.5	86	80.625	64.5	53.75	48.375	43	32.25	26.875	16.125
19	43.5	105	84	78.75	63	52.5	47.25	42	31.5	26.25	15.75
20	45.88	102.5	82	76.875	61.5	51.25	46.125	41	30.75	25.625	15.375
21	48.17	100	80	75	60	50	45	40	30	25	15
22	50.47	97.5	78	73.125	58.5	48.75	43.875	39	29.25	24.375	14.625
23	52.76	95	76	71.25	57	47.5	42.75	38	28.5	23.75	14.25
24	55.06	92.5	74	69.375	55.5	46.25	41.625	37	27.75	23.125	13.875
apdefa ult25	57.35	90	72	67.5	54	45	40.5	36	27	22.5	13.5
26	59.64	87.5	70	65.625	52.5	43.75	39.375	35	26.25	21.875	13.125
27	61.94	85	68	63.75	51	42.5	38.25	34	25.5	21.25	12.75
28	64.23	82.5	66	61.875	49.5	41.25	37.125	33	24.75	20.625	12.375
29	66.53	80	64	60	48	40	36	32	24	20	12
30	68.82	77.5	62	58.125	46.5	38.75	34.875	31	23.25	19.375	11.625
31	71.11	75	60	56.25	45	37.5	33.75	30	22.5	18.75	11.25
32	73.41	72.5	58	54.375	43.5	36.25	32.625	29	21.75	18.125	10.875
33	75.7	70	56	52.5	42	35	31.5	28	21	17.5	10.5
34	78	67.5	54	50.625	40.5	33.75	30.375	27	20.25	16.875	10.125
35	80.29	65	52	48.75	39	32.5	29.25	26	19.5	16.25	9.75
36	82.58	62.5	50	46.875	37.5	31.25	28.125	25	18.75	15.625	9.375
37	84.88	60	48	45	36	30	27	24	18	15	9

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Table 8. Potassium Recommendation (Kg/ha) in different crops and vegetables on the basis of Soil test report of K/ K<sub>2</sub>O kg/ha grown in Uttar Pradesh

K Kg/ha	K <sub>2</sub> O kg/ha	Recommen- dation (% of GRD)	Sugarcane, late Potato, Hybrid Tomato	Timely Potato, Tomato high yield, cauliflo- wer	Paddy Hybrid	Paddy high yield, Maize hybrid & Composi- te, Mustard, Onion, Garlic	Toria, Okra, Brinjal	Ground nut	Maize local, Bajra Hybrid, Soybean, Wheat, Yellow Mustard, Pea, Mentha	Paddy basmati , Rajma,	Deshi, B ajra Till,	Hybrid Jawar, Arhar, Moong, Urd, Barley, Gram, Lentil
			100kg/ha	80kg/ha	75kg/ha	60kg/ha	50kg/ha	45kg/ha	40kg/ha	30kg/ha	25kg/ha	20kg/ha
83	100	150	150	120	112.5	90	75	67.5	60	45	37.5	30
92	110	145.5	145.5	116.4	109.125	87.3	72.75	65.475	58.2	43.65	36.375	29.1
100	120	142	142	113.6	106.5	85.2	71	63.9	56.8	42.6	35.5	28.4
108	130	138.5	138.5	110.8	103.875	83.1	69.25	62.325	55.4	41.55	34.625	27.7
117	140	135	135	108	101.25	81	67.5	60.75	54	40.5	33.75	27
125	150	131.5	131.5	105.2	98.625	78.9	65.75	59.175	52.6	39.45	32.875	26.3
133	160	128	128	102.4	96	76.8	64	57.6	51.2	38.4	32	25.6
142	170	124.5	124.5	99.6	93.375	74.7	62.25	56.025	49.8	37.35	31.125	24.9
right150	180	121	121	96.8	90.75	72.6	60.5	54.45	48.4	36.3	30.25	24.2
158	190	117.5	117.5	94	88.125	70.5	58.75	52.875	47	35.25	29.375	23.5
167	200	114	114	91.2	85.5	68.4	57	51.3	45.6	34.2	28.5	22.8
175	210	110.5	110.5	88.4	82.875	66.3	55.25	49.725	44.2	33.15	27.625	22.1
183	220	107	107	85.6	80.25	64.2	53.5	48.15	42.8	32.1	26.75	21.4
192	230	103.5	103.5	82.8	77.625	62.1	51.75	46.575	41.4	31.05	25.875	20.7
200	240	100	100	80	75	60	50	45	40	30	25	20
208	250	96.7	96.7	77.36	72.525	58.02	48.35	43.515	38.68	29.01	24.175	19.34
217	260	93.4	93.4	74.72	70.05	56.04	46.7	42.03	37.36	28.02	23.35	18.68
225	270	90.1	90.1	72.08	67.575	54.06	45.05	40.545	36.04	27.03	22.525	18.02
233	280	86.8	86.8	69.44	65.1	52.08	43.4	39.06	34.72	26.04	21.7	17.36
242	290	83.5	83.5	66.8	62.625	50.1	41.75	37.575	33.4	25.05	20.875	16.7
250	300	80.2	80.2	64.16	60.15	48.12	40.1	36.09	32.08	24.06	20.05	16.04
258	310	76.9	76.9	61.52	57.675	46.14	38.45	34.605	30.76	23.07	19.225	15.38
267	320	73.6	73.6	58.88	55.2	44.16	36.8	33.12	29.44	22.08	18.4	14.72
275	330	70.2	70.2	56.16	52.65	42.12	35.1	31.59	28.08	21.06	17.55	14.04
283	340	66.9	66.9	53.52	50.175	40.14	33.45	30.105	26.76	20.07	16.725	13.38
292	350	63	63	50.4	47.25	37.8	31.5	28.35	25.2	18.9	15.75	12.6
300	360	60	60	48	45	36	30	27	24	18	15	12

Table 9. Regression equation between soil test value of OC % and dose of N kg/ha for different crops

S.No	Crops and Vegetables	Equation
1	Sugar Cane, Hybrid tomato	Y= -180X+288
2	Wheat, late potato, hybrid paddy, mentha	Y= -150X+240
3	High yielding paddy, hybrid maize, composite maize, mustard, rajma, Timely potato, cauliflower	Y= -120X+192
4	Basmati paddy, desi maize, hybrid bajra, toria, tomato (high yield variety), onion, garlic okra, brinjal	Y= -100X+160
5	Hybrid Jawar, Late wheat, yellow mustard	Y= -80X+128
6	Barley	Y= -60X+96
7	Deshi Bajra	Y= -50X+80
8	Till	Y= -30X+48
9	Ground Nut, soybean, Gram, Lentil, Pea, Arhar, Moong, Urd	Y= -20X+32

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**Table 10.** Regression equation between soil test value of available phosphorus kg/ha and dose of  $P_2O_5$  kg/ha for different crop

S.No	Crops and Vegetables	Equation
1	Sugar Cane , Hybrid tomato, Soybean	$Y = -0.8718X + 122$
2	hybrid paddy	$Y = -0.8173X + 114.37$
3	hybrid maize, composite maize, wheat , mustard , Gram , Lentil, Pea rajma, Mentha. potato, tomato( high yield variety),cauliflower, onion, garlic	$Y = -0.6539X + 91.50$
4	toria , okra, brinjal	$Y = -0.5449X + 76.25$
5	Arhar	$Y = -0.4904X + 68.62$
6	Basmati Paddy, Bajra, hybrid Jawar, Urd, Moong, Late wheat , Yellow mustard	$Y = -0.4359X + 61.00$
7	Groundnut, Barley,,	$Y = -0.3269X + 45.75$
8	deshi Bajra ,	$Y = -0.2724X + 38.12$
9	Till	$Y = -0.1635X + 22.88$

**Table 11.** Regression equation between soil test value of available potassium kg/ha and dose of  $K_2O$  kg/ha for different crop

S.No	Crops and vegetables	Equation
1	Sugarcane, Late Potato, Hybrid Tomato	$Y = -0.3428X + 182.92$
2	Timely Potato, high yielding Tomato, cauliflower	$Y = -0.2743X + 146.34$
3	Hybrid Paddy	$Y = -0.2571X + 137.19$
4	High yield Paddy, Maize hybrid & Composite, Mustard, Onion, Garlic	$Y = -0.2057X + 109.7$
5	Toria, Okra, Brinjal	$Y = -0.1714X + 91.46$
6	Groundnu	$Y = -0.154X + 82.31$
7	Desi Maize, Bajra Hybrid, Soybean, Wheat, Yellow mustard, Pea, Mentha	$Y = -0.137X + 73.17$
8	Paddy basmati, Rajma,	$Y = -0.1029X + 54.87$
9	Deshi Bajra, Till,	$Y = -0.0857X + 45.73$
10	Hybrid Jawar, Arhar, Moong , Urd, Barley, Gram, Lentil	$Y = -0.0686X + 36.59$

## Conclusion

To facilitate the soil test laboratory of the Uttar Pradesh a ready reckoner and equation for prescription of fertilizers especially for nitrogen, phosphorus and potassium based on each soil test value may be economically useful . By the use of these equation and ready reckonear fertilizer use efficiency for different crops may be improved.

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## ROOF WATER HARVESTING: A CASE STUDY

Vikrant Kumar<sup>1</sup>, M. Nayeem Ali<sup>2</sup>, Ashok Kumar<sup>3</sup> Anjali Jakhar<sup>4</sup> and Mukul<sup>5</sup>

<sup>1,4,5</sup>Assistant Professor College of Agriculture, <sup>2</sup>HOD Agriculture  
<sup>3</sup>Dean College of Agriculture Shri Ram College, Muzaffarnagar, 251001

\*Corresponding Author: vvv6096@gmail.com

### Abstract

The study was conducted at Shri Ram college, Muzaffarnagar- 251001 located at 29° 28'N, 77°41'E at 272 meters MSL. The climate of Muzaffarnagar is subtropical characterized by much hot summer and cooler winter. The average temperature of the area is 24.2°C which range from 45°C to 0.9 °C. The average rainfall of the area is 929 mm. The dries month is November with 8 mm of rain and highest rainfall in July with an average 261.4 mm. Shri Ram College is spread in more than 5.7 hac lands. For this study the roof of block B having 894.14 square meter area was selected. Based on last thirty years rainfall data (maximum 40 mm rain in a day) a rain water collecting well of 36 m<sup>3</sup> was manufactured to store water. The study indicates that from 894.14 m<sup>2</sup> catchment area 35.78 m<sup>3</sup> water is generated which required almost 36 m<sup>3</sup> well size for storing the water. The 9 feet depth of collecting well with 6 feet diameter was found appropriate if 40 mm rain in a day occurs. To drain out 36 m<sup>3</sup> water stored on the roof of 894.14 m<sup>2</sup> area 7 pipes of 10cm diameter required. The study also found that 3x4 feet size two siltation tank may be sufficient before the rain water enters into the collecting well. The 6 inch (15 cm) perforated pipe was found suitable to percolate the water into ground.

**Keywords:** Well, Siltation Tank, Rainfall, Catchment Area, Water Potential etc.

### Introduction

Water is essential for all life and used in many different ways, it is also a part of the larger ecosystem in which the reproduction of the bio diversity depends. Fresh water scarcity is not limited to the arid climate regions only, but in areas with good supply the access of safe water is becoming critical problem. Lack of water is caused by low water storage capacity, low infiltration, larger inter annual and annual fluctuations of precipitation and high evaporation demand (2).

In India water harvesting means utilizing the erratic monsoon rain for raising good crops in dry tracks and conserve the excess runoff water for drinking and for recharging purposes (2).

Rain water harvesting (RWH) is a technology that can be used for collecting and storing rainwater from rooftops, open land surfaces using simple storage utensils such as tanks, pits and cistern. Harvested rainwater is a renewable source of clean water that is ideal for multiple uses. The greater attractions of a Rain Water Harvesting system (RWHS) are its accessibility, low cost and easy maintenance features at the household level. Rain water harvesting enhances water supply by mitigating the temporal and spatial variability of rainfall and provide water for basic human needs and other small activities. Rainwater harvesting (RWH) could be the most sustainable solution to be included in the urban water management system (3).

Therefore it is urgent to find a sustainable solution that could alter the usage of groundwater. Rainwater harvesting would be one of the most conceivable and viable solutions to release the pressure

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on the groundwater table as the system utilizes natural rainwater without affecting groundwater sources (3).

Shri Ram college, Muzaffarnagar- 251001 located at 29° 28'N, 77° 41'E at 272 meters MSL. The climate of Muzaffarnagar is subtropical characterized by much hot summer and cooler winter. The average temperature of the area is 24.2°C which range from 45 °C to 0.9 °C. The average rainfall of the area is 929 mm. The dries month is November with 8 mm of rain and highest rainfall in July with an average 261.4 mm Shri Ram College Muzaffarnagar is a wide spread educational campus with a vast area of around 5.7 hac. There are around 10000 students studying in the main campus, whose daily requirement has to be served. The nearby water-tables are being exploited daily at a fast pace. So this create a situation to conserve the rain water either through roof rain water harvesting unit or storage of rain water in the surface This huge area can be utilized for the purpose of Rainwater Harvesting. With the annual rainfall of around 929 mm/year with 40 mm maximum rain in a day in this area of muzaffarnagar provides good opportunities to harvest the rainwater. Keeping these things in mind the study was conducted to design a water harvesting unit for at least 900 m<sup>2</sup> areas and study the impact on ground water level.

### Methodology

Shri Ram College is spread in more than 5.7 hac lands. For this study the roof of block B having 894.65 square meter area was selected. Based on last thirty years rainfall data (maximum 40 mm rain in a day) a collecting well of 36 m<sup>3</sup> was manufactured between B and C block to store and inject the water into ground. To inject the stored water in ground a 20-m deep 6 inch perforated pipe was diged in the center of collecting well. The stored water will reach to ground and will improve the level. In the selected area of 894.14 m<sup>2</sup> a total of 35.78 m<sup>3</sup> rain water can be collected if the 40 mm maximum rain in a day occurred based on last 30 year rainfall data. Seven drainage pipes were fitted to drain out the rain water from the roof of building. These pipes were connected to the pipe laid down in the subsurface. Two siltation tank of 3x4 feet size were made both side of main

collecting well. Water through drainage pipe coming from roof will be first collected in the siltation tank after that this water will go to main well which will further inject to ground through perforated pipe. To filter the rain water in main well a 500 mm thick layer of 50-200 mm boulder was filled around the perforated pipe after that 500 mm thick layer of 5-10 mm size gravels and than a 500 mm thick layer of 1.5-2 mm course sand was filled through which water will passed & will automatically filtered into ground so that contaminate in rain water may be checked. The underground water table was measured at different time to assess the impact of water harvesting on the water table.

### Methodology flow chart:

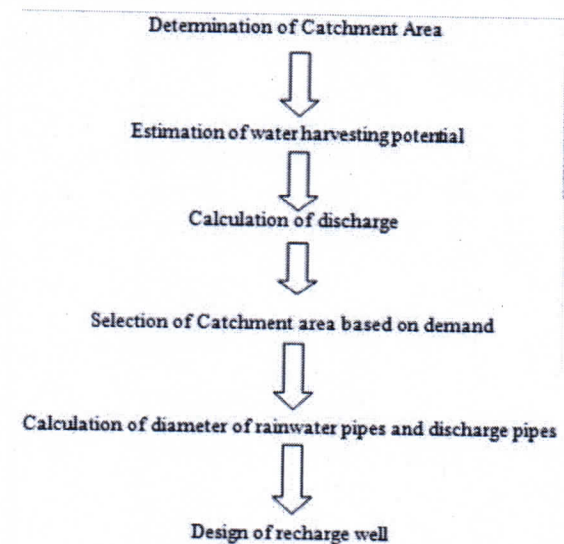
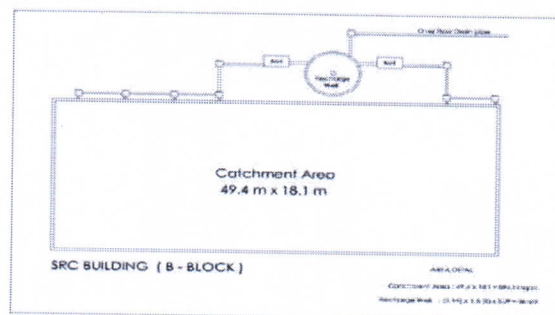


Figure 1 Design layout of Water Harvesting Technique in Shri Ram College, Muzaffarnagar.



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**Table 2 Discharge rate of Block B.**

Building Name	Constant (C)	I (mm/hr)	Area (m <sup>2</sup> )	Q (m <sup>3</sup> /sec.)
Block B	0.9	20/3600000	894.14	0.0045
Total Discharge				0.0045

**4. Calculation of number of rainwater pipes (R.W.P.)**

Assuming the diameter of pipe as 10 cm, the total number of required pipes is calculated in this project.

$$Q = n \times \pi \times d^2 \times v$$

Where, n = minimum no. of pipes

d = Diameter of rainwater pipe i.e. R.W.P.

v = Velocity of water on the roof when it is at the verge of entering in the pipe due to the slope available at the roof. As the roofs are flat or having 0-2% slope so:

v = 0.1 m/s (as per CGWB guidelines)

So, no. of pipes is calculated as:

$$n = Q / (\pi \times d^2 \times v)$$

Using the above formula the total number of required RWP were calculated and summarized in table 3.

**Table 3: Calculation of number of rainwater pipes (R.W.P.) to be installed**

Building Name	d (m)	v(m/sec)	Q (m <sup>3</sup> /sec.)	Number of pipes
Block B	0.1	0.1	0.005	6.37
Total Pipes				7

**Relationship between catchment area and bore diameter**

On the basis of study conducted at Shri Ram College, Muzaffarnagar it was observed that to percolate the rainwater in soil aquifer the size of bore to be installed in the center of collecting well and the catchment area a regression equation between the two variant has been developed which is shown as under

$$Y = 3000X \dots \dots \dots (1)$$

Where-

Y= Catchment area (L × W) m<sup>2</sup>

X=Bore diameter (m)

**Results**

The study conducted at Shri Ram College, Muzaffarnagar indicates that from 894.14 m<sup>2</sup> catchment area 35.78 m<sup>3</sup> water is generated which required almost 36 m<sup>3</sup> well size for storing the water if 40 mm rain in a day occurs (Table-1). To drain out 36m<sup>3</sup> water stored on the roof of 894.14 m<sup>2</sup> area 7 pipes of 10 cm diameter required (Table-3). The study also found that 3x4 feet size two siltation tank may be sufficient before the rain water enters into the collecting well. Approximately 9 feet depth of collecting well with 6 feet diameter was found appropriate to accommodate the water (36 m<sup>3</sup>) collected in one day if 40 mm rain occurs. Study also observed that in any case if rain occurred more than 40 mm so excess water can be stored in a reservoir made at the surface which after stop the rain may be reused to recharge the ground water level. In this way every drop of water may be harvested. The 6 inch (15 cm) perforated pipe was found suitable to lower down the water into ground. As per equation 1 study also recommends that the 300 m<sup>2</sup> catchment area 10 cm bore diameter will be sufficient.

**Conclusion**

Since water is a very precious natural resource. It has to be save and used properly. Shri Ram College has taken the initiation on the theme during Nov. 2021. Water harvesting unit of 36 m<sup>3</sup> water potential has been constructed in between the B and C Block based on 40 mm rain per day maximum. A provision for collecting the over flow water in the unit to collect the excess rain over the 40 mm was made. A 10 cm diameter pipe was installed in the collecting well to store the overflow water in the pond which after the rain stop may be again reuse to recharge the ground. The effect on ground water recharging will be study after 3 year, 4 year different time interval.

**Suggestion**

On the basis of case study conducted in Shri Ram College during Nov. 2021. It is observed that if the rain in a day occurred more than the

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Muzaffarnagar

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IQAC, Shri Ram College,  
Muzaffarnagar

maximum rain occurred in last 30 year in a day is 40 mm there may be excess water which may not be injected into the ground in one shot, this water should be flow to reservoir for time being after stop the rain this reserved water may be used for recharging the ground. As per table number 2 if projected rain is 60 mm and 80 mm per day a total of 54 m<sup>3</sup> and 72 m<sup>3</sup> water, respectively will be stored out of this only 72 m<sup>3</sup> will have to be percolated in well to recharge the ground. To accommodate this water there may be two options. first option is to dig two bore of 15 cm diameter in two well or the second option may be construct the reservoir to accommodate the excess water for time being and as the rain stop this excess water will be recirculation in to the well for recharging the ground. This study may be validating as and when required.

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Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

Chairman  
IQAC, Shri Ram College,  
Muzaffarnagar



## Basmati rice performance as influenced by application timing of organic N sources

SHAKTI OM PATHAK<sup>1</sup>, B P DHYANI<sup>1</sup>, U P SHAHI<sup>1\*</sup>, ASHOK KUMAR<sup>1</sup>, VIVEK<sup>2</sup> and S P SINGH<sup>1</sup>

Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh 250 110, India

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### ABSTRACT

Field experiments were conducted during 2019 and 2020 at the Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and technology, Meerut, Uttar Pradesh. The experiment consisted of 14 different treatments replicated thrice in a randomized block design. Soil of the experimental field was sandy clay loam in texture, neutral in reaction with low in available nitrogen, medium in available phosphorus and potassium. Result on pool basis reveal that highest growth and yield attributes parameters, viz. plant height (97.04 cm), effective tiller (225.22/m<sup>2</sup>), panicle length (30.67 cm), grain weight (1.77 g/panicle), filled grains/panicle (82.18), test weight (28.50 g) along with biological yield 108.24 q/ha and grain yield 40.78 q/ha were recorded with the application of 25% recommended N through dhaincha incorporated on planting date + rest N through chemical fertilizer followed by application of 25% recommended N through vermicompost incorporated 10 day before transplanting + rest N through chemical fertilizer.

**Keywords:** Basmati Rice, Dhaincha, INM, Vermicompost

'Rice is Life' is most appropriate statement for India since this crop plays a vital role in country's food security and is the backbone of livelihood for millions of rural households. Basmati is lengthy, fragrant rice grown for centuries in the unique geographical region of the Himalayan foot hills of Indian sub-continent. India contributes more than 70% of the overall global production (Udhayakumar *et al* 2021). There is about 1.5 mha land under basmati rice which provides steady income for farmers and there is no obvious alternative crop with similar economic returns. Farmers of western Uttar Pradesh, a basmati export zone are focussing on cultivation of basmati rice due to more remunerative, however its export will depend on its quality. It is therefore important to reduce the use of chemical fertilizer in basmati cultivation by substituting through organic sources.

Dhaincha being a leguminous crop utilizes atmospheric nitrogen through symbiotic nitrogen fixation to meet a major part of its nitrogen requirement. Nitrogen contained by dhaincha can benefit the succeeding crop with its incorporation in soil. Vermicompost, humus like material produced by vermicomposting is rich with various essential plant nutrients. Vermicompost helps to improve and protect

fertility of top soil and also helps to boost up productivity by 40% with 20–60% lower inputs, it also enhances the quality of end products and thereby creating significant impact on flexibility in marketing. Readable availability of nutrient from vermicompost signifies its effect in soil. Organic materials may be a boon to the poor marginal farmers who cannot afford to purchase fertilizer in the required quantities due to escalating prices. Organic materials such as green manure with its succulence and comparatively a narrow C:N ratio decomposes rapidly after incorporation into the soils resulting in release of nitrogen for use by the succeeding crops. There is no doubt about the role of organic sources on the crop productivity and soil sustainability but the question arises regarding timing of their application. Therefore, present investigation was undertaken to study basmati rice performance as influenced by application timing of organic N sources.

### MATERIALS AND METHODS

The present study was carried out during *kharif* 2019 and 2020 at Reaserch farm of Sardar Vallabhbhai Patel University of Agriculture and technology, Modipuram, Meerut, Uttar Pradesh. Soil of the experimental field was sandy clay loam in texture and neutral in reaction with low in organic carbon, available nitrogen, medium in available phosphorus, potassium and zinc. The experiment was laid out with fourteen (14) treatments of INM, viz. Control (T<sub>1</sub>); Recommended dose of N P K through chemical fertilizer (T<sub>2</sub>); 25% recommended N through dhaincha incorporated 10 days before transplanting (DBT) + rest N through

<sup>1</sup>ICAR-Indian Agricultural Research Institute, New Delhi;  
<sup>2</sup>Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh. \*Corresponding author email: upshahi@gmail.com

Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar

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IQAC, Shri Ram College,  
Muzaffarnagar



chemical fertilizer (T<sub>3</sub>); 25% recommended N through dhaincha incorporated 5 DBT + rest N through chemical fertilizer (T<sub>4</sub>); 25% recommended N through dhaincha incorporated on planting date + rest N through chemical fertilizer (T<sub>5</sub>); 25% recommended N through vermicompost incorporated 10 DBT + rest N through chemical fertilizer (T<sub>6</sub>); 25% recommended N through vermicompost incorporated 5 DBT + rest N through chemical fertilizer (T<sub>7</sub>); 25% recommended N through vermicompost incorporated on planting date + rest N through chemical fertilizer (T<sub>8</sub>); 37.5% recommended N through dhaincha incorporated 10 DBT + rest N through chemical fertilizer (T<sub>9</sub>); 37.5% recommended N through dhaincha incorporated 5 DBT + rest N through chemical fertilizer (T<sub>10</sub>); 37.5% recommended N through dhaincha incorporated on planting date + rest N through chemical fertilizer (T<sub>11</sub>); 37.5% recommended N through vermicompost incorporated 10 DBT + rest N through chemical fertilizer (T<sub>12</sub>); 37.5% recommended N through vermicompost incorporated 5 DBT + rest N through chemical fertilizer (T<sub>13</sub>); 37.5% recommended N through vermicompost incorporated on planting date + rest N through chemical fertilizer (T<sub>14</sub>) in randomized block design with three replications. Rice seedlings (Pusa Basmati-1509) with plant geometry (20 cm × 10 cm) were transplanted on 15 July 2019 and 16 July 2020. Recommended dose of phosphorus and potassium were applied through DAP, SSP and MOP, and nitrogen was applied through urea and organic sources such as dhaincha (*Sesbania aculeata*) and vermicompost. Full dose of phosphorus and potassium was applied at the time of transplanting while 25–37.5% N

through organic sources as per treatment and 12.5–25.0% through chemical fertilizer was applied before or at time of transplanting. Remaining 50% nitrogen was applied in two equal split at maximum tillering and panicle initiation stage. For the growth parameters, plant height of 5 randomly selected tagged hills was measured from the soil surface to the tip of the fully opened leaf. Total tillers were counted from 1.0 m<sup>2</sup> area from each plot. Grains obtained from 10 randomly selected panicles were counted and expressed as grains/panicle. Length of 10 panicles was measured and average length was calculated. Net plot was harvested and sun dried for 4–5 days and biological yield was recorded. Threshing was done manually and weight of grain was subtracted from biological yield to get straw yield.

## RESULTS AND DISCUSSION

*Growth parameters:* The two years pool data (Table 1) clearly reflect a significant effect of different treatments on height of basmati rice crop measured at different stages. Application of 25% recommended N through dhaincha at planting date along with rest N through chemical fertilizer (T<sub>5</sub>) produced significantly taller plant than T<sub>1</sub>, T<sub>12</sub>, T<sub>13</sub>, T<sub>14</sub> at tillering (57.42 cm), panicle initiation (84.39 cm), flowering (94.28 cm) and harvest (97.04 cm). Short plant with the height 79.62 cm significantly lower than the rest of the treatments was found in control T<sub>1</sub> where no plant nutrients were supplied. Substitution of 25% nitrogen through dhaincha produced slightly taller plant than the vermicompost although the difference was non-significant in most of the cases.

Table 1 Effect of INM treatments on growth of basmati rice at different growth stages (pool data 2019–2020)

Treatment	Plant height (cm)				Tiller Density (m <sup>2</sup> )				LAI		
	Tillering	Panicle	Flowering	Harvesting	Tillering	Panicle	Flowering	Harvesting	Tillering	Panicle	Flowering
T <sub>1</sub>	48.60	68.60	75.92	79.62	172.30	208.62	182.75	161.84	1.48	3.82	3.07
T <sub>2</sub>	57.64	82.56	93.47	95.17	194.2	291.19	278.50	220.34	2.25	4.73	4.02
T <sub>3</sub>	56.10	81.24	91.24	93.27	184.55	288.52	269.18	216.01	1.97	4.59	3.81
T <sub>4</sub>	55.60	82.01	92.11	95.12	187.36	290.10	275.30	220.75	2.08	4.66	3.82
T <sub>5</sub>	57.42	84.39	94.28	97.04	189.50	298.41	281.87	225.22	2.35	4.96	4.15
T <sub>6</sub>	56.99	83.52	93.43	96.29	188.54	291.61	280.38	219.91	2.26	4.87	4.06
T <sub>7</sub>	54.94	82.79	91.58	92.84	185.55	288.47	275.28	214.47	2.08	4.69	3.87
T <sub>8</sub>	53.67	79.99	89.21	91.88	182.64	287.48	272.28	212.40	2.03	4.40	3.87
T <sub>9</sub>	51.70	79.77	87.06	90.86	179.39	273.94	264.52	203.00	2.00	4.39	3.88
T <sub>10</sub>	52.80	79.36	87.75	91.83	180.78	276.66	269.33	208.83	2.11	4.62	3.96
T <sub>11</sub>	54.67	83.10	89.77	94.78	183.78	283.92	273.08	214.99	2.28	4.79	4.05
T <sub>12</sub>	53.13	78.19	85.96	91.43	184.34	279.59	269.25	202.93	2.26	4.72	3.94
T <sub>13</sub>	51.57	76.08	84.91	89.66	180.97	277.12	261.25	194.00	2.09	4.43	3.86
T <sub>14</sub>	51.31	73.67	85.13	89.18	178.81	272.49	254.92	187.50	2.02	4.35	3.67
SE(m)±	1.33	2.07	2.32	2.06	2.56	3.90	3.15	4.00	0.08	0.17	0.13
CD at 5%	3.86	6.03	6.73	5.51	7.43	11.34	9.17	11.63	1.48	3.82	0.36

\*Treatment details are given in Material and Methods.

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The number of tillers/m<sup>2</sup> of basmati rice as influenced by different treatments at different growth stages are shown in Table 1. Pool data reveal that at maximum tillering, tiller density in all the treatments consisting substitution of 37.5% N through dhaincha or vermicompost incorporated at any time decline significantly from T<sub>2</sub>. Tiller density in comparison to T<sub>2</sub> was also significantly lower in T<sub>3</sub>, T<sub>7</sub>, T<sub>8</sub> where 25% N was substituted through vermicompost or dhaincha applied at any time. At panicle stage maximum tiller density 298.41/m<sup>2</sup> recorded in T<sub>5</sub> was significantly higher than T<sub>1</sub> and other treatments consisting 37.5% N through organic sources applied at any time. Almost similar trend was also found at flowering stage.

The Leaf area index (LAI) an important parameter of plant growth was influenced by different treatments. From the table it is clear that leaf area index increased up to panicle initiation stage and thereafter declined at flowering. At maximum tillering 2.35 recorded in T<sub>5</sub> was significantly higher than T<sub>1</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>8</sub>, T<sub>9</sub>, T<sub>13</sub> and T<sub>14</sub> and statistically at par to rest of the treatments. At panicle initiation stage also, maximum LAI 4.96 recorded in T<sub>5</sub> was significantly higher than T<sub>1</sub>, T<sub>8</sub>, T<sub>9</sub>, T<sub>13</sub> and T<sub>14</sub>. With exception of T<sub>1</sub> and T<sub>14</sub> rest of the treatments differ non-significantly in respect of LAI at flowering stage.

**Yield and yield attributes:** On the two years pool basis application of 25% recommended N through dhaincha at planting date along with rest N through chemical fertilizer (T<sub>5</sub>) produced significantly higher panicle length (30.67 cm) than the treatments with exception of T<sub>2</sub>, T<sub>5</sub>, T<sub>6</sub>, T<sub>11</sub> and T<sub>12</sub> (Table 2). Panicle length (23.36 cm) significantly lower than the rest of the treatments was found in control T<sub>1</sub>

where no plant nutrients were applied. Substitution of 25% nitrogen through dhaincha produced comparatively larger panicle than the vermicompost, although the difference was non-significant cases.

The filled grains/panicle differs significantly under various treatments and ranged from 54.28–82.18. Application of 25% recommended N through dhaincha at planting date along with rest N through chemical fertilizer (T<sub>5</sub>) produced significantly maximum number of filled grain/panicle (82.18) at harvest than the T<sub>1</sub>, T<sub>14</sub>, T<sub>3</sub>, T<sub>13</sub>. Lower filled grains/panicle (54.28) significantly lower than the rest of the treatments were found in control T<sub>1</sub> where no plant nutrients were applied externally. Substitution of 25% nitrogen through dhaincha produced comparatively a greater number of filled grains/panicle than the vermicompost although the difference was non-significant in most of the cases.

Data regarding the effect of different treatments on grain weight/panicle (g) of basmati rice are presented in Table 2. It is clear from the table that the grain weight g/panicle differs significantly under different treatments and ranged from 1.33–1.77 g/panicle. Application of 25% recommended N through dhaincha at planting date along with rest N through chemical fertilizer (T<sub>5</sub>) recorded maximum grain weight/panicle (1.77 g) at harvest. Minimum grain weight/panicle (1.33 g) significantly lower than the rest of the treatments was found in control T<sub>1</sub> where no plant nutrients were applied externally. Substitution of 25% nitrogen through dhaincha produced comparatively higher grain weight/panicle than the vermicompost. On the pool basis, maximum test weight

Table 2 Yield and yield attributes of Basmati rice as influenced by INM

Treatment	Panicle length(cm)	Grain weight (g)/panicle	Filled grain/panicle	Test weight(g)	Biological yield (q/ha)	Grain yield (q/ha)	Straw yield (q/ha)
T <sub>1</sub>	23.36	1.33	54.28	26.73	58.46	19.68	38.56
T <sub>2</sub>	28.58	1.73	79.47	28.27	102.83	38.39	64.44
T <sub>3</sub>	25.35	1.68	75.17	27.54	97.74	34.95	62.79
T <sub>4</sub>	26.77	1.75	77.93	27.60	101.58	38.82	62.76
T <sub>5</sub>	30.67	1.77	82.18	28.50	108.24	40.78	67.47
T <sub>6</sub>	29.04	1.73	79.95	28.30	106.21	39.35	66.36
T <sub>7</sub>	27.63	1.67	76.34	28.05	101.69	38.81	62.88
T <sub>8</sub>	26.37	1.62	74.53	27.80	97.74	37.29	60.46
T <sub>9</sub>	27.32	1.69	70.22	27.56	95.73	34.25	61.48
T <sub>10</sub>	27.22	1.74	72.81	27.51	94.93	36.13	58.81
T <sub>11</sub>	28.11	1.75	77.18	28.17	100.84	36.65	64.20
T <sub>12</sub>	28.23	1.74	76.94	27.84	91.75	31.65	59.95
T <sub>13</sub>	27.40	1.72	70.88	27.74	90.01	30.96	59.05
T <sub>14</sub>	25.32	1.67	67.97	27.60	87.11	30.18	56.93
SE(m)±	0.78	0.06	1.22	0.65	3.09	1.44	2.75
CD at 5%	2.26	0.17	3.56	NS	8.98	4.17	8.00

\*Treatment details are given in Material and Methods.

was found in T<sub>5</sub> (28.50 g) but did not differ significantly under different treatments.

Effect of different treatments on biological yield of basmati presented in Table 2 on the two years pool basis application of 25% recommended N through dhaincha at planting date along with rest N through chemical fertilizer (T<sub>5</sub>) produced significantly higher biological yield (108.24 q/ha) than T<sub>1</sub>, T<sub>3</sub>, T<sub>8</sub>, T<sub>9</sub>, T<sub>10</sub>, T<sub>12</sub>, T<sub>13</sub> and T<sub>14</sub> weight. Minimum biological yield of 58.24 q/ha significantly lower than the rest of the treatments was found in control plot where no plant nutrients were supplied.

Grain yield varied from 19.68–40.78 q/ha with the maximum production in T<sub>5</sub>. Grain yield was higher by 6.2% with the substitution 25% N through dhaincha applied on date of planting and 2.5% with vermicompost incorporated at 10 DBT than T<sub>2</sub>. Grain yield of rice did not decline significantly from T<sub>2</sub> with the substitution of 25% N through dhaincha or vermicompost incorporated at any time or 37.5% N substitution through dhaincha. Significant reduction in grain yield was noted with the substitution of 37.5% N through vermicompost at any time.

Data presented on the two years pool basis indicate that there was significant effect of different treatments on the straw yield of basmati rice crop. It is clear from the table that the straw yields differ significantly under different treatments. Straw yield varied from 38.56–67.47 q/ha with the maximum production in T<sub>5</sub> was slightly higher with the substitution 25% N through dhaincha incorporated at the time of planting or vermicompost 10 day before planting. Straw yield of rice did not decline significantly from T<sub>2</sub> with the substitution of 25 and 37.5% N dhaincha and vermicompost incorporated at any time of planting.

Results reveal the better performance of growth and yield attributes with the application of dhaincha on planting date or vermicompost 10 DBT. Growth which ultimately affects the crop yield depends on adequate nutrient supply since the planting of the crop. Among the plant nutrients, nitrogen plays a vital role in plant growth and development. Although most of the nitrogen in crop production is supplemented through chemical fertilizers but with foreseeing adverse effect on environment integrated approach of nitrogen management came into existence and being followed in different cropping system. The chemical fertilizers supply the nitrogen immediately while in organic sources it may be delayed due to slow mineralization. In Integrated Nutrient Management (INM) the aim is to ensure the timely availability of nitrogen as per crop requirement. Release of plant available nitrogen from various organic sources is different. The material susceptible for fast decomposition will release nitrogen immediately. Incorporation of dhaincha, 10 DBT will release the nitrogen at the time of planting when rice roots are not fully established to absorb the released nitrogen and it may get lost. Nitrogen release from vermicompost will depend on mineralization. To get the better response of applied vermicompost it must be applied before transplanting and in our study application 5 or 10 DBT was found better. It

may be due to release of nitrogen from vermicompost at the time when plants require maximum nitrogen. The result find support from findings of Murugan and Swarnam (2013) who reported the peak release of nitrogen from vermicompost at 48 days after incorporation in acid soil. In our study, soil is alkaline and in comparison to acid, soil mineralization will be at faster rate due to more microbial activity. Therefore, release of nitrogen may be earlier than 48 days benefitting the rice crop between maximum tillering and panicle initiation stage if applied 5 or 10 DBT.


Increase in plant height with the application of organic sources was also reported by Shekara *et al.* (2010). Paramesh *et al.* (2014) also reported that 50% RDN through chemical fertilizers + 50% RDN through vermicompost recorded significantly higher leaf area over control. Manivannan and Sriram Chandrasekharan (2016) recorded significantly higher grain and straw yield when 50% of recommended nitrogen was substituted by vermicompost compared to control. Application of dhaincha and vermicompost 5 DBT was also found better. This may be due to the availability of nitrogen at right time. No better response of dhaincha applied 10 DBT get support from the findings of Sardar *et al.* (2015) who reported that application of dhaincha 20 DBT yielded lower than FYM and vermicompost. Similarly, the study conducted by Hoque *et al.* (2007) also reveal that application of Sisso as well as acacia leaves 8 DBT was not better than poultry manure and cow dung applied at planting time. Puli *et al.* (2017) reported more uptake of nitrogen with the application of dhaincha 7 DBT than the vermicompost applied at the time of planting. Chaudhary *et al.* (2018) also reported a significant reduction in yield of rice with the application of sesbania 7 or 10 DBT than one DBT.


Based on the two-year experimentation it can be concluded that 25% nitrogen requirement of rice crop can be substituted by incorporation of dhaincha 5 DBT or at the time of transplanting. Similarly, vermicompost incorporation can be made 10 or 5 DBT.

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Co-ordinator  
IQAC, Shri Ram College,  
Muzaffarnagar

  
Chairman  
IQAC, Shri Ram College,  
Muzaffarnagar

# Agile Approach of Predicting Cardiac Disease using ANN Based on Feature Selection

Ankit Maithani  
CSE Department  
Dev Bhoomi Institute of Technology  
Dehradun, India  
ankitmaithani2518@gmail.com

Reetika Koli  
CSE Department  
Dev Bhoomi Institute of Technology  
Dehradun, India  
reetikakoli89@gmail.com

Ritu Pal  
CSE Department  
Dev Bhoomi Institute of Technology  
Dehradun, India  
ritu.pal26@gmail.com

Dhajvir Singh Rai  
CSE Department  
Dev Bhoomi Institute of Technology  
Dehradun, India  
dhajvirrai123@gmail.com

Ankur Rohilla  
CSE Department  
SRGC  
Muzaffarnagar, India  
ankurrohilla2302@gmail.com

Rahul Kumar  
CSE Department  
MIET  
Meerut, India  
rkralkumarcs@gmail.com

**Abstract** – Recent study shows that almost 30% of total global deaths are caused by heart disease. Medical diagnosis is done mainly by specialist's skill and experience but sometime cases are reported of wrong diagnosis therefore the doctor advises patients to take various tests for further analysis which is very expensive and time consuming as medical databases are huge and cannot be processed quickly. In this paper we have predicted heart disease possibility in patients with the help of neural network with Feature selection. This approach was applied to the dataset to get the better results and to increase the performance by reducing the unnecessary attributes from the existing dataset.

**Keywords:** Artificial neural network, Feature selection, Data mining, Heart Disease, Chi Square, Random forest.

## I. INTRODUCTION

Heart disease is one of the cardiac diseases that affect human being. In 2003 World Health Organization reported that globally 29.2% of total deaths are due to heart disease. Today heart disease is one of the major causes of death in many countries due to change in food habits, life style, smoking and alcohol consumption. Hence, efficient and effective methods of heart disease prediction are of high importance [1].

Medical diagnosis is done mostly by cardiologist but sometime cases are reported inaccurate at the time diagnosis. Patients are advised to take various test related to heart for further diagnosis which is very costly and presence of large medical databases which cannot be processed quickly. It also makes the diagnosis process very time consuming. Therefore data mining has become the basic need of the medical healthcare world.

Data mining is the process of extracting the precious knowledge from the huge amount of databases. It is very important tool in medical field where it fetched biomedical and health care knowledge and provides a great help in medical decision making and produces scientific hypothesis from huge medical databases [2].

Initially data pre-processing plays a crucial role in data mining, since the quality of output is based on the quality of Input data. Enhancing the medical database improves the quality of diagnosis result. One of the most important steps of data pre-processing is data reduction (feature subset selection).

There may be some irrelevant and redundant attributes present in datasets. They can increase the computation time and can affect the diagnosis accuracy. This type of irrelevant data can be eliminated before learning with the help of feature selection. The aim of feature selection is to perceive a minimum set of attributes and reduces; complexity of a model which make it easier to interpret which are necessary for the current operation and eliminate irrelevant, redundant or noisy data [3]. This reduction gives a great impact on data mining process and also increases the accuracy level of diagnosis.

Artificial Neural Networks is an information processing prototype that is used for the simulation of human brain and can be applied to a number of real world complex problems. Neural networks are well trained for pattern recognition, and also for storing and retrieving patterns to solve combinatorial optimization problems. These abilities also make neural network very good for classification problems.

In this paper we applied chi square test and random forest for feature selection and then compared the results of both feature selection methods and the better one is selected for the work. Then neural network is used for classification of heart disease. Objective of this paper is to predict the heart disease in a patient with reduced number of attributes which directly reduces the number of tests required to diagnosis the heart diseases.

This paper is organized as follows: Section 1 provides an introduction about work. Section 2 describes related study about topic. Section 3 explains outline of techniques that are used in our research. Section 4 describes about the tool used in our experiment and section 5 gives the data set

description. Section 6 provides with the experiments and results and at the last section 7 gives the conclusion of concerned work.

## II. RELATED WORK

Today, health care have a collection of enormous dataset, which is designed by compliance and patient care record and keeping regularity requirement while most of this dataset are stored in record file, but the new aim is to make a fast digitization of these dataset as well as right decision making .

Few research works have been done for the diagnosis of diverse diseases using data mining techniques. Our approach is to use Feature subset selection and artificial neural network for prediction of heart disease.

D. R. Patil et al. present a prediction system for heart disease. For prediction they have used a neural network with multilayer perceptron. In this system 13 clinical attributes are used as input for neural network and back-propagation algorithm is used for training purpose to predict that the patient is diagnosed with heart disease or not [4].

B.L Deekshatuluet al. introduced a classification approach which uses the hybrid approach consists of ANN and feature selection for classification of the heart disease. For pre-processing and to eliminate the irrelevant attributes PCA algorithm is used. This algorithm indirectly reduces the no. of diagnosis tests. They used Andhra Pradesh heart disease data base for their work [2].

Priti Chandra et al. propose a new approach for heart disease prediction. They used associative classification and hybrid feature subset selection. Their approach prunes irrelevant, redundant attributes from the Andhra Pradesh heart disease data and generates compact rule set. These rules will be built as classifier and will help cardiologist to predict the heart disease of a patient [6].

Suganya et al. presents a system which predicts the possibility of heart disease in a patient at its early stage with minimum number of attributes. The combination of WSN (wireless sensor network) data and Novel Feature Selection method is used for prediction of heart disease at its early stages. The dataset used in this work is from Cleveland heart disease database[4].To find the best features in disease identification process

B Subanya et al. used a meta heuristic algorithm. They used a Binary Artificial Bee Colony (BABC) algorithm to determine the set of optimal features with accurate classification in cardiac disease diagnosis. KNN method is used to evaluate the fitness of BABC algorithm. It means that the selected features by BABC algorithm are validated by K-NN classification algorithm [5].

M. Anbarsai et al. focused on a concept that the presence of heart disease can be predict with reduced number of attributes. They used Genetic Algorithm to determine the list of those attributes which contributed more towards the diagnosis of heart disease“which indirectly reduces the number of tests. With the help of genetic search attributes are reduced from thirteen to six. To predict the diagnosis of patients by using 3 classifiers i.e. Classification with the help of clustering and Decision Tree and Naive Bayes rule are used. They found that the performance of Classification via clustering was poor compared to other two methods [1].

Yasin Kaya et al. focused on the classification of PVC heart beats from ECG signals. Selected features were used for performance evaluation of classification. The main objective is to use genetic algorithms for feature selection to select the best features and to integrate them for PVC recognition. MIT-BIH Arrhythmia Database is used as a test dataset. To obtain the experimental results various classification algorithms i.e. ANN, SVM and KNN were applied [7]. Training dataset with redundant and irrelevant features may give the less accurate results when classification is done. Therefore feature subset selection is used as the data pre-processing step, which plays an important role in the field of data mining.

Abeer S. Desuky et al. proposed the multivariate filters and wrapper approach with Particle Swarm Optimization (PSO) as a feature selection method for large medical database. The selected features are used as input to five classifiers (Naive Bayes, Bayesian, Radial basis function and k-nearest neighbour, decision tree) and output is compared with other researcher's work [3].

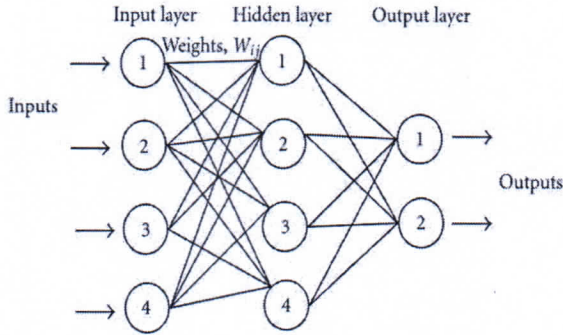
An Intelligent Heart Disease Prediction System was developed by Sellappan Palaniappan et al. using 3 data mining techniques (Naïve Bayes, Decision Trees and Neural Network) were used to build this system. This system could used to find and extract hidden pattern associated with cardiac disease from a huge existing database. It can answer heart disease related complex queries and can help doctors in better decision making [8]. If proper features of a system are selected efficiency and performance of that system will definitely increase in terms of accuracy, money and time.

Dr. T.R. Neelakantan et al. proposed a method in which a Multi-Layer Neural Network is used as a method for feature selection. This process selects relevant features from a Ischemic Heart Disease (IHD) data base. This method reduced the number of attributes from 17 to 12. The main objective was to observe back propagation network to study about IHD [9]. In database classification, feature selection plays an important role. It simply removes insignificant features which reduces the computational cost and execution time and makes the diagnosis process more easy and accurate.P. Jaganathan et al. proposed a different feature subset selection method which is based on fuzzy entropy

measures and provides a new way of handling the medical data classification. Evaluation of the proposed method is done using a RBF classification algorithm [10].

### III. OVERVIEW OF METHODS

#### A. Artificial Neural Network



ANNs is a processing system containing numerous nodes, which is inspired by human brain. In ANN various neurons are interconnected with the help of links containing some weight can easily build up a mutual interaction. Artificial neural network is an interconnected set of three simple layers namely input layer, hidden layer and output layer. The nodes (neurons) in network can take the processed data as an input and perform numerous operations on the data and operational output is passed to next neurons for the further processing. The output coming from each node is known as its node or activation value. In medical diagnosis patient risk factors are treated as nodes of the input layer of concerned network. It is configured for specific applications, such as pattern recognition or data classification through a learning process. "These networks are very reliable for solving real world problems. In neural network we don't tell the machine how to solve our problems. It learns from observation data, find patterns and figure out its own solution to the problem.

#### B. Feature Selection

Feature selection or attribute selection is the process of selecting a subset of significant features (variables, predictors) for the construction of our working model. Generally features are of 3 types redundant, relevant and Irrelevant. The main reason behind using feature selection is that the raw data contains many irrelevant and redundant features which may decrease the performance and thus can be removed without losing any important information. Feature subset selection is a procedure used to improve the quality of input data by using machine learning. The goal of feature selection is to find a minimum set of attributes which are necessary to solve any complex problem in such a way that the result obtained using reduced attributes is as close as possible to data containing all the attributes. Three main

categories of feature selection algorithms i.e. filter method, Wrapper method and embedded method . Wrapper method uses a predictive model for scoring feature subsets. For selecting features various filter methods are used, which depend upon the general characteristics of the training data set without using any supervised algorithms. While embedded method is considered in "feature selection" as a part of the model construction processes.

Data from clinical sources are of high volume in nature which may contain some unnecessary features which may reduce the accuracy of diagnosis. Therefore feature selection is highly important in this field to make the quality input for the best diagnosis results.

#### C. Chi Square Test

Chi squared test is one of the simplest method of feature selection. It is used to determine a set of relevant features. It is used to determine if there is a significant relationship between two variables. This test is performed if all the variables are continuous. Generally, we use chi square technique ( $\chi^2$ ) for determining relevant variables. This technique is used for continuous variables, In which a target variable is selected; then every parameter is checked to determine the existence of a relationship between the parameter and the target. Karl Pearson proved that the statistic Process for dimensionality reduction i.e. Principle component analysis (PCA) is

$$\chi^2 = \frac{(O_i - E_i)^2}{E}$$

Where O = observed frequency and E = expected frequency.

#### D. Random Forest

Random forest consists of several decision trees. Each tree is trained in isolation. Every node in the decision trees is a condition on a single feature. It uses the Out-Of-Bag error approximation to find the importance of each feature. In initial step RF estimates the Out-Of-Bag error ( $err(X_j)$ ) every feature, individually and then it exchanges the feature value randomly by one of its values in the OOB set. For the new value of the feature ( $err(X_{j\text{ooB}})$ ) again the OOB error is estimated. In a decision tree importance factor of any particular feature is the mean value over all the trees and the difference between the OOB error estimations before and after the value exchange [12]. Features with large values for this score are ranked as more important than features with small values. In Rstudio the `random.forest.importance` function is used to rate the importance of each feature in the classification of the outcome.

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$$VI(X^j) = \frac{1}{nb\_trees} \sum_j (|err(X^j) - err(X_{oob}^j)|)$$

IV. TOOL USED

For the analysis of algorithms we used the software Rstudio. It is a free and open source IDE (integrated development environment) for R programming language. R provides a wide variety of statistical and graphical techniques. Rstudio provides a friendly environment to the user in which required packages can be installed easily. A person having a little knowledge of programming can easily use this.

NoSql is used for storing and handling the database at backend because of its highly reliability, flexibility and availability.

V. DATA SET DESCRIPTION

We have used UCI machine learning repository heart disease data set for our work. The thirteen attributes are used in their data set listed in figure 1. The Label attribute is the class identifier with value "1" indicating suffering from cardiac disease and value "0" indicating no cardiac disease detected.

<b>Predictable attributes:</b>	
"Value: 1 = Presence of heart disease, Value: 0= No heart disease"	
<b>Input attributes</b>	
1.	Age (year)
2.	Sex/gender (value 1= Male; value 0 = Female)
3.	Type of Chest Pain (value 1=typical type 1 angina, value 2=typical type2 angina, value 3: non-angina pain; value 4: asymptomatic)
4.	Resting blood pressure
5.	Cholesterol (mg/dl)
6.	Blood Sugar ( 1 if value>120 mg/dl; 0 if value < 120 mg/dl)
7.	Resting ECG results(value 0: normal; value 1: 1 having ST-T wave abnormality; value 2: showing probable or definite left ventricular hypertrophy)
8.	"Heart rate (maximum)
9.	Exercise induced angina(1= yes and 0= no)
10.	Old peak = ST depression induced by exercise relative to rest
11.	The slope of peak exercise ST segment
12.	Number of major vessels (0-3) coloured by fluoroscopy
13.	Thal: normal=3; fixed defect=6; reversible defect =7

VI. EXPERIMENTS AND RESULTS

In this paper first we used 13 attributes (risk factors) as an input data to the ANN. The heart disease dataset was then divided into 2 categories i.e. training data and testing data. Training data consists of a total of 199 tuples and testing

data consists of 71 tuples. Then neural network algorithm was applied to this dataset. As a result of which the error rate came to be 12.69 which was high. It shows that the performance of model is very low

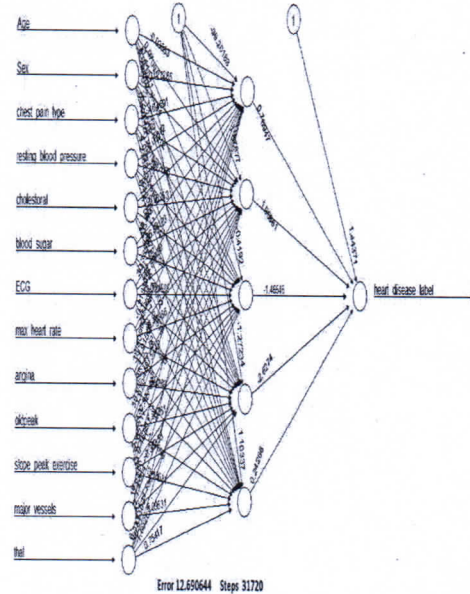


Fig. 1 ANN model of concerned dataset

The error rate is high because the data set may have some irrelevant and redundant features which may decrease the performance and thus can be removed easily with the help of feature selection.

First we applied chi square test for performing feature selection on our dataset. The chi.squared function automatically selects the most contributed attributes. User may choose the number of attributes according to their need. For example, if we select 10 attributes, then chi.squared function will select those 10 attributes which contributed more toward the result. In our work we reduced the number of attributes from 13 to 8 using this function.

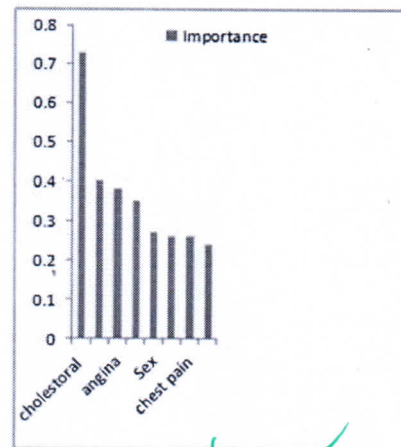


Fig. 2 Chi square Importance graph

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The reduced attributes are fed to neural network as input. Attributes names were changed like chest pain type as cp, resting blood pressure as rbp, cholesterol as sc, angina as exangina, slope peak exercise as slope and major vessels as vessels. Then neural network algorithm was applied to this reduced dataset. The model gives the error rate of 6.43 %. It means the accuracy of model is 93.57%, which is far better than before.

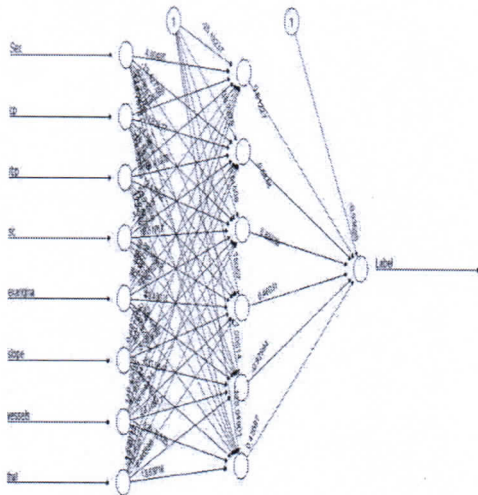


Fig. 3 ANN model after applying Chi square test

Now we used Random forest feature selection method. The function named: "random.forest.importance" is used to calculate the importance factor of each and every feature towards the result. The function returns a value in the form of data frame which contains some details i.e. name and the importance value based on the mean decrease accuracy of each attribute. Now we select the 8 features which have more importance value.

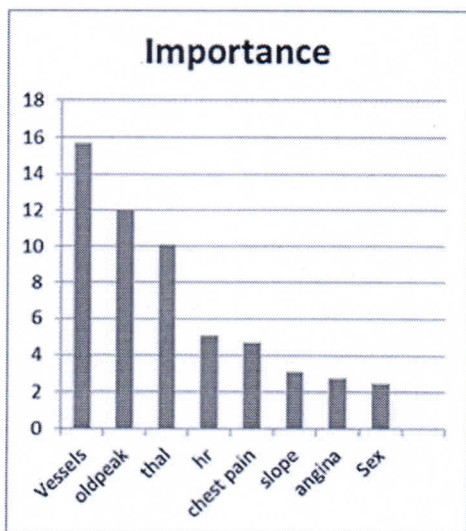


Fig. 4 Random Forest importance graph

The reduced attributes are fed to neural network as input. The model gives the error rate of 9.90 %. It means the accuracy of model is 90.10%

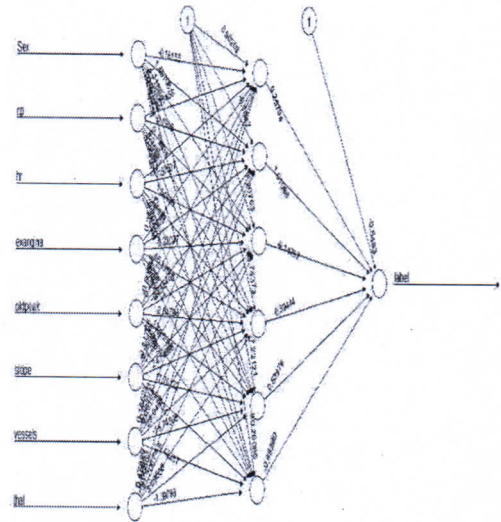


Fig. 5 ANN model after applying random forest

Comparison graph of Chi square and random forest

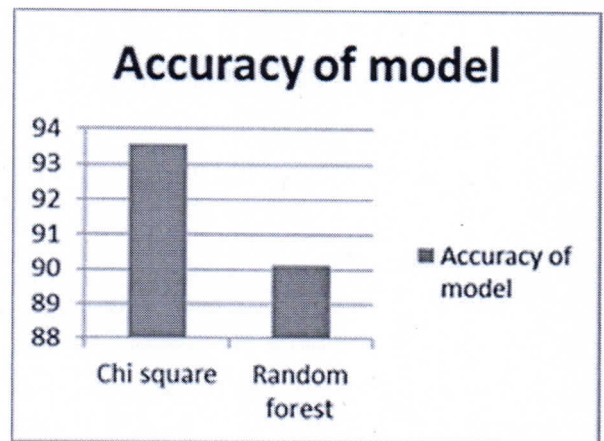


Fig. 6 Chi square Vs Random forest

## VII. CONCLUSION

The main objective behind this process is to diagnose presence of cardiac disease in a patient using minimum number of risk factors. In original data set 13 attributes were used for prediction. In our work we applied feature selection with the help of chi square test and random forest and found top 8 attributes which contributed more towards prediction result. So the number of attributes is reduced from 13 to 8. In initial step we used all the 13 attributes as an input to ANN for the classification of heart disease and the model gives the error rate of 12.69%. It means the accuracy of model is 87.31 %. After applying chi square test only 8

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selected attributes are used as an input to the ANN and the error rate is 6.43 %. It means the accuracy is 93.57 % and after applying Random forest the accuracy is 90.10%. It means Chi square gives better result in our work as a feature selection technique. So we applied Chi square feature selection on input data and it shows a big difference in accuracy and our experimental results indicate that ANN can give better and accurate classification results if its input attributes are less i.e. they are selected on feature selection basis.

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Co-ordinator  
IQAC, Shri P. Ram College  
Muzaffarnagar

Chairman  
IQAC, Shri P. Ram College,  
Muzaffarnagar

# Blockchain Technology: A Smart and Efficient Way for Securing IoT Communication

Sameeka Saini  
CSE, Dev Bhoomi Institute of  
Technology  
Dehradun, India  
sameeka.saini@gmail.com

Ankit Maithani  
CSE, Dev Bhoomi Institute of  
Technology  
Dehradun, India  
ankitmaithani2518@gmail.com

Diksha Dhiman  
CSE, Quantum University  
Roorkee, India  
dhimandiksha81@gmail.com

Ankur Rohilla  
SRGC (Shri Ram Group of  
College)  
Muzaffarnagar, India  
ankurrohilla2302@gmail.com

Nisha Chaube  
Graphic Era Deemed to be  
University  
Dehradun, India  
nisha.chaube20@gmail.com

Amita Bisht  
CSE, Dev Bhoomi Institute of  
Technology  
Dehradun, India  
amitabisht08@gmail.com

**Abstract**—Blockchain is the trending topic now-a-days due to its decentralized and security feature. Internet usage on the other hand is increasing rapidly along with the increase in threats and attacks. The Internet of Things, or IoT, is the arrangement of billions of physical devices around the world that are connected to the internet for the purpose of collecting and sharing data, worldwide. IoT appliances and devices are the boom in the technology but the biggest concern in IoT devices is its security. A lot of attacks are discussed on IoT. Existing technologies are not enough to secure the IoT devices completely. BIoT or Blockchain IoT is the mechanism of using security feature of Blockchain in IoT to make it more secure and vulnerable to communication attacks. In this paper we have discussed the basics of Blockchain, IoT and How various work have been varied out on BIoT

**Keywords**—Blockchain, BIoT, Bitcoin, Etherum, IoT, MQTT, Smart Contract, Solidity.

## I. INTRODUCTION

Blockchain is a distributed ledger that contains data in an interconnected form of chains that are secured. Or one can easily understand it as a database that stores some kind of information in the interconnected blocks. Whenever any new data arrives then it is to be inserted into a new block. Once the block is ready with data it is to be inserted and interconnected with the previous existing blocks in that Blockchain in chronological order, by the help of hash techniques. The following figure shows the network of Blockchain.

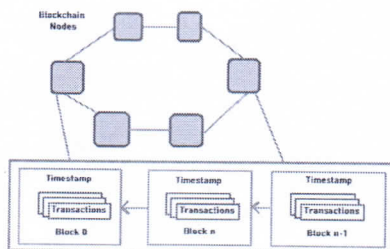


Fig. 1. Architecture of Blockchain.

In Blockchain we can store different types of information or data that may be inter-related or totally different from each other. It is the emerging technique with wide variety of applications. Blockchain is gaining popularity because of its decentralized and secure nature. It uses Hashing technique to store hash of previous data is stored and a secure chain is formed that's hard to manipulate. People are investing in Bitcoins and accepting the concept of Blockchain.

Bitcoin, the term was first suggested by Satoshi Nakamoto as "Bitcoin: A peer-to-peer electronic cash system".[3] Bitcoin and Blockchain are two different things as Bitcoin uses the concept of Blockchain. Another term that is equally important is Ethereum Blockchain. Following Figure 2 shows the architecture of Ethereum.

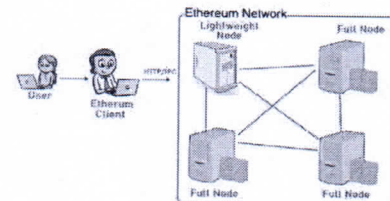


Fig. 2 Architecture of Ethereum

Ethereum was created by a crypto currency researcher and programmer named Vitalik Buterin [5]. Ethereum is a Blockchain-based, decentralized platform used for its own crypto currency, "ETHER". It helps in building Smart Contracts and Distributed Applications so that they can run without any downtime, fraud, and interference from any third party.

All Mining in Bitcoin is usually done for solving computations. Users willingly participate in the competition to update the Block in Blockchain. Users get query to solve and if his/her system is faster than others then he/she wins and adds the block in the Blockchain successfully. The EVM is Ethereum virtual machine is a software platform that allows execution of code for each and every smart contract. To maintain the consensus in Blockchain every Ethereum code is executed on the EVM.

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IoT is the emerging trend in today's internet dependent world. Internet-Of-Things (IoT) is a loosely coupled system of multiple homogeneous and heterogeneous devices having sensing, processing, and network capabilities power.[7] IoT has wide variety applications in areas such as smart cities, connected vehicles, healthcare, smart agriculture, smart grid, smart retail, technology enhancement etc. Figure 3 shows few applications of Blockchain for IoT.

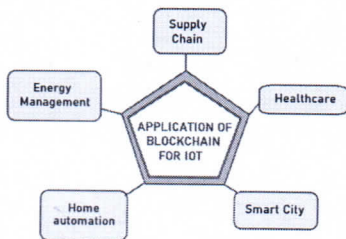


Fig. 3 Applications of Blockchain for IoT.

But along with its advantages it has some severe issues of privacy and security in IoT. As Blockchain is a distributed and secure yet powerful mechanism for providing security and privacy we can use both of them together. With the help of Blockchain we can decentralize the IoT networks and by eliminating single points of failure we can make connected devices more secure and less vulnerable to malware and other attacks. BIoT is the Blockchain IoT that is more secured than simple IoT and a lot of work has been done on this topic. The figure 4 shows the attacks on IoT.

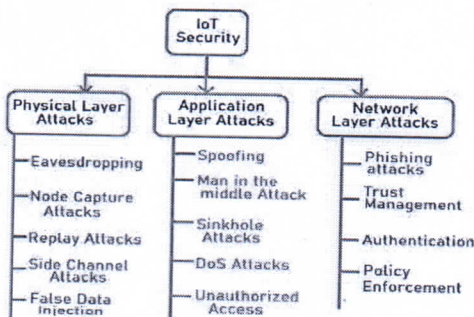


Fig. 4 Various issues related to security in IoT

Some real world examples of BIoT are as follows:

1. Smart Homes

BIoT has enabled security system of smart homes that can be handled from the smartphones remotely. No doubt IoT devices are smart enough to reduce the work manually but they lack in security and privacy. With help of Blockchain the communicated data is protected against various types of attacks. An Australian telecommunication & media company named Telstra that is famous for home solutions also uses BIoT to make their smart devices secure and privacy protected. They store the information such as biometrics, voice recognition and facial recognition on Blockchain.

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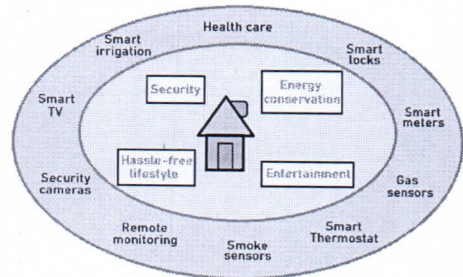


Fig. 5 Smart Homes using BIoT.

2. Smart Automobile

IoT-enabled sensors are used in automobiles to make them smart and fully automated. All the devices are connected through decentralized network. Benefit of connecting them in decentralized network enables many users to exchange sensitive information effortlessly and rapidly. The BIoT can be used as automated fuel payment, autonomous cars, smart parking & automated traffic control.

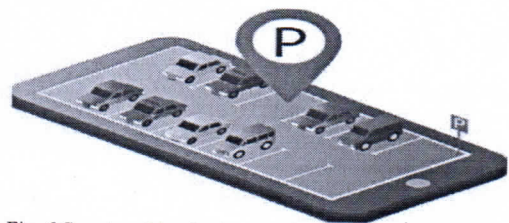


Fig. 6 Smart parking in Automotive Industry using BIoT.

3. Supply Chain and Logistics

The vast network of logistics and supply chain contains some stakeholders i.e. dealers, clients and providers of raw material. Involvement of many stakeholders makes system more prone to attacks and insecure. Tracking the shipment, reliable payment and other imp features can be securely carried out with the help of BIoT. All sensitive data is stored in Blockchain and all connected, verified and valid stakeholders are listed in smart contracts and only they can access that information. A renowned distributor and producer of food products which uses BIoT to improve its accountability and transparency by creating a protected, irreversible and observable ledger manageable and accessible by verified participants i.e. stakeholders is Golden State Foods.

4. Budget Distribution

Sharing of Economy or distribution of budget with the help of BIoT has become a very popular and secure idea. It decentralizes the whole system to earn revenue and secure idea. It decentralizes the whole system to earn revenue by sharing all the sensitive information among users without any third party to rely on. "Stock.it" is using BIoT for objects/devices.

5. Pharmacy Industry

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The pharmaceutical sector that develops, manufacture and distributes the drugs or medicines is also an important application of BIoT. By the help of BIoT we can track the drug's complete journey in any very easy and efficient way. "Mediledger"- a BIoT designed transparent and visible offering simplified payment process, controlling user access etc.

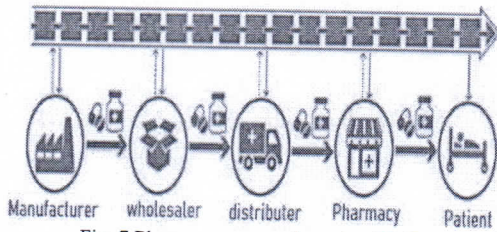
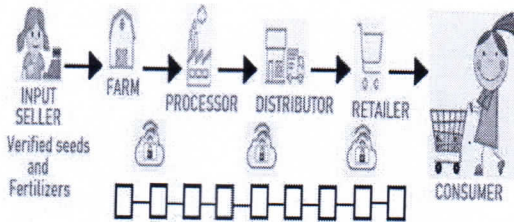


Fig. 7 Pharmacy companies using BIoT.

### 6. Agriculture Industry

One of the major problem faced by the world today is of rapid growing population which in turn makes us concern about growing more food for them. BIoT helps the farmer to select the crops based on humidity, temperature, soil moisture, light etc. Also the BIoT can be used in Food supply chain to know the food's source and check whether eatables are safe to eat or not. The phases are as follows:

- Data is sensed by IoT sensor or farmer manually stores
- Dissemination of harvests to food processing companies.
- Processed food to be supplied to the retailers.
- Customers can back-track supply chain.



Data stored in this network is shared and secured  
Fig. 8 Agricultural Industry using BIoT.

## II. LITERATURE REVIEW

BIoT is a revolution in the latest technology in terms of security and privacy in smart devices. Various works have been done on BIoT. Mohanta B. in 2020 [6], secured the IoT devices with Blockchain and Ethereum. For unique identification 160 bit hash value is used that is generated by ECDSA algorithm. For message communication MQTT, XMPP, etc protocols are used but they are not so secured so the author has used Blockchain in which there is no need for key distribution. For individuals or groups, all data access strategies, interval and circumstances are written in smart contract. The smart contract offers the right to ownership of

IoT devices that supports updating, adding, or decision-making procedure strongly.

Yakut S. et. al[7] proposed a method in which they have used raspberry pi along with solidity language to create smart contract. They have used hyper ledger fabric platform for connecting organization in Blockchain. As a future work, they will work on verification and authorization security tools with lightweight cryptographic methods.

Fakhri D. et al. [2] in their paper they showed how the data is secured in IoT smart devices by experimenting on smart refrigerator first without using Blockchain and then with using Blockchain. They have used MQTT broker protocol in without Blockchain for transmitting data from smart refrigerator to smart television. The same communication data is secured replacing the protocol with Ethereum. EVM used is Go Ethereum with Golang programming language. Framework for smart contract is truffle with solidity programming language.

BIoT is also used in exchanging information or data in a secured manner. Hien Thi Thu Truong et. al [9] proposed a Sash framework in which they coupled IoT platforms with Blockchain. BIoT is also used in E-voting system. Garg k. [13] in her paper compared the various techniques used during E-Voting system and how that techniques contribute towards more secure, privacy and decentralized voting system.

Urien P. [10] introduced a Blockchain Transaction Protocol for Restraint Nodes-the BIoT paradigm, whose foremost concern is to attach a sensor data in Blockchain connections.

Jinha S. et. al.[12] proposed a system to verify and detect data on the IoT Blockchain like transaction generation intermission, Generation rate of Blockchains and the indicators of IoT data. They also implemented visualization tool for monitoring the Blockchain robustness and IoT data in a reliable interpretation via visualization of real-time Blockchain updated events, Blockchain network measurements, and finally the IoT sensing data stored on Blockchain as a new and updated transaction. The Blockchain anomaly detection can be detected by inspecting if the Blockchain works under normal conditions or not and to identify malevolent node that execute some malicious behavior, for that they used Blockchain anomaly detection for that they used some threshold or SVM. The conception tools are executed on HTML5-enabled Web browsers for transferability.

Shin S. et. al. [11] CyExec (Cyber Security Exercise System), containing a virtual environment using Virtual Box and Docker, is a low-rate and flexible cyber security exercise system, proposed by the authors. The high rate of Cyber Range scheme and lack of personnel to preserve and cope up the exercise environment are the reason human resource

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development is not progressing. CyExec is, supposing the overview of higher education institutions and small and medium-sized enterprises, is the exercise system to acquire the elementary methods of cyber-attack and resistance.

The following table shows the summary of some researches and surveys done on BIoT on various application whose main aim was to provide security and privacy to the data communicated between smart devices and users.

Table 1. Details of work done on BIoT in past some years

AUTHOR NAME	PARAMETER	CONTRIBUTIONS
B. K. Mohanta et. al. [6]	For Securing IoT communication. Parameters taken Security, Privacy.	First they created smart home environment based on IoT technology. They used 1. Raspberry Pi device to gather data from sensors devices. 2. Ethereum platform connected to Blockchain. 3. Decauth authentication technique to authenticate intermediate devices. 4. Solidity platform for writing smart contract in Ethereum network.
S. Yakut et. al.[7]	For security and privacy purposes.	Authors performed applicability of various Blockchain framework with Hyper ledger on IoT device. For that they used Raspberry Pi 3B with 16 GB SD card. Hyper ledger Composer and Hyper ledger Fabric are tested on Raspberry
D. Fakhri et. al. [2]	For securing data transfer in IoT devices.	Author showed the difference between with and without using Blockchain. The data communication between smart refrigerator & smart TV with MQTT protocol and then they have compared it with technology using Blockchain, Ethereum, ECDSA encryption algorithm.
S. Shin et. al. [11]	IoT security exercise content.	They proposed CyExec for security which is low cost and flexible consisting of a virtual environment using Virtual Box and Docker.
J. Song et. al. [12]	Anamoly detection	They suggest a process for sensing differences that may follow in an IoT Blockchain platform. They too proposed a conception device for monitoring healthiness of Blockchain by analyse & visualize log data.
K. Garg et. al. [13]	Anonymity and security	They compared the various algorithms and already done work on E-Voting system.
K.M. Giannoutakis et. al. [14]	Security	The paper projected a distributed method for supportive IoT security in smart homes through Blockchain technology.

III. CONCLUSION

Clearly it's seen and observed that we are using BIoT in various applications and in coming years it will be scaled more in other application areas also. IoT is an emerging technique but in it security and privacy is not maintained. Blockchain is also a current emerging technique that is famous for its secure and decentralized nature. Together Blockchain IoT (BIoT) is used to make smart appliance more secure and private. In this paper we have reviewed the existing work and techniques in contribution to making IoT more secure in various applications like agriculture, automobile and healthcare etc.

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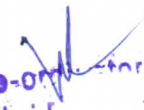
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## Research Article

# PATH ANALYSIS IN M4 MICRO MUTANTS IN WHEAT

ROHIT<sup>1</sup>, JITENDRA SINGH<sup>2</sup> AND ARCHANA NEGI<sup>2</sup>

<sup>1</sup>Department of Plant Breeding & Genetics, R.B.S. College, Bichpuri, Dr Bhimrao Ambedkar University, Agra, 282004, India

<sup>2</sup>Department of Agriculture, Shri Ram College, Muzaffarnagar, 251001, India

\*Corresponding Author: Email - jitu1040@gmail.com

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**Abstract-** Information on the mutual association of traits is important for effective selection in plant breeding program. An experiment was conducted at R. B. S. College, Bichpuri, Agra to evaluate the direct and indirect effects of yield related traits on grain yield. Path coefficients were studied for twelve characters in six desired mutants of wheat. Days to 50% flowering, exerted high order of positive direct effects towards yield per plant followed by plant height at flag leaf stage and germination percentage. Days to germination made positive contribution towards yield per plant, spike length and weight of 500 seeds. This implies the true relationship between these traits and grain yield; therefore, due attention should be given on such traits during selection for further improvement.

**Keywords-** Path coefficients, Mutation, Correlation, Selection

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## Introduction

Bread wheat (*Triticum aestivum* L.) is one of the most important food crops of the world, and continuous improvement in its productivity will be required to keep pace with global population growth. Induced mutations are of considerable values for comprehending evolution and accelerating the process of plant improvement. Radical changes in agriculture techniques and human needs and their prejudices as well, force the plant breeder to employ all available methods, including mutation for the improvement of cultivated plants.

The correlation coefficient simply indicates degree of association among the characters, contributing towards economic yield and it has been quite useful as basis of selection. However, it does not provide measure of casual relationship existing among variables. Selection based on simple correlation coefficient without considering interactions among yield and yield components may mislead the breeders to reach their main breeding purpose [1,2]. Path analysis can be used to calculate the quantitative impact on grain yield through direct and indirect effects caused by one or the other component traits [3,4]. It provides an effective means of partitioning correlation coefficients into direct and indirect effects and illuminates the relationship in a more meaningful way. Path analysis thus permits a critical examination of specific factors that produce a given correlation and can be successfully employed in formulating an effective selection strategy [5].

## Material and Methods

Present investigation was carried out at Agricultural Research Farm of R.B.S.College, Bichpuri, Agra. The experimental material used in the present investigation comprised of six M4 mutants of HD 2329 variety of *Triticum aestivum* L. induced by gamma rays. Dwarf plant, Semi-dwarf plant, long spike, Tall plant, Long seed and High tillering plants were selected as desirable mutants from the M3 generation. Three varieties viz., UP 2338, HD 2329 and RR 21 were used as a check. The experiments were laid out in a simple Randomized Block Design with three replications. Each of the treatment accommodated four rows of three meter length with a spacing of 9x22.5 cm. Seeds were shown in the field with spacing of row to row was kept 5 cm. All the agronomical packages and practices were applied to raise healthy crop.

Observations were recorded both on the plot basis and single plant basis. For single plant observations ten competitive plants from each plot were randomly selected. Average of these plants in respect to different plant characters was taken for statistical analysis. The data were recorded from the randomly selected plant from the field for various quantitative characters viz., days to germination, germination percentage, plant height at flag leaf stage, days to 50% flowering, seedling injury, spike length, numbers of effective tillers, number of seeds per spikelet, number of seeds per spike, number of spikelets per spike, weight of 500 seeds and yield per plant. Path coefficient of different characters were estimated according to Wright (1921) [6] and Dewey and Lu (1959) [7].

## Results and Discussion

With the help of path coefficient analysis, correlation coefficients of all the characters with yield per plant were partitioned into the direct and indirect effects.

### Direct effect

Days to 50% flowering (0.791), exerted high order of positive direct effects towards yield per plant followed by height at flag leaf stage (0.784) and germination percentage (0.752).

Days to germination, number of seeds per spikelet, number of seeds per spike and weight of 500 seeds also made direct positive contribution towards yield per plant, but in low order. However, number of spikelets per spike exerted high direct negative contribution towards yield per plant. Seedling injury, spike length and number of effective tillers exerted lower direct negative contribution towards yield per plant.

### Indirect effects

Days to germination made positive contribution towards yield per plant, spike length and weight of 500 seeds followed by high positive contribution via number of spikelets per spike and number of seeds per spike. However, it made high negative contribution towards days to 50% flowering, height at flag leaf stage, seedling injury and germination percentage.

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Table-1 Path coefficient analysis showing direct and indirect effects of yield components on yield per plant

Characteristics	Plant	Yield per Germination	Days to % age	Germination to 50% Flowering	Days length	Spike length leaf stage	Height at effective tillers	No. of spikelets per spike	No. of seeds per spikelet	No. of seeds per spike	No. of 500 seeds	Weight injury	Seedling
Days to germination	0.238	0.242	-0.319	-0.888	0.195	-0.986	-0.14	0.646	-0.222	0.394	0.1	-0.523	
Germination % age	-0.311	0.242	0.752	-0.845	-0.142	0.326	0.154	0.521	0.944	-0.384	-0.392	-0.324	
Days to 50% flowering	0.957	0.934	-0.537	0.791	0.262	-0.407	-0.665	-0.158	-0.319	0.612	0.785	-0.220	
Spike length	0.585	-0.436	-0.332	0.790	-0.161	-0.163	-0.246	-0.396	-0.419	0.120	0.112	-0.728	
Height at flag leaf stage	0.143	-0.486	-0.558	0.793	-0.162	0.784	-0.420	0.183	-0.355	-0.152	0.911	-0.549	
Number of effective tillers	-0.423	0.478	0.193	-0.248	0.874	-0.783	-0.490	0.719	0.372	-0.102	-0.647	0.193	
Number of spikelets per Spike	-0.313	-0.258	-0.311	0.640	0.612	-0.115	-0.488	-0.604	-0.391	0.114	0.578	-0.704	
Number of seeds per Spikelet	0.868	-0.378	-0.385	0.547	-0.954	-0.481	-0.315	-0.606	0.158	0.150	0.113	-0.115	
Number of seeds per spike	-0.559	-0.559	-0.345	0.602	0.157	-0.508	-0.354	-0.577	0.157	0.160	0.106	-0.861	
Weight of 500 seeds	0.144	-0.581	-0.254	0.543	-0.904	-0.309	-0.172	-0.420	0.102	0.164	0.235	-0.102	
Seedling injury	-0.164	-0.104	0.752	0.156	-0.349	0.120	0.201	0.202	0.310	-0.724	-0.554	-0.220	

Number of effective tillers and number of seeds per spikelet exerted lower negative contribution with days to germination. Germination percentage caused high negative effects towards yield per plant via days to 50% flowering, seedling injury, number of seeds per spike and weight of 500 seeds. It was negatively correlated with spike length. It had high positive effects through number of seeds per spikelet (0.944), number of spikelets per spike and height at flag leaf stage, while positive effects through days to germination and number of effective tillers, seedling injury exerted negative contribution towards yield per plant via days to germination. It had high negative effects through number of seeds per spike, weight of 500 seeds and spike length. However, it made high positive contribution towards height at flag leaf stage, number of effective tillers and number of spikelets per spike. Days to 50% flowering exhibited high positive contribution towards yield per plant via days to germination, weight of 500 seeds and number of seeds per spike. It had positive effects through spike length. On the other hand, it exerted high negative effect towards germination percentage, height at flag leaf stage, number of effective tillers and number of seeds per spikelet. It caused negative effects via seedling injury and number of spikelets per spike.

Spike length exhibited high positive contribution towards yield per plant via days to 50% flowering. It caused positive effects via number of seeds per spike and weight of 500 seeds. On the other hand, it exerted high negative effect towards seedling injury, days to germination percentage, number of spikelets per spike. It caused negative effects via height at flag leaf stage and number of effective tillers.

Height at flag leaf stage made positive contribution towards grain yield via number of spikelets per spike. It caused high positive effects towards weight of 500 seeds and days to 50% flowering. It had high negative effects through days to germination, germination percentage, seedling injury, number of effective tillers and number of seeds per spikelet, while negative effects through spike length and number of seeds per spike.

Number of effective tillers exerted high negative effects towards yield per plant via weight of 500 seeds while negative effect through days to 50% flowering and number of seeds per spike. On the other hand, it exhibited high positive effects via days to germination, spike length, height at flag leaf stage, number of spikelets per spike and number of seeds per spikelet, while it had positive effect towards germination percentage and seedling injury.

Number of spikelets per spike made high negative effect towards yield per plant via germination percentage, seedling injury, number of effective tillers and number of seeds per spikelet followed by lower order of negative contribution via days to germination and height at flag leaf stage. It contributed high positively via days to 50% flowering, spike length and weight of 500 seeds, while it had positive effect towards number of seeds per spike.

Number of seeds per spikelet caused high positive contribution towards grain yield via days to 50% flowering followed by lower order of positive contribution via number of seeds per spike and weight of 500 seeds. On the other hand, it exerted high negative effect towards days to germination, seedling injury, spike length, height at flag leaf stage, number of effective tillers and number of spikelets per spike, while it caused negative effect towards seedling injury.

Number of seeds per spike exerted high positive contribution towards yield via days to 50% flowering followed by a lower order of positive contribution via spike length, number of seeds per spikelet and weight of 500 seeds. However, it had high negative effect towards days to germination, germination percentage, seedling injury, height at flag leaf stage, number of effective tillers and number of spikelets per spike. Weight of 500 seeds made positive effect towards yield per plant via number of seeds per spikelet and number of seeds per spike.

Seedling injury had high positive effect towards days to 50% flowering.

However, it made high negative effect towards days to germination, spike length, height at flag leaf stage and number of spikelets per spike and it caused negative effect towards germination percentage, seedling injury and number of effective tillers.

In the present investigation, path coefficient analysis was carried out taking yield per plant as dependent variable and rest of the eleven traits as independent variables. Days to germination showed direct positive effects on yield.

Positive direct effects of germination percentage on yield per plant was also observed. The direct effect of germination percentage on yield per plant was less than the total correlation coefficient. Positive indirect effects of germination percentage via days to germination, height at flag leaf stage, number of spikelets per spike and number of seeds per spikelet are expected to be responsible for reducing correlation coefficients. Seedling injury showed direct negative effects on yield per plant.

Days to 50% flowering had high positive effects on yield per plant. Positive indirect effects of days to 50% flowering via days to germination, spike length, number of seeds per spike and weight of 500 seeds are expected to be responsible for reducing correlation coefficients.

Spike length exhibited very low negative direct effects on yield per plant and supported by Singh *et al.* (2001) [8]. However, these findings are in disagreement with the findings of Okuyama *et al.*, (2004) [9] and (2005) [10]; Naserian *et al.*, (2007) [11]; Mecha *et al.*, (2017) [12] who reported direct positive effects of spike length on grain yield per plant. Positive correlation of spike length with yield per plant may be due to positive indirect effects to yield via number of seeds per spikelet, number of spikelets per spike and days to germination.

Height at flag leaf stage had high positive effects on yield per plant, which shows parity with the findings of Anand *et al.* (1978) [13] and Bhullar and Nijjar (1984) [14]. On the other hand Mitsiwa, (2013) [15] and Ayer *et al.*, (2017) [16] reported that plant height showed negative direct effect on grain yield.

Number of effective tillers had high direct negative effects on yield per plant. These results are in contradiction with Kumbhar *et al.* (1982) [17] and Singh *et al.* (2001). On the other hand, Nayak *et al.*, (2001); Khedikar *et al.*, (2004) and Hasib and Kole, (2004) reported that number of effective tillers had positive direct effect on yield per plant.

In agreement to Singh *et al.* (2001), number of spikelets per spike showed direct negative effect on yield per plant. Whereas, Lad *et al.*, (2003) [18], Anwar *et al.*, (2009) [19]; Khan and Dar, (2010), Mecha *et al.*, (2017) reported positive direct effects. Positive correlation of this character to yield per plant may be due to high positive indirect effects of spikelets per spike towards yield per plant via days to 50% flowering, spike length and weight of 500 seeds, while high negative indirect effect of spikelets per spike via seedling injury and number of effective tillers are also found in the present study.

Days to 50% flowering had high positive effects on yield per plant. These results are in of Nayak *et al.*, (2001); Khedikar *et al.*, (2004) and Hasib and Kole, (2004). Number of seeds per spikelet had positive direct effects on yield per plant. Direct effects were lower than the correlation coefficient because it shows positive indirect effect to yield per plant via days to 50% flowering, number of seeds per spike and weight of 500 seeds.

Number of seeds per spike had low direct positive effects on yield per plant and thus confirmed the findings of Dencic *et al.*, (2000) [20]; Naserian *et al.*, (2007); Kotal *et al.*, (2010). However, it showed sharp disagreement with Kumbhar *et al.* (1982) and Zhuzhukin (1983) [21], who reported high direct effects of seeds per spike on yield per plant. The total correlation coefficients of number of seeds per spike with yield per plant was higher than its direct effects.

500 seeds weight showed positive direct effect on yield per plant. Therefore, the findings are in contrast with Khan *et al.*, (2013) [22,23]; Mecha *et al.*, (2017). The total association of this character with yield per plant is less contributed by direct effect but more by indirect effects through days to 50% flowering.

#### Conclusion

Positive direct effects of days to 50% flowering, plant height at flag leaf stage and germination percentage with yield per plant indicated that selection of these genotypes with days to 50% flowering, plant height at flag stage and germination percentage should be emphasized while selection for improving grain yield.

**Application of research:** The current study confer that these characters which exerting maximum direct positive effect should be considered suitable for further future wheat breeding programme.

**Research Category:** Plant breeding

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**\*\*Research Guide or Chairperson of research: Jitendra Singh**  
University: Dr Bhimrao Ambedkar University, Agra, 282004, India  
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**Study area / Sample Collection:** R. B. S. College, Bichpuri, Agra

**Cultivar / Variety / Breed name:** Wheat (*Triticum aestivum* L.)

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Co-ordinator  
IQAC, Shri Ram College  
Muzaffarnagar



# **Character Association in M<sub>4</sub> Micro Mutants in Wheat (*Triticum aestivum* L.)**

**Rohit <sup>a</sup>, Jitendra Singh <sup>b\*</sup> and Archana Negi <sup>b</sup>**

<sup>a</sup> Department of Plant Breeding and Genetics, R. B. S. College, Bichpuri, Agra, India.  
<sup>b</sup> Department of Agriculture, Shri Ram Group of College, Muzaffarnagar, India.

## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Original Research Article**

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## **ABSTRACT**

To determine the association among yield related traits on grain yield of mutant wheat, an experiment was conducted at the Agricultural Research Farm of R. B. S. College, Bichpuri, Agra (Uttar Pradesh). The application of physical mutagens such as X-rays, gamma rays, and neutrons, as well as chemical mutagens, for inducing variation is well set up. Induced mutations have been applied to the Joint offer of FAO/IAEA Division of Nuclear Methods in Agriculture, more than 1800 cultivars acquired either as direct mutants or derived from their crosses have been released globally in 50 countries. The correlation of twelve characters in wheat induced mutants was investigated. The number of spikelets per spike and spike length both had a significant and positive correlation with yield per plant. Selection for traits that are positively correlated with yield per plant could lead to increased yield. This suggests that selecting for these traits may be more effective in maximising grain yield.

**Keywords:** Correlation analysis; mutant wheat; selection; physical mutagens.

\*Corresponding author: E-mail: [jitu1040@gmail.com](mailto:jitu1040@gmail.com);

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**Co-ordinator**  
**IQAC, Shri Ram College**  
**Muzaffarnagar**

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

## 1. INTRODUCTION

"*Triticum aestivum* L. (wheat) is one of the world's oldest crops and has been used for >8000 years as a food crop. Today, wheat is one of the most important sources of grain for humans, and is cultivated on greater areas of land than any other crop. Wheat is counted among the big three Cereal crops, with over 600 million tonnes being harvested annually. Although cultivated under a wide range of climatic conditions, the most extensive production of wheat is in areas where the winters are cool and summers are comparatively hot" [1,2].

Induced mutations are of considerable values for comprehending evolution and accelerating the process of plant improvement. Keeping in the view the importance of mutations in breeding and of various agents coming under the broad category of both physical and chemical mutagens, gamma-rays, belonging to the former group have been utilized in inducing mutations in wheat variety 'HD 2329' in the present investigation.

"Crop plants often face multiple abiotic stresses, such as water scarcity, flooding, increasing temperatures, and soil salinity during their life cycle. In the current scenario of climate change, wheat production is most prone to drought stress in semi-arid zones of the world" [3,4,5].

"Yield is a complex character resulting from multiplicative interaction of yield components and therefore, selection for this character becomes a difficult task. Since, grain yield is a complex trait, controlled by many genes, as well as environmentally influenced and determined by the magnitude and nature of their genetic variability in which they grow" [6]. "In addition, grain yield is related with other characters such as plant type, growth duration and yield components" [7]. "The correlation coefficient gives an idea about various associations existing between yield and yield components. The knowledge of factors responsible for high yield has been rendered difficult since yield is a complex character and there may not be genes for yield by itself" [8]. Various components and their multiplicative interaction results in total effect of yield. To get marked improvement in yield, it is essential to have information on the association between different characters and their contribution to yield. The correlation coefficient gives a measure of the relationship

between traits and provides the degree to which various characters of a crop are associated with productivity. Association of characters with yield, among themselves and the extent of environmental influence on the expression of these characters are necessary to develop stable genotypes. In such situations, correlation analysis could be used as an important tool.

## 2. MATERIALS AND METHODS

The investigation was carried out at the Agricultural Research Farm of R. B. S. College, Bichpuri, Agra. The experiment was carried out in a simple Randomized Block Design (RCBD) of three replications, in which each of the treatments accommodated four rows of three meter length with a spacing of 9x22.5 cm. The experimental material used in study comprised of six  $M_4$  mutants of HD 2329 variety of *Triticum aestivum* induced by gamma rays, along with three cultivated varieties (U.P. 2338, R.R. 21, HD 2329) used as check. Dwarf plant, Semi-dwarf plant, Long spike, Tall plant, Long seed and High tillering plants were selected as desirable mutants from  $M_3$  generation were used in the investigation. Seeds were shown in the field with spacing of row to row was kept 5 cm. All the agronomical packages and practices were applied to raise healthy crop. Observations were recorded both on plant basis and single plant basis. For single plant observations ten competitive plants from each plot were randomly selected. Correlation coefficients between all possible character pairs were computed from the mean values.

## 3. RESULTS AND DISCUSSION

Yield per plant showed highly significant and positive correlation with spike length (0.83) and number of spikelets per spike (0.74). This trait also had positive correlation with days to germination, days to 50% flowering, number of seeds per spikelet, number of seeds per spike and weight of 500 seeds. On the other hand it was found negatively correlated with germination percentage, seedling injury, and plant height at flag leaf stage and number of effective tillers.

Weight of 500 seeds exhibited strong negative correlation with plant height at flag leaf stage (-0.77). This trait also showed non-significant negative correlation with germination percentage, seedling injury and number of effective tillers. This character was found positively and significantly correlated with days to germination

(0.717) and number of seeds per spikelet (0.72). This trait also had positively correlated with days to 50% flowering, spike length, number of spikelets per spike and number of seeds per spike.

Number of seeds per spike was highly significantly and positively correlated with spike length (0.78), number of spikelets per spike (0.74) and number of seeds per spikelet (0.97) and also showed positive correlation with days to germination and days to 50% flowering. On the other hand it was found negatively correlated with germination percentage, seedling injury, number of effective tillers and plant height at flag leaf stage.

Number of seeds per spikelet was significantly and positively correlated with spike length (0.72) and also showed positive correlation with days to germination, plant height at flag leaf stage, days to 50% flowering and number of spikelets per spike. This trait also had negative correlation with germination percentage, seedling injury and number of effective tillers.

Number of spikelets per spike exhibited strong positive correlation with spike length (0.83). This trait also showed non-significant positive correlation with days to 50% flowering. However, it was found negatively correlated with days to germination, germination percentage, seedling injury, number of effective tillers and plant height at flag leaf stage. Plant height at flag leaf stage showed negative correlation with germination percentage. This trait exhibited positive correlation with days to germination, seedling injury, days to 50% flowering and spike length.

Spike length had positive correlation with days to germination, germination percentage and days to 50% flowering. It was negatively correlated with seedling injury.

Days to 50% flowering was highly significantly and negatively correlated with seedling injury and positively correlated with days to germination and germination percentage. Seedling injury was significantly and positively correlated with days to germination and negatively correlated with germination percentage.

Days to germination exhibited non-significant positive correlation with germination percentage.

Experimental findings of the present investigation revealed that, yield per plant and spike length

exhibited high and positive correlation. "Spike length showed positive and significant correlation with grain yield" [9,10]. "The increase in spike length is directly associated with increase in yield per plant" [11,1]. The findings of Dutamo et al. [12] and Mecha et al. [13] reported that spike length had positive correlation with grain yield.

"The grain yield was recorded negatively correlated with number of effective tillers" is supported by Larik [14]. The yield per plant showed significant and positive correlation with number of spikelets per spike.

Yield per plant also showed positive correlation with days to germination, days to 50% flowering, number of seeds for spikelet, number of seeds per spike and weight of 500 seeds.

"Weight of 500 seeds was significantly and positively correlated with days to germination and number of seeds per spikelet, while it was positively correlated with spike length and fully supported" by Faizul et al. [15]. "500 seeds weight was positively correlated with spikelets per spike" as reported by Tripathi [16]. Ganno et al. [17] reported that "thousand seed weight had a positive significant correlation with grain yield".

"Weight of 500 seeds was positively correlated with seeds per spike" as reported by Sinha and Sharma [18].

Weight of 500 seeds was negatively and significantly correlated with plant height at flag leaf stage.

Number of seeds per spike exhibited positive and significant correlation with number of spikelets per spike. This finding is supported by Sinha and Sharma [18].

"Number of seeds per spike was positively and significantly correlated with spike length. Number of grains per spike had strong positive relationship with yield per plant" [2,19]. "Increase in grains per spike will also have a better influence on grain yield" [20,21]. Number of seeds per spike was positively and highly significant with number of seeds per spikelet, while it was negatively correlated with number of effective tillers, plant height at flag leaf stage, germination percentage and seedling injury.

Number of seeds per spikelet was positively correlated with number of spikelets per spike, days to 50% flowering, days to germination and

Table 1. Correlation coefficients for different characters

Characters	Days to Germination	Germination %	Seedling injury	Days To 50% flowering	Spike length	Height at flag leaf stage	No. of effective tillers	No. of spikelets per spike	No. of seeds per spikelet	No. of seeds per spike	Weight of 500 seeds	Yield per plant
Days to germination	1	-0.12	0.012	0.45	0.06	0.07*	-0.17	-0.18	0.44	0.28	0.717*	0.14
Germination % age			-0.45	0.496	0.21	-0.24	0.24	-0.15	-0.21	-0.26	-0.27	-0.1
Seedling injury				-0.81*	-0.55	0.026	0.34	-0.51	-0.57	-0.49	-0.34	-0.22
Days to 50% flowering					0.36	0.25	-0.08	0.33	0.57	0.41	0.48	0.23
Spike length						0.0014	-0.33	0.83*+	0.72*	0.78*	0.70*	0.83*+
Height at flag leaf stage							0.014	-0.38	0.072	-0.10	-0.77*	-0.13
Number of effective tillers								-0.22	-0.64	-0.67	-0.39	-0.017
Number of spikelets per spike									0.65	0.74*	0.33	0.74*
Number of seeds per spikelet										0.97*+	0.72*	0.57
Number of seeds per spike											0.65	0.65
Weight of 500 seeds												0.56

\*Significant at 5% level of probability; +Significant at 1% level of probability

  
Co-ordinator  
IQAC, Shri Ram College  
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IQAC, Shri Ram College,  
Muzaffarnagar

plant height at flag leaf stage. This character was negatively correlated with number of effective tillers, germination percentage and seedling injury. The results of Sultana et al. [11] suggested that the longer the spike length the higher was the number of spikelets per spike, grain number and grain yield.

Number of spikelets per spike exhibited positive and significant correlation with spike length. Safeer-ul-Hassan, et al. [22] reported that "spike length is positive and significantly correlated with number of spikelets per spike". Dutamo et al. [12] and Mecha et al. [13] reported that "number of spikelets per spike had positive correlation with grain yield". "Number of spikelets per spike showed positive and significant correlation with number of seeds per spike" [9] [23]. This character was negatively correlated with days to germination, germination percentage, seedling injury, plant height at flag leaf stage and number of effective tillers. Spike length was positively and non-significantly correlated with germination percentage, days to germination and days to 50% flowering. Days to 50% flowering was negatively and significantly correlated with seedling injury while, this character was positively correlated with days to germination and germination percentage. Association studies between spike length, spikelet numbers and grain yield indicated a tendency of spike length to increase with increase of spikelet numbers and grain yield. Similar results were reported by Khaliq et al. [24] and Khan et al. [25,26].

Plant height at flag leaf stage was negatively correlated with germination percentage and positively correlated with days to 50% flowering, days to germination, seedling injury and spike length. Number of effective tillers was found positively correlated with plant height at flag leaf stage but it was reported negatively by Faizul et al. [15]. In the present investigation number of effective tillers was found positively correlated with germination percentage and seedling injury, while it was negatively correlated with days to germination, days to 50% flowering and spike length.

#### 4. CONCLUSION

For effective breeding techniques, scientific knowledge on the relationship of yield and yield-related characteristics is crucial. Yield per plant had significant positive correlation with spike length and number of spikelets per spike and significantly correlated with days to germination,

days to 50% flowering, number of seeds per spikelets and number of seeds per spike. These findings show the actual connection between these features and plant yield. Therefore, in order to increase grain output, these features should be taken into consideration as key selection criteria in bread wheat breeding programmes. The information generated by this research will be helpful for the breeders. The results obtained in the present study have great importance to future breeding program.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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