

SYNOPSIS ON

Pre-dissertation-I

(AGR 596)

Effect of Integrated Nutrient Management on Growth and Yield of Wheat

(*Triticum aestivum*)

Submitted To

Department of Agronomy

School of Agriculture

Lovely Professional University

Punjab (India) 144411



Submitted By

Manpreet Kaur

Reg. No. 11715193

UNDER GUIDANCE OF

Mrs. Vandna Chhabra

Department of Agronomy

Lovely Professional University

May, 2018

CERTIFICATE

This is to certified that this synopsis entitled “**Effect of Integrated Nutrient Management on Growth and Yield of Wheat (*Triticum aestivum*)**”submitted in partial fulfillment of requirement for degree – Master of Science in Agronomy by **Manpreet Kaur, Registration no. 11715193** to Department of Agronomy, School of Agriculture, **Lovely Professional University**, has been formulated and finalized by the student herself on the subject.

(Signature of Student)

Manpreet Kaur

11715193

(Signature of Supervisor)

Mrs.Vandna Chhabra

UID: 21027

Designation: Assistant Professor

Department of Agronomy

School of Agriculture

Lovely Professional University

DECLARATION

I hereby declare that the project work entitled —“**Effect of Integrated Nutrient Management on Growth and Yield of Wheat (*Triticum aestivum*)**” is an authentic record of my work carried at **Lovely Professional University** as requirements of Project work for the award of degree - Master of Science in Agronomy, under the guidance of **Mrs.Vandna Chhabra**, Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India.

Manpreet Kaur

(Registration No. 11715193)

Table of contents

| S.no. | Table of content | Page no. |
|-------|----------------------|----------|
| 1. | Introduction | 5-6 |
| 2. | Review of literature | 7-8 |
| 3. | Objectives | 9 |
| 4. | Material and Methods | 10-14 |
| 5. | Reference | 15-16 |

INTRODUCTION

Wheat (*Triticum Spp.*) has been described as “king of cereals” and important food crops in India. Wheat has importance as human food and cultivated in all world. Wheat is a good source of carbohydrates and protein for human. Wheat is cultivated in many countries like south western Asia, Cyprus, Jordan, turkey, Egypt. . Area under wheat in India is 10 million ha in 1950-1951 and 30 million ha in 2010-2011. Production of wheat in India is 6 million tonnes in 1950-1951 and 80 million tonnes in 2010-2011 (Tripathi and Mishra 2017). Three species of wheat in India is *Triticum aestivum*, *T. durum* and *T.dicoccum* are cultivated.

Triticum aestivum is cultivated in all the North, central and south regions of India while durum is cultivated in Punjab and Central India and *T.dicoccum* in Tamil nadu, Andhra Pradesh, Gujarat, Maharashtra. The demand for food grains is expected to rise not only as a function of population growth but also as more and more people cross the poverty line with economic and social development. The demand for wheat in India by 2020 has been projected to be between 105 to 109 mt as against 95.85 mt production of present day. Most of this increase in production will have due the land area under wheat is expected to expand. Wheat is sown in the starting of Rabi Season and is harvested in the beginning of Kharif season. Due to various climatic variations the time sowing and the harvesting time can be change. In one agro-climatic zone to other that affects the vegetative and reproductive period due to their different growing period that ways differences in potential yield.

Combination of organic and inorganic fertilizers sustains environment and maintaining soil productivity. Optimum and judicious use of organic fertilizers and individual or combination use of chemical fertilizers provide and solve the problem of raise a price chemical fertilizers and loss of soil productivity and fertility. The production as well as productivity can be raised up by adopting the proper management, higher yield variety, appropriate sowing time, water; fertilizers management .vertical increase in crop production along with nutritional security is possible only through higher and better use of both organic and inorganic sources. Fertilizers important part of improved crop-production and soil productivity. Optimum amount of fertilizer application is considered a important to raise the crop production.

Adoption of intensive cropping system will meet the needs of human demands of increasing population, requires high energy, due to this increase the input cost and hazards of environment degradation. Enhanced use of inorganic sources for increasing production has been widely recognized but their indiscriminate use may have adverse effect on soil health, ecology and other natural resources, the high cost of fertilizer also restricts their large scale use. Use of organic fertilizers in INM which helps in supplying the nutrient deficiencies in soil. Addition of organic nutrients create favorable environment for seed germination in addition to improvement in physical, chemical and biological properties of soil. Chemical fertilizer is highly expensive and it is depends on non-renewable sources that is in limited quantity. To combine the supply of inorganic fertilizers and use of indigenous sources like farm yard manure should be encouraged

the plant nutrient, improve the physical, chemical and biological properties of the soil and thereby increase the fertility and productivity of the soil.

The soil contains free living bacteria which are capable of fixing nitrogen in the all crops. The beneficial effect of Azotobacter on plant is responsible not only with the process of nitrogen fixation and improved nutrition value of plants but also with synthesis of complex compounds such as vitamins like nicotinic acid, pyridoxine, biotin, thiamine and growth promoting hormones such as gibberellins, indole acetic acid and other substances which stimulate the germination of seeds and provides favorable environmental conditions for plant growth. Many micro organisms present in Soil which increase the availability of phosphate to plants, and mineralizing inorganic phosphorus into organic forms easily available to plant.

Nitrogen is one of the most essential nutrients for crop production. It is a important role in metabolism of nucleotides, enzymes, vitamins, hormones. Nitrogen helps in utilization of potassium, phosphorus and other elements. Phosphorus is necessary for early development and growth and helps to establish seedling. Sulphur increases the root growth and helps to stimulate the seed formation and effect on chlorophyll of plants. The present study was designed to find out the effect on growth and yield of wheat (*Triticum aestivum*) due to the combine use of organic and inorganic fertilizers.

REVIEW OF LITERATURE

Wagh *et al.*, (2002) on sweet corn reported that with application of 100%(225:50:50kg) NPK per hectare + 5t FYM + Azotobacter + PSB all the growth characters like plant height, no. of grains per spike, leaf area index and dry matter production were recorded more than the other fertilizer and FYM levels.

Brar *et al.*, (2001) Plant growth and leaf area index are significantly more with the application of 120kg N + 26.2kg P₂O₅ + 33.5kg K₂O per hectare than the other treatment combination.

Kumar *et al.*, (2005) Application of 150kg N + 41.3kg P₂O₅ along with 10ton FYM per hectare produces higher grain yield.

Sharma *et al.*, (2007) reported that 75% NPK +PSB+Azotobacter + Zn significantly enhance grain yield (58.23 q/ha) over the 100% NPK treatment (49.79q/ha) and the maximum macro and micronutrient uptake by wheat were found significantly in the treatment 75%NPK + 5tFYM/ha + PSB + Azotobacter + Zn.

Desai, (2012) reported that combine use of organic and inorganic fertilizers gave significantly spikes per meter row length, spike length, number of grains per spike and yield.

Verma *et al.*, (2013) 80%RDF along with basal dose of PSB produce higher amount of yield and yield components and also give higher seed yield over seed treatment. Plant height, no. of seeds per plants is maximum under basal dose of both organic and inorganic fertilizers. Highest output and benefit cost ratio were found under the treatment of FYM@10 tones per hec + 50:25:50 kg NPK per ha.

Karki *et al.*, (2005) reported that the application of 120kg N + 10tFYM/hec produce higher plant height and dry matter production per plant than the other treatment.

Virdia and Mehta, (2010) Various quantity of press mud (5, 10, 15,20t/ha), farmyard manure-FYM (10 t/ha) along with recommended dose of fertilizer. The grain and straw yield was significantly higher with integrated nutrient application (press mud @ 20 t/ha + RDF), as compare the press mud @ 15 t/ha + RDF or FYM@ 10 t/ha + RDF. The growth and yield attributing characters analysis results were not affected, except available P status of soil. The highest gross return was found under inorganic nutrients than INM treatments.

Reena *et al.*, (2017) Recommended dose of NPK and single application of FYM, sulphur and boron greatly influenced on grain and straw yield of wheat than the rest of the treatment. Application of 75%NPK along with sulphur, boron and FYM also increase the yield of straw and grain. Higher yield were found in 75%NPK with sulphur, boron and FYM treatment. Individual application of FYM, boron, sulphur with 100%NPK enhanced the plant growth than the other treatment.

Patel *et al.*, (2017) Plant height, tillers and test weight of wheat were significantly more under 75%NPK with10t FYM per hectare as compare the use of recommended dose of NPK. Among

different treatment T4 (FYM@7.5t per ha +50%RDF + bio fertilizer) registered the maximum value of plant height, number of tillers and grains per spikes which was significant more than the other treatment. Maximum growth and development of crop were recorded under 10 t FYM + 75%RDF per hectare.

Yugal *et al.*, (2015) Plant height, effective tillers, total no of filled grains, test weight, grain and straw yield of wheat crop were significantly influenced with STCR dose with 5 t FYM. Growth parameters can be increased by the application of inorganic sources along with organic manure. Recommended dose of RDF along with FYM @ 5t show similar effects on plant height tillers and yield of grains or straw over other treatments

Thomas *et al.*, (2004) Application of 100%NPK gave higher amount of tillers and significantly highest number grains as comparison to other treatment. Highest grain and biological produce under treatment farm compost along with poultry manure. The combination of these two forms registered for maximum values of yield parameters and biological yield. Residue effect of manure and NPK gave higher wheat yield. Farm compost, vermicompost and poultry manure enhance the certain parameters.

Rasool *et al.*, (2015) Response of sweet maize (*Zea mays saccharata*) to growth and yield to varying the combination of organic and inorganic fertilizers during the kharif season. The results revealed that application of 75 RDF + FYM @4.5t/ha) + Azotobacter + Phosphate solubilizing bacteria were found significantly increased the number of days taken to tasseling, silking other growth attributes; plant height, leaf area index and dry matter accumulation. The treatment 75 % (NPK) + FYM (4.5 t/ha) + Azotobacter + Phosphate solubilizing bacteria were significantly increasing cob yield, fodder yield and biomass yield, however, ratio of cob produce highest in treatment FYM @18t per hec and T2 [Recommended NPK kg ha-1 (90:60:40)], respectively, whereas unfertilized control recorded the lowest ratio of cob to fodder yield.

Choudhary *et al.*, (2017) Variety WH 1105 significantly produce higher growth attributes viz. Plant height, dry matter accumulation, over HD 2967. Results further indicated that plant height, dry matter accumulation, dry matter translocation, dry matter translocation efficiency increased with application of 100 % RDF + Azotobacter + PSB over 100% RDF.

Wailare and Kesarwani, (2017) Recommended dose of RDF along with farmyard manure, poultry manure were found that produce maximum plant height and leaf area index as compare to other treatment. No. of grains per cobs, cob weight significantly maximum under recommended of fertilizer. Higher production of crop obtained under 50%RDF + FYM, poultry manure.

OBJECTIVES

1. To study the effect of Azotobacter, PSB, Organic and Inorganic sources of nutrients on wheat growth and yield.
2. To evaluate the influence of nutrient sources on soil chemical properties
3. To estimate the economical benefit of using different types of nutrient sources in various combinations.

Material and Methods

Technical Programme

A) Research topic: —“Effect of Integrated Nutrient Management on Growth and Yield of Wheat.

B) Location: The experiment conducted on agriculture research farm, Lovely Professional University, Phagwara.

C) Experimental details:

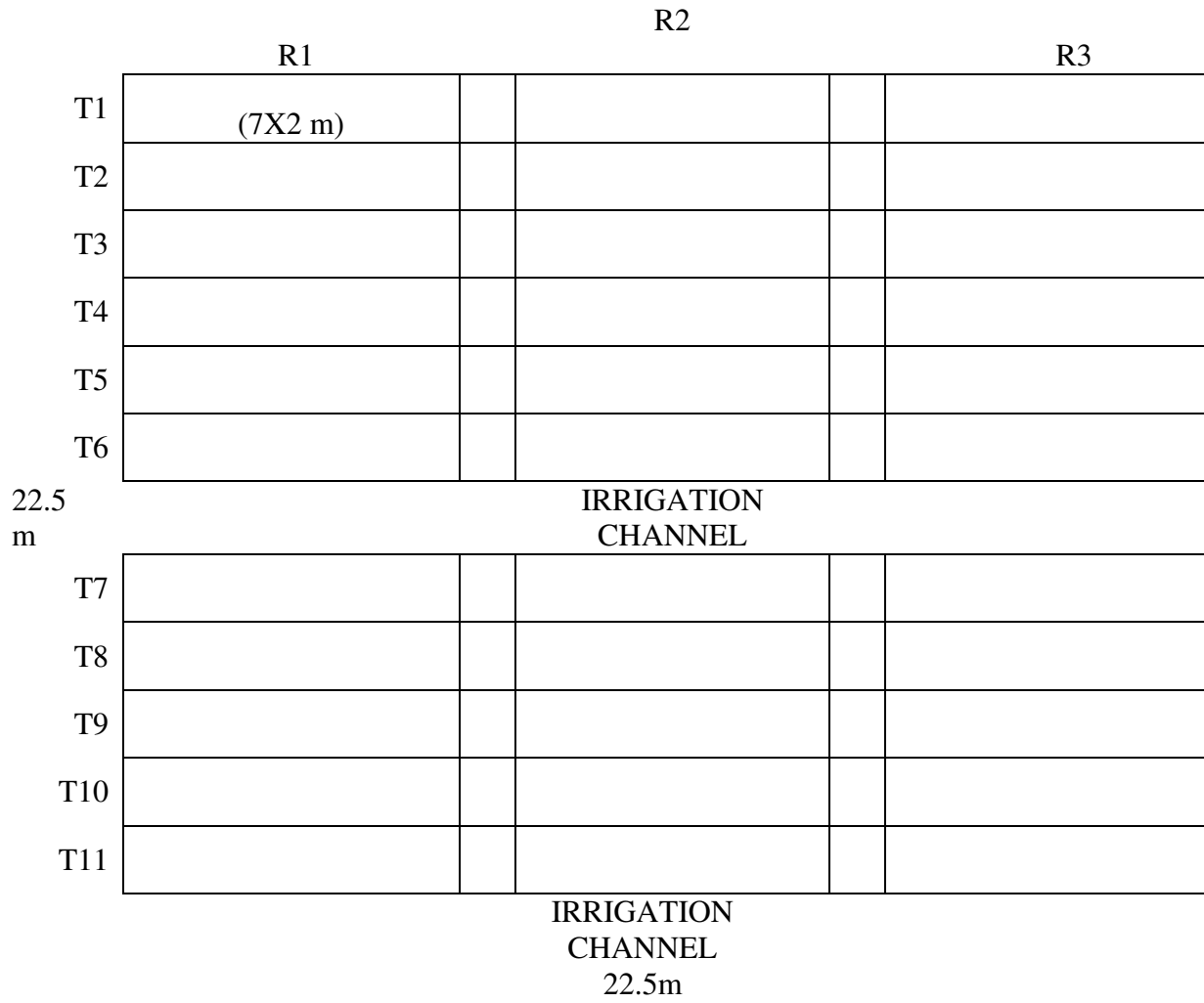
| | | |
|-----------------------------------|---|----------------------------------|
| 1. Year of experiment | : | 2017-2018 |
| 2. Recommended dose of fertilizer | : | 125:60:30 kg N, P, K /ha |
| 3. No. of treatments | : | 11 |
| 4. No. of replications | : | 3 |
| 5. Total no. of plots | : | 33 |
| 6. Plot size | : | 6m x 2m |
| 7. Dates of sowing | : | 2-12-2017 |
| 8. Experiment design | : | Randomized Complete Block Design |
| 9. Crop and variety | : | Wheat |
| 10. Spacing | : | 22.5cm |

TREATMENT DETAILS

| | |
|-----|---|
| T1 | Control |
| T2 | 100% (Recommended Dose of Fertilizer) NPK |
| T3 | 50% (Recommended Dose of Fertilizes) NPK + FYM@5t/ha |
| T4 | 75%(Recommemded Dose of Fertilizer) NPK + Azotobacter |
| T5 | 75% NPK + Phosphate Solubilizing Bacteria(PSB) |
| T6 | 75% NPK + Sulphur@ 40kg/ha (gypsum) |
| T7 | 100% (Recommended Dose of Fertilizer) NPK |
| T8 | 50% (Recommended Dose of Fertilizes) NPK + FYM@5t/ha |
| T9 | 75%(Recommemded Dose of Fertilizer) NPK + Azotobacter |
| T10 | 75% NPK + Phosphate Solubilizing Bacteria(PSB) |
| T11 | 75% NPK + Sulphur@ 40kg/ha (gypsum) |

LAYOUT

IRRIGATION CHANNEL



Collection of Sample

Soil sample will be taken for analysis to check soil status (pH, N, P, K, S, EC and Organic carbon) of experimental field before crop season.

Analytical methods to be followed during investigation are as under:

| S No. | Test parameter | Method | References |
|-------|----------------|--|--------------------------|
| 1. | pH(1:2.5) | Glass electrode | Spark (1996) |
| 2. | EC(1:2.5) | Conductivity meter | Spark (1996) |
| 3. | Organic carbon | Wet digestion | Walkely and black (1934) |
| 4. | Available N | Alkaline potassium permanganate method | Subbiah and Asija (1956) |
| 5. | Available P | Olsen method | Olsen (1954) |
| 6. | Available K | Flame photometer | Jackson (1973) |
| 7. | Available S | Barium chloride | J.R. Freney (1975) |

Observations to be Recorded

- ❖ Observation will be recorded at vegetative and reproductive stage of wheat.
 1. Plant height (cm)
 2. Leaf area index
 3. Number of tillers per plant
 4. Number of spikelet per plant
 5. Length of spikes per plant (cm)
 6. Number of grains per spike
 7. Weight of 100 grains or test weight (gm)
 8. Biomass

Economic

1. Grain yield(kg/ha)
2. Straw yield(kg/ha)
3. Gross return
4. Cost of cultivation
5. Net return

References

- Allolli, T.B. and Athani, S.I. and Imamsaheb, S.J. (2011). Effect of integrated nutrient management (INM) on yield and economics of sweet potato (*Ipomoea batatas L.*), *Asian J. Hort.*, **6** (1): 218-220
- Auwal Tukur Wailare and Amit Kesarwani Effect of Integrated Nutrient Management on Growth and Yield Parameters of Maize (*zea mays l.*) As well as Soil Physicochemical Properties Biomed J sci & Tech Res Volume 1- Issue 2: 2017
- Brar, B.S., Dhillon, N.S. and Chhina, H.S. (2001). Integrated use of farmyard manure and inorganic fertilizers in maize (*Zea mays L.*). *Indian. J. agric. Sci.*, **71** (9): 605-607
- G.D Sharma, RisikeshThakur, SomRaj, D.LKauraw and P.S Kulhare Impact of Integrated NutrientMangement on Yield, Nutrient uptake, protein content of Wheat (*Triticum aestivum*)*International.J.Life.Sci.*,**8**(4): 1159-1164, 2013
- H. A Desai, I. N. Dodia, C. K. Desai, M. D. Patel AND H. K. Patel Integrated Nutrient Management in Wheat (*Triticum aestivum L.*) Department of Agronomy, C. P. College of Agriculture, S. D. Agricultural University, Sardarkrushinagar, Gujarat
- H.M. Viridi and H.D. Mehta Integrated nutrient management in transplanted rice (*Oryza sativa L.*) *International Journal of Agricultural Sciences*, January to June, 2010, Vol. 6 Issue 1 : 295-299.
- Karki, T.B., Ashok Kumar and Gautam, R.C. (2005). Influence of Integrated Nutrient Management on Growth, Yield, content and uptake of Nutrients and Soil Fertility status in Maize (*Zea mays*) in New Delhi. *Indian J. agric. Sci.*, **75**(10): 682-685
- Kumar Ashok, Gautam, R.C., Singh Ranbirand Rana, K.S. (2005). Growth, Yield and Economics of Maize-Wheat cropping sequence as influenced by Integrated Nutrient Management of New Delhi. *Indian J. agric. Sci.*, **75**(1): 709-711
- N K Verma, B K Pandey, R D Mahan and Adarsh KumarBrahmanandMahavidyala Response of Mode of Application with Integrated Nutrient Management on Growth and Yield of Chick Pea (*Cicerarietinum L.*),*Trends in biosciences.*,**8**(2):472-475
- Patel Tejalben G, Dr.Khushvadan C Patel and Patel Vimal N Effect of integrated nutrient management on yield attributes and yield of wheat (*Tritium aestivum L.*) *International Journal of Chemical Studies* 2017; 5(4): 1366-1369
- R.R. Choudhary, H.L. Yadav, S.L. Choudhary, A.L. Prajapat and Ritu Choudhary Effect of Integrated Nutrient Management on Growth of Wheat (*Triticum aestivum*) Cultivars *Int.J.Curr.Microbiol.App.Sci* (2017) 6(8): 2369-2374
- Reena, S.B. Pandey, D.D. Tiwari, R.C. Nigam, A K Singh & S Kumar. Effect of Integrated Nutrient Management on Yield and Nutrients Uptake of wheat and Soil Health. *Int. Arch. App. Sci. Technol*; Vol 8 [3] September 2017. 25-28.

Shahid Rasool, R. H. Kanth², Shabana Hamid³, W. Raja², B. A. Alie² and Z. A. Dar⁴ Influence of Integrated Nutrient Management on Growth and Yield of Sweet Corn (*Zea mays L. saccharata*) under Temperate Conditions of Kashmir Valley American Journal of Experimental Agriculture 7(5): 315-325, 2015.

Thomas Abraham and R.B. Lal effect of integrated nutrient management on productivity of wheat (*triticum aestivum* L.) and soil fertility in legume based cropping system Indian J. Agric. Res., 38 (3) : 178 - 183, 2004

Tripathi, A. and Mishra, A.K., 2017. The wheat sector in India: Production, policies and food security. In *The Eurasian Wheat Belt and Food Security* (pp. 275-296). Springer, Cham.

Wagh, D.S. (2002). Effect of spacing and Integrated Nutrient Management on Growth and Yield of Sweet Corn (*Zea mays saccharata*). M.Sc. (Agri.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Pune.

Yugal Kishor Sahu, A.K. Chaubey, V.N. Mishra, A. S. Rajput¹ and R. K. Bajpai effect of integrated nutrient management on growth and yield of rice (*oriza sativa* L.) Vol. 15 No. 2, 2015 pp. 983-986.