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REPORT

“Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora”

This is to certify that the declaration statement made by this student, **Sakshi, Reg No. 11718098 (M.Sc.) Agronomy** is correct to the best of my knowledge and belief. The Project Proposal based on the **“Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora ”** is fit for the submission and partial fulfillment of the conditions for the award of M.Sc in Agronomy from Lovely Professional University, Phagwara.

(Signature of the student)

SAKSHI

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(Signature of the Major advisor)

Dr. Hina Upadhyay

Associate professor

UID

DECLARATION

I hereby declare that this report entitled “**Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora**” is an authentic record of my work carried out at Lovely Professional university as requirement for the degree of **Master of Science** in discipline of (**Agronomy**), under the guidance of **Dr. Hina Upadhyay** Associate Professor, Department of Agronomy, School of Agriculture , Lovely professional university, Phagwara, Punjab.

SAKSHI

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M. Sc. (Agronomy)

CERTIFICATE

This is to certify that this report entitled “**Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora**” is submitted in the partial fulfillment of the requirement for the degree of **Master of Science** in discipline of (**Agronomy**) is a research work carried out by **Sakshi (Reg. No. 11718098)** under my supervision and that no part of this report has been submitted for any other degree.

(Signature of Supervisor)

Dr. Hina upadhyay

Associate Professor

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INTRODUCTION

Cereals are an important dietary protein source throughout the world, because they constitute the main protein and energy supply in most countries (Bos *et al.* 2005). Wheat is one of the major cereal crops with a unique protein, which is consumed by humans and is grown around the world in diverse environments.

Wheat (*Triticum aestivum L.*) occupies the prime position among the food crops in the world. Wheat is an annual plant belonging to the family Poaceae (Gramineae). In India, it is the second important food crop being next to rice and with an average yield of 3.07 t ha⁻¹ as recorded in 2013-14 and in Punjab the yield was 4.85 t ha⁻¹. Wheat has played a very vital role in stabilizing the food grain production in the country over the past few years. It is one of the staple foods of north Indian population. Wheat grains are ground in to flour (atta) and consumed mostly in the form of chapati or leavened bread. Soft wheat is used for making chapati, bread, cake, biscuits, pastry and other bakery products whereas hard wheat is used for suji and sewaya. Wheat contains about 70% carbohydrates, 12% protein, 1.7% fat, 2.7% minerals, 2% fiber and 12% moisture. Wheat grain is used for preparing starch. Wheat straw is used as fodder, padding material and mulching material.

Area and production

Wheat is grown in India on an area of about 31.18 Million ha. with a production of 95.91 Million tonnes and productivity of 3.1 t/ha (2013-14). Analysis of area, production and productivity of wheat during the last decade (1999-2000 to 2013-14) indicated that the major wheat producing states that achieved the average productivity of 3t/ha and above are Uttar Pradesh (98.56 lakh ha), Punjab (35 lakh ha), Haryana (25.22 lakh ha), Rajasthan(30.80 lakh ha). The significantly contributing states are Madhya Pradesh (57.92 ha), Bihar (22.57 lakh ha), Jharkhand (1.73 lakh ha), Gujarat(13.51 lakh ha), West Bengal (3.35 lakh ha) and Uttarakhand (3.48 lakh ha) are with the productivity category range of 2-3 t/ha. Maharashtra (10.97 lakh ha), Jammu & Kashmir (2.93 lakh ha) and Himachal Pradesh (3.56 lakh ha) are largely rainfed wheat growing states and have little more than 1.5 t/ha productivity. The record production of 95.91 million tonnes of wheat in the country (4 Advance Estimate, DES, GoI, 2013-14) against the targeted production of 92.50 million tonnes during 2013-14 from an area of 31.3 million ha with the average productivity of 3.05 tonnes/ha is the significant achievement in wheat production in the country.

Wheat is grown in all types of climatic conditions i.e. tropical, sub-tropical and temperate. In India, major wheat is under cultivation in areas in the sub-tropical region. The most favorable climatic condition for wheat cultivation is cool and moist weather during the vegetative growth period followed by dry, warm weather for the grain to mature and ripening. The optimum temperature range for ideal germination of wheat seed is 20-25 C. During the heading and flowering stages, excessively high or low temperatures and drought are harmful to wheat. Cloudy weather, with high humidity and low temperatures is conducive for rust attack. Wheat plant requires about 25-30 C optimum average temperature at the time of ripening. The temperature at the time of grain filling and development are very crucial for yield.

Wheat having two distinct parts: Root and Shoot system. Root Starts with the formation of a radicle (embryonic root). In Shoot System having all parts above the ground Stems, leaves and inflorescence (flowering & fruiting). The Stem is round & cylindrical, hollow except at the node (solid). Leaves having four parts – Leaf sheath, leaf blade, ligule, auricle and Leaf sheath is the basal part of the leaf surrounds the culm (stem) & protects the growing point and axillary buds from weather and also provide support to culm (stem). Leaf blade is flattened, parallel venation Ligule is a soft membranous part at the junction of the sheath and the blade. Auricle is a claw like appendages projecting from the collar of the leaf. Inflorescence is a flowering portion having ear or head or spike consist of spikelet, florets, kernel spikelets are systematically arranged in a zigzag manner along a common axis (rachis) Spikelets composed of flowers called florets and the no. of florets in a spikelet vary from 1-5. Florets in each spikelets are enclosed by two glumes. Wheat is a monoecious plant with perfect flowers. It reproduces sexually as a self-pollinated crop.

The use of organic amendments applied to soil not only enhances its nutrient status but also reduces the incidence of pest. Improvement of soil fertility through the application of fertilizers has become an essential factor that enables the world to feed billions of people of its population. Soil fertility is usually maintained by the application of organic and inorganic fertilizers and there is also an improvement in the physical and biological properties of the soils.

The use of inorganic fertilizers can improve crop yields, soil pH, total nutrient content and nutrient availability most especially in the tropics where soils are adversely affected by sub-optimal soil fertility and erosion causing deterioration of the nutrient status and changes in population of soil organisms. But its use is constrained by acidity, scarcity, nutrient imbalance and it is no longer within the reach of poor-resource farmers due to its high cost. When excessively used, it also has a depressing effect on yield.

Objectives

Keeping in view all the aspects, the present study in wheat is undertaken with the following objectives:

1. To study the effect of different treatments on the growth and yield attributes.
2. To study the different phenotypical attributes on the growth and yield attributes.
3. To study weed infestation on the growth and yield attributes.
4. To study yield variation in different treatments.

Scope of the study

Studying and evaluating the Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora, we are determining the best combination of organic and inorganic fertilizer to get the higher yield in wheat. Only the use of the best combination of organic inorganic fertilizer can improve the yield of wheat crop. Thus we have to find out the best combination fertilizer to get higher crop yield.

REVIEW AND LITERATURE

Singh and Tomer (1991) stated that farm yard manure is very important for the growth of plants. It improves the soil physical properties; increase the infiltration rate and soil absorb maximum quantity of water. Farmyard manure is environmental friendly it do not have any bad effect on soils and crops and it helps in the uptake of nutrients as well.

Samiram, J.S. et al.(1993) observed that the increasing levels of nitrogen not only increased the 1000 seed weight but also gave higher yield of straw, more functional leaves, high growth rate and higher net assimilation rate at all the stage of growth.

Pandey, I.B. et el .(1999) stated that plant height, number of shoot length, increased significantly with the increasing levels of nitrogen fertilization.

Sawires, 2000 and Sobh et al. (2000) stated that a beneficial effect of nitrogen application on wheat gave the highest values of number of spikes m⁻², plant height, spike length number of spikelets spike⁻¹, 1000-grain weight and grain and straw yields of wheat with increasing N level.

Sawires, E.S. et al. (2000) and (Kumar B. et al. (2000) reported that the successive increasing the number of spikes/ear under varied doses of nitrogen and seed rate may due to availability of more nutrients for proper growth of plant at different stages of wheat crop.

Sawires, E.S. et al. (2000) reported that Purity percent, Germination percent and spike length (cm.) increased significantly with increasing levels of nitrogen fertilization.

Singh and Singh (2002) reported that the application of farmyard manure @ 5 and 10 t-1ha to the wheat crop it increases the yield of crop.

Kharub and Sharma (2002) suggested the chemical fertilizers are no doubt very important source of fertilizers they increases the growth of plants, yield of crop that is the full dose of NPK increases the yield of crop up to 44.67 q-1ha – 121.16 q-1ha while on the other hand the excessive use of chemical fertilizers are dangerous for the environment because they are not eco-friendly they are the cause of pollution as well as harmful for the soil microorganisms.

Lathwal et al. (1992) and Kibe et al. (2003) found that use of higher doses of nitrogen in wheat crop increased the number of grain per spike.

Dutta et al. (2003) reported that the use of chemical fertilizers with organic fertilizers had beneficial effect on crop growth and soil health as compared to the alone use of organic fertilizers.

Duvivedi et al. (2004) recorded that in wheat crop the addition of DAP increased the height of plant as the use of 80 kg P₂O₅-1ha DAP increase the height of wheat crop. Wheat seed inoculation with phosphate Solubilizing bacteria + chemical fertilizers increased the grain yield of wheat as compared to the non inoculated seed or without combination of chemical fertilizers.

Kumar et al. (2005) Given the statement that the Application of 180 kg-1ha NPK increase the grain and straw yield in wheat 32.5 % and 33.7

.Kumar et al. (2005) stated that the use of 100 % NPK + 50 % nitrogen has beneficial effect on plant height and dry matter in wheat.

Bokkhtiar and Sakurai (2005) suggested that the use of farmyard manure + chemical fertilizers increase the absorption of NPK which is present in the soil as compare to the alone use of chemical fertilizers.

Kumar et al. (2005) reported that Application of 180 kg-1ha NPK increase the grain and straw yield in wheat 32.5 % and 33.7% .

Zahir et al. (2006) recorded that the yield of wheat was obtained maximum when nitrogen and farmyard manure was applied as 75:25, the biological (10952 kg-1ha) straw (77-10 kg-1ha) and grain (32-42 kg-1ha) yield of wheat was obtained.

Mahapatra et al. (2007) suggested that farmyard manure significantly very important for the wheat crop it increases the grain weight as kg grains/tones in a year.

Zingore et al. (2007) stated that As these sources have been reported to contribute 15-45 kg nitrogen and 10-25 kg potassium per hectare.

Cheema and Farooq, (2007) reported that Weed infestation is among the important factors for low yields.

Amandeep et al. (2009) reported that the use of sulphur in wheat was not necessary but if the sulphur was added in wheat crop the sulphur contents was increases.

Bandyopdhyay et al. (2009) suggested that the application of 100 % NPK significantly improves the yield of wheat about 21.5%.

Chander (2010) reported that if the nitrogen was applied as 1/3 basal + 2/3 at node under zero and in 1/3 basal + 1/3 at tillering +1/3 at floral initiation index rotary tillage the uptake of nitrogen in wheat was highest.

Chauhan et al.(2011) suggested that the use of farmyard manure 15 t-1ha + 100% NPK increases the yield of wheat crop as compared to the use of 75% NPK + 15% farmyard manure.

.Katkar et al. (2011) Reported that the application 100% NPK + farmyard manure @ 10 t-1ha increases the biological parameters like soil microbial biomass dehydrogenises activity 9.8 and 9.0 %.

Agamy et al. 2012 stated that the application of bio and/or farmyard manure in combination with NPK significantly increased plant height, number of spikelets spike length, 1000-grain weight and grain yield fed.

Nayek et al. (2014) stated that the increase in uptake of nutrients may be due to added supply of NPK and because of good proliferation of root system and balanced nutrient application, thereby resulting in better adsorption of nutrient.

Muhammad Yousaf et al. (2015) suggested that the, availability of nitrogen to wheat during various phases of its growth and development is an important factor influencing the yield and quality of grain.

MATERIAL AND METHODS

TECHNICAL PROGRAMME:-

Name of experiment: - “Comparison of organic and inorganic sources of nutrient on wheat yield and weed flora.”

Climate:-

Climate of the field comes under Agro ecological sub region (Northern plain, hot sub humid eco region Punjab). Agro climatic zone (Trans gangetic plain region). The area comes under the semi arid zone with annual rainfall 527.1mm/ annually.

Location: - The experiment will be conducted on Agriculture Research Farm LPU, Phagwara. Six agro-climatic zones have been classified to characterized climatic zone distribution in Punjab and the study area is in Chaheru village of Kapurthala district, which lies in the northern plain zone between 31.2690° N, 75.7021° E. The district lies in the heart of Punjab and situated between the river Sutlej and Beas. Out of six agro-climatic zones of Punjab, the area lies in Central plain region. The soil of the village is covered by alluvial soil .It have sub-tropical monsoon type climate with normal rainfall 600 mm.



Experimental detail:-

1. Year of experimentation = 2017-2018
2. No. of treatments = 8
3. No. of replication = 3
4. Total no. of plots = 24
5. Plot size = 520 square meter
6. Per plot size = 7x3
7. Net plot size = 504 square meter
8. Sowing time = 5 December 2017
9. Experimental design = RCBD
10. Crop and variety = Wheat, HD 3086
11. Spacing = 20x10

Collection of soil samples:

Soil samples will be taken before crop sowing to check the soil pH, organic carbon, electric conductivity, N, P, K and Fe ratio present in soil

Soil analysis has to be done and following parameters are to be calculated:-

S. N.	Test parameter	Method	References
1	pH (1:2.5)	Glass electrode	Sparks (1996)
2	EC (1:2.5)	Conductivity meter	Sparks (1996)
3	Organic C	Wet digestion	Walkley and Black (1934)
4	Available N	Alkaline potassium permanganate method	Subbiah & Asija (1956)
5	Available P	Olsen's Method	Olsen <i>et al.</i> (1954)
6	Available K	Flame photometer	Jackson (1973)

TREATMENT DETAILS

Variety = HD3086

Sowing time = 5 December 2017

Sowing depth = 3-5 centimeter

Detail about the treatments:

1. T0= Control
2. T1= 100% RDF
3. T2= 100% vermicompost
4. T3= 100% FYM
5. T4= 100% Vermicompost +RDF
6. T5= 50% RDF + 50% Vermicompost
7. T6= 100% Vermicompost + 100% FYM
8. T 7= 50% RDF + 50% Vermicompost + 50%FYM

Layout of Experimental Plot

IRRIGATION CHANNEL								
R1	T1R1	T5R1	T2R1	T4R1	T7R1	T0R1	T6R1	T3R1
R2	T0R2	T7R2	T4R2	T2R2	T6R2	T5R2	T3R2	T1R2
IRRIGATION CHANNEL								
R3	T7R3	T6R3	T5R3	T4R3	TR33	T2R3	T1R3	T0R3

Observations to be recorded

A. Morphological

1. Plant height
2. Total no of tillers
3. Weed infestation
4. Leaf size
5. Spike length
6. No. of grains /spike

B. Biochemical Observation

1. Total soluble sugar (TSS)
2. Total soluble protein (TSP)
3. Total Carbohydrates
4. Total Chlorophyll content of leaves

C. Yield attributes

1. 1000 grain weight (grams)
2. Grain yield (1 meter square)
3. Seed Index (100)
4. Harvest Index
5. Straw yield

Expected outcome

The experiment was conducted at the Lovely professional University, School of agriculture near experimental farm of Phagwara, Punjab. The experiment was conducted by using eight treatment and three replication i.e. different doses of organic and inorganic fertilizer, it is expected that out of these treatments some treatments will enhance the yield attributes of wheat and will also minimize the weed flora.

REFERENCE

Agamy, R.A.; G.F. Mohamed and M.M. Rady 2012. Influence of the application of fertilizer on growth yield, anatomical structure and some chemical components of wheat (*Triticum aestivum*, L.) grown in newly reclaimed soil. *Aust. J. of Basic and Appl. Sci.*, **6 (3):** 561-5

Bokhtiar, S.M. and Sakurai, K. 2005. Effects of organic manure and chemical fertilizer on soil fertility and productivity of plant and ratoon crops of sugar cane. *Archives of Agronomy and Soil Science*, **51:**325-334

Bandyopadhyay, K.K., Ghosh, P.K., Hati, K.M. and Misra, A.K. 2009. Efficient utilization of limited available water in wheat through proper irrigation scheduling and integrated nutrient management under different cropping system in a Vertisols. *Journal of the Indian Society of Soil Science*. **57(2):**121-128.

Cheema, Z.A., and M. Farooq. 2007. Agriculture in Pakistan. Agriculture in Pakistan: Problems of small farmers and their solutions. 23 p. Allied Book Center, Urdu Bazar, Lahore, Pakistan.

Chauhan, D.S. Sharma. R.K. Tripathi, S.c. Kharub , A.S. and Chhokar, R.S. 2011. News paradigm in tillage technology for wheat production. Research Bulletin NO. 8, DWR, Karnal, pp:16.

Dutta, S., Pal, R., Chakeraborty, A. Chakrabarti, K. 2003. Influence of integrated plant nutrient supply system on soil quality restoration in red and laterite soil. *Archives of Agronomy and Soil Science*, **49:** 631-637.

Katkar, R. N Sonune, B.A. and Kadu, P.R.2011. Long term effect of fertilization on soil chemical and biological characteristics and productivity under sorghum-wheat system in vertisols. *Annals of plant and soil research* (**2**):32-34.

Kharub, A. S. and Sharma, V.K. 2002, Effect of nutrient combination on wheat productivity under tyopic ustochrept soils of Karnal. *Annals of Plant and Soil Research* **4 (1)**: 124-126.

Kumar. Et al. (2005) Integrated nutrient management in pearl millet-wheat cropping system *India journal of Agricultural Science*. **75(10)**:640-643.

Lathwal OP, Sirrgb T, Singh Tej. Effect of irrigation and nitrogen levels of yield attributes and yield of wheat. *Haryana Journal of Agronomy*.1992; **8(1)**:69-70.

Muhammad Yousaf, Muhammad Shaaban, Suliman A, Ibrahim Ali, Shah Fahad, Jamil Khan M et al. The Effect of Nitrogen Application Rates and Timings of First Irrigation on Wheat Growth and Yield. *International Journal of Agriculture Innovations and Research*. 2015;**2(4)**:645-653.

Nayek, S. S., Brahmachari, K. and Chowdhury, M. D. R. 2014.Integrated approach innutrient management of sesame with special reference to its yield, quality and nutrient uptake. *The Bioscane*. **9(1)**:101-105.

Pandey IB, Thakur SS, Singh SK.Response of timely sown wheat varieties to seed rate and fertility level. *Indian J Agronomy*. 1999; **44(4)**:745-741.

Parveen Kousar, Liaquat Ali, Amber Raza, Ammarah Maqbool, Saman Maqbool, Sana Rasheed et al. Effect of different levels of nitrogen on the economic yield of Wheat (*Triticum aestivum* L.) variety Aas-11. *International Journal of Agronomy and Agricultural Research (IJAAR)*. 2015; **6(3)**:7-11.

Singh, V and Tomer, J.S. 1991, Effect of K and FYM levels on yield and uptake of nutrients by wheat. *Journal of Potassium research* **7 (4)**: 309-313.

Sobh, M.M.; M.S. Sharshar and A.Soad El-Sayed 2000. Response of wheat plants to nitrogen and potassium applicationin salt affected soil. *J. Product*,**5**: 83-97.

Sawires ES. Yield and yield attributes of wheat in relation to N fertilization and withholding irrigation at different stages of growth. *Annals of agriculture research*. 2000; **45 (2)**:439-452.

Samiram JS, Dhillon SS. Effect of seed rates and nitrogen level on new genotypes (PBW-154 and PBW-222) of wheat. *Indian Journal of Agronomy*. 1993; **38(1)**:100-112.

Sawires ES. 2000 Yield and yield attributes of wheat in relation to N fertilization and withhold irrigation at different stages of growth. *Annals of agriculture research*. 2000; **45 (2)**:439-452.

Zingore, S., Murwira, H. K. and Delve, R. J. 2007. Influence of nutrient management strategies on variability of soil fertility, crop yields and nutrient balances on smallholder farms in Zimbabwe. *Agric. Ecosyst. Environ.* **119**: 112-126.