SYNOPSIS

Dissertation-II

(AGR 690)

"The effect of integrated use of organic and inorganic fertilizer on growth and yield of maize (*Zea maya L.*)"

Submitted To:

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CERTIFICATE

This is to certified that this synopsis entitled **"The effect of integrated use of organic and inorganic fertilizer on growth and yield of maize (*Zea mays* L.)"**submitted in partial fulfilment of requirements fir degree – Master of Science in Agronomy by **Jasmeet Sharma, Registration no. 11614022** to Department of Agronomy, School of Agriculture, **Lovely Professional University**, has been formulated and finalized by the student himself on the subject.

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DECLARATION

I hereby declare that the project work entitled **— "The effect of integrated use of organic and inorganic fertilizer on growth and yield of maize (*Zea mays* L.)"** 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 **Mr. Vinay kumar** , Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India.

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Index

I. Introduction:

Maize is one of the important cereal crops grown in *kharif* season. It is one of the having great diversity future crop having the ability to change under varied agro-climatic condition. Maize is important cereals in terms of providing essential nutrients, vitamins, minerals to human population and hence it is known as 'queen of cereals' (Singh *et al.*, 2003; Lone *et al.*, 2013). *Zea mays* is classified into different group on the basis of kernel viz., dent corn, flint corn, pop corn, flour corn, sweet corn, pod corn, waxy corn (Brown et al.,1985). According to advance estimate it is cultivated in 8.7 m ha (2010-11) mainly during *Kharif* season which covers 80% area. Maize in India, contributes nearly 9% in the national food basket and more than Rs.100 billion to the agricultural GDP at current prices apart from the generating employment to over 100 million man-days at the farm and downstream agricultural and industrial sectors. It is also one of the best cereal fodder crops grown during summer and rainy season. It is considered ideal forage because it grows quickly, produces high palatable biomass and helps to increase body weight and milk quality in cattle due to higher nutrients value (Chaudary *et al*, 2016). During summer season farmers generally harvest two crops of fodder maize from April to end August and are left with period of almost two month for sowing of next Rabi season crops such as wheat, oat, barley and berseem. The farmer are looking for a suitable variety of fodder maize which gives a good quality and quantity of fodder yield in short duration and perform well under late summer conditions.

Efficient nutrients management consists of organic manures, biofertilizer and chemical fertilizer supplies essential nutrients to growing crops to achieve yield potential of crop (Ghaffari et al., 2011). The productivity of quality protein maize is low due to inherent low soil fertility and poor nutrient management practices like low use of inorganic fertilizer, no use of organic manure, poor recycling of crop residue and no use of secondry and micronutrient in tribal regin. The conjunction use of organic manure and chemical fertilizers can augment the nutrient use efficiency and also enhance the productivity of quality protein maize (Kumar et al.,2005). The major drawbacks of inorganic fertilizers are their low accessibility to resource-poor farmers (Garrity 2004) and their low efficiency in highly weathered soils (Baligar and Bennett 1986). While organic fertilizers are able to improve nutrient use efficiency, under tropical conditions

they mineralize rapidly in soil and benefits through increases in organic matter last only for a few growing seasons (Bol et al. 2000; Diels et al. 2004; Tiessen et al. 1994). Biofertilizer has capable of fixing atmospheric N or convert insoluble phosphate in the soil, thus increases the soil fertility status, sustainability and acts as supplement chemical fertilizer (Balasubramaniyan & Palaniappan., 2004). Biofertilizer consists of Azospirillum and Azotobactor fixes atmosphere nitrogen (20to 30 kg/ha) in soil and thereby reduce considerable amount of application of chemical fertilizer to soil (Reddy and Reddy 2010). Highest productivity of crops in sustainable manner without deteriorating the soil and other natural resources could be achieved only by applying appropriate combination of different organic manures and inorganic fertilizers (Chandrashekara *et al*., 2000). It is important to identify the best type of available organic resources which can be used as fertilizers and their best combination with appropriate proportion of inorganic fertilizers. In the present study, evaluate three cultivars of kharif maize with different combination of organic manure and inorganic fertilizers under Punjab condition will be taken with following objectives:-

Objective:

1. To find out the best *kharif* maize cultivars under Punjab conditions.
2. To find out the best combination of organic manure and inorganic fertilizers.
3. To find out the response of cultivars with integrated nutrient management system.

II. Review of literature:

Impact of Cultivars

High forage yield along with proper nutrition is important for the livestock farmer for better growth and development of cattle (Kumar et al 2016). Brar et al. (2016) observed that maximum green fodder yield (246.3 q/ha) was recorded under cultivar P-3396 which was significantly higher than J-1006(204.3q/ha) and local variety (155.0 q/ha). They also showed that maize hybrid P-3396 registered 20.6 and 58.9 per cent higher green fodder yield as compared to J-1006 and local variety respectively. Dry matter yield followed similar trend as green fodder yield with different cultivar of maize. Cultivar P-3396 recorded significantly higher dry matter yield over J-1006 and local variety. Dwyer and Stewart (1986) reported that the dry matter yield of maize is a function of numerous interacting environmental and genetic factors on both these treatment combination were significantly superior over rest of the treatment combinations.

Impact of Integrated Nutrient Management

Madhavi et al.(1995) conducted a trail on integrated nutrients management for maize and observed that maximum plant height was recorded with the combination of 4.5 tonns poulty manure and 100% RDF, which was at par with 3.0 tonns poultry manure and 100% RDF combinations.

Kumar et al.(2002) observed that application of 150% RDF and 100% RDF + 10Tonnes FYM/ha showed nearly equal plant height, which was higher than 50% RDF + 10tonnes FYM and RDF alone treatments. Pinjari (2007) undertaken the field experiment during 2005-06 and 2006-07 to find out the effect of integrated nutrient management on sweet corn and revealed that protein content(%) was minimum with 75% RDN + 25% N as PM, which was significantly superior over rest of the nutrient sources.

Lone et.al.,(2013) observed that maximum cob girth without husk (18.30cm) were found in No FYM+125% RDF and minimum cob girth without husk (12.67cm) were found in No FYM + State recommended dose of NPK. The maximum cob length without husk(10.90cm) were found in FYM 6t/ha + State recommended dose of NPK and minimum cob length without husk(8.67cm) in No FYM + Recommended dose of fertilizer ,T.S.S content is more(11.12) in FYM 6t/ha +150%RDF and less T.S.S(8.53) in No FYM + State recommended dose of NPK.

Kalhapure et. al.,(2013) reported that the maximum plant height(172.6cm) was found in 25%RDF + Biofertilzer(Azotobactor + PSB)+ green manuring with sunhemp + compost and minimum plant height (123.8cm) in (control) treatment. They also produced highest stover yeild(12.6t/ha) 25%RDF + biofertilizer(Azotobactor + PSB) + Green manuring with sunhemp + compost and minimum stover yeild (7.1t/ha) was found in (control) treatment. The highest number of cobs per plant(1.6) was recorded in 25% RDF + biofertilizer(Azotobactor + PSB) + green manuring with sunhump + compost and lowest number of cobs per plant(0.8) was recorded in (control).

Various studies revealed that sustainable yield and yield related parameters of maize are significantly improved by integrated nutrient management (INM) practices. Balanced application of NPK fertilizers with FYM and lime improved sustainable crop productivity and growth of maize (Dasog et. al., 2012), (Dutta et. al., 2013). Agricultural wastes alone or in combination with reduced rates of NPK fertilizer increased seed weight per plant, 100-seed weight, number of seeds per cob and grain yield of maize compared with un-amended treatment (Ogundare et. al., 2012).

INM including vermicompost showed best results in yield parameters of maize like number of grains per cob, weight of the cob, 100 seed weight and yield (Kannan et. al., 2013.).

Application of 25% recommended dose of fertilizers (20 kg N+ 60 kg P2O5+ 60 kg K2O/ha) in combination with biofertilizers, green manuring and compost @10 t/ha increased maize grain yield by 252.38% over control (no fertilizer application) and 147.62% over the application of 100% recommended dose of fertilizers alone (Kalhapure et. al., 2013).

III. Material and methods

(A). Name of experiment: To evaluate cultivars and impact of integrated nutrient management on growth, yield and quality attributes on *kharif* maize under Punjab condition

(B). Location: The experiment will be conducted on Agricultural Research Farm, **LOVELY PROFESSIONAL UNIVERSITY, Phagwara (Punjab).**

(C). Experimental Details:

1. Year of experimentation : 2017
2. Recommended dose of fertilizer : As per the treatments
3. No of treatment : 08
4. No of replication : 03
5. Total no. of plots : 8X3X1 = 24
6. Plot size : 5m X 5m
7. Date of sowing : 5July2017
8. Experimental design : Factorial Randomized Completely Block Design(RCBD)
9. Crop and no of variety : Maize and One variety
10. Spacing : Standard (50cm X 20cm)
11. Estimated area needed : 600m^2
12. Seed rate : 8kg/acre

(D).Treatment details

1. T_0- Control.
2. T_1- RDF.
3. T_2- 25% RDF+75% Vermicompost+Azotobactor.
4. T_3- 25%RDF+75% Vermicompost+Azospirillum.
5. T_4- 50%RDF+50% Vermicompost+Azotobactor.
6. T_5 50%RDF+50% Vermicompost+ Azospirillum.
7. T_6- 25%RDF+25%Vermicompost+ Azotobactor.
8. T_7- 25%RDF+25% Vermicompost+Azospirillum.

(E).Collection of samples

1 Avalible N, P_2O_5 , K_2O

2 Soil pH

(F).Observations

1 Plant height

2 No. of cobs

3 No. of leaves

4 No. of grian/cob

5 Dry matter yeild (qa/ha)

6 Leaf area

(E). Statistical analysis

The data will be statistically analyzed by using statistical software package,MSTATC (Aazadi et al2014). The mean data will be subjected to variance analysis and test of significance as per method of Fisher (1935).

(F). Layout of Farm

Replication no:3	**Replication no:2**	**Replication no:1**
R3T5	R2T8	R1T1
R3T4	R2T7	R1T2
R3T2	R2T6	R1T3
R3T3	R2T5	R1T4

R3T1	R2T4	R1T5
R3T7	R2T3	R1T6
R3T8	R2T2	R1T7
R3T6	R2T1	R1T8

VI. Expected outcomes

This experiment will be conducted at the Lovely Professional University, School of Agriculture, near experiment farm of Phagwara, Punjab. By the use of organic as well as inorganic fertilizer that leads in maintaining soil health as well as increasing maize yield.

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