

**SYNOPSIS ON  
Dissertation-II  
(AGR 690)**

**“Study of fertilizers and manure effect on yield and its  
contributing characteristics of maize”**

**Submitted to :**  
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## CERTIFICATE

This is to certified that this synopsis entitled — “Study of fertilizers and manure effect on yield and its contributing characteristics of maize” submitted in partial fulfillment of requirements fir degree – Master of Science in Agronomy by **Ranjit Singh, Registration no. 11617558**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 — “Study of fertilizers and manure effect on yield and its contributing characteristics of maize” 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. Madakemohekar anant hanumant**, Assistant Professor, School of Agriculture, Lovely Professional University, Phagwara, Punjab, India.

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## Table of Content

<b>Sr. no.</b>	<b>Table of Content</b>	<b>Page no.</b>
1	Introduction	5-6
2	Objectives	7
3	Scope of Study	7
4	Review of Literature	8-9
5	Material and Methods	10
6	Research Methodology	11-12
7	Observations to be Record	12
8	Expected Outcomes	13
9	Proposed Work with Timeline	13
10	Harvesting	13
11	References	14-15

## Introduction

Maize (*Zea mays* L.) is an important cereal crop belongs to family Gramineae. “Zea” is named as a food grass in Greek. It is also known as the —Queen of Cereals because of its highest genetic yield potential. It was originated from Central America and Mexico. Maize is a most versatile crop because of its wider adaptability, so it can be grown in diverse seasons and ecologies. Maize is grown from 58°N to 40°S. It is grown in areas with minimum 250mm to maximum 5000mm rainfall in one year and from below sea level to higher altitudes 3000m (Dowswell, 1996). It is used as a raw material in many industries. The genus *Zea* has four species but only *Zea mays* L. is economically important. Maize is of many types like white grain/normal yellow, baby corn, sweet corn, waxy corn, popcorn, high oil corn, quality protein maize, high amylase corn etc. Globally, it is cultivated in 166 countries across the world and occupies more than 160 million ha area. Its contribution in the global food production (40% annually (>800mt.) is maximum among the food cereal crops. Among the world maize growing countries, USA produces 35% of the total maize production, followed by China with more than 20% production (Annon., 2012).

India has 5% of corn acreage and contributes 2% of world production (Annon., 2008). In India maize is the third important cereal crop after wheat (38%) and rice (42%). Maize contributes 9% of the total cereal production in India (Annon., 2015). It is used for many purposes, 28% of maize produced in India is used for food purpose, 11% is used for livestock feed, 48% as poultry manure, 12% for starch and oil production and only 1% as seed (Annon., 2007). In India, stats of 2014-2015 shows an increase in the maize production over last two year. In 2014-2015 maize production was 24.35 million tones and it is recorded as highest in the history of maize production in India. The major increase in the area has occurred during recent past in the states of Maharashtra, Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Tamil Nadu and West Bengal. On the other hand, area under maize cultivation is showing declining trends in Rajasthan, Gujarat, and Uttar Pradesh in recent past. The productivity of maize is also increasing in recent years both during Rabi and kharif season. The productivity increasing in the states of Haryana, Bihar, Chhattisgarh, Jammu & Kashmir, Jharkhand, Madhya Pradesh, Odisha, West Bengal and Andhra Pradesh (Annon., 2014).

In Punjab during 2013-2014 maize was grown in 0.13 million hectare area (1.38% to all India) with the maize production of 0.51 million tonnes (2.08% of all India). Average yield of 39 quintal per hectare was obtained, which is more than the yield of 2012- 2013 (36.82 q/ha) (Annon., 2014).

fertilizer is a substance added to soil to improve plants' growth and yield. First used by ancient farmers, fertilizer technology developed significantly as the chemical needs of growing plants were discovered. Modern synthetic fertilizers are composed mainly of nitrogen, phosphorous, and potassium compounds with secondary nutrients added. The use of synthetic fertilizers has significantly improved the quality and quantity of the food available today. Plants use nitrogen in the synthesis of proteins, nucleic acids, and hormones. When plants are nitrogen deficient, they are marked by reduced growth and yellowing of leaves. Plants also need phosphorus, a component of nucleic acids, phospholipids, and several proteins. It is also necessary to provide the energy to drive metabolic chemical reactions.

Manure is organic matter ,mostly derived from animal feces except in the case of green manure,, which can be used as organic fertilizer in agriculture. Manures contribute to the fertility of the soil by adding organic matter and nutrients such as nitrogen, that are trapped by bacteria in the soil. Higher organisms then feed on the fungi and bacteria in a chain of life that comprises the soil food web . It is also a product obtained after decomposition of organic matter like cow dung which replenishes the soil with essential elements and add humus to the soil.

Animal manure, such as chicken manure and cow dung has been used for centuries as a fertilizer for farming . It can improve the soil structure (aggregation) so that the soil holds more nutrients and water, and therefore becomes more fertile. Animal manure also encourages soil microbial activity which promotes the soil's trace mineral supply, improving plant nutrition. It also contains some nitrogen and other nutrients that assist the growth of plants.

In 2007 university of Minnesota study indicated that foods such as corn, lettuce, and potatoes have been found to accumulated antibiotics from soils spread with animal manure that contains these drugs.

## **Objectives of the study**

- a) To study the effect of fertilizers and manure on yield and yield attributes.
- b) To compare the effect by combining fertilizers and manure using different methods.
- c) To identify the best combination of fertilizer and manure

## **Scope of Study**

Studying and evaluating the effect with the use of combination of both fertilizer and manure on the yield and yield attributes of maize crop. We are evaluating for the best combination of these nutrient sources because only the use of the chemical fertilizers is harming the soil health and environment also. Thus there is need to find out the alternate sources, which are safe for the human, soil and environment.

## Review of Literature

### Maize yield and yield components response to fertilizers

**M. A. Arun kumar** conducted an experiment (2007) field experiment was conducted at Main Agricultural Research Station, Agriculture College, Dharwad, during 2002-03 to study the fertilizer requirement of maize grown on Vertisols of zone-8 of Karnataka. The growth parameters of maize *viz.*, leaf area index and total dry matter production were influenced favourably with increasing levels of NPK application. The yield and yield components of maize were also influenced favourably with increasing levels of NPK application. A reduction in N application below 75 per cent of recommended dose of nitrogen (RDN) reduced the yield parameters and fresh cob yield significantly. The fresh cob yield of maize in treatment which received 75 per cent RDN along with 100 per cent recommended dose of phosphorus (RDP) and recommended dose of potassium (RDK) was on par with the highest yield obtained in the treatment which received highest levels of all the three nutrients *i.e.*, 100% RDN + 100% RDP + 125% RDK indicating the possibility of reducing N level by 25 per cent without affecting yield levels of maize. Sughra et al., (2010) studied the effect of different treatments of fertilizers on growth and yield of maize and they found that all the traits related to growth and yield responded significantly to all the treatments but the treatment T5 (Azospirillum+ 100% NPK) is superior in regard to green leaves per plant at harvest (9.83), plant height (135.50 cm) and cob weight (70.33g). The experiment was conducted to evaluate the effect of different fertilizers on yield and yield components of maize and they found that among nitrogen fertilizers O4 had highest grain yield (11100 kg/ha) and among phosphate fertilizers MC1+ P5 gave highest grain yield (10200 kg/ha). Interaction between nitrogen and phosphate fertilizers showed that O6 + (MC1+P5) had highest grain yield (11920 kg/ha) (Beyranvand et al., 2013).

**Solomon Wisdom G.O** conducted an experiment on (2012) Comparative study on the effect of organic manure (cow dung) and inorganic fertilizer (N.P.K) on the growth of maize (*Zea Mays L.*) was carried out at the University of Abuja, Biological science garden for

a period of fourteen (14) weeks. A control was set up for this study. Maize plants treated with N. P.K fertilizer were significantly taller than those treated with cow dung and those of control. Mean number of leaves, stem diameter, shoot and root dry weight were higher with N.P.K fertilizer but showed no significant difference ( $P > 0.05$ ) from those grown with cow dung manure. Growth indices of maize plants to which fertilizer N.P.K was applied showed no significant ( $P > 0.05$ ) increase than the cow dung. It is recommended that cow dung manure can be used in the absence of N.P.K fertilizer considering the cost and associated environmental effect of the later.



**Meena et al., (2013)** designed experiment to check the effect of graded doses of nitrogen with and without Azotobacter inoculation on yield and nutrient uptake by maize crop. Grain yield increased with increasing levels of nitrogen, and maximum grain yield of 4.3 Mg/ha was obtained by use of 150 kg N/ ha with FYM @ 5 t/ha.

**Umesha et al., (2014)** assessed the effect of NPK, chroococcum, enriched compost during Kharif 2011 on maize var. Nithyashree (NAH 2049). Highest plant height at 30, 60, 90 days after sowing and at harvest (120 days) (31.70, 180.93, 186.07 and 188.13 cm respectively), highest total dry matter production at harvest (375.80 g) and yield.

**Stephen Oyedeji et al. (2014)** conducted an experiment on the study that compares the growth, yield, and proximate composition of *Amaranthus hybridus*, *Amaranthus cruentus*, and *Amaranthus deflexus*, grown with poultry manure and NPK in relation to the unfertilized soil of Ilorin, Nigeria. Viable seeds of the Amaranths raised in nursery for two weeks were transplanted (one plant per pot) into unfertilized soil (control) and soils fertilized with either NPK or poultry manure (PM) at 30 Kg ha<sup>-1</sup> rate arranged in randomized complete block design with four replicates. Data were collected on plant height, stem girth, number of leaves, leaf area, and number of branches from 1 week after transplanting (1 WAT). Fresh weight, dry weight, and proximate composition were determined at 6 WAT. Except for the length, breadth, and number of leaves, the order of growth parameters and yield in the three *Amaranthus* species was NPK > PM > control. NPK grown *Amaranthus* species had the highest protein while PM-grown vegetables had the highest ash content. Crude fibre in *A. cruentus* grown with PM was significantly higher than NPK and the control. The NPK treatment of *A. hybridus* and *A. deflexus* had the highest crude fibre content. NPK and PM favoured growth and yield of the *Amaranthus* species but influenced proximate composition differently.

**Farnia and Torkaman (2015)** studied the effect of fertilizers on yield and yield components of maize and the result showed that the effect of N fertilizer, P fertilizer and interaction between them on all traits were significant. The comparison of the mean values showed that Nitroxin\*phosphate barvar2 treatment had the highest cob weight (286g), cob length (22cm) and biomass (62590kg/ha). However combined application of Nitroxinand and Bio super phosphate treatment had the highest 1000 grain weight (332g/1000grains) and grain yield (14233kg/ha).

## **Material and methods**

### **Technical program of work**

Location of experiment

Experiment will be conducted at the field of lovely professional university, phagwara, situated geographically 252 m above sea level. It falls under central plain zone of agro climatic zones of Punjab.

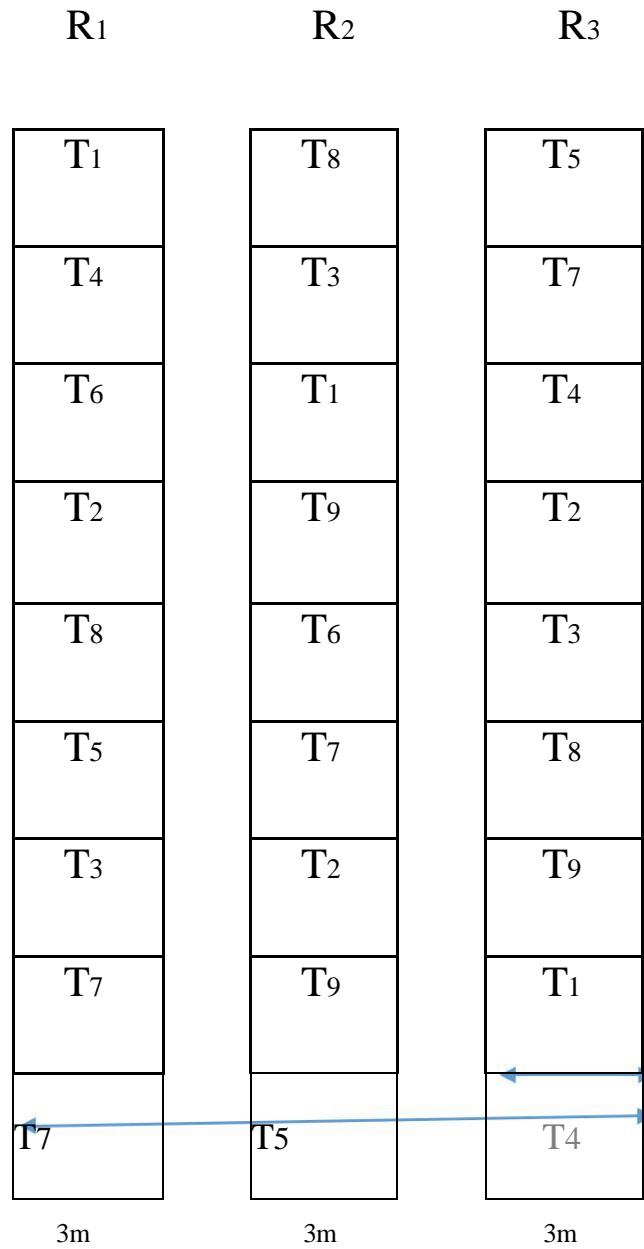
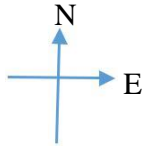
Brief introduction about work :

- CROP : Maize
- Period of work : 2017-18
- Design of experiment : randomized complete block design
- Sowing method : sowing will be done at ridges S
- Topic under discussion : study of fertilizer and manure effect on the yield and it's contributing characteristics of maize

### **TREATMENTS**

- T1 : CONTROL ( NIL)
- T2 : UREA + COMPOST
- T3 : UREA + P + COMPOST
- T4 : UREA + P
- T5 : UREA + P + K
- T6 : N + P + K + COMPOST
- T7 : COMPOST
- T8 : COMPOST + P + K
- T9 : COMPOST + N + K

## Research Methodology:



Where,

R1 = Replication 1

R2 = Replication 2

R3 = Replication 3

Plot Area:  $4 \times 3 = 12\text{m}^2$

Treatments: 9

Replication: 3

Total no. of Plots: 27

Total area of Plots:  $370\text{ m}^2$ . approx.

Variety: PMH2

Seed Rate: 8 kg/ acre

### **Observations to be record:**

a) Yield Parameters:

1. Number of grains per cob (g)
2. Number of Cobs (Number/plant)
3. 1000 grain weight (gm)
4. Grain Yield (Kg)
5. Cob length (cm)
6. Harvest Index (%)

b) Soil Parameters Soil

1. Soil EC
2. Soil PH
3. N,P,K content of soil (kg/ha)
4. Organic Carbon (%)
5. Organic matter (%)

c) Growth parameters

1. Plant height (cm)
2. No. of green leaves per plant (Number/plant)
3. Stem girth per plant (cm)
4. Leaf area per plant (cm)

## **EXPECTED OUTCOMES**

The experiment will be conducted at the Lovely Professional University, School of Agriculture, near experimental farm of Phagwara, Punjab. By the use of inorganic fertilizer and compost, it is expected that they will enhance the growth and yield of maize. Application of different fertilizers will affect not only the economics of maize but also the physical, chemical and biological properties of soil.

## **PROPOSED WORK WITH TIMELINE**

- 1. Time of sowing:** Mid-august
- 2. Spacing:** R \* R = 60 cm, P \* P = 20 cm
- 3. First Hoeing:** 15 Days after sowing
- 4. Irrigation:** 4-6 irrigations or as per the soil conditions.

### **Harvesting:**

When the stalks and leaves are somewhat green but the cover of the husk becomes dried and brown in colour, then the crop is ready for harvesting.

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