Dissertation-I

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Master of Science

In

Agronomy

SUMITTED BY

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SYNOPSIS

Effect of foliar zinc application at different phenological stages on growth and yield parameters of wheat (*T. aestivum*)

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Certified that topic entitled " **Effect of foliar zinc application at different phenological stages on growth and yield parameters of wheat (*T. aestivum*).**" has been decided and formulated by the student himself and is appropriate for his programme.

(Signature of the student)

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Reg No. 11715014

(Signature of the Major advisor)

Dr. Chandra Mohan Mehta

CERTIFICATION

This is to certify that Amit Kumar Yadava registration No (11715014) is doing project titled *"Effect of foliar zinc application at different phenological stages on growth and yield parameters of wheat (T. aestivum)"* under my guidance and supervision. To the best of my knowledge the present work is the result of his original investigation and study. No part of the project has ever been submitted for any other degree at any university. The project is fit for submission and the partial fulfillment of the condition for the award of degree of M.Sc. in Agronomy.

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DECLARATION

I hereby declare that the project work entitiled "**Effect of foliar zinc application at different phenological stages on growth and yield parameters of wheat (*T. aestivum*)**" is an authentic record of my work carried out by Lovely Professional University as requirement of project work for the award of degree of Master of Science in Agronomy, under the guidance of Dr. Chandra Mohan Mehta, Department of Horticulture, School of Agriculture, Lovely Professional University, Phagwara, Punjab.

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INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most cultivated cereal crop in the world. It is eaten in various forms by more than one thousand million human beings in the world. In India it is second important staple food crop, it is eaten in the form of chapatis. In areas where rice is the staple cereal food wheat is eaten in the form of purist or in the form of upma. In addition to this wheat is also consumed in various other preparations such as dalia, halwa, sweet meals etc. In most of the urban areas in the country the use of backed leavened bread, flakes, cakes, biscuitsetc, is increasing at a fast rate. Besides staple food for human beings wheat straw is a good source of feed for a large populationof cattle in our country.

Wheat compares well with other important cereal in its nutritive value. It contains more protein then other cereals. Wheat has the relatively high content of niacin and thimine. Wheat proteins are of special significance besides, their significance in nutrition, they are principally concerned in providing the characteristics substance gluten which is very essential of bakers. In bakery of gluten provide the structural farm-work for a familiar spongy, cellular texture of bread and other baked products. Flours of other cereals lacking gluten are therefore, not good for bread making. Wheat crop is growing more than 122 countries of the world. Wheat is the world leading cereal crop, cultivated over an area about 215 million hectares with a production of 584 million ton grain (1999).

Maximum area under wheat is in china followed India, Russia and USA in the production China stands first and India Ranks second. in regard to average yield per hectare, UK rank first followed France. The Average wheat yield is only 3582kg/hectare in India which is much lower than most of the wheat growing country of the world. In India wheat is the main cereal crop. In respect of area and production it occupies the second position, been exceeded only by rice. The area of production along with yield per hectare of wheat in different states of India. Uttar Pradesh, Madhya Pradesh, Punjab, Rajsthan, Bihar, Haryana, Maharastra and Gujrat are major wheat growing states in the country through are maximum area and production of wheat is in Uttar Pradesh but Punjab gives highest average yield per hecatare(4532kg) followed by Haryana (4016kg). In India account about 12% total production in the world.

REVIEW OF LITERATURE

Wheat crop fertilizer application describe that 2 to 3tones of farmyard manure per hectare or some other is the applied 5 or 6 week before sowing The fertilizer of the wheat crop. N 120 kg per hectare,P2O5 60 -40 per hectare,K2o 40 kg per hectare.

Cereals are the major source of Zn for the worldвАЩs population, chiefly for the poor people of the third world countries. In several developing countries, e.g., Iran, wheat is accountable for about half of the protein and daily calorie intake (FAO 2012). A monotonous use of wheat,based products gradually results in Zn malnutrition since wheat is inherently low in Zn (Cakmak et al. 2010a). Phytic acid, a form of stored phosphorus (P) in grains, is also an anti nutrition factor. The complex of phytic acid (PA) with mineral elements, such as potassium (K), magnesium (Mg), calcium (Ca), iron (Fe) and Zn, results in a marked diminution in bioavailability of these nutrient elements.

Thus it is important to improve the nutritive value of cereals by increasing the levels of Zn and other micronutrient and/or decreasing the content of anti-nutritional factors, such as PA. Therefore, Zn bio-fortification of wheat grain by genetic and agronomic approaches is generally recommended to solve human Zn deficiency (Bharti et al. 2013; Abdoli et a1. 2014).

Pre-sowing soil application of zinc sulfate is the most common approach to correct Zn deficiency in crops such as wheat (Cakmak 2008) and rice (Singh and Singh Shivay 2015). In calcareous soils, Zn availability is usually very low and Zn deficiency widespread. Foliar Zn application under such conditions could be more effective than any other forms of Zn applicationst (Cakmak et al. 2010a). Foliar Zn application is an effective method and technique of ameliorating plant Zn deficiency and for increasing Zn content of grain; although its effectiveness may depend on time of application (Phattarakul et a1. 2012). For example, Cakmak et al. (2010a, b) showed that the highest grain Zn concentrations were obtained when Zn was applied four ' times (stem + booting + milk + dough stages), and application at later stages (especially booting. and milk stages) resulted in higher grain Zn content than applications at early stages. Li et a1. (2014) showed that foliar Zn application at the primary grain filling period considerably increased the grain Zn content and the Zn utilization efficiency by 82.9 and 49 %, respectively, and caused highest decrease in the phytate to Zn molar'ratio compared to early stages (Yang et a]. 2011). Foliar Zn application is a promising short-term approach to improve

Zn concentrations in grains and can also help in alleviation of Zn deficiency related health problems in the developing world. Therefore, the present study was con~ ducted to determine the effectiveness of foliar application Zn at the different growth stages on grain yield, and nutritional quality of wheat grains.

PLAN OF WORK

The present experiment will conduct in winter season 2017 at agricultural farm of Lovely Professional University, Jalandhar, Punjab. Materials and methods used during this experiment are described below.

DESIGN AND LAYOUT OF THE EXPERIMENT

TECHANICAL PROGRAMME :

EXPERIMENTAL DETAILS :

- Year of the experimentation : 2017
- No. of treatments : Eight(8)
- No. of replications : Three(3)
- Total no. of plots : Twenty four(24)
- Plot size : 3m x 3m($9m^2$)
- Irrigation channel : 0.5 m
- Total area : $245m^2$
- Row to row spacing : 20 cm
- Plant to plant spacing : 10 cm
- Crop : Wheat

Recommended dose of fertilizers: kg/ha

N 120kg; P_2O_5 60kg; K_2O 40kg

TREATMENT DETALS

Variety :PBW 590,509
Sowing time : 9th December

Seed Rate : 90gm

Sowing depth : 3-5 cm

NUTRIENT MANAGEMENT TREATMENTS

T1 no zinc
T2 stem elongation
T3 booting
T4 flowering
T5 milking
T6 soft dough
T7 booting + milking
T8 booting + soft dough
Number of replication : 3
Number of irrigation channel : 2

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.

Observation :

Soil parameter

Parameters	Observation
1. Soil pH and EC	6.5 and 0.53
2. Organic Carbon	0.375
3. Available Nitrogen	Less than 272kg/ha (low)
4. Available Phosphorus	19.8 kg/ha (medium)
5. Available Potassium	Less than 140 kg/ha (low)

Analysis :soil analysis
Initial soil: initial soil samples will be analyzed for pH, EC, Organic C, available N,P and K and Fe amount present in soil.

Analytical methods to be followed during investigation are as under

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 *et al*. (1954)
6	Available K	Flame photometer	Jackson (1973)
7	Zinc	*Atomic Absorption Spectroscopy*	Walsh (1955)

Plan of proposed work

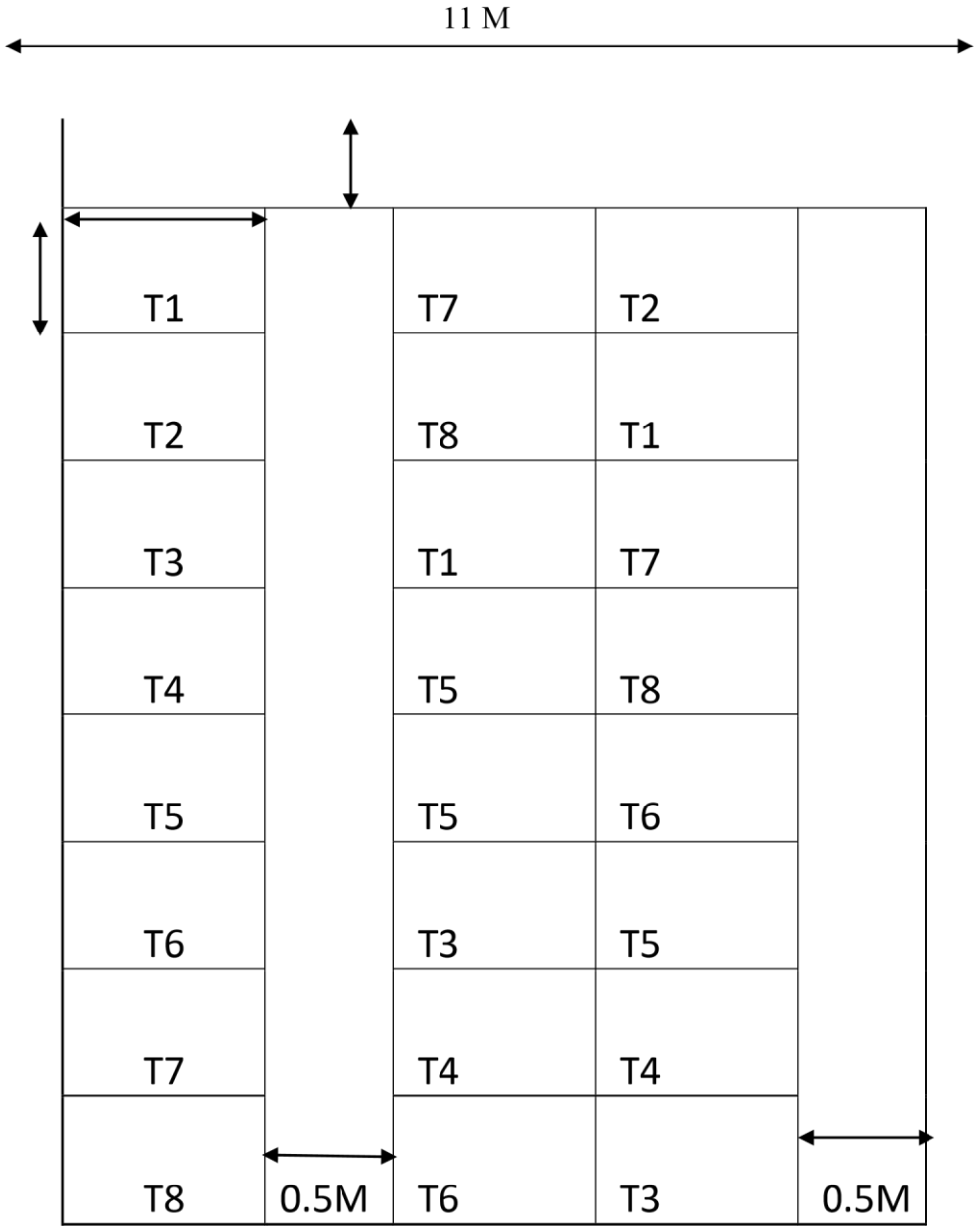
Area :275 m^2

Seed Rate :2kg300gm per 275 m^2

Time of sowing : 9th December 2017
Spacing : 15 x20cm

Layout of the field experiment on wheat :

Treatment	Plant growth stage at which foliar zinc spray application (2gm/l) was given
1	No zinc(control and no foliar spary)
2	Stem elongation
3	Booting
4	Flowering
5	Milking
6	Soft dough
7	Booting +milking
8	Booting + soft dough


11 M
T1
T7
T2
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T8
T1
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T3
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T7
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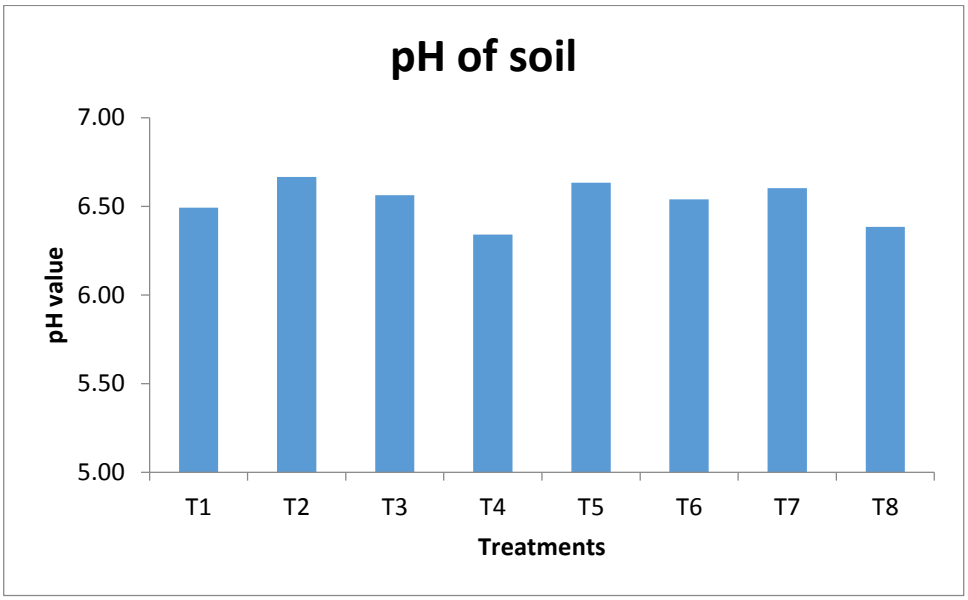
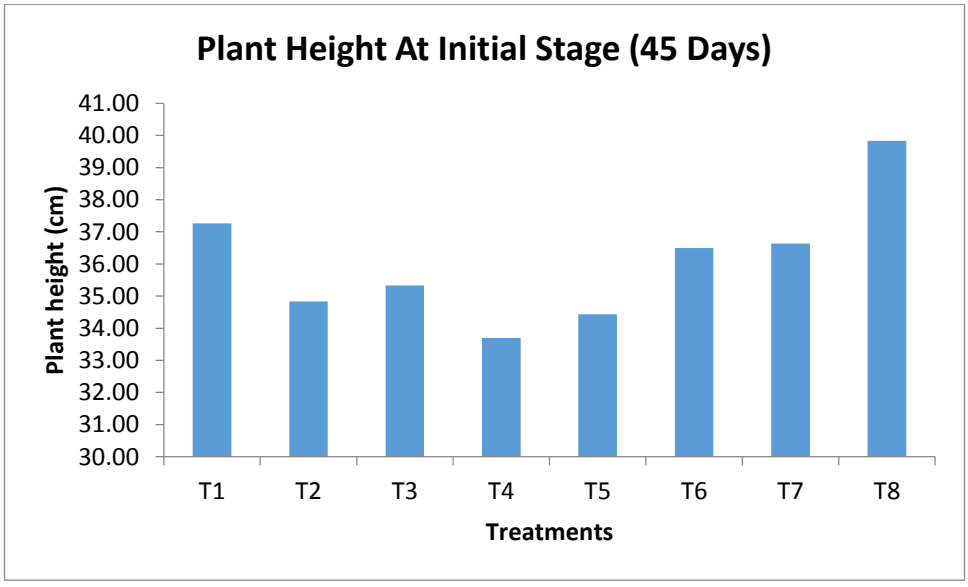
T3
0.5M

Preliminary Results:

pH of Soil: pH value of soil was observed between 6.34 to 6.67.



Plant Height at Initial Stage: Preliminary results on growth parameters reflected that T8 is having maximum growth while minimum was observed in T2. However statistical analysis is still need to be performed for significance.



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