SYNOPSIS ON

Dissertation-||

(AGR 596)

"EFFECT OF BIOCHAR AND DIFFERENT MICRONUTRIENT AMENDMENTS ON SOIL QUALITY GROWTH AND YIELD OF WHEAT-MAIZE CROPPING SYSTEM"

Submitted To

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CERTIFICATE

This is to certified that this synopsis entitled ***"Effect of biochar and different micronutrient amendments on soil quality growth and yield of wheat-maize cropping system"***

Submitted by **Sarwan Singh, Registration no. 11716790** to Department of Agronomy, School of Agriculture, LovelyProfessional University, Phagwara has been formulated and finalized by the student himself on the subject

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Introduction

Wheat is a grass widely cultivated for its seed, a cereal grain are staple food. There are many species of wheat but genus ***Triticum***; the most widely grown is common wheat (*T. aestivum*).wheat is also used as flour for making chapattis' in India and some other countries.The archaeological record suggests that wheat was first cultivated in the regions of the Fertile Crescent around 9600 BCE. Botanically, the wheat kernel is a type of fruit called a caryopsis.Wheat is grown on more land area than any other food crop (220.4 million hectares, 2014). World trade in wheat is greater than for all other crops . In 2016, world production of wheat was 749 million tons making it the second most-produced cereal after maize. Since 1960, world production of wheat and other grain crops has tripled and is expected to grow further through the middle of the 21st century. .Wheat is an important source of carbohydrates.

Maize (*Zea mays L.*) is one of the most versatile emerging crop shaving wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. It is cultivated on nearly 150 m ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 35.5 % (782 m t) in the global grain production. The United States of America (USA) is the largest producer of maize contributes nearly 35% of the total production in the world and maize is the driver of the US economy. The USA has the highest productivity (> 9.6 ton /hac.) which is double than the global average (4.92 ton /hac.). Whereas, the average productivity in India is 2.43 t ha^{-1}. In India, maize is the third most important food crops after rice and wheat. According to advance estimate it is cultivated in 8.7m 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. In addition to staple food for human being and quality feed for animals, maize serves as a basic raw material as an ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc. Maize has become a staple food in many parts of the world, with total production surpassing that

of wheat or rice. The six major types of corn are dent corn, flint corn, pod corn, popcorn, flour corn, and sweet corn.

Proposed Research Objectives:

- To evaluate the impact of different amendments on soil physical, chemical and biological properties.
- To study the effect of amendments on growth response.
- To correlate the soil properties with yield.

Review of Literature:

Ali et.al,(2013).Has reported the level of Zn content was raised from 15.2 to 37.4 mg kg-1 by application of 10.0 kg Zn ha-1. Thus, substantial improvement in wheat productivity could be harvested with simultaneous increased concentration of Zn nutrient in grain for alleviation of syndrome caused due to Zn deficiency across rural and peri-urban communities.

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)

Kalhapure et.al., (2013).reported that 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.

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.

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 tonspoultry manure and 100% RDF, which was at par with 3.0 tons poultry manure and 100% RDF combinations.

Pavithra and Patil (2013) found that foliar application of Starter @ 2% at 15 and 45 DAS + Booster @ 2% at 55 and 70 DAS recorded significantly higher yield components like effective tillers per square meter, number of grains per ear head, 1000-grain weight (43.10 g), grain yield

(39.97 g ha-1) and quality parameters i.e. protein, gluten, starch, zeleny, zinc content in wheat grains.

Proposed Research Methodology

The experiment will be conducted at the research field of Lovely Professional University, Phagwara situated at 31°14'48.0"N Latitude and 75°41'45.0"E Longitude at 252 m above MSL. It comes under central plain zone of agro climatic zones of Punjab. The wheat variety HD-3086 with a seed rate of 98.80 Kg/ha is shown with a line spacing of 22.5 cm.The soil samples from three different depths(0-15cm, 15-30cm and 30-45cm) were collected, processed and analyzed for measurable soil parameters *viz*., pH, EC, organic C, Nitrogen, Phosphorous, Pottash, Zinc, Manganese, Iron and Sulphur, etc. using the standard protocols (Black, 1965). The data will be given through statistical investigation (Panse and Sukhatme, 1961) and appropriate computations .

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Treatments:

T_1: Control

T_2: RDF (Recommended Dose of Fertilizer, NPK; 80-100:50-60:30-40 Kg/ha)

T_3: RDF+Biochar+ $ZnSO_4$

T_4: RDF+Biochar+$FeSO_4$

T_5: RDF+Biochar+Mn

T_6: RDF+Biochar+ Sulphur

Design of Experiment:Randomized blockdesign (RBD).

Layout

<table>
<tr><td>T_1R_1</td><td rowspan="6">Sub irrigation channel</td><td>T_4R_2</td><td rowspan="6">Sub-irrigationchannel</td><td>T_6R_3</td></tr>
<tr><td>T_2 R_1</td><td>T_3 R_2</td><td>T_5 R_3</td></tr>
<tr><td>T_3 R_1</td><td>T_2 R_2</td><td>T_4 R_3</td></tr>
<tr><td>T_4 R_1</td><td>T_1 R_2</td><td>T_3 R_3</td></tr>
<tr><td>T_5 R_1</td><td>T_6 R_2</td><td>T_2 R_3</td></tr>
<tr><td>T_6 R_1</td><td>T_5 R_2</td><td>T_1 R_3</td></tr>
<tr><td colspan="5">Main irrigation channel</td></tr>
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Observations recorded:

a) **Yield Parameters:**

1. Number of grains per head (g)
2. Number of heads per plant
3. 1000 grain weight (gm)
4. Grain Yield (Kg)
5. length (cm)
6. Harvest Index (%)
7.

b) **Growth parameters**

1. Plant height (cm)
2. No. of green leaves per plant (Number/plant)
3. Stem girth per plant (cm)
4. Dry matter production (g)

Research outcome till detail:

Field preparation: 20 November, 2017 , (fertiliser application of DAP+BIOCHAR+MOP)

Date of sowing: 21 november, 2017

Date of harvesting: 17 april, 2018

Sowing Time

Germination Stage

55 Days After DOS

Micronutrients

Urea Application

Harvesting

(A) GROWTH PARAMETER

1. **Plant height:** Plant height was recorded on healthy plants from the base of the plant to the highest leaf on the plant using a meter scale.
2. **No. of green leaves:** no. of green leaves appear on crop plant are counted manually and noted dow on note book.
3. **No. of tillers/m row:** no. of tillers are counted in every plot/treatment of field plot with help of measuring tape.

(B) YIELD PARAMETERS

1. **No. of grains/ear.** : grains of wheat ear are counted at the time of harvesting.
2. **No. of ear heads /m^2 :** Ears of crop plants/m^2 are counted few days before harvesting.
3. **Test weight/1000 seeds (gms.):** Seeds will be counted after harvesting and threshing and weigh the sample.
4. **Seed yield/m^2 (in gms.):** harvest one sq. meter crop plants and weigh the crop seed yield

(C) SOIL PARAMETERS

After harvesting I take soil samples from every field plot treatments in transparent polythenes for conducting following experiments in the agricultural lab.

1. Soil PH
2. Soil EC
3. Organic carbon%
4. Available N, P_2O_5 ,K_2O.