I. INTRODUCTION

1.1 Background

Sweet corn (Zea mays saccharata Sturt) or better known as sweet corn is one of the most famous horticultural commodities in the United States and Canada. Sweet corn has been known in Indonesia since the 1970s (Syukur, 2013). The public increasingly favors sweet corn because it has a sweeter taste, more fragrant aroma and higher nutritional content. Sweet corn is usually served in the form of corn on the cob, roasted corn, corn sugar, corn milk, cakes and corn chips. Sweet corn is also very good for diabetics because it contains low levels of sugar and fat.

Sweet corn seeds are rich in sugar content and calories compared to other vegetables. In 100 grams of fresh sweet corn seeds contain 86 grams of calories, 2 grams of fiber or about 5% of the daily dietary fiber requirement and about 6% of the daily vitamin requirement. Sweet corn contains a lot of free sugar and starch. The sugar content in sweet corn is not glucose or sucrose, but in the form of fructose, a type of sugar polymer known as fruit sugar (Dongoran, 2009).

Sweet corn production in Indonesia in 2013 was 18,506,287 tons, decreased by around 670,743 tons compared to sweet corn production in 2012 which was 19,377,030 tons, in 2014 it was 19,033. 000 tons and in 2015 it was 19,610,000 tons (BPS, 2016). The more comprehensive the community's knowledge of the sweet corn plant, the more people's demand for this sweet corn plant will increase.

The production of sweet corn does not match the increasing demand for sweet corn. Sweet corn productivity in Indonesia averages 8.31 tons per ha. Meanwhile, the potential yield of sweet corn for 2 varieties of Kumala F1 can reach 13-15 tons per ha and for Bonanza F1 varieties can reach 33-34.5 tons per ha.

Land productivity is low or even unproductive for agricultural activities, can be caused by improper land management and land use that can trigger soil degradation. Soil degradation or land degradation is defined as land that has a low level of productivity or is not productive at all for agricultural activities (Winarso, 2005). Land degradation is also influenced by the type of crop and cropping system where corn is a nutrient-hungry plant so it will deplete the nutrients in the soil and nutrients from the fertilizers given. In contrast, the monoculture planting system is not good for land productivity so that it will cause land degradation. The use of biochar can overcome land degradation. The biochar used is from jengkol peel as agricultural waste, which is abundantly available in production centres and is not used correctly, so it is considered waste (Gani, 2009). Biochar has the advantage of being a soil enhancer that can provide organic materials and contains macro nutrients and large amounts of micro nutrients for plant growth (Gani, 2013).

Biochar can last long enough in the soil so that the use of biochar as a soil enhancer and improving the physical-chemical properties of the soil can also store good carbon in the soil. Soil enrichment of carbon by adding biochar can positively affect soil properties, including stability of soil aggregates, soil CEC, soil C-organic content, water and nutrient retention.

So far, generally the manufacture of waste charcoal from agriculture is intended for export. Biochar as a soil improvement material made from agricultural residues that are difficult to decompose is an alternative that can improve the quality of soil physical properties so that crop production can be increased (Lehmann, 2007). In addition to biochar, Indonesia still uses a fertilization system using inorganic fertilizers and the use of inorganic fertilizers can increase agricultural yields. However, without realizing it, the continuous use of inorganic fertilizers has an adverse effect on the soil's physical chemical, and biological properties. This causes the ability of the soil to support the availability of water, nutrients and the life of microorganisms in the soil to decrease. One of the efforts to reduce the use of inorganic fertilizers can use organic fertilizers, namely chicken manure, where manure has important elements needed by plants such as nitrogen (N), Phosphorus (P), and Potassium (K) and can facilitate the absorption of nutrients and water in the soil. The use of chicken manure can provide better plant growth.

Based on the description above that jengkol peel biochar and chicken manure contain complete nutrients in different proportions. They can improve soil conditions and jengkol peel biochar as a soil enhancer that can last for a long time and also as a source of nutrients for sweet corn plants and is expected to reduce the intensity of pest attacks on sweet corn plants. Therefore, the author is interested in researching the effect of giving jengkol peel biochar and chicken manure on growth and production as well as the intensity of pest attack on sweet corn (Zea mays saccharata Sturt).

1.2 Problem Formulation

The higher demand for sweet corn (Zea mayssaccharata Sturt) to the community and with the lack of cultivating sweet corn plants of the Bonanza F1 variety and the very high level of pest attack causes sweet corn production to decline. For this reason, it is necessary to carry out activities that can increase the production of sweet corn (Zea mayssaccharata sturt) and can reduce the level of pest attack on the sweet corn plant (Zea mayssaccharatasturt).

Thus, it is necessary to plant sweet corn (Zea mayssaccharata sturt) Bonanza F1 variety by giving Jengkol Peel Biochar and Chicken Manure.

1.3 Research Objectives

This research aims to determine how the effect of giving jengkol peel biochar combined with chicken manure on the growth and production of sweet corn (Zea mayssaccharata Sturt) which can suppress and reduce the intensity of pest attacks.

1.4 Research Hypothesis

1. Provision of jengkol peel biochar has a significant effect on increasing the growth and production of sweet corn plants (Zea mays saccharata Sturt.) and reducing the intensity of pest attacks.
2. The application of chicken manure significantly increased the growth and production of sweet corn (Zea mays saccharata Sturt.) and reduced the intensity of pest attacks.
3. The combination of giving jengkol peel biochar and chicken manure significantly increased growth and production (Zea mays saccharata Sturt.) and reduced the intensity of pest attacks.

1.5 Research Benefits

1. It is obtained a combination of giving biochar from jengkol peel's raw materials and chicken manure to increase growth and production as well as the intensity of attack on sweet corn plant pests (Zea mays saccharata Sturt.)
2. It is obtained a combination of giving jengkol peel biochar and chicken manure to increase the growth of sweet corn so that it can suppress the decrease in the intensity of pest attacks on sweet corn plants.

3. As one of the requirements to obtain a bachelor's degree in the Agrotechnology Study Program, Faculty of Agriculture, Medan Area University.

I. LITERATURE REVIEW

2.1 Sweet Corn Plant Classification

Sweet corn is a secondary commodity and belongs to the grass family, (Gramineae) genus Zea, and species Zea mays Saccharata. Sweet corn has the characteristics of a clear endosperm, thin seed coat, low starch content, when ripe the seeds wrinkle. The main product of sweet corn is the fruit/cob, sweet corn seeds have a shape, colour and endosperm content that varies depending on the type, sweet corn seeds consist of three main parts, namely the seed coat, endosperm and embryo (Koswara, 2009).

The classification of sweet corn plants is as follows: Kingdom: Plantae, Division: Spermatophyta, Sub division: Angiospermae, Class: Monocotyledonae, Order: Poales, Family: Poaceae, Genus: Zea, Species: Zea mays Saccharata Sturt. (Pritama, 2015).

2.2 Sweet Corn Plant Morphology

Morphology of Sweet Corn Plants (Kasryno, 2002), the roots of hybrid corn plants are fibrous roots that grow at the base of the stem and spread widely as lateral roots. The seminal roots grow downward from the corn seed institute. The stems of corn plants are cylindrical and segmented at the base of the stem, which are quite short with a number of about 6 to 8 segments. The average height of corn plants is between 1 to 3 meters above ground level. While the leaves of corn plants are in the form of ribbons or lines and the number of leaves is about 5-7 strands per stem, depending on the type or variety planted. The length of the leaves is 20-25 cm and the width is between 5 cm-7 cm (Akil, 2009).

Corn includes fibrous root plant consisting of three types of roots, namely seminal roots, adventitious roots, and aerial roots. Seminal roots grow radicle and embryo.

Adventitious roots are also called tunjang roots, these roots grow from the bottom of the book, which is about 4 cm from the soil surface. While aerial roots are roots that come out of the two or more bottom nodes near the soil surface (Nurdin et al., 2011).

Corn leaves are elongated, have the characteristics of a ribbon (ligulatus), pointed leaf tips (acutus), flat leaf edges (integer). Between the midrib and leaf blade there are ligules (Subekti et al., 2013). According to Purwono and Hartono (2007), the function of ligules is to prevent water from entering the leaf petals and stems.

Male flowers and female flowers on corn are separate in one plant (monoecious). Male flowers grow at the top of the plant, in the form of a wreath (inflorescence). Cob as a female flower, grows from the book between the stem and leaf midrib (Aris et al., 2016).

Corn plant seeds known as kernels consist of 3 main parts, namely the cell wall, endosperm, and embryo. This part of the seed is the most important part of the harvest. The average seed portion consists of 10% protein, 70% carbohydrates, 2.3% fibre. Corn seeds are also a source of vitamins A and E. (Farany et al., 2016).

2.3 Growing Requirements of Sweet Corn Plants

Sweet corn in Indonesia grows well from 50^o North Latitude up to 40^o South Latitude. Sweet corn can grow in almost any type of soil with good drainage and an adequate supply of humus and fertilizer. Good soil acidity for sweet corn growth is 5.5 – 7.0 (Anonymous, 1992) in Rizki Widyaningrum (2004). The most important climatic factors are rainfall and temperature. In general, sweet corn requires water as much as 200-300 mm/month. The optimal temperature conditions for sweet corn are between 23^oC - 27^oC. However, at low temperatures up to 16^oC and high temperatures up to 35^oC, sweet corn can still grow (Rizki Widyaningrum, 2004). The altitude where the sweet corn plant has a wide distribution area because it is able to adapt well to various environments ranging from lowlands to highlands with a size of 0 m - 1,500 m above sea level (Syukur, 2013).

2.4 Pests and Diseases of Sweet Corn

2.4.1 Cob Borer Worm (Helicoverpa armigera)

Cob borer worm (Helicoverpa armigera) is well-known as a destroyer of sweet corn plants found in the lowlands or highlands. The parts of the sweet corn plant that it damages are mainly corn fruits. The Helicoverpa worm that did not manage to enter the corn fruit, damaged the young sweet corn leaves. Infected cobs are marked with hair or tips that appear to be eaten by cob borer caterpillars or in that part there is borer activity (Winasa and Widodo, 2010).

The fruit or cob borer worm (Helicoverpa armigera) attacks after the plant is 45 days after planting. If the young corn buds are attacked, they will be damaged and when the sheath is opened, worms will be found inside. Part of the corn seeds that have been attacked by the worm; it would be empty. Empty seeds in an open sheath make it easier to be contaminated with fungi so that they become rotten and black in colour.

Symptoms of cob borer worm’s attack begin at the time of the formation of flower buds, flowers and young fruit. The larvae enter the young fruit, eat the seeds of corn, the larvae live in the fruit, usually this insect attack is difficult to detect and difficult to control with insecticides (Winasa and Widodo, 2010).

The control threshold for Helicoverpa armigera was if there were 2 per clump at 45 days after planting or the intensity of attack was more than 2%. Usually, this worm attack is difficult to control with insecticides. Attacks on young cobs can cause severe damage, while on older cobs it will only cause damage to the seeds at the tip of the cob (Suharto, 2007).

2.4.2 Downy mildew (Peronosclerospora maydis)

Downy mildew disease is the major disease of maize cultivation. This disease attacks corn plants, especially varieties susceptible to pests and diseases and when the corn plants are still young (between 1-2 weeks after planting). Loss of production due to downy mildew can reach 100%. Symptoms that arise due to downy mildew are that the plant growth will be stunted, including the formation of cobs, even corn cobs are not formed at all. Furthermore, the leaves curl and twist, the male flowers turn into excessive leaf mass and the leaves are torn (Wakman and Hasanuddin, 2003).

This fungus is an obligate parasite, meaning that it survives and develops only on living plants. Factors causing the amount of damage, among others, are caused by climatic factors and cropping techniques. Climatic factors such as humidity and air temperature greatly affect the development of Peronosclerospora maydis, especially at humidity above 80% and a temperature of 28-30^{0}C and the presence of dew (Wakman and Hasanuddin, 2003).

2.5 Jengkol Peel Biochar

Biochar is a term used to describe porous charcoal made from organic waste added to soil. Biochar is produced through the pyrolysis process of biomass. This pyrolysis is carried out by exposing the biomass to high temperatures in the absence of oxygen. Biochar has characteristics due to its large surface area, large volume, micro pores, bulk density, macro pores, and high-water binding capacity. These characteristics make biochar able to supply carbon. Biochar can also reduce CO_2 from the atmosphere by binding it into the soil (Purnomo, 2008).

The advantages that can be obtained from the use of Biochar are that it can function as a soil enhancer, increase plant growth by supplying a number of useful nutrients and improve soil physical, chemical and biological properties. The potential of biochar as a soil enhancer in addition to improving the physical, chemical, and biological properties of the soil can also be the main source of material for conserving organic carbon in the soil. The addition of biochar to the soil increases the availability of the main cations Phosphorus, N, Ca, K, Mg and soil cation exchange capacity (CEC) (Gani, 2010).

Charcoal is a black residue containing impure carbon produced by removing water and volatiles from animals or plants. Pyrolysis is the chemical decomposition of organic matter through a combustion process without or little oxygen where the raw material will undergo a chemical breakdown of the chemical structure into gas. This process Carbonation process is the process of decomposition of cellulose into carbon elements and the release of non-carbon elements which takes place at a temperature of 600-700 ^{o}C. In preparation for the manufacture of biochar with jengkol peel, namely collecting 200 kg of jengkol skin biochar. Then make biochar by burning jengkol peel in a modified pyrolysis tube for 3 hours. Next is the sorting of jengkol skin that has become completely charcoal, if there is a jengkol skin that has not yet become charcoal, then the process of charcoaling will be carried out again. Jengkol peel that has become charcoal is activated by making a technical HCL solution of 33% to a concentration of 10%, then soaking for 24 hours, after that it is rinsed with clean water then drained and dried. Activated jengkol pell charcoal was grinded and finely sieved with a size of 40 mesh (Hutapea et al, 2015).

Delsi (2010) in Gusnidar et al (2011), examined the effect of jengkol pell’s extract on viability and weed vigor in the same plant, from the report it was known that at a concentration of 10% jengkol pell's extract increased rice plant growth, and decreased weed viability and vigor. The results of the preliminary analysis showed that jengkol peel contains nutrients; 1.82% N; 0.03% P; 2.10% K; 0.27% Ca; 0.25% Mg.

2.6 Chicken Manure

Manure is an organic fertilizer from the fermentation of solid or liquid manure (urine) which generally comes from mammals or poultry. Organic fertilizers, such as chicken manure, have advantages in terms of improving soil physical properties such as soil permeability, soil porosity, soil structure, and soil cations (Roidah, 2013).

Muhsin (2003) stated that chicken manure had good potential, because in addition to its role in improving the physical, chemical, and biological properties of soil, chicken manure also contains higher N, P, and K compared to other manures.

In addition, manure also plays a role in increasing the absorption and carrying capacity of the soil to water so that the availability of water needed by plants is fulfilled. The nutrient content in chicken manure is 1.7% N, 1.90% and 1.50% O (Hardjowigeno, 2003).

III. MATERIALS AND METHODS

3.1 Place and Time of Research

This research was conducted on the Experimental Campus of the Faculty of Agriculture, University of Medan Area, which is located at Jalan Pond No. 1 Medan Estate, Percut Sei Tuan Subdistrict with a height of 22 meters above sea level (MDPL), flat topography and Alluvial soil type. This research was conducted from October 2019 to January 2020.

3.2 Materials and Tools

The materials used in this study were sweet corn seeds of the Bonanza F1 variety, EM4, brown sugar, chicken manure taken from Pantai Labu, Pantai Labu Subdistrict, Deli Serdang Regency, Jengkol peel taken from Jalan Kolam Medan Estate. The tools used in this study were pyrolysis tubes (modified tubes), hoe, rake, tarpaulin, meter, gembor, bucket, books and stationery, calliper.

3.3 Research Method

This research was conducted using a factorial randomized block design (RAK) consisting of 2 treatment factors, namely:

1. Factor of giving Jengkol Peel Biochar (B) which consists of 4 levels, namely:

B0 = Without Jengkol Peel Biochar (control)

B1 = Jengkol Peel Biochar of 5 tons / ha (0.72 kg / Plot)

B2 = Jengkol Peel Biochar of10 tons / ha (1.44 kg / Plot)

B3 = Jengkol Peel Biochar 15 tons / ha (2.16 kg / Plot)

2. The factor of giving chicken manure which consists of 4 levels, namely:

K0 = without giving chicken manure

K1 = Chicken manure of 7.5 tons / ha (1.08kg / plot)

K2 = Chicken manure of 15 tons / ha (2.16 kg / plot)

K3 = Chicken manure of 22.5 tons / ha (3.24 kg /plots)

Thus, the number of treatment combinations is 4 x 4 = 16 treatment combinations, namely:

B0K0	B1K0	B2K0	B3K0
B0K1	B1K1	B2K1	B3K1
B0K2	B1K2	B2K2	B3K2
B0K3	B1K3	B2K3	B3K3

Based on the combination of treatments that can be 16 combinations treatment, then the replication used in this study according to the calculation of the minimum repetition in the Factorial Randomized Block Design (RAK) as follows:

$(tc-1)(r-1) \geq 15$

$(16-1)(r-1) \geq 15$

$15(r-1) \geq 15$

$15r - 15 \geq 15$

$15r \geq 15 + 15$

$15r \geq 30$

$r \geq 30/15$

$r \geq 2$

r = 3 replicates

remarks:

Number of repetitions	: 3 repetitions
Number of experimental plots	: 48 plots
Experimental plot area	: 120 cm x 120 cm
Number of plants per plot	: 9 plants
Number of plants sampled per plot	: 4 plants
Total number of plants sampled	: 192 plants
Total number of plants	: 432 plants
Planting distance	: 40 cm x 40 cm
Distance between plots	: 50 cm
Distance between replicates	: 100 cm

3.4 Research data analysis method

After the results and research are obtained, the data analysis method will be carried out using a factorial Randomized Block Design (RAK) as follows:

$$Y_{ijk} = \mu + \tau_i + \alpha j + \beta_k + (\alpha\beta)_{jk} + \sum ijk$$

Where:

Y_{ijk} = Observation results from the i-level factor N and the j-level factor at the i-level replication

μ = General mean

τ_i= Effect of replication – i

αj = Effect of Jengkol Peel Biochar at level – j

βk = Effect of chicken manure level - k

$(\alpha\beta)_{jk}$ = The interaction effect of Jengkol Peel Biochar at the j-level and chicken manure at the k-level

Σijk = Effect of error from Jengkol Peel Biochar at level - i and chicken manure at level - j and repetition at level - k

3.5 Research Implementation

3.5.1 Making Jengkol Peel Biochar

The material used, namely jengkol peel is collected and first dried until the water content reaches 12%. The way to reduce the water content is done by drying in the sun then all the ingredients are dry so that the material is further processed, namely the carbonization process. The carbonation process is the process of decomposing cellulose into carbon elements and releasing non-carbon elements which takes place at a temperature of 600-700 ^{o}C. In preparation for the manufacture of Jengkol Peel Biochar, namely collecting 200 kg of jengkol peel biochar. Then make biochar by burning jengkol peel in a modified pyrolysis tube for 3 hours. Next is the sorting of jengkol peel that has become completely charcoal, if there is a jengkol peel that has not yet become charcoal, then the process of charcoaling will be carried out again. Jengkol peel that has become charcoal is activated by making a technical HCL solution of 33% to a concentration of 10%, then soaking for 24 hours, then after that rinsed with clean water then drained and dried. Activated jengkol peel charcoal was grinded and finely sieved with a size of 40 mesh (Hutapea et al, 2015).

3.5.2 The Making of Chicken Manure

For the making of chicken manure, the materials needed are 60 kg of chicken manure, ¼ kg of brown sugar, 50 ml of EM4 and 5 L of water. As for the steps to ferment it into manure are as follows by providing 60 kg of chicken manure above. tarpaulin, after that dissolves 50 ml of EM4 and ¼ kg of brown sugar, the two ingredients are made into a solution with 5 L of water, then mixes chicken manure with 50 ml of EM4 solution and ¼ kg brown sugar by stirring. After that closes the tarp tightly. Perform stirring at intervals of 3 days which aims to remove the gas that is in the tarpaulin. After reaching 4 weeks the chicken manure is ready to use.

3.5.3 Area Preparation

The area used for planting is cleaned of weeds, plant debris, and existing garbage, then the soil is treated by tractor and hoed and then smoothed and levelled. Furthermore, experimental plots were made and drainage ditches were made among them.

3.5.4 Land Processing

The hoed soil was tossed and made into experimental plots with a size of 120 cm x 120 cm, bed height of 30 cm with a distance between plots of 50 cm, distance between replicates of 100 cm.

3.5.5 Application of Jengkol Peel Biochar

Jengkol peel biochar is applied according to the treatment dose that has been determined. Biochar application is done at the time of planting. Biochar was sprinkled on each plot with a dose of B0 = control (without jengkol peel biochar), B1 = 0.72kg/plot, B2 = 1.44 kg/plot, B3 = 2.16 kg/plot then stirred until evenly distributed.

3.5.6 Application of Chicken Manure

Chicken manure is applied at the time of planting. Chicken manure was sprinkled on each plot with a dose of K0 = control (without chicken manure), K1 = 1.08 kg/plot, K2 = 2.16 kg/plot, K3 = 3.24 kg/plot then stirred until evenly distributed.

3.5.7 Basic Fertilizer Application

The basic fertilizer needed in this study was NPK Mutiara’s compound fertilizer 16:16:16. With the application of each experimental plot, 18 g/plot was given. Basic fertilizer application is carried out at the same time as the application of chicken manure at the time of planting. Application of NPK Mutiara 16:16:16 fertilizer is performed around the planting hole.

3.5.8 Cultivation

Planting corn seeds is done by soaking the seeds first in water for 15 minutes, if there are seeds that floating in the water, the seeds are not used. Then the soaked seeds are inserted into the planting hole, the seeds are planted in a tugal way. Each planting hole is filled with 2 seeds, this is done to minimize seeds that do not grow. This planting is done with a spacing of 40 cm x 40 cm.

3.5.9 Plant Maintenance

a. Watering

Watering is done regularly, 2 times a day, namely in the morning at 08.00-10.00 WIB and in the afternoon at 17.00-18.00 WIB. Provision of water at the time of watering is done with the same dose for each plot and depending on the conditions in the field. If it rains and the soil is wet enough, then watering is not necessary. This watering is done by using gembor.

b. Weeding

Weeding is done manually by pulling weeds around the corn plant. Weeding is done when the plant's age is one week after planting or depending on the conditions of weed growth in the field.

c. Hoarding

The hoarding is done simultaneously with weeding aims to strengthen the position of the stem, so that the plant does not easily fall and cover the roots that appear above the soil surface.

d. Pest and Disease Control

Pest and disease control is carried out preventively, namely by keeping the land clean from weeds, which can become hosts for sweet corn plant pests and manually catching and killing these pests.

Pests that attack sweet corn plants are grasshoppers, armyworms, and cob borers. Control is done with chemical pesticides (Regent) with a dose of 2 ml/l water. Its application is by spraying on the leaves evenly thoroughly at intervals of 1 week.

3.5.10 Harvest

Harvesting is done after the plant is 75 days after planting, namely when the sweet corn seeds are pressed to release a white liquid like milk and reach the harvest criteria with signs that the leaves have started to dry (klobot) are yellowish in colour and the cob hairs have browned and the cobs have fully filled. Harvesting should be done in the morning when the air temperature is still low because the high air temperature can reduce the sweetness of the sweet corn seeds due to the conversion of sugar into starch.

3.6 Observation Parameter

3.6.1 Plant Height (cm)

Plant height was measured starting after the plant was 2 weeks upon the planting (MST). Plant height was measured by measuring the plant from the base of the stem to the tip of the highest leaf. Plant height's measurements were carried out at intervals of once a week. Plant height's observations were carried out for 6 times.

3.6.2 Rod Diameter (cm)

Stem diameter was measured in each sample plant using a calliper. Measurements were carried out from the age of 2 weeks after planting (MST) to 7 WAP with a measurement interval of once a week.

3.6.3 Number of Leaves (pieces)

Observation of the number of leaves was done by counting the number of leaves that were fully opened in each corn plant. Observation of the number of leaves was carried out when the corn plants were 2 MST at an interval of 1 week. Observation of the number of leaves of corn plants was carried out for 6 times.

3.6.4 Flowering Age (days)

The flowering age of the plant was observed at 4-5 weeks after planting (MST), which was between 28-35 days after planting.

3.6.5 Cob Diameter (cm)

The diameter of the cob was measured after the cob was peeled off the cob. Corncob diameter was measured with a calliper and measured at the centre of the corncob.

3.6.6 Cob Length (cm)

The length of the cob was measured after the corn was removed from the cob. The length of the cob is calculated from the tip of the cob to the base of the cob using a ruler.

3.6.7 Pest Attack Intensity

The intensity of damage is done by giving a score indicating the stage of plant damage. Observations of the intensity of pest and disease attacks were carried out from the age of 2 weeks after planting until the harvesting period and with an interval of 1 week.

According to Maman et al (2014) the intensity of disease attack was highest at the age range of 7 mst, 8 mst, 9 mst and 10 mst. Disease intensity is calculated using the following formula:

$$IS = \frac{\Sigma(ni\ x\ vi)}{Z\ x\ N}(ni\ )\ x\ 100\%$$

Remarks:

IS: Attack Intensity

ni: Number of leaves on the scale -i

vi : scale value - i

N : Number of leaves observed

Z : The highest scale of the observed sample

The value of the damage score, namely:

0 = if no plants are affected

1 = if 1-2% of plants are attacked

2 = if 26 – 50% of plants are attacked

3 = if 51 – 75% of plants are attacked

4 = if more than 76% are attacked

II. CONCLUSIONS AND SUGGESTIONS

2.1 Conclusion

1. The provision of jengkol peel biochar did not significantly affect the vegetative phase starting from plant height, stem diameter, number of leaves and had no significant effect on the generative phase starting from flowering day, the diameter of the cob and the length of the cob.
2. The provision of chicken manure did not significantly affect the vegetative phase starting from plant height and number of leaves but had a significant effect on stem diameter. Meanwhile, in the generative phase, there was no significant effect starting from the day of flowering, the diameter of the cob and the length of the cob.
3. The combination treatment between the provision of jengkol peel biochar and chicken manure had no significant effect on the vegetative phase starting from plant height, stem diameter, number of leaves and had no significant effect on the generative phase starting from flowering day, the diameter of the cob and the length of the cob.

2.2 Suggestions

1. In relation to production, the researcher suggests to reduce the use of inorganic fertilizers, so farmers can use chicken manure with K3 treatment to increase the parameters on the diameter of the cobs.
2. It is advisable to do further research using jengkol peel biochar and chicken manure at different doses and different plants.

PROOFREADING

1.	the most popular horticultural	:	the most famous horticultural
2.	The wider the community's	:	The more comprehensive the community's
3.	which is very abundantly	:	which is exceedingly abundantly
4.	not used properly	:	not used correctly
5.	with an altitude	:	with a size
6.	disease is the main disease	:	disease is the major disease
7.	increasingly favoured by	:	increasingly favored by
8.	fibre	:	fiber
9.	Sweet corn is increasingly favored by the public	:	The public increasingly favors sweet corn
10.	The increasing demand for sweet corn is not matched by the production of sweet corn	:	The production of sweet corn does not match the increasing demand for sweet corn
11.	given, while the monoculture	:	given. In contrast, the monoculture
12.	Land degradation can be overcome by the use of biochar	:	The use of biochar can overcome land degradation
13.	waste which is exceedingly abundantly	:	which is abundantly
14.	nutrients and also contains large amounts	:	nutrients and large amounts
15.	in addition to improving	:	and improving
16.	can have a positive effect on soil properties	:	can positively affect soil properties
17.	that can be used to improve	:	that can improve
18.	but without realizing it,	:	However, without realizing it
19.	In addition to the use of biochar	:	In addition to biochar
20.	fertilizers has an adverse effect on the soil's physical	:	fertilizers has an adverse effect on the soil's physical
21.	proportions and can improve soil conditions	:	proportions. They can improve soil conditions
22.	interested in conducting research on the effect	:	interested in researching the effect