RESPON PEMBERIAN KOMPOS KOTORAN SAPI DAN BIOCHAR SABUT KELAPA TERHADAP PERTUMBUHAN DAN PRODUKSI TANAMAN BAWANG MERAH (*Allium ascalonicum* L)

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ABSTRAK

YOSHUA MARBUN. 168210060. “Response to the Provision of Cow Manure Compost and Coconut Coir Biochar on the Growth and Production of Shallots (Allium ascalonicum L). Supervised by Mrs. Ir. Ellen L Panggabean, MP as the head supervisor and Mr. Ir. H. Abdul Rahman, MS as the second supervisor.

This study aims to determine the response of cow dung compost on the growth and production of shallot (Allium ascalonicum L), determine the response of giving coconut coir biochar to the growth and production of shallot (Allium ascalonicum L) and determine the interaction of giving cow dung compost and giving coconut fiber biochar on the growth and production of shallots (Allium ascalonicum L), which was carried out in the experimental garden of the Faculty of Agriculture, University of Medan Area (UMA), which is located on Jalan Pool No.1 Medan Estate, Percut Sei Tuan District with a height of 22 meters above sea level. (masl), flat topography, Alluvial soil type and pH 5-7. This research was conducted from August to December 2020.

This study used a factorial randomized block design (RAK) with two treatment factors, namely (1) the factor of giving cow dung compost (P) which consisted of 4 levels, namely P0 = no treatment (control); P1= 20 tons/ha (200 g/plot); P2= 30 tons/ha (300g/plot); P3=40 tons/ha (400 g/plot). (2) the factor of giving coconut coir biochar (B) which consists of 4 levels, namely B0 = without treatment (control); B1 = giving coconut coir biochar 250 grams/plot; B2= 500 gram/plot of coconut coir biochar; B3 = giving coconut coir biochar 750 grams/plot. Each treatment was repeated 2 (two) times. The parameters observed in this study were: plant height (cm), number of leaves (strands), number of tubers, tuber diameter, wet tuber weight per sample, wet tuber weight per plot, tuber wind dry weight per sample, tuber wind dry weight. per plot.

The results obtained from this study, namely: (1) giving cow dung compost in P3 treatment significantly increased plant height, number of leaves per clump, number of tubers, tuber diameter, wet tuber weight per sample, wet tuber weight per plot, wind dry weight. bulbs per sample, and bulb dry weight per plot of shallot (Allium ascalonicum L); (2) the application of coco coir biochar in the B3 treatment significantly affected plant height, number of leaves, number of tubers, tuber diameter, wet tuber weight per sample, wet tuber weight per plot, tuber wind dry weight per sample, and tuber wind dry weight per plot. onion plant (Allium ascalonicum L); (3) there was no significant interaction between cow dung compost and coconut coir biochar on the growth and production of shallot (Allium ascalonicum L).

Keywords: Shallots, Cow Manure Compost, Coconut Coir Biochar

CHAPTER I
INTRODUCTION

1.1 Background of Study

Shallots are originally from the South Asian region, namely India, Pakistan, and Palestine. Countries in Western Europe, Eastern Europe, and Spain started consuming shallots in the eighth century. Shallots were spreading from Western Europe, Eastern Europe, and Spain to America, East Asia, and Southeast Asia. The consumption of shallots at that time was related to the searching for herbs and spices carried out by European in the far eastern region which then continued with their colonization of Indonesia (Grace and Diamonds, 2004).

Shallots (*Allium ascalonicum* L.) are one of the main herbs needed in everyday life, shallots are used by consumers' households as a complement to daily cooking spices. Shallots are also used as traditional medicines which are recognized by society. Likewise, the rapid growth of the food processing industry lately also improves the need for shallots in Indonesia (Firmansyah and Sumarni, 2013).

The Badan Pusat Statistik (English: the Central Statistics Agency) (BPS, 2018) states that the production shallots in Indonesia from 2012 to 2016 Numbered 893,124 tons, 964,195 tons, 1,010,773 tons, 1,233,984 tons, and to 1,229,184 tons. In 2016, the production of shallots dropped compared to the production in 2015 which was as big as 0.39%. A large number of shallots were harvested in Indonesia from 2012 to 2016, namely 93,667 Ha, 99,519 Ha, 98,937 Ha, 120,704 Ha, and 122.126 Ha. The national harvest area of shallots in 2016 only reached as big as 1.18% compared to 2015. To meet the domestic needs, the government issued a policy of importing shallots from other countries even though this might harm the production of shallots in Indonesia (Dewi, 2012).

From the description above, it can be seen that the production of shallots has not met domestic needs. The government must import shallots from another country. Besides, improving the production of shallots can be achieved by implementing cultivation technology. There are some ways to increase the production of shallots, and this includes the use of organic and inorganic fertilizers. However, the use of chemical fertilizer with high dosage and concentration for a long period of time can cause slump infertility or a lack of nutrients in the soil (Isroi, 2009). A solution that can be taken to improve the soil is by applying compost made from cow manure which can increase the nutrients in the soil, and by applying Biochar which can improve the physical properties of the soil.

Biochar is used as an ingredient that can repair or improve the soil. Biochar has long been used in the agricultural sector because it is useful for increasing soil productivity. The main materials to produce Biochar are agricultural wastes and plantations, such as rice husks, coconut shells, cocoa pods, and wood derived from industrial forest plantations. The technique of using Biochar came from the results of plantations in the Amazon 2500 years ago. The native Indian inhabitants put the agricultural waste in a hole in their plantation land.

According to Lehmann and Joseph (2009), Biochar is produced from organic materials that are difficult to decompose, so they are burned (pyrolysis) without oxygen at a high temperature. Charcoal of this burning process produces active carbon which contains minerals such as calcium (Ca), magnesium (Mg), and inorganic carbon. The quality of the organic compounds in Biochar depends on the organic materials and the method of carbonization. Organic and inorganic compounds in Biochar are used as an ameliorant to improve soil quality, specifically in marginal land (Rondon et al., 2007; Hunt *et al* ., 2010).

Fertilizer is added to the soil to provide an essential element for the growth of plants. Based on the materials used, fertilizers are divided into inorganic and organic fertilizers. Based on its shape, organic fertilizer is divided into two, namely liquid fertilizer and solid fertilizer. Liquid fertilizer is a liquid material that is easily soluble and contains one or more carrier elements needed by plants. The advantage of liquid fertilizer is that it can provide nutrients according to the need of plants (Hadisuwito, 2012).

According to Mulyani Sutejo (2015) and Rukmana (2005), cow manure (organic fertilizer) could add to the availability of materials needed by plants (macro and micronutrients). In other words, cow manure can change various factors in the soil so that it becomes a factor that ensures soil fertility. Cow manure is considered complete compost because besides providing nutrients for the plants, it also develops microorganisms in the soil. Microorganisms are very important for soil fertility because the remains of organic plants can turn into humus and certain compounds synthesized by the micro-organisms into useful materials for plants. Furthermore, Sheikhfani (2000) explains that organic fertilizer (compost or cow manure) has natural properties and does not damage the soil, provides macro and micronutrients, and also increases water-holding capacity and soil microbiological activity.

According to Mul Mulyani Sutejo (2007), manure is an organic fertilizer that can increase the availability of nutrients in the soil. In other words, cow manure can change various factors in a land so that it becomes a factor that ensures soil fertility. Cow manure is considered a complete fertilizer because besides providing nutrients for plants, it also develops microorganisms in the soil. Micro-organisms are very important for land fertility and the remains of plants can become humus and certain compounds which are synthesized as useful materials for plants.

According to Untung (2005), applying a dose of organic fertilizer as much as 20 tons per hectare still cannot substitute for the nitrogen needs for the growth of spinach plants. Moreover, Darwin Pangaribuan (2012) stated that the combination of chicken manure bokashi with a half dose of inorganic fertilizer can increase the production of tomatoes compared to goat manure bokashi, cow manure bokashi, and horse manure bokashi. Bokashi is based on manure such as chicken manure, cow manure, goat manure, and horse manure which are combined with a half dose of inorganic fertilizer, and can be used to save the use of inorganic fertilizer.

Based on the description above, the researcher plans to conduct research on the Response of Applying Cow Manure Compost and Coconut Coir Biochar to the Growth and Production of Shallots (*Allium ascalonicum* L) with the use of mulch plastic.

1.2 Formulation of Study

Based on the background of the study above, the formulation of the study is as follows – Can the vegetative and generative growth of shallots (*Allium ascalonicum)* L). be increased by applying cow manure compost and Coconut Coir Biochar?

1.3 Objective of Study

1. To know the response of applying cow manure compost to the growth and production of shallots (*Allium ascalonicum* L.)
2. To know the response of applying Coconut Coir Biochar to the growth and production of shallots (*Allium ascalonicum* L.)
3. To know the interaction of applying cow manure compost and Coconut Coir Biochar to the growth and production of shallots (*Allium ascalonicum* L.)

1.4 Hypothesis

1. Applying cow manure compost can increase the growth and production of shallots (*Allium ascalonicum)* L.)
2. Applying Coconut Coir Biochar can influence the growth and production of shallots plant red (*Allium ascalonicum)* L.)
3. There is a significant interaction between applying cow manure compost and Coconut Coir Biochar to the growth and production of shallots (*Allium ascalonicum)* L.)

1.5 Significance of Study

This research is expected to be used as the preparation of the thesis which is one of the requirements for obtaining a Bachelor's degree at the Faculty of Agriculture at the Universitas Medan Area, and the study is also expected to be useful for those who are interested in growing shallots (*Allium ascalonicum* L.).

CHAPTER II
LITERATURE REVIEW

2.1 Shallots

Shallots (Indonesian: brambang) (*Alliumascalonicum* L.) is the name of a plant from the Alliaceae family. Shallots are the basic and main ingredient for cooking in Indonesia. It is an important spice for home cooking, restaurants, and the food industry. Besides, shallots can also be used as herbal medicine. Shallots have local names including: Bawang Abang Mirah (Aceh), Bawang Abang (Palembang), Dasun Merah (Minangkabau), Bawang Suluh (Lampung), Bawang Beureum (Sunda), Brambang Abang (Java), Bhabang Merah (Madura), and many others. Each region has a different name for shallots. Shallots are classified as follows (Estu *et al*, 2007):

Division: Spermatophyta

Sub Division: Angiosperms

Class: Monocotyledonae

Order: Liliales/Liliflorae

Family: Liliaceae

Genus: Allium

Species: Allium ascalonicum or Allium Cepa var. Ascalonicum.

2.2 The Morphology of Shallots

Shallots grow upright and could reach 15-50 cm in height. Shallots form a bundle, and they are categorized as season plants. The roots are in the form of fibrous roots which are not long and not too deeply embedded in the soil (Wibowo, 2001).

The leaves of shallots are small, round, and elongated like a pipe, but some shallots also form a semicircle on the transverse cross-section of the leaves. The tip of the leaf is tapered, while the lower part is wide and big (Estu et al, 2007).

The outer petals are always circular in form covering the inner petals. Several strands of the outset petals (2-3 strands) are thin and dry up. The swelling petals can be seen to inflate, forming a plant that is considered a layered plant. The swelling part contains backup food for the buds (Wibowo, 2001).

The bottom part of the plant is shaped like a disc which is a stem of an imperfect tree (rudimentary). From the bottom of the disc, fiber roots grow. There is a bud that can become a new plant at the top of the disc there. These shoots are called lateral shoots, which will form a new disk and form more layer plants (Estu et al, 2007).

The flowers of shallots are categorized as perfect flowers consisting of 5-6 threads of stamen and a pistil. The flower leaves are slightly green with white stripes. The fruits shape a triangle that looks like a dome. Fruits are formed from 3 leaves (carpel) which form 3 chambers containing 2 ovules. The seeds of young shallots are white and will turn black when they are ripe (Estu *et al* . 2007).

2.3 The Condition of Growing Shallots

2.3.1 Climate

Shallots can grow well in an area with a dry climate in a bit hot temperature, and an area that gets more than 12 hours of sunlight. Shallots can grow well on high land or low land (0-900 masl) with rainfall of 300 - 2500 mm/year and a temperature of 250 - 320 C. The types of soil which are good for the cultivation of shallots are regosol, grumose, latosol, and alluvial, with pH 5-5.7 (Estu *et al*, 2007).

2.3.2 Land

To grow well, shallots should be grown in a land that is loose, fertile, and contains a lot of organic matter, and land that easily provides water with good aeration and is not muddy. The cultivation of shallots can be carried out on paddy land and dry land. The measurement of soil pH can be done to determine the total chalk agriculture on acidic land or land with a pH under 6.5 (Estu et al, 2007).

2.4 The Cultivation of Shallots

2.4.1 Preparing the Land

The land for growing shallots should be prepared to loosen the ground, improve drainage, and kill germs. The grafting is carried out at about 30 cm in-depth, 1 m in length, and 1 m in width. After that, composted organic fertilizer is also given. The next preparation is grafting the beds so that the fertilizer that has been given is mixed with the ground. Finally, holes for plating the shallots are prepared.

2.4.2 The preparation of Seeds and Planting

The use of quality seeds is absolute in cultivating shallots. Varieties of shallots that can be used include Trisula, Bima Brebes, Bauji, Ampenan, Medan, Keling, Maja Cipanas, Sumenep, Kuning, Timor, Lampung, Banteng and other local varieties. Shallots that are used as seeds are usually harvested when they are quite ripening, such as 60-80 days after being selected in the field and in the storage. The seeds of shallot are medium in size with a diameter of 1.5-2 cm, and asymmetrical shape, and have been stored for 2-4 months. The color of shallots is glossier and free of pests.

2.4.3 Maintenance

1. Replacing shallot plants

Replacing shallot plants is carried out until the shallots reach the age of 2 weeks. Shallots that are too old cannot follow this process because the shallots will not grow well at the same time. This will affect the time of harvesting.

2. Land Sanitation and Irrigation

Land sanitation consists of controlling the weeds/grass (weeding), controlling the water in the rainy season so that there are no puddles, and removing shallots infected by pests and disease. Weeding is carried out before the fertilization processes either the first fertilization or the second fertilization.

3. The Second Fertilization

The second fertilization is carried out 2 weeks after planting. This includes applying foliar fertilizers and root fertilizers. Fertilizers are given by spraying at 1 x 7 days to 1 week before harvesting.

4. Controlling Pest and Diseases

Pest and diseases attacking shallots are controlled manually by using natural or artificial pesticides.

5. Harvesting

Shallots can be harvested at the age of 60-70 days after planting for lowland crops and 80-100 days after planting (DAP) for shallots grown on highland. Shallots are ready to be harvested when the base leaves are weak with 70-80% of yellow leaves, the top stem of shallots is starting to fall, the shallots can be seen above the soil surface, and there has been the formation of red pigment and emergence of the distinctive smell of shallots, as well as the appearance of purplish and reddish color in shallots.

2.5 Diseases Attacking Shallots

2.5.1 Purple Spots Disease

Purple spot disease has symptoms of drying leaves at the tip or at the edges of the leaves. Another name for purple spots like this is blight or "trotol". This disease is caused by infection of fungus pathogen type named *Phytophthora infestation*. Because this disease is caused by a fungus, this disease will easily spread in humid areas, especially during the rainy season. The purple spot infection is quite long, about 7-10 days. Without any treatments given, shallots can die because all the leaves are rotten (Nirwanto, 2010).

To prevent purple spot disease, shallots should be grown during the dry season. In addition, it is important to pay attention to cleaning the weeds near the shallots because weeds can create a humid environment. Furthermore, it is also suggested to use fungicide made from active Mancozeb every 4-7 days. If the plant has been infected by purple spot disease, a fungicide should be used with an active Mancozeb for 3 days in a row, and a systemic fungicide with active Dimetomorph or Metalaxyl should also be given once every 7 days.

2.5.2 Withered Fusarium Disease

This disease is similar to *Fusarium wilt disease* in chili plants. The cause of Fusarium wilt is the fungal pathogen called *Fusarium* sp. Symptoms are also the same, namely withered leaves causing the plant to die. This fungus attacks the roots and shallots. The infection period of the Fusarium fungus is about 7 days before the plant dies (Arie, 2013).

2.5.3 Anthracnose Disease

If anthracnose on chili and tomato plants is more likely to attack the fruits, then anthracnose on shallots is more likely to attack the leaves of this plant. This disease is caused by infection with the fungus named *Collectricum* that likes like moist areas. Anthracnose spores easily spread, and are carried away by the flow or splash of water (Suskandini, *et al* . 2015).

The symptoms are similar to blight or purple spot disease, but anthracnose quickly causes plants to die (wither) if not immediately handled. To prevent anthracnose, the area must be clean from weeds and not too moist and must be regularly sprayed by using contact fungicides containig Mancozeb. Meanwhile, if the symptoms have already been widespread, then the plant should be sprayed with systemic fungicides with active Dimetomorph or Difeconazole followed by spraying of contact fungicides made from active Propineb for 3 days in a row. After that, contact fungicide spraying can be done every 3-4 days, and the spraying of fungicide systemic can be given once every 10 days.

2.5.4 Dew Hair Disease (Embun Bulu)

The cause of “Embun Bulu” (kresek) is fungus. The spreading of spores and the infection will be very fast during the rainy season. Thus, it is difficult to overcome this disease if it is just by applying contact fungicides. However, in the dry season, this disease is rarely encountered because the spores and the feather dew fungus will easily die from the sunlight. To overcome this disease, Systemic fungicides with the active Difeconazole and Translaminar fungicides such as Trivia should be used because it is capable to penetrate leaves and reach the lower part of the leaves surface.

2.5.5. Bacterial Wilt Disease (Layu Bakteri)

The symptoms are the same as Fusarium wilt, but the phase lasts very fast around 3 days for the plant to dry and die. This disease is caused by pathogen bacteria that infect injured roots or stems of the plant. Although it is very malignant, this disease is not like fusarium wilt (layu fusarium) which cannot be cured. Bacterial wilt can be cured with a systemic bactericide containing Active Streptomicyn with additional hydroxide casting at the base of the injured plant.

2.6 The Role of Planting Media In Cultivation

2.6.1 Coconut Coir Biochar

Biochar is a carbon-rich solid material that is converted from organic waste (agricultural biomass) through incomplete combustion or limited oxygen supply (pyrolysis). Incomplete combustion can be carried out by means of combustion or pyrolysis with temperatures 250 ^{0}C-350 ^{0}C within 1-2 hours, depending on the type of biomass and the burning tool used. Burning can also be done without pyrolysis, depending on the type of raw material. Both types of combustion produce carbon-containing Biochar to be applied to the soil. Biochar is not a fertilizer, but it works as a repairer of the soil.

The application of Biochar as a soil enhancer has been widely studied, both in Indonesia and internationally. Many studies have proven that Biochar is very useful for agriculture, especially for improving the quality of cultivated land (physical, chemical, and biological properties of the soil). Some research results show that the addition of Biochar can increase soil fertility and restore land quality (Atkinson et al. 2010; Glaser et al. 2002). Adding charcoal/Biochar to the soil serves to (1) increase the availability of nutrients, nutrient retention, and water retention (Glaser et al. 2002), and (2) create a habitat that is good for symbiotic microorganisms.

In addition to having a positive effect on soil properties, the application of Biochar also has an effect on increasing plant productivity, especially on acidic soil, but had no significant effect on soils with neutral pH in the Mid-West. Besides that, the application of Biochar in the soil can reduce emission rates of CO2 and N2O and contribute to carbon stocks (52.8%), meaning that Biochar can keep carbon long enough (Ogawa *et al* . 2006).

2.6.2 Cow Manure Compost

According to Indriani (2005), compost is all organic materials that have undergone decomposition so that its original shape and form are no longer recognizable and it has turned blackish and has no smell.

Compost is the result of weathering organic materials such as leaves, straw, reeds, garbage, grass, and other materials which cannot be recognizable from one material to another. This weathering process is accelerated by human assistance. Meanwhile, composting is a process where organic materials undergo biological decomposition, especially by microbes. Microbes that utilize organic matter act as acidic materials. Basically, all solid organic materials can be composted, for example, household organic waste, organic trash from the traditional market, paper, livestock waste, agricultural waste, agro-industrial waste, factory waste paper, sugar mill waste, palm oil mill waste, and many more. Organic materials which are difficult to be composted include bones, horns, and hair. Composting method is a simple method, and it can produce fertilizers that have a high-value economy.

Household waste can be turned into compost which is useful for plants in the yard of the respective household. Fresh organic waste from daily food or drinks is separated from dry (inorganic) waste such as cans, plastic, and paper. The fresh garbage is then piled up inside a small hole in the yard. Within a certain period, the bottom part of the pile can be lifted and then spread over the plant as fertilizer compost. The process of turning rubbish into compost can be used to improve soil structure, increase soil permeability, and can reduce the use of mineral fertilizers (inorganic) like urea. Besides being expensive, urea can also increase the level of soil pollution.

The use of cow manure as compost is highly recommended in the world of agriculture. Fertilizer compost is an organic fertilizer that will cause a negative impact neither on plants nor the natural environment. As what has been explained previously regarding the content of nutrients in cow manure, namely nitrogen, phosphorus, and potassium. All of these three nutrients are beneficial to supporting the growth of plants.

1. The Benefits of Nitrogen (N) in Cow Manure;

   The benefits of nitrogen for plant growth are as follows:

   1. Increasing the plant growth
   2. Increasing protein in the soil
   3. Increasing the number of leaves in plants
   4. Increasing the activities of microorganisms in the soil
   5. Helping the process of synthesizing acidic amino and protein in plant

2. The benefits of Phosphor (P) in Cow Manure

   Cow Manure also contains Phosphor which is useful for:

   1. Helping the respiration and photosynthesis process of plant
   2. Helping the process of composing acidic nucleic
   3. Helping the formation of seeds and fruits
   4. Stimulating the development of plant roots so that plants are more resistantto drought
   5. Speed up the time to harvest the plants

3. The benefits of Potassium (K) in Cow Manure

   Potassium in Cow Manure also plays a big role in the process of plant growth, including:

   1. Shaping and transporting carbohydrates to plants
   2. Acting as a useful catalyst in process of protein formation
   3. Arranging various types of activity from a mineral element in plants
   4. Neutralize reactions in cells, especially reactions of organic amino acids
   5. Increasing the growth of the meristem network
   6. Arranging the movement of stomata
   7. Strengthen the stem of plants so that it is not easy to collapse
   8. Increasing the number of carbohydrates and sugar in fruit
   9. Congesting the seeds of plants so that theycan become the superior seed
   10. Increasing the quality of fruits
   11. Increasing the endurance of plants from pests and disease
   12. Increasing the development of roots

2.6.3 Silver Plastic Mulch

Plastic mulch is a plastic sheet covering cultivated land and plants thataim to protect the soil surface from erosion, maintain soil moisture and soil structure, as well as prevent the growth of weeds. Plastic mulch is a type of inorganic mulch because it is made of ethylene polymerization process under high pressure. Plastic mulch is widely used in crop cultivation with production intensification systems, like a horticulture type of vegetables.

The use of plastic mulch has several advantages over other types of mulch. These advantages are the high production of plants. Increased temperatureinthe soil will stimulate plant growth and accelerate the harvest. Based on a study, the harvesting time can be achieved faster approximately within 7-14 days.

It can also reduce evaporation. Covering the soil with plastic mulch will reduce the risk of losing water because of evaporation. Besides, the use of irrigation drops on land with plastic mulch increase the water requirement for plants.The use of water is more efficient because it can reduce the used water by 45% compared with irrigation spraying.

Plastic mulch can help with weed handling. Black and silver black plastic mulch will reduce the intensity of light on the soil surface so that weeds are less likely to grow. However, when using clear mulch, spraying is still needed herbicides to prevent weed growth, and reduce nutrient loss from fertilizers. The water surface will be stuck by mulch plastic so that nutrients from fertilizer will not be lost because of rain-wash. The use of mulch plastic will keep nutrition forthe plant in the roots, so that use nutrition is more efficient.

CHAPTER III
MATERIALS AND METHOD

3.1 Time and Place of Study

This research was conducted in the experimental field of the Faculty of Agriculture, Universitas Medan Area, on Jalan PBSI No 1 Medan Estate, Subdistrict Percut Sei Tuan Deli Serdang Regency with an altitude of 22 meters above the surface, the type of alluvial soil, flat topography and pH 5-7. The research was carried out from August to December 2020.

3.2 Materials and Tool

Materials used for conducting this study are shallots of Bhima variety, Coconut Coir Biochar, cow manure fertilizer, mulch plastic, fungicide anthracol, Hcl 30%, and sufficient water.

The tools used are a hoe, sprayer, water can, tape measure, plastic rope, drum plastic, bucket, knife, scales, used burlap, tarpaulin, book and writing tools.

3.3 Method Study

The research method used is a randomized block design factorial, that is a treatment applying Cow Manure Compost (P) and treatment applying Coconut Coir Biochar (B).

1. Cow Manure Compost consists of 4 levels of treatment,

   namely: P0 : 0 ton/ha (0g/plot)

   P1 : 20 ton/ha (200 g/plot)

   P2 : 30 ton/ha (300 g/plot)

   P3 : 40 ton/ha (400 g/plot)

2. Coconut Coir Biochar consists of 4 levels of treatment;

B0 : Without Applying Coconut Coir Biochar

B1: Applying Coconut Coir Biochar (250 g/plot)

B2: Applying Coconut Coir Biochar (500 g/plot)

B3: Applying Coconut Coir Biochar (750 g/plot)

Thus, there are 16 combinations of treatments given, namely :

B0P0	B1P0	B2P0	B3P0
B0P1	B1P1	B2P1	B3P1
B0P2	B1P2	B2P2	B3P2
B0P3	B1P3	B2P3	B3P3

Respectively, the treatment is repeated as much as 2 times by provisionsas follows:

(tc-1) (r-1) 15

(16-1) (r-1) 15

15 (r-1) 15

15r - 15 ?? 15

15r 15+ 15

15r 30

r 30/15r

2

r = 2

Unit Study

Number of Treatment	= 2 Treatment
Number of Repetition	= 2 Test
Number of plot experiments	= 32 plot
Planting Distance	= 20 cm x 20cm
Number of plants/plot	=16 Plant
Number of Plant Sample/plot	= 3 Plant
Number of all Samples of Plant	= 128Plants
Number of All plants	= 512 Plant
Plot Size	= 100 cm x 100cm
Distance between plot	= 30 cm
Distance between Repetition	= 50 cm

3.4 Method Analysis

Linear method assumed for Random Group Design Factorial is as follows:

$$\mathbf{Y_{ijk} = \mu + pi + \alpha j + \beta_k + (\alpha\beta)_{jk} + .Ijk}$$

Information:

Yijk = Results observation from factor N level i-th and factor level j on test level i

Effect of mean (NT)/general meanpi = Group influence on level i

j = Effect of Coconut Coir Biochar on j . level k

= _ Influence Cow Manure Compost on level k-th

$(\alpha\beta)_{jk}$ = Influence combination treatment Coconut Coir Biochar level j and Cow Manure Compost on k-th level

ijk = Effect of experimental error after the application of various doses of Coconut Coir Biochar at level j and various doses of Cow Manure Compost at level k which is in place in group i.

3.5 Implementation of The Study

3.5.1 Making Coconut Coir Biochar

This research uses activated Biochar which is made through the process of heating without airflow following the procedure carried out by Hutapea *et al* ., (2015). Materials that are used in the manufacture of Coconut Coir Biochar is Coconut Coir which is already old. Coconut Coir was collected as much as 40 kg, and dry for 3 days depending on the sunlight so that the Number of water contained in the Coconut Coir can be reduced. Next, the dry coconut coir is charred using a pyrolysis tube with a temperature of 300 ^{0}C-400 ^{0}C for 1 hour so that it does not turn to ash. The next step is sorting to choose the Coconut Coir that has been properly carbonized and become ash. If there is Coconut Coir that has not yet turned into charcoal completely, the process returns to composing (carbonization). Coconut Coir which becomes charcoal is going through the activation method in that Hcl technical 33% becomes concentration 10%. Then, the immersion is carried out at 24 o'clock before it is washed with distilled water until the product reaches a neutral pH. The immersion treatment with HCl and distilled water was meant to throw away compound salt alkali. The next step is that the coconut coir is drained. After it is activated, Coconut Coir is entered into the oven, and is ground and sifted until with the size 20 mesh.

3.5.2 Planting

The size of the shallots seeds that will be planted first is selected at the same time. Then, the outer skin of shallots is peeled which is outermost and dry. On the shoots, the plant is cut approx one-third of the length of the plant, wait for the cut to dry then planted one plant per hole on one plot.

3.5.3 Determining the Plant Sample

The total number of plots in this study is 32 plots, with each plot measuring 100 x 100 cm. Each plot contains 16 plants sample of 3 plants each plot which is determined by the Random Method.

3.5.4 Weeding

Weeding of plants is done manually by pulling the grass growing directly on each side of the polybag and around the plant. This is done to reduce competition in taking nutrients in a polybag.

3.5.5 Replacing the shallot plants

Replacing the shallot plants is at the age of 2 weeks after planting. Shallot plants that are too old can result in different growing phases. This will affect the time of harvesting.

3.5.6 Watering

Watering is done to keep the condition of shallot plants to have enough water. Watering is carried out in the morning from 07.00-10.00 and in the afternoon from 16.00-18.00 at Indonesian Western Time using a watering can. Watering is done every day and if it rains, watering the plant will also be carried out. The goal is that the plant does not lack water caused by the planting media.

3.5.7 Preventing Pests and Disease

The preventive measure against pests and diseases is carried out by keeping the land clean from weeds, which could become a host pest for shallot plants. Pests and diseases are prevented by: mechanical (manual) at a low attack rate. Meanwhile, the high attack rate of pests can be overcome by using the fungicide Antracol with a dose of 2 grams mixed in a watering can. Prevention can be done by spraying throughout the leaves for an interval of 1 week. Spraying is carried out periodically and depends on the attack intensity of pests and the disease.

3.5.8 Harvest

Shallots are harvested when the plants are 60 DAP with physical nutrients statistics as follows: the leaves have begun to wither and turn yellow around 70-80% of the total plant, the base stem hardens and part of the plant has to protrude above the ground. Harvesting is done by pulling all parts plant. Harvesting shallots is carried out in the afternoon.

3.6 Parameter of Study

3.6.1 Plant Height (cm)

Plant height measurements were carried out after the plants were 2 WAP up to 6 weeks after planting (WAP), with intervals of 1 week. The height of the plant is measured starting from the lowest part of the shallot plants until the highest part/leaf of the shallot plants by using a meter.

3.6.2 Number of Leaves per clump (sheet)

Leaves appear on the tillers for each clump. Observations were made at the age of plants 2 weeks after planting (WAP) to 6 WAP with intervals oftime once a week.

3.6.3 Number of tubers

Tubers that have been harvested were counted in number per plant. The number of tubers at the end of the harvest was accumulated so that a total number of tubers per plant could be obtained.

3.6.4 Diameter of Tubers (mm)

The sample of tubers, after being cleaned from the soil, was then measured in diameter tubers using a vernier caliper.

3.6.5 Weight of Fresh Tubers per sample (g)

The weight of fresh tubers was measured in grams (g) by weighing tubers obtained from 3 plants at the moment after harvesting so that the tubers were still fresh. The tubers were cleaned of roots, leaves, and soil.

3.6.6 Weight of Fresh Tubers per plot (g)

The weight of fresh tubers was measured in grams (g) and was obtained by measuring the part of tubers per plot that has been harvested so that the tubers were still fresh. Tubers were cleaned of roots, leaves, and soil.

3.6.7 Weight of Half Dry Tubers per sample (g)

Weighing of dry tubers is carried out after shallots were dry for three days and it was hoped that the shallots were not exposed to the sun directly. Three shallot plants were used as samples to be measured.

3.6.8 Weight of Half Dry Tubers per plot (g)

Weighing of the half-dry tubers was done after the shallots were dry for three days and were expected not to be exposed to sunlight directly. The shallots measured were the shallots planted in the experimental plot.

CHAPTER V
CONCLUSION AND SUGGESTION

5.1 Conclusion

1. Applying Cow Manure Compost on P3 treatment significantly increases plants' height, the total number of leaves per clump, the number of tubers, the diameter of tubers, the weight of Fresh Tubersper sample, weight of Fresh Tubers per plots, weight of half-dry tubers per sample, andweight of half-dry tubers per plot shallots *(Allium ascalonicum* L. *)*
2. Applying Coconut Coir Biochar in B3 treatment significantly influences the plant height, number of leaves per clump, number of tubers, the diameter of tubers, the weight of Fresh Tubers per sample, weight of fresh tubers per plot, the weight of half-dry tuber per sample, and weight of half-dry tubers per plot of shallots *(Allium ascalonicum* L. _).
3. No significant interaction on the application of Cow Manure Compost and Coconut Coir Biochar to the growth and production shallot *(Allium ascalonicum* L. *)*

5.2 Suggestion

It is advisable to do further research on the application of Coconut Coir Biochar to different plants with longer harvesting time so that the potential of Coconut Coir Biochar can be seen over a long period.