

Response of Cow Compost and Combination of Husk Charcoal Media with Latosol Soil to Deli Tobacco Seedlings Growth

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Abstract: *The purpose of this study was to determine the response of cow compost and the combination of husk charcoal media with latosol soil to the growth of deli tobacco plants (Nicotiana Tabaccum L). This study uses Factorial Randomized Block Design (RBD) with two factors tested with three replications. The first factor is the provision of Compost Cow (K) consisting of 4 levels, namely: K0 = 0 (control) without treatment, K1 = 500 gr / plot, K2 = 750 gr / plot, K3 = 1000 gr / plot. The second factor is the combination of husk charcoal media, latosol soil and administration sand consisting of 3 levels, such as: M1 = A (100) gr + T (800) gr + P (100) gr, M2 = A (200) gr + T (700) gr + P (100) gr, M3 = A (300) gr + T (600) gr + P (100) gr. The parameters observed consisted of growth in plant height (cm), number of leaves (strands), root volume (ml), and growth percentage (%). Based on the results of the study in the field, it was found that the administration of cow compost (C) and the combination of husk charcoal media with latosol (M) gave no significant effect on the parameters of leaf number and root volume but had a very significant effect on plant height parameters. The interaction between the effect of cow compost and the combination of husk charcoal growing media and latosol soil had no significant effect on leaf number and root volume but had a very significant effect on plant height.*

Keywords: *deli tobacco, cow compost, husk charcoal, latosol soil.*

1. INTRODUCTION:

The history of mining began from the American continent, which was estimated to be the area of origin of tobacco plants (*Nicotiana tabacum* L.). In the spread of tobacco plants have involved various nations that have considerable interest in this plant. In Europe, no less than four countries directly received these plants from America, namely Britain, France, Portugal, and Spain. These countries are colonial countries that have colonies that are widespread throughout the world. Tobacco consumption that continues to grow in the country raises the demand for tobacco continues to grow as well. It is what has encouraged countries to cultivate tobacco plants on a large scale in the colonies that are suitable for planting tobacco. So that eventually these plants were widespread throughout the colonies, including Indonesia [1].

In order to be able to grow and produce optimally, plants need the provision of nitrogen (N), phosphorus (P), and potassium (K) insufficient and balanced amounts. Nutrients N, P, and K are the primary macronutrients needed by plants in considerable amounts, while the availability of these three nutrients in the soil is generally low. In general, the provision of N, P, and K fertilizers can increase plant growth and yield. However, the dosage of N, P, and K fertilizers are given still varies greatly depending on the type of soil, season, and method of planting, and the variety used [2]. The effectiveness of organic matter about improving soil properties depends on the quality of the organic material itself. The quality of organic materials is reflected in the content of chemical compounds, among others in the form of N, P, K. Therefore, to improve the quality of organic materials, composting, residual residues of plants and other sources of organic material are needed from various sources [3]. Cow manure has the potential to be composted because it has the following chemical constituents: nitrogen 0.4 - 1%, phosphorus 0.2 - 0.5%, potassium 0.1 - 1.5%, water content 85 - 92%, and some elements others (Ca, Mg, Mn, Fe, Cu, Zn). However, to produce good compost requires additional ingredients, because of the pH of cow manure 4.0 - 4.5 or too acidic so that microbes that can live are limited. These additional materials that are easily obtained from research locations include sawdust, husks, and grass [4].

Latosol soil is soil with a clay content of more than 60%, crumbs until lumpy, loose and uniform soil color with horizon boundaries that are blurred with soil solum of more than 150 cm. Latosol soil is one type of soil that is quite common in the tropics, spread throughout the Indonesian archipelago [5]. Husk charcoal is a practical planting medium because it does not need to be sterilized. It is because the pathogenic microbes have died during the combustion process. Husk charcoal contains N 0.32%, P 15%, K 31%, Ca 0.95% and PH 6.8. The characteristics of husk charcoal are mild with (specific gravity 0.2 kg / l), high air circulation, high capacity to hold water, the blackish color so that it can absorb sunlight effectively. Husk charcoal has properties that are easy to bind to water, not easy to clot, and have good porosity properties [6].

2. THEORIES:

2.1 Terms of Growing Tobacco Plants

Tobacco plants grow well at optimum temperatures of 18-27 C requiring low rainfall during planting and high rainfall during harvest. The required rainfall ranges from 1,500 mm - 2,000 mm every year. The availability of water and the irradiation of sunlight will affect the growth and production of tobacco plants, with a lack of solar radiation causing stunted growth and production. Air humidity is proper to know in order to take into account when the high development of pineapple disease. Air humidity also affects the length of growth of plants with proper air humidity ranging from 62% - 85% [7]. Each type of tobacco plant requires different types of soil. Deli tobacco is very suitable for alluvial and andosol soil types. Native tobacco 5.5-6.0. If the value is less than 5, it is necessary to give liming to increase the pH, whereas if the pH value higher than 6, it needs to give sulfur to reduce pH [8].

2.2 Function and Role of Cow Compost

Usually giving cow manure is always followed by an increase in crop yields. The increase in crop yields is based on several factors, such as the maturity level of cow manure itself, soil properties, method of application, and so on. The effect of cow manure on crop yields can be caused by positive influence on the physical, chemical, and biological properties of the soil [9]. Cow manure that is given regularly into the soil can increase the power to hold water so that groundwater is formed because it will facilitate plant roots to absorb nutrients for growth and development [10]. Nutrient composition in cow manure consists of 0.40% Nitrogen, 0.25% Phosphorus, 0.10% K₂O. Manure that is ready to be used if there is no further decomposition by microbes. Cow manure is given as basic fertilizer.

2.3 Characteristics of Latosol Soils

Latosol is soil with original mineral content and low nutrients, low pH (4.5-5.5), crumb consistency, high aggregate stability, and. The color of the land is red, reddish brown, brown, yellowish brown or yellow, depending on either tufa or igneous rock. Latosol has a low nutrient content with wet saturation (less 35%) and low CEC (15-25me / 100g) [11]. The physical properties of the soil are generally suitable for plant root growth. Deep, loose soil and good soil drainage much support the growth of plant roots. Latosol soil content generally correlates positively with its organic carbon content, so keeping the soil organic matter content high is very important for latosol soil. The supply of organic matter can be done using organic material from plant debris in the form of mulch or green manure or using manure [12].

2.4 Function and Role of Husk Charcoal

Rice husk contains high carbon and has a relatively small moisture content. Rice husk has properties that easily bind water, protein, fat, fiber, ash, carbohydrates. Judging from the chemical content found in rice husks, rice husk has the potential to be used as an additional ingredient in composting and planting media. In the husk, charcoal soil works by improving the physical, chemical, and biological structure of the soil. Rice husk can increase soil porosity so that the soil becomes loose and also increases the ability of the soil to absorb water and increase soil pH. The addition of husk charcoal to the planting or soil media also increases the aeration system (air exchange) in the root zone of the plant [13].

2.5 Mechanism of Nutrient Absorption by Root

Nutrients in the soil can only be absorbed by plants when they come in contact with plant roots. Mass flow is the movement of nutrients in the soil to the root surface of plants that are transported by convective flow of water due to absorption of water by plants as transient water. Nutrients absorbed through this model are N (in the form of NO₃), Ca²⁺, Mg²⁺, H₃BO₃, and sulfur. Diffusion is the process of moving nutrients in a soil solution from a high concentration part to a low concentration part. The nutrients absorbed through this model are P, K, Cu, Fe, Mn, and Zn [14].

3. METHODOLOGY:

3.1 Media Planting Preparation

The media used is a combination of latosol and husk charcoal. Where this latosol soil is taken in the Patumbak sub-district of Deli Serdang district. Then cow manure as compost material is prepared by the composting process lasting for three weeks. After three weeks the compost has been made with the composition of the compost not hot and not smelly.

3.2 Sterilization of Planting Media

Planting media that has been prepared is first steamed with the aim of sterilizing the planting media from various types of pathogens present in the planting media. After steaming the planting, media is sifted to separate the media from the remains of roots, small rocks, and other materials.

3.3 Land Preparation

The land is cleared of garbage and weeds; then the land is leveled so that baskets and net pots can, according to the research chart. Then beds with a width of 1 m were made, 6 m long and 30 cm high above the bed surface covered with tarps so that the roots of the seedlings were not translucent into the soil and beds were made for each replication of the study.

3.4 Shade Making

Tobacco nurseries need shade because deli tobacco plants do not want to receive direct sunlight (100%). The shade is made from bamboo poles and clear Polyethylene plastic as the roof. Shade is made with a height of 1 m in the East and 80 cm in the West, with shade poles placed above the beds.

3.5 Mixing Planting Media

Preparation of planting media was carried out one week before transferring seedlings, planting media using a combination of husk charcoal, latosol soil, sand and cow compost. The planting medium is mixed evenly according to each treatment from 500 gr to 1000 gr per treatment plot.

3.6 Soaking Seeds

Soaking the seeds of the tobacco plant is done for 72 hours before planting.

3.7 Seed Seeding

After soaking the seeds are sown in beds of seeding with topsoil planting media for two weeks

3.8 Charging Net Pot

The planting media container used is a 4 x 4 cm net pot, the planting media that has been provided is mixed according to each treatment. Mixing is carried out in kg units each treatment consisting of latosol soil, husk charcoal, sand, and cow compost every replication.

3.9 Planting Seeds

Seeds that are planted first must be selected, and only regular seeds are planted on the net pot. After that, the seeds are covered with soil again. Before planting, the soil should be flushed first until saturated.

3.10 Determination of Sample Plants

Determination of the sample was carried out by random sampling with a total sample of 5 plants per plot of 15 plants per plot with 3 replications. The sample plants are marked with standard stakes as measurement points for plant height to the point of growth.

4. RESULT AND DISCUSSION:

4.1 Plant Height (cm)

The results of the study after being statistically analyzed showed that the administration of cow compost had no significant effect on the height of deli tobacco seedlings at the age of 15 HSPT, but the effect was very significant at ages 23 to 42 HSPT. In the combination treatment of husk and latosol charcoal, growing media showed no significant effect at 15 to 23 HSPT, but the effect was very significant at ages 31 to 42 HSPT on the height of deli tobacco seed plants. The interaction between the administration of cow compost and the combination of husk and latosol charcoal growing media showed no significant effect on plant height at the age of 15 HSPT but was very evident at age 23 to 42 with HSPT. The average results of deli (*Nicotiana Tabaccum L.*) tobacco seedlings aged 15 to 42 HSPT due to the treatment of cow compost with a combination of husk charcoal and latosol soil growing media after the average difference test using Duncan distance test can be seen in Table 1.

Table 1. Average Plant Height of Deli Tobacco Seeds (cm) As a Result of Compost Treatment of Cow and Combination of Husk Charcoal Media with Latosol Soil at Age 15 to 42 HSPT.

Treatment	Plant Height (cm)							
	15 HSPT		23 HSPT		31 HSPT		42 HSPT	
Cow Compost								
K0 = (Non-Treatment)	1,49	aA	2,92	bA	5,13	bB	7,72	bB

K1 = 500 gr/plot	1,70	aA	3,39	aA	5,65	aAB	8,65	aA
K2 = 750 gr/plot	1,60	aA	3,18	abA	5,66	aAB	8,75	aA
K3 = 1000 gr/plot	1,60	aA	3,16	abA	5,88	aA	9,05	aA
Husk Charcoal Media, Latosol Soil and Sand								
M1 = A (100) +T (800) +P (100) gr	1,59	a	3,17	a	5,80	aA	8,97	aA
M2 = A (200) +T (700) +P (100) gr	1,62	a	3,19	a	5,69	abAB	8,44	abAB
M3 = A (300) +T (600) +P (100) gr	1,58	a	3,12	a	5,25	bB	8,21	bB

Table 1 describes the treatment of cow compost has no significant effect on the age of 15 HSPT, but has a very significant effect on the growth of deli tobacco seedlings at ages 23 to 42 HSPT. The highest plants were found in K3 treatment with an average plant height of 9.05 cm which was not significantly different from K2 which was 8.75 cm and with K1 treatment was 8.65 cm but was significantly different from the K0 treatment which was 7.72 cm. In the combination treatment of husk and latosol charcoal media showed a very significant effect on the growth of deli tobacco plants at ages 15 to 23 HSPT, but at the age of 31 and 42 HSPT showed a very significant effect. From table 1 it can be seen that the highest plant height is found in the treatment of M1 with a height of 8.97 cm which is not significantly different from M2 which is 8.44 cm but has a very significant effect with the treatment of M3 which is 8.21 cm.

4.2 Number of Leaves (strands)

The results of the study after being analyzed statistically showed that the administration of cow compost had a very significant effect on the age of 15 HSPT, but the effect was not significant at ages 23 to 42 HSPT. The combination treatment of husk charcoal media with latosol soil showed the significant effect at ages 15 to 23 HSPT, but it was not significantly affected at ages 31 to 42 HSPT to the number of deli tobacco seedling leaves. The interaction between the administration of cow compost and the combination of husk charcoal and latosol media showed no significant effect on the number of leaves of deli tobacco seedlings at ages 15 to 42 HSPT. The average results of the number of leaves of deli tobacco (*Nicotiana Tabaccum L.*) at ages 15 to 42 HSPT due to the treatment of cow compost and the combination of husk charcoal media with latosol soil after the average difference test using the Duncan distance test can be seen in Table 2.

Table 2. Average Number of Leaves of Deli Tobacco Seeds (strands). Due to the Compost Treatment of Cows and the Combination of Husk Charcoal Media with Latosol Soils Aged 15 to 42 HSPT

Treatment	Number of Leaves (strands)							
	15 HSPT		23 HSPT		31 HSPT		42 HSPT	
Cow Compost								
K0 = (Non-Treatment)	4,71	aA	6,27	a	5,97	a	5,53	a
K1 = 500 gr/plot	4,27	abAB	6,22	a	6,31	a	5,80	a
K2 = 750 gr/plot	4,10	bB	6,20	a	6,20	a	5,76	a
K3 = 1000 gr/plot	4,31	abAB	6,11	a	6,33	a	5,84	a
Husk Charcoal Media, Latosol Soil and Sand								
M1 = A (100) +T (800) +P (100) gr	4,53	a	6,33	a	6,33	a	5,70	a
M2 = A (200) +T (700) +P (100) gr	4,36	a	6,27	a	6,18	a	5,82	a
M3 = A (300) +T (600) +P (100) gr	4,15	a	6,00	a	6,09	a	5,68	a

Table 2 describes the treatment of cow compost on the number of leaves (strands) of deli tobacco seedlings had a very significant effect on age 15 HSPT, but at ages 23 to 42 HSPT had no significant effect on the number of leaves. The highest number of leaves in the measurement of 42 HSPT in the use of K3 cow compost treatment with the number

of leaves of the deli tobacco seed plant 5.84 strands then followed in the K1 treatment that is 5.80 strands and K2 which is 5.76 strands while the least number of leaves obtained the treatment without compost K0 averaged 5.53 strands. In the combination treatment of husk charcoal media with latosol, soil showed a significant effect at ages 15 to 23 HSPT, but the effect was not significant at ages 31 to 42 HSPT. From table 2, it can be seen that there are many leaves in the M2 combination with an average of 5.82 strands, followed by M1 treatment, which is 5.70 strands while the number of leaves is slightly in the M3 treatment, which is 5.68 strands.

4.3 Root Volume (ml)

The measurement data of the volume of the roots of deli tobacco seed (ml) due to the treatment of cow compost and the combination of husk charcoal media with latosol soil at age 42 HSPT are presented in Appendix 20 while the analysis of fingerprints is presented in appendix 21. The results of the analysis after statistical analysis show that administration of cow compost had no significant effect on the volume of the root of deli tobacco seedlings at the age of 42 HSPT. The combination treatment of husk charcoal media with latosol soil has no significant effect on the root volume of deli tobacco seedlings at the age of 42 HSPT. The interaction between the treatment of cow compost and the combination of husk charcoal media with latosol soil showed no significant effect on the root volume of deli tobacco at the age of 42 HSPT. The average volume results of the deli tobacco seed plants (*Nicotiana Tabaccum L.*) at 42 HSPT due to the treatment of cow compost and the combination of husk charcoal media with latosol soil after the average difference test using the Duncan distance test can be seen in Table 3.

Table 3. Average Root Volume of Deli Tobacco Seedlings (ml) Due to Compost Treatment of Cow and Combination of Husk Charcoal Media with Latosol Soil at HSPT Aged 42.

Treatment	Root Volume (ml)	
Cow Compost		
K0 = (Non-Treatment)	0,76	a
K1 = 500 gr/plot	0,98	a
K2 = 750 gr/plot	0,91	a
K3 = 1000 gr/plot	0,92	a
Husk Charcoal Media, Latosol Soil and Sand		
M1 = A (100) +T (800) +P (100) gr	0,91	a
M2 = A (200) +T (700) +P (100) gr	0,91	a
M3 = A (300) +T (600) +P (100) gr	0,86	a

Table 3 explains that the treatment of cow compost has no significant effect on the volume of roots of deli tobacco plants at the age of 42 HSPT. It can be seen that the highest root volume is found in K1 treatment of 0.98 ml and followed by K3 treatment which is 0.92 ml and K2 which is 0.91 ml while the smallest root volume at treatment K0 is 0.76 ml. In the combination treatment of husk charcoal and latosol soil, the effect was not significant on root volume at 42 HSPT. From table 3, the highest root volume can be seen in the combination of M1 and M2, with an average of 0.91 ml.

5. CONCLUSION:

From the results of the research obtained and the results of statistical analysis, several conclusions can be drawn. The application of cow compost to the planting media gave no significant effect on the number of leaves and root volume but had a very significant effect on plant height (cm) where the plants were highest in K3 (1000 gr/plot) treatments. The combination treatment of husk charcoal growing media with latosol soil has no significant effect on the parameters of leaf number and root volume but has a very significant effect on the parameters of plant height (cm) where the best growth is at M1 (A 100gr + T 800gr + P 100gr). The interaction between the influence of cow compost and the combination of husk charcoal growing media with latosol soil had no significant effect on the number of leaves and root volume, but it had a very significant effect on plant height.

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