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Response to the Growth of Local Payakumbuh Tobacco (*Nicotiana Tabacum* L) on Giving Kiambang Compose (*Pistia Stratiotes*)

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Abstract

Tobacco plants are one of plants that are often cultivated by farmers in the Limapuluh Kota district. While the productivity of tobacco plants ranges from 1.13 tons/ha – 1.83 tons/ha. The productivity of tobacco plants cannot be achieved by farmers. many things that could be the cause. one of them, is poor soil health due to a lack of organic matter contained in the soil. Various sources of organic matter can be used, one of which is organic fertilizer derived from kiambang plants (Pistia stratiotes). Kiambang compost contains Nitrogen, Phosphorus and Potassium nutrients. The aim of this study was to obtain the best basic fertilizer dose for tobacco plants from kiambang plant compost as an alternative. The time for conducting the research is from April 2022 to July 2022. The implementation of this research activity is in the experimental garden of the Payakumbuh State Agricultural Polytechnic, Tanjung Pati, Harau District, Limapuluh Kota Regency. The study used a Non-Factorial Randomized Block Design (RBD). with kiambang fertilizer doses of 0 gramss, 100 gramss, 200 gramss, 300 gramss and 400 gramss. Parameters observed in the study include plant height, number of leaves, leaf length Longest, Widest Leaf Width, Leaf Wet Weight, and Leaf Dry Weight.

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The results of the study Application of kiambang compost had an effect on plant height, number of leaves, leaf width, and leaf length. An additional dose of kiambang compost at a dose of 400 gramss per plant is a good treatment for the development of growth and yield of the Rudaau Gadang tobacco variety.

Keywords: Payakumbuh local tobacco; Kiambang compost; organic matter.

1. Introduction

Tobacco is a plant that is often cultivated by farmers in Limapuluh Kota district. For tobacco plants, in particular, each region has its own story so that each region has a local variety. As stated by [1] Every tobacco name absolutely depends on its location and the name is taken from the area where it is planted. Each region has its own characteristics for the results obtained from this tobacco plant, especially in the taste of the tobacco, and this is a special assessment of the tobacco itself, such as Srintil tobacco. In the area of West Sumatra, especially in the Limapuluh Kota Regency, there are local varieties, namely rudau gadang and rudau teleng which are favorites for every farmer. BPS data for 2020 shows that the production of tobacco farmers in Limapuluh Kota Regency is 178.96 tons with a planting area of 248 hectares. The productivity of tobacco plants in the harvested area ranges from 721 kg/ha or 0.72 tons/ha [2]. While the productivity of tobacco plants ranges from 1.13 tons/ha – 1.83 tons/ha. The productivity of tobacco plants at this time cannot be achieved by farmers. many things that might be the cause of the occurrence of one of them, is poor soil health due to a lack of organic matter given to the soil. This opinion is in accordance with that expressed by [3] Adequate soil organic matter content is one of the keys to sustainable agriculture. Agricultural land, whether rice fields or wetlands, dry land has a low soil organic matter content. The soil organic matter content is generally less than 2%. In addition, it can also be used as a soil enhancer. According to [4] Soil repairers are synthetic and/or natural, organic and/or mineral substances in solid and/or liquid form which are able to improve the physical, chemical and/or biological properties of the soil. Various sources of organic matter can be used, one of which is organic fertilizer derived from kiambang (Pistia stratiotes) plants. Organic fertilizers are materials derived from dead plants, animal manure and/or animal parts and/or other organic wastes that have gone through a processing process, in solid or liquid form, can be enriched with minerals and/or beneficial microbes to increase nutrient content and soil organic matter and improve the physical, chemical and biological properties of the soil [4] . In addition, the use of microorganisms and organic matter in agriculture can increase the availability of soil nutrients and absorption by plants and form a more loose soil structure [5]. Soil that contains organic matter to meet the needs of plants can guarantee an increase in agricultural productivity. Neglect to return organic matter to the soil and intensification of the use of chemical fertilizers on agricultural land has caused the physical and chemical quality of the soil to decline [3]. Types of plants that can be used as a source of organic matter for water hyacinth, water lily and kiambang [6]. Kiambang is a water weed that can grow in irrigation channels around paddy fields. Kiambang belongs to aquatic plants. The benefits of aquatic plants are as environmental cleaning agents, however, if the aquatic plant population has experienced an explosion, it will turn them into aquatic weeds [6]. Every existing plant has benefits that can be used for sustainable agriculture, so that social sustainability is obtained. Several sources of organic matter that can be used with various contents such as water hyacinth N-Total (%) 0.67, P Total (ppm) 2208.87, K-Total (ppm) 9409.33 while Kiambang compost has N-Total content (%) 2.43 P Total (ppm) 1239.68 K-Total (ppm) 8145.18 [6]. The purpose of this research is to get

the right dose of compost as an alternative to the use of fertilizers that can be used as basic fertilizers in tobacco cultivation.

2. Research Methods

2.1. Time and place

The time for conducting the research is from April 2022 to July 2022. The implementation of this research activity is in the experimental garden of the Payakumbuh State Agricultural Polytechnic, Tanjung Pati, Harau District, Limapuluh Kota Regency.

2.2. Tools and materials

Tobacco seeds of the local variety Rudau Gadang, N fertilizer, P fertilizer, K fertilizer, compose kiambang, EM4, stationery, hoes.

2.3. Experimental design

This research was conducted using a non-factorial randomized block design (RBD) with a dose of kiambang compost as the treatment level. Then the treatment was repeated 5 times. The treatment levels were 0 gramss of kiambang compost, 100 gramss of kiambang compost, 200 gramss of kiambang compost, 300 gramss of kiambang compost and 400 gramss of kiambang compost. The data obtained were analyzed statistically according to the analysis of variance (ANOVA) and further tests were carried out using the LSD (Least Significant Difference) test to determine the effect of each treatment on the various variables observed.

2.4. Research Implementation

2.4.1. Making Kiambang Compost

Preparation of the composting site using plastic measuring 80 cm x 120 cm, then composting is carried out using the raw material of 70% kiambang plants as much as 4 kg mixed with 30% or 1.2 kg of livestock manure, and sufficient bran for microorganism food mixed with 100 ml of MOL EM4 /5 liters of water. The liquid material is then flushed into the raw compost material to start the process of decomposing the compost, then the composting site is covered with a tarpaulin to prevent rain, every 1 week is reversed until the composting process is complete ± 4 weeks. Compost that has changed to brownish color, loose texture and is odorless, this indicates that the compost can be used.

2.4.2. Planting

The tobacco seeds used are Payakumbuh local tobacco seeds with the local name Rudau Gadang. The spacing used is 100cm x 50 cm. Age of seeds used 45 days after germination. Giving treatment at the time of making the planting hole mixed with kiambang compost with a dose of 0 grams, 100 grams, 200 grams, 300 gramss and 400gramss. Then it is stirred and after that, it is planted by sticking.

2.4.3. Maintenance

Embroidering

carried out until the age of 2 weeks of plants in the field. After that no more insertion of plants.

2.4.4. Weeding and rolling

Weeding was carried out according to the weed growth conditions in the research area, while weeding was carried out at 3 weeks and 6 weeks after planting.

2.4.5. Fertilization

at the age of the plant 7-10 days after planting by means of a drill approximately 5 cm on the side of the plant, then covered with soil. The second fertilizer at age, the dose given is 5 gramss of Urea, 5 gramss of SP36 and 5 gramss of KCL. At the age of 21–25 days after planting, use a hammer method 10-15 cm on the side of the plant (parallel to the outermost part of the tobacco leaf) with a dose of 5 gramss of Urea, 5 gramss of SP36 and 5 gramss of KCL

2.4.6. Control of pests and diseases

Pest control using the active ingredient Deltamethrin 25 g/l with a dose of 1 cc/l water. Fungus control with a dose of 1 grams with the active ingredient Mankozeb 80%

2.4.7. Harvest

Age of harvest is carried out in 3 stages of age, namely 60 Days After Planting (DAP) for tapak leaves, 75 DAP for filler leaves and 90 DAP for upper leaves. As for the division of leaves when harvesting according to a predetermined age is as follows ;

a. Leaf harvest is carried out three times, namely in the first harvest as many as 2-4 ‘tapak’ leaves (bottom),
b. the 2nd harvest of 8-10 filler leaves (middle), and
c. the 3rd harvest of 6 - 8 leaves of the skin (above).

2.5. Observation variable

Table 5

Observation variable	Method	Time
Plant height	*Measurements*	30 DAP, 45 DAP, and 60 DAP
Number of leaves	*Measurements*	30 DAP, 45 DAP, and 60 DAP
Leaf length	*Measurements*	At harvest Age 60 DAP, 75 DAP, and 90 DAP
Leaf width	*Measurements*	At harvest Age 60 DAP, 75 DAP and 90 DAP
Wet Leaf weight	*Measurements*	At harvest Age 60 DAP, 75 DAP and 90 DAP
Dry leaf weight	*Measurements*	At harvest Age 60 DAP, 75 DAP and 90 DAP

3. Results And Discussion

3.1. Plant Growth

3.1.1. Plant height

Observations of plant height on plants aged 30 days after planting (DAP), 45 DAP and 60 DAP in all treatments found significant differences according to the LSD Follow-up Test. Parameters of plant height when the plants were 30 DAP showed a significant difference between without application and with doses of kiambang compost. Likewise plant height at the age of 45 DAP and 60 DAP, showed the difference between each dose given. Plants that were not given kiambang compost showed the lowest relative growth. Along with increasing age, plant growth is increasing. Plant height on tobacco affects the production of tobacco plants. Plant height is a parameter of growth and development that supports production indirectly, and the average number and area of leaves is a production component that directly supports production [7]

Observations of plant height in Table 1, at the age of the plant 30 DAP, 45 DAP and 60 DAP each dose increase gets a different plant height, the lowest average is obtained at the age of 30 DAP to 60 DAP with plant height ranging from 16.93 cm- 70.67cm. the highest average was found in the application of 400 grams doses of good kiambang compost with each plant height of 24.60cm at 30 DAP, 59.40cm at 45 DAP, and 100.27cm at 60 DAP. Plants obtained by [8] in Madura local varieties ranged from 80.89 cm-93.8 cm. [9] Get the height of the Marem 1 tobacco plants at the age of 45 DAP 19.83-22.68cm.

The different growth may be due to the stages of the growth of the tobacco plant itself. If the plants during seedling growth experience stagnation due to poor soil aeration, then the physiological age of the plants in the field decreases due to the increase in the age of the seedlings and stagnation at the beginning of growth [8]. [10] tobacco plants absorb large amounts of nitrogen at the age of 3-4 weeks after planting, at that age the plants experience rapid growth. Whereas at the age of 4–6 weeks, the tobacco plants absorb ± 80% of total N [7].

Table 1: Average plant height given various doses of compost on tobacco.

Threatment	Plant height 30 DAP	Plant height 45 DAP	Plant height 60 DAP
		----------cm----------	
0	16,93 ± 2,19 a	44,20 ± 14,65 a	70,67 ± 18,51 a
100	20,40 ± 2,68 b	43,93 ± 5,05 a	81,80 ± 13,81 ab
200	22,73 ± 3,11 bc	59,00 ± 15,46 b	103,40 ± 30,18 c
300	22,33 ± 4,85 bc	51,20 ± 16,30 ab	92,93 ± 21,06 bc
400	24,60 ± 1,39 c	59,40 ± 9,40 b	100,27 ± 21,76 bc

Note: numbers followed by the same letter in the same column are not significantly different according to the LSD test at a 5% level

3.1.2. Number of leaves

The results of observing the number of leaves on plants aged 30 days after planting (DAP), 45 DAP and 60 DAP in all treatments found a significant difference according to the LSD Follow-up Test. Plant growth, including the

number of leaves and plant height, also affects the rate of plant photosynthesis. Fertilization factor for annual crops, spacing in a certain area also affects the level of sunlight absorption. The application of Kiambang Compost Fertilizer to the parameters of the number of leaves at the age of the plant at 30 DAP, 45 DAP and 60 DAP showed significant differences at each dose level of compost given to the plants. The lowest number of leaves was obtained without the application of kiambang compost either at the age of 30 DAP, 45 DAP and 60 DAP. Giving a dose of 100 gramss of kiambang compost at each age of observation of tobacco plants was not significantly different from without kiambang compost. Giving a dose of 200 gramss makes a real difference with either a dose of 100 gramss or 0 gramss of kiambang compost. While the doses of 300 gramss and 400 gramss showed no significant difference, they were significantly different from without the application of kiambang compost.

In plants aged 30 DAP, the number of leaves of tobacco plants without the application of kiambang compost was 5.33 leaves, 7.53 leaves at 45 DAP and 12.07 leaves at 60 DAP. at 45 DAP the number of leaves ranged from 7.53 – 10.60 leaves, and the number of leaves aged 60 DAP obtained the number of leaves ranged from 12.07 – 16.27 leaves. This is consistent with that obtained by [7] The number of leaves of the Prancak-N2P1 variety at various doses of fertilizer without NPK fertilizer was 5.22 - 8.44 at 27 DAP, at 48 DAP the number of leaves ranged from 10.22 strands - 13.11 strands, while in 62 DAP plants 13.89 strands to 18.22 strands. The same results were obtained by [11] by applying biochar to Biochar compost and Organic Compound Fertilizer 13.2 – 16.6 strands. [12] Production of tobacco plants in the form of leaves, with the application of various types of fertilizers has an effect on the number of leaves.

Table 2: Average number of leaves at various doses of kiambang compost.

Threatment	Leaf count 30DAP	Leaf count 45DAP	Leaf count 60DAP
	-------- blade ----------		
0	5,33 ± 1,34 a	7,53 ± 1,26 a	12,07 ± 2,56 a
100	5,53 ± 0,95 a	8,00 ± 1,21 a	13,60 ± 2,56 ab
200	7,00 ± 2,01 b	9,87 ± 2,35 b	16,07 ± 3,09 c
300	6,53 ± 1,59 ab	9,00 ± 1,52 ab	15,40 ± 2,06 bc
400	7,60 ± 0,74 b	10,60 ± 0,80 b	16,27 ± 1,26 c

Note: numbers followed by the same letter in the same column are not significantly different according to the LSD test at a 5% level

The differences in the observations in Table 2 are possible. Physically, soil organic matter improves soil structure, increases water holding capacity, chemically increases cation exchange capacity (CEC) so that the ability to bind cations is high, and biologically, organic matter improves soil biological life.

Kiambang compost contains a high enough N element so that at the beginning of growth it is very supportive for plant development. [11] Nitrogen is a major component in plant metabolic processes.

Nitrogen is one of the elements most needed by plants because 16-18% of protein consists of nitrogen.

3.1.3. The longest leaf length and the widest leaf width

Observational data generated on leaf length were taken in 3 stages, namely at harvest 60 DAP, 75 DAP, 90 DAP which was divided into several parts, namely the lower, middle and upper leaves. The longest leaf length was obtained at each dose of kiambang fertilizer, while without administration kimbang compost fertilizer gets the longest leaf length the lowest. At the harvest age of 60 dap, the longest leaf length was 49.73 cm, 75 dap 52.67, and 90 dap 44.53 cm. while the lowest without composting got the lowest score at the age of 60 dap with a leaf length of 41.67cm, 75 dap with a leaf length of 44.73cm and 90 dap of age 31.87cm.

The width of the leaves of tobacco plants with the application of kiambang compost obtained the difference between without application and the application of kiambang compost. The widest leaf width at harvest age of 60 DAP with a width of 30.47 cm and without the application of kiambang compost, the leaf width is 25.47 cm. Harvest age 75 DAP widest leaf width 31.40cm and without application 27.40cm.

harvesting tobacco plants 90 DAP get the widest leaf width of 24.73 cm and 19.30 cm without feeding. Application of kiambang compost can affect both the length and width of the tobacco plant leaves. Applying organic matter to the soil can increase soil fertility and crop production in sustainable agriculture that is environmentally friendly [13]. Organic matter content can improve soil physical, chemical and biological functions [14].

the application of titonia organic fertilizer at different doses provides an increase in plant development[15] . Apart from organic matter, the length of the leaves and the width of the leaves of the tobacco plant are affected by the type of variety and the height at which the tobacco is grown [16] Observational data is presented in table 3.

Table 3: The longest leaf length and the c at the age of harvesting tobacco plants with various doses of kiambang compost.

Treatment	**Longest Leaf Length**		
	Leaf length 60 DAP	**Leaf length 75 DAP**	**Leaf length 90 DAP**
		----------cm----------	
0	41,67 ± 4,42 a	44,73 ± 6,34 a	31,87 ± 4,74 a
100	46,47 ± 4,92 b	49,33 ± 3,27 b	37,93 ± 3,60 b
200	48,87 ± 3,02 b	50,67 ± 6,05 b	39,07 ± 5,66 bc
300	47,93 ± 5,67 b	52,60 ± 5,44 b	38,47 ± 9,32 b
400	49,73 ± 3,29 b	52,67 ± 7,34 b	44,53 ± 5,01 c
Treatment		**Widest Leaf Width**	
		----------cm----------	
0	25,47 ± 2,80 a	27,40 ± 3,22 a	19,13 ± 3,38 a
100	28,40 ± 3,24 ab	26,93 ± 1,53 a	20,87 ± 2,71 a
200	29,47 ± 1,42 b	29,47 ± 2,04 ab	20,13 ± 2,24 a
300	29,33 ± 4,50 b	29,93 ± 4,29 ab	20,40 ± 4,70 a
400	30,47 ± 2,86 b	31,40 ± 4,09 b	24,73 ± 1,47 b

Note: numbers followed by the same letter in the same column are not significantly different according to the LSD test at a 5% level

3.2. Plant yield

3.2.1. Leaf Wet Weight and Leaf Dry Weight

Based on variance, the application of kiambang compost to tobacco plants harvested at the age of 60 DAP found a difference between giving and not giving. While there was no significant difference at the harvest age of 75 DAP, but at the harvest of leaves at the age of 90 DAP there was a significant difference. The lowest yield of tobacco plants at 60 DAP was obtained in the treatment without kiambang compost with a weight of 107.80 gramss and the highest figure was 172.60 gramss. At harvester age 75 DAP, the middle leaves were harvested with the lowest weight without compost weighing 205.80 gramss and the heaviest 404.00 gramss. The harvest at 90 DAP was that the top leaves obtained the lowest number without the application of kiambang compost weighing 74.00 gramss and the heaviest was obtained at the dose of 400 gramss of kiambang compost weighing 161.60 gramss.

Based on variance, there was no significant difference in the application of kiambang compost to tobacco plants harvested at the age of 60 DAP, in the dry weight of the leaves, as well as the harvest age of 75 DAP, but there was a significant difference in the harvest of leaves at the age of 90 DAP. The lowest yield of tobacco plants at the age of 60 DAP was obtained without the application of kiambang compost with a weight of 12.40 gramss and the highest value was 20.60 gramss. At harvester age 75 DAP, the middle leaves were harvested with the lowest weight without compost weighing 43.40 gramss and the heaviest 80.80 gramss. Tobacco harvest at 90 DAP, the part that was harvested was the top leaves, which got the lowest score without the application of kiambang compost weighing 8.60 gramss and the heaviest was obtained at the dose of 400 gramss of kiambang compost weighing 24.00 gramss. Observational data is presented in table 4.

On observation of leaf wet weight and leaf dry weight without application of kiambang compost fertilizer gave the lowest fresh weight and leaf dry weight. Giving kiambang compost can increase the wet weight and dry weight of leaves.

The application of kiambang compost obtained an increase in dry weight with each increase in the dose of administration. This is in accordance with what was stated [17] that an increase in each dose of water hyacinth compost obtained the highest plant dry weight, while the lowest application showed the lowest plant dry weight. That the dry weight of plants is the accumulation of carbohydrates available for plant growth.

Wet weight is influenced by the water content in plant cells whose levels are influenced by the environment such as temperature and humidity, so plant dry weight is more indicative of plant growth status [18].

In addition, another factor is the emergence of flowers as a sign of the end of the vegetative phase. [19] When the flowers appear will be an inhibiting factor for the number of leaves formed, because that is the final limit for the formation of production leaves

Table 4: Leaf wet weight and dry weight of tobacco plant leaves at harvest age of 60, 75 and 90 days at various doses of kiambang compost.

Treatment	Wet Weight leaves		
	Leaf weight 60DAP	**Leaf weight 75DAP**	**Leaf weight 90DAP**
		---------grams--------	
0	107,80 ± 22,27 a	205,80 ± 160,28a	74,00 ± 18,44 a
100	145,20 ± 40,25 b	241,20 ± 84,65a	87,20 ± 32,06 a
200	161,00 ± 23,58 b	361,80 ± 135,26a	116,20 ± 44,42 a
300	161,60 ± 49,27 b	397,00 ± 152,84a	103,60 ± 70,72 a
400	172,60 ± 27,16 b	404,00 ± 212,65a	161,60 ± 27,95 b
Treatment	**Dry Weight leaves**		
	Leaf weight 60DAP	**Leaf weight 75DAP**	**Leaf weight 90DAP**
		---------grams--------	
0	12,40 ± 2,57a	43,40 ± 35,95a	8,60 ± 1,88 a
100	16,60 ± 6,06a	62,80 ± 21,08a	12,60 ± 5,38 ab
200	18,80 ± 9,35a	75,20 ± 28,60a	17,00 ± 6,57 b
300	20,60 ± 6,89a	81,80 ± 41,92a	15,60 ± 10,41 b
400	20,60 ± 6,83a	80,80 ± 52,01a	24,00 ± 4,21 c

Note: numbers followed by the same letter in the same column are not significantly different according to the LSD test at a 5% level

4. Conclusion

The application of kiambang compost has an effect on plant height, number of leaves, leaf width, leaf length. Giving a dose of kiambang compost with a treatment dose of 400 gramss per plant is a good treatment for the development of growth and yield of the Rudu Gadang tobacco variety

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