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Analysis of Organic Mulching on Soil Fertility and the Productivity of Sweet Corn (*Zea mays saccharata Sturt L.*)

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Abstract: One of the causes of the low productivity of sweet corn is decreased soil productivity due to the leaching of nutrients by rainwater, tillage, and continuous application of inorganic fertilizers. The function of mulching is to increase soil moisture, suppress weed growth, and prevent soil erosion to create optimal soil conditions for plant growth. This study aimed to determine the effect of organic mulching on soil fertility and the productivity of sweet corn (Zea mays saccharata Sturt). This study used a Split Plot Design consisting of two factors, Tillage (P) and Organic Mulch (M) which had 6 levels, M0 = No Mulch, M1 = Plastic Mulch, M2 = Rice Straw Mulch, M3 =Cocopeat Mulch, M4 = Sawdust Mulch, M5 = Rice Husk Mulch. The results show that the M2 treatment of Rice Straw Mulch tended to increase soil fertility and had a significant effect on the productivity of sweet corn.

Keywords: Organic mulch; Soil fertility; Sweet Corn (*Zea mays saccharata Strut L.*)

Introduction

The low productivity of sweet corn is due to decreased soil productivity. According to Arsyad (2010), soil degradation is caused by soil erosion. In addition, the decrease in soil productivity is also caused by the leaching of nutrients by rainwater and evaporation. One of the limiting factors for the productivity of sweet corn is the level of soil fertility. Efforts to maintain soil fertility are by adding nutrients to the soil, good tillage, and modifying the soil microclimate to increase the productivity of sweet corn (Dewantari et al., 2015; Sihotang et al., 2022). The addition of nutrients to the soil can be done through fertilization. There are two types of fertilization, namely organic fertilization and inorganic fertilization (Haryadi et al., 2015).

Reducing the loss of nutrients in the soil can be done by using mulch. Mulches are soil cover materials that can maintain soil moisture and soil temperature in the planting medium so that stability is maintained. According to Samiati et al. (2012), the application of mulch affects soil moisture to create optimal soil conditions for plant growth. Mulch also serves to suppress the growth of weeds around the plants. Mulching can prevent soil erosion on the soil surface during the rainy season (Tinambunan et al., 2014). The two types of mulch that can be used are plastic mulch and organic mulch. Plastic mulch has a relatively high cost. Therefore, organic mulch can be an alternative to plastic mulch, where the raw materials are easy to obtain. Some organic mulch materials that can be used are rice straw, cocopeat, sawdust, and rice husk (Nugraha et al., 2017; Sihotang et al., 2019).

Rice straw is a waste that comes from the harvest of rice plants. Rice straw waste is still underutilized in the community. Rice straw waste can potentially be used as organic mulch which can increase soil fertility and increase the growth and productivity of sweet corn. According to Nugraha et al. (2017), organic rice straw mulch was able increase the growth and productivity of corn by 30.78% compared to those who did not use rice straw mulch.

Cocopeat is powdered coconut coir that can be used as organic mulch. Cocopeat is also a small source of N, P, Ca, and Mg. Not only that, cocopeat can absorb water, maintain humidity and soil temperature, reduce water evaporation in the soil, and keep the soil loose by protecting it from compaction caused by rainfall

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(Bustami, 2013; Sihotang; 2019; Sihotang; 2016). According to the results of Bustami (2013), organic cocopeat mulch with a thickness of 3-5 cm was able to increase the growth of long beans by 11.62% and the productivity of long beans by 28.43%.

Sawdust is waste from the furniture industry or the wood industry. Sawdust can be used as environmentally friendly organic mulch to maintain soil conditions to avoid the grip of drought (Kasi et al., 2017). According to the research of Viantika et al. (2017), the use of sawdust as organic mulch was able to increase the growth height of cacao seedlings by 14.97% compared to those who did not use sawdust mulch. Furthermore, sawdust mulch was able to increase the stem girth of cacao seedlings by 18.95% compared to those who did not use sawdust mulch (Kasi et al., 2017).

Rice husk is the coating of the grain of rice which is rarely utilized. Rice husk can be used as organic mulch. According to the research of Aziiz et al. (2018) rice husk mulch with a thickness of 4.5 cm was able to increase the number of leaves, leaf area, total plant dry weight, number of pods per plant, and seed weight per plant in green beans. According to the research of Suryani et al. (2020), the use of rice husk mulch was able to increase the growth of tomato plants by 11.91% compared to those who did not use rice husk mulch. Furthermore, rice husk mulch was able to increase the number of fruits per tomato plants by 5.66%. Therefore, the objective of this study was to find out the effect of organic mulch on soil fertility and the productivity of sweet corn (*Zea mays saccharata Sturt*).

Method

The research was carried out in the experimental garden of the Faculty of Agriculture, University of Medan Area. This study used a Split Plot Design (SPD) consisting of Main Plots and Subplots. The treatment factor of the Main Plot is the Tillage Factor, namely P1, where the soil was processed only as needed, and P2, where the soil was processed intensively. The treatment factor for the Subplots was Organic Mulch Factor consisting of 5 treatment levels, namely M0 = Control (without using mulch); M1 = Plastic Mulch (Inorganic); M2 = Rice Straw Mulch; M3 = Cocopeat Mulch; M4 = Sawdust Mulch; M5 = Rice Husk Mulch. Data analysis was done using the Split Plot Design (SPD) with the following formula:

$$Yijk = \mu + Kk + \alpha i + \beta k + \delta ij + (\alpha\beta)ij + \epsilon ijk \quad (1)$$

When the study resulted in a significant effect, then further testing would be carried out with the Duncan's Range Test. The parameters observed in this study were the weight of corn ears with husks per subplot, the weight of corn ears without husks per subplot, and the length of corn ears per sample. The soil chemical analysis was done for pH, organic C, total N, C/N, available P, and available K.

Results and Discussion

Soil Analysis

In the soil samples from the research results of Hasibuan et al. (2022), it did not include organic matter which was added to each treatment. Table 1 shows that there was an increase in soil organic C elements. The P2M4 treatment had a soil organic C content of 1.28%. The soil organic C content after the study was still relatively low. According to the standard criteria for assessing the soil analysis results, soil organic C content is considered high if it reaches 3-5%. The soil organic C analysis shows that the level of soil fertility in the research area was relatively low. This is in line with the opinion of Farrasati et al. (2019) who stated that organic C plays an important role in supporting sustainable agriculture, especially as a basic indicator of soil fertility, maintaining nutrient availability, improving soil physical properties, and maintaining the viability of soil microorganisms. Nutrient cycles and the availability of essential nutrients for plant growth such as N, P, S, Ca, Mg, Zn, and Fe are also related to the carbon content as the nutrient reservoir from the decomposition of organic matter (Powlson et al., 2015).

Table 1. Soil Analysis Before and After Study

Treatment	pH	*	C (%)	*	N (%)	*	C/N	*	P2O5 (ppm)	*	K2O (%)	*
Before Study	6.3	sa	1.02	l	0.04	vl	26	vh	9.21	m	0.018	vl
P1M0	6.2	sa	1.01	l	0.07	vl	14	m	9.29	m	0.09	vl
P1M1	6.3	sa	1.11	l	0.15	vl	7	l	9.33	m	0.42	vl
P1M2	6.4	sa	1.09	l	0.22	l	5	l	9.23	m	0.31	vl
P1M3	6.3	sa	1.12	l	0.16	l	7	l	9.36	m	0.53	vl
P1M4	6.4	sa	1.1	l	0.18	l	6	l	9.34	m	0.47	vl
P1M5	6.4	sa	1.13	l	0.2	l	6	l	9.36	m	0.45	vl
P2M0	6.3	sa	1.03	l	0.08	vl	13	m	9.30	m	0.08	vl
P2M1	6.4	sa	1.2	l	0.16	l	8	l	9.36	m	0.55	vl

Treatment	pH	*	C (%)	*	N (%)	*	C/N	*	P2O5 (ppm)	*	K2O (%)	*
P2M2	6.4	sa	1.24	l	0.24	m	5	l	9.41	m	0.33	vl
P2M3	6.3	sa	1.25	l	0.19	vl	7	l	9.40	m	0.61	vl
P2M4	6.3	sa	1.28	l	0.21	m	6	l	9.36	m	0.55	vl
P2M5	6.4	sa	1.27	l	0.23	m	5	l	9.38	m	0.52	vl

Description (*): a). sa: Slightly Acidic, b). n: Neutral, c) sb: Slightly Basic, d) vl: Very Low, e). l: Low, f). m: Moderate, g) h: High, h) vh: Very High (Laboratory analysis from the Palm Oil Research Center, 2022).

According to the soil analysis results, there was an increase in N levels after the study. The P2M2 treatment had an N content of 0.24%. It increased from the pre-study N level which was 0.04%. According to the standard criteria for assessing soil analysis results, it's classified as moderate, where the N level is considered high if it reaches 0.51-0.75%. The results suggest that the mineralization process of organic N in the soil was imperfect, so it affected the availability of soil N. This is in line with the opinion of Wijanarko et al. (2012) who stated that the process of mineralization is a process that is responsible for the availability of N in the soil. Mineralization includes the weathering of soil organic matter which involves the action of enzymes to hydrolyze complex proteins. In the decomposition process, microorganisms utilize carbon compounds in organic matter to obtain energy with a byproduct in the form of CO_2. This causes the C content of organic matter during decomposition to decrease, so the C/N ratio gets lower. The rate of mineralization of organic N into inorganic N is an important factor in determining the availability of N in the soil.

Furthermore, there was a decrease in C/N after the study. The P1M2 treatment had a C/N value of 5 compared to the C/N of 26 before the study. The C/N ratio is a marker of the ease of decomposition of organic matter. High C/N will have a negative impact on the soil because the microbes will be more active and an increase in the microbial population will result in competition for nutrients between the microbes and the plants. Atmojo (2013) stated that high C/N means the organic matter had not been completely decomposed, which will have a negative impact on plants. Decomposer microbes will require soil nutrients to grow so microbes and plants will compete for nutrients. This will have an impact on the availability of nutrients in the soil because the nutrients are turned into microbial organic compounds. This phenomenon is called nutrient immobilization.

Table 1 also shows an increase in P2O5 levels after the study. The P1M3 treatment had P2O5 level of 9.36 ppm and was classified as moderate based on the standard criteria for assessing soil analysis. Prior to the study, P2O5 level was 9.21 ppm. The results suggest that the soil had moderate content of organic matters and minerals that contained P. This is in line with the opinion of Pinatih et al. (2015) who stated that the availability of soil P2O5 greatly influences the level of availability of organic matters and minerals that contained P in the soil. A low reserve of P in the soil indicates low organic matter content and low P-containing minerals content, resulting in low total P content.

The analysis of K content showed an increase in K2O levels after the study. The P2M3 treatment had 0.61% K content and is classified as very low. Before the study, the K2O content was 0.018 which is classified as very low. According to the standard criteria for soil analysis, K2O level is classified as high if it reaches 6-10%. The results suggest that the low potassium value was caused by the low Cation Exchange Capacity (CEC) value of the soil. This is in line with the opinion of Pinatih et al. (2015) who stated that the high value of potassium in the soil is due to the large CEC value. Large cation exchange capacity increases the soil's ability to retain K, thereby slowing the release of K in the soil solution and reducing the leaching potential.

Table 2. Organic Mulch Analysis

Treatment	pH	*	C (%)	*	N (%)	*	C/N	*	P2O5 (ppm)	*	K2O (%)	*
M0	6.3	sa	1.02	1	0.04	vl	26	vh	11.78	m	0.018	vl
M1	6.3	sa	1.02	1	0.04	vl	26	vh	10.68	m	0.018	vl
M2	7.5	n	30.56	vh	0.72	h	42	vh	11.08	m	1.82	m
M3	8.3	sb	24.80	vh	0.45	m	55	vh	10.88	m	2.14	m
M4	7.4	n	29.67	vh	1.33	h	22	vh	11.78	m	1.97	m
M5	7.8	sb	38.74	vh	0.74	h	52	vh	10.68	m	1.39	m

Description (*): a). sa: Slightly Acidic, b). n: Neutral, c) sb: Slightly Basic, d) vl: Very Low, e). l: Low, f). m: Moderate, g) h: High, h) vh: Very High (Laboratory analysis from the Palm Oil Research Center, 2022).

Data from the analysis of organic mulch content can be seen in Table 2. The analysis results are based on laboratory results from the Oil Palm Research Center.

Based on Table 2 we can see that rice straw mulch had an organic C content of 1.02%, an N content of 0.72%, a C/N value of 42, P2O5 of 11.08 ppm, and K2O of 1.82. Cocopeat mulch contained 24.80% organic C, 0.45% N, 55 C/N, 10.88 ppm P2O5, and 2.14% K2O. Sawdust mulch contained 29.67% organic C, 1.33% N, 22.30 C/N, 11.78 ppm P2O5, and 1.97% K2O. The rice husk mulch organic C content was 38.74%, N was 0.74%, C/N was 52, P2O5 was 10.68% and K2O was 1.39%. The analysis showed that the C/N value of each organic mulch was still relatively high, whereas good organic matter for the application should have a low C/N value because a high C/N value means decomposer microbes and plants will compete for nutrients, in accordance with Atmojo (2013).

The C/N value of 42 for rice straw mulch was due to its high cellulose content. Rice straw requires a long composting time before all the rice straw can decompose. Based on Budiarta et al. (2016) regarding the composting process of rice straw without the addition of other organic matter, rice straw requires 84 days of composting time with a resulting C/N ratio of 39.66. Cocopeat mulch had a high C/N value of 55 because of the water-absorbent properties of cocopeat media, so the decomposition process was hampered. This was stated by Sriharti & Salim (2010) who stated that decomposer microorganisms would work optimally if the organic matter has a moisture content of 40-60%, if the water content of the organic matter is above 60% then the decomposition process would be hampered. The water content in cocopeat has a close relationship with the humidity level. If the humidity is low the water content is also low whereas if the humidity is high, then the water content is also high. Rice husk mulch had a high C/N value of 52. This was because the composting of rice husks was done under open-air conditions, which produced high C/N values and made it difficult to decompose. The open composting of rice husks would result in a C/N value of around 30-50, which caused the lengthy decomposition process of rice husks.

Weight of Corn Ears with Husks Per Sample (grams)

According to Table 3, the organic mulching also had no significant effect on the gross weight per sample of sweet corn. The M2 and M3 treatments had the largest average weights, namely 452.11 grams and 408.33 grams, while the lowest weights were in the M4 and M0 treatments, which weighed 346.50 grams and 354.61 grams. The results suggest that the organic mulches were not able to maximally supply additional P nutrients to increase corn weight. Table 2 showed that the P nutrient did not change significantly before and after the study even though there was an addition of 2% P element. This is in line with the opinion of Suryani (2007) who stated that one of the nutrients that play an important role in increasing crop productivity is the P nutrient. This element plays an active role in the process of assimilation and respiration of plants, accelerating the flowering and ripening of seeds and fruit. For the optimal formation and enlargement of corn ears, corn requires sufficient nutrients. Koswara (1986) stated that nutrient deficiency before the formation of corn silk greatly affects the number of seeds.

Table 3. Average Weight of Corn Ears With Husks Per Sample of Sweet Corn After Tilling, Mulching, and Combination of the Two Treatments

Treatment	Weight of Corn Ears with Husks/Sample (g)	
Tillage		
P1	389.43	ns
P2	389.63	ns
Mulch		
M0	354.61	ns
M1	382.44	ns
M2	452.11	ns
M3	408.33	ns
M4	346.50	ns
M5	393.17	ns
Combination		
P1M0	359.11	ns
P1M1	392.11	ns
P1M2	454.11	ns
P1M3	413.56	ns
P1M4	342.11	ns
P1M5	375.56	ns
P2M0	350.11	ns
P2M1	372.78	ns
P2M2	450.11	ns
P2M3	403.11	ns
P2M4	350.89	ns
P2M5	410.78	ns

Note: numbers followed by the same letter in the same column are not significantly different at the level α = 0.05 (lowercase) and α = 0.01 (uppercase) based on Duncan's Range Test

The combination of tilling and organic mulching had no significant effect on the weight of corn ear with husks per sample. According to Table 3, the P1M2 and P2M2 treatments had the largest average weights, namely 454.11 grams and 450.11 grams, while the lowest weight was P1M4, which weighed 342.11 grams. The results suggest that the decomposition of organic mulch was imperfect, resulting in insufficient nutrients for the plants, especially phosphorus. This is in line with the opinion of Koswara (1986) that nitrogen and phosphorus are very influential in seed formation. Phosphorus is an important element in the generative period, namely in the process of forming flowers and fruit, while nitrogen

plays a role in the formation of sweet corn ears and seed fillings.

Weight of Corn Ears with Husks Per Subplot (grams)

According to Table 4 organic mulching had a significant effect on the weight of corn ears with husks per subplot. The M2 treatment had a significant effect compared to the other treatments at a 95% confidence level. Treatment M2 had the highest average weight of 4303.50 grams. The M5 treatment had the lowest average weight of 3193.67 grams. The results suggest that organic mulching can increase the organic matter content of the soil. This is in line with the opinion of Nugroho (2019) on tilling without mulching, that soil organic matter will decrease by 0.13% compared to pre-treatment soil, and the soil organic matter will increase by 0.58% if given organic mulch. Furthermore, the weight of the corn ears was also influenced by the length and diameter of the ear. This is in accordance with the opinion of Yunus (2009) who stated that corn ear length, corn ear diameter, and seed diameter will affect the weight of corn.

Table 4. Average Weight of Corn Ear with Husks Per Subplot After Tilling, Mulching, and Combination of the Two Treatments

Treatment	Weight of Corn Ears with Husks/Subplot (g)	
Tillage		
P1	3913.33	ns
P2	3541.94	ns
Mulch		
M0	3670.67	bc
M1	3942.50	b
M2	4303.50	a
M3	3753.83	bc
M4	3501.67	c
M5	3193.67	d
Combination		
P1M0	3682.33	ns
P1M1	4152.00	ns
P1M2	4513.67	ns
P1M3	3933.00	ns
P1M4	3470.67	ns
P1M5	3728.33	ns
P2M0	3659.00	ns
P2M1	3733.00	ns
P2M2	4093.33	ns
P2M3	3574.67	ns
P2M4	3532.67	ns
P2M5	2659.00	ns

Note: numbers followed by the same letter in the same column are not significantly different at the level α = 0.05 (lowercase) and α = 0.01 (uppercase) based on Duncan's Range Test

The treatment combination of tilling and organic mulching had no significant effect on the weight of corn ears with husks per subplot. The P1M2 treatment was the best treatment with the highest average weight of corn ears with husks per subplot, namely 4513.67 grams. The P2M5 treatment had the lowest average weight of corn ears with husks, namely 2659 grams. The results indicate that the use of mulch can increase soil temperature so that the roots of sweet corn can develop optimally. This is in line with the opinion of Harsono (2012) who stated the importance of temperature of the root area for plant growth and development since it would affect the physiological processes of the roots in taking water and mineral nutrients from the soil. Organic matter derived from plant tissues can be used as a source of N which is needed by soil microorganisms to increase the breakdown of organic matter (Harsono, 2012).

Weight of Corn Ears without Husk per Sample (grams)

According to Table 5, organic mulching did not significantly affect the weight of corn ears without husk per sample. The M2 treatment was the best because it had the highest average weight of corn ears without husks per sample, namely 363.72 grams. Meanwhile, the weight of corn ear without husks per sample was the lowest in the M4 and M0 treatments with average corn ear weights of 275.89 grams and 292.83 grams. The results suggest that essential nutrients in the soil were not yet available in the soil. This is in accordance with the opinion of Rahmad et al. (2013) that for good plant growth, essential nutrients in the soil must be available for plants, if the nutrients in the soil are lacking it will affect the physiological activities of plants so the growth of plants will be disturbed. Organic mulching on sweet corn was able to suppress weed growth in the planting area. This is in line with the opinion of Marzuki (2002) who stated that the application of organic mulch can suppress weed growth, so it increases crop productivity. Organic mulch can also be a cost-efficient solution for controlling weeds in the planting area.

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Tabel 5. Average Weight of Corn Ears without Husks Per Sample of Sweet Corn After Tilling, Mulching, and Combination of the Two Treatments

Treatment	Weight of Corn Ears with Husks/Sample (g)	
Tillage		
P1	314.94	ns
P2	314.33	ns
Mulch		
M0	292.83	ns
M1	313.33	ns
M2	363.72	ns
M3	323.56	ns
M4	275.89	ns
M5	318.50	ns
Combination		
P1M0	290.78	ns
P1M1	325.11	ns
P1M2	366.00	ns
P1M3	326.00	ns
P1M4	272.11	ns
P1M5	309.67	ns
P2M0	294.89	ns
P2M1	301.56	ns
P2M2	361.44	ns
P2M3	321.11	ns
P2M4	279.67	ns
P2M5	327.33	ns

Note: numbers followed by the same letter in the same column are not significantly different at the level α = 0.05 (lowercase) and α = 0.01 (uppercase) based on Duncan's Range Test

The treatment combination of tilling and organic mulching had no significant effect on the weight of corn ears without husks. The best treatment P1M2 had the highest average weight of 366 grams and the lowest average was the P2M4 treatment of 279.67 grams. The results suggest that the use of rice straw mulch can have a positive impact on increasing the weight of corn ears without husks. This is in line with the opinion of Zairin et al. (2003), who stated that the application of rice straw mulch was able to increase the weight of onion bulbs by 17.46% compared to not using rice straw mulch. Rice straw mulch has the effect of increasing crop productivity. In addition, rice straw mulch can suppress weed growth while maintaining soil moisture. This is in accordance with the opinion of Yetnawati et al. (2021) who stated that organic mulch is not only useful as a ground cover, but organic mulch also has a good impact on soil climate, suppresses weed growth, and prevents acceleration of transpiration in the soil and can improve soil quality.

Weight of Corn Ears Without Husks Per Subplot (grams)

According to Table 6, organic mulch treatment had a very significant effect on the weight of corn ears without husk per subplot. The M2 treatment had a very significant effect over the other treatments at 99% confidence level. Rice straw mulch had the advantage of being able to decompose more quickly than other organic mulches. Organic mulching was also able to suppress weed growth, thereby minimizing competition for nutrients for the main crop. The use of mulch can also maintain transpiration in the soil. This is in line with the opinion of Damaiyanti et al. (2013) who stated that organic mulch maintains the stability of soil conditions. Organic mulch can retain moisture on the soil surface, prevent rapid transpiration, and make the rooting area more suitable for plant root growth. Organic mulching also has a positive impact on soil fertility. Organic mulch will decompose over time, and this will make the soil more fertile. Microorganisms also play an active role in decomposing organic matter (Hardiman et al., 2014). Some organic mulches can store water, this has a big impact on the availability of water in the soil. Water absorption in mulch will minimize the need for watering. Adventitious roots also develop better in organic mulch so it can increase the absorption of water and nutrients in plants (Rivai et al., 2017).

The treatment combination of tilling and organic mulching had no significant effect on the weight of corn ears without husks per subplot. Treatments P1M2 and P2M2 were the best treatments and had the highest average weight of corn ears without husks, namely 2510.6 grams and 2445 grams. The lowest average weights were in the P2M4 and P1M0 treatments with

1911.00 grams and 1998.67 grams. Combination treatment of tilling and organic mulching was still not able to show significant results. These results suggest that the sawdust mulch can absorb heat from sunlight, thereby inhibiting the growth of sweet corn. This is in line with the opinion of Kasi et al. (2017) who stated that hot weather conditions will turn sawdust mulch dry and make it absorb heat, which increases the temperature of the mulch enough to burn plant stems.

Tabel 6. Average Weight of Corn Ears without Husks Per Subplot After Tilling, Mulching, and Combination of the Two Treatments

Treatment	Weight of Corn Ears with Husks/Subplot (g)
Tillage	
P1	2191.39 ns
P2	2114.78 ns
Mulch	
M0	2019.17 cCB
M1	2225.33 bB
M2	2477.83 aA
M3	2125.83 bBC
M4	1915.50 dDC
M5	2154.83 bB
Combination	
P1M0	1998.67 ns
P1M1	2342.00 ns
P1M2	2510.67 ns
P1M3	2198.00 ns
P1M4	1920.00 ns
P1M5	2179.00 ns
P2M0	2039.67 ns
P2M1	2108.67 ns
P2M2	2445.00 ns
P2M3	2053.67 ns
P2M4	1911.00 ns
P2M5	2130.67 ns

Note: numbers followed by the same letter in the same column are not significantly different at the level α = 0.05 (lowercase) and α = 0.01 (uppercase) based on Duncan's Range Test

Length of Corn Ears Per Sample (cm)

Table 7 shows that organic mulch had a very significant effect on the length of the sweet corn ears. The M2 treatment had a very significant effect on the other treatments at the 99% confidence level. The M2 treatment was the best treatment in increasing the length of sweet corn ears with an average of 19.30 cm. The M0 treatment had the lowest average of 18.42 cm. The results suggest that the use of organic rice straw mulch can increase water availability and contains the nutrient potassium which functions in the formation of corn ears and the filling of sweet corn seeds. This is in accordance with the opinion of Rivai et al. (2017) who stated that organic rice straw mulch can increase water availability and contains nutrients, namely potassium which functions in corn ears formation and the filling of sweet corn seeds. According to Sitomorang et al. (2015), the addition of sawdust as organic mulch reduced the height gain of oil palm seedlings, allegedly due to the administration of sawdust in its raw state. It takes a long time until sawdust decomposes and it also can become a growing medium for weeds. Organic mulch can also be a source of nutrition for plants and can prevent soil erosion (Saragih, 2008).

Tabel 7. Average Length of Corn Ears Per Sample After Tilling, Mulching, and Combination of the Two Treatments

Treatment	Length of Corn Ears /Sample (cm)
Tillage	
P1	18.73 ns
P2	18.86 ns
Mulch	
M0	18.42 cD
M1	18.86 bB
M2	19.30 aA
M3	18.81 bBC
M4	18.74 bBC
M5	18.64 bC
Combination	
P1M0	18.32 ns
P1M1	19.00 ns
P1M2	19.34 ns
P1M3	18.58 ns
P1M4	18.61 ns
P1M5	18.52 ns
P2M0	18.51 ns
P2M1	18.71 ns
P2M2	19.26 ns
P2M3	19.03 ns
P2M4	18.88 ns
P2M5	18.77 ns

Note: numbers followed by the same letter in the same column are not significantly different at the level α = 0.05 (lowercase) and α = 0.01 (uppercase) based on Duncan's Range Test

The treatment combination of tilling and organic mulching had no significant effect on the length of the sweet corn ears. The P1M2 treatment was the best, having the highest average of 19.34 cm. The P1M0 treatment had the lowest average, namely 18.32 cm. The results suggest that the use of other organic mulches had not been able to increase the length of sweet corn ears. Organic mulch from rice straw powder was able to modify soil conditions such as soil moisture and water content to stimulate plant growth. This was reinforced by McMillen (2013) who stated that the use of mulch would result in a decrease in soil temperature, suppress evapotranspiration, prevent water loss on the soil surface, and reduce air temperature. Besides that, organic mulching would be able to prevent nutrient losses due to evaporation. The use of rice straw organic

mulch has the advantage of being easy to decompose more quickly than other mulches (Permana et al., 2017).

Conclusion

The application of mulch on sweet corn showed an increase in soil fertility and had a significant effect on the weight of corn ears with husks per subplot and had a very significant effect on the weight of the corn ears without husks and the length of corn ears but had no significant effect on the weight of corn ears with husks per sample, the weight of corn ears without husks per sample, and diameter of corn ears. M2 treatment with rice straw organic mulch was the best treatment for sweet corn.

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The authors declare no conflict of interest.

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