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The Response Growth And Yeild of Sweet Corn at Various Plant Spacing And Oil Palm Empty Fruit Bunch (OPEFB) Compost

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Abstract: *Sweet corn has good prospects for developing in order to support farmers' production and income. Maximum production is achieved when using suitable spacing. In addition to adjusting the right planting distance to increase production, it is necessary to add nutrients to the plants by providing organic fertilizer. This study aims to analyze the effect of the interaction between plant spacing and oil palm empty fruit bunch compost fertilizer doses as well as the single factor of spacing and oil palm empty fruit bunch compost fertilizer doses on the growth and yield of sweet corn. The study was held in the village of Padang Pangrapat, Tanah Grogot District Paser Regency from December 2017 to Maret 2018 DraftThe study used a Randomized Block Design (RBD), factorial two factors with 3 tests. The first factor uses the treatment of Plant spacing (J) which consists of 3 levels, they are : (j1) = 60x20 cm, (j2) = 60x30 cm, and (j3) = 60x40 cm. The second factor is Empty Oil Palm Bunches (K) consisting of 3 levels, they are : (k1) = 1.2 kg plot-1, (k2) = 2.4 kg plot-1, and (k3) = 3.6 kg per plot. The results showed that plant spacing treatment had a very significant effect on plant height parameters 6 mst, number of leaves 4 mst, and weight of cob per plot. The oil palm empty fruit bunch compost treatment has a very significant effect on plant height of 4 and 6mst. The interaction between the two treatments had a very significant effect on the plant height parameters aged 2, 4 and 6 mst, and the number of leaves aged 2 mst and 6 mst.*

Keywords: *Sweet Corn, Plant spacing, Palm Oil Empty Fruit Bunch Compost*

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I. Introduction

Sweet corn has good prospects for development in order to support farmers' production and income. This is supported by the available planting area which is still quite wide and sweet corn is increasingly popular and is popular with the public. Sweet corn has a sweet taste because the sugar content is 5-6% higher than ordinary corn. Another advantage of sweet corn is that the production age is shorter because it can be harvested at the age of 60-70 days after planting (Suprapto, 2011)

Maximum production is achieved when using suitable spacing.The higher the level of density of a plant resulting in higherthe degree of competition between plants in terms of getting nutrients and light.According to Williams and Yoseph, (1970) in Asro 'LaelaniIndrayanti, (2010) Plant spacing is very influential on growth and yield plant. This will affect the leaf area, plant dry weight, system rooting, the amount of sunlight received, and the amount of nutrientswhich is absorbed from the soil.

In addition to adjusting the right planting distance to increase production, it is necessary to add nutrients to the plants by providing organic fertilizer. According to Makkasau and Mansjur, (2006) Organic fertilizers are fertilizers made from ingredientswhich can be renewed, recycled, overhauled by soil bacteria intoelements that can be used by plants without polluting the soil and water. The organic material that can be used is Oil Palm Empty Fruit Bunch (OPEFB). The Oil palm empty fruit bunches contain various nutrients needed by plants, they are 0.7% Nitrogen, 0.13% Pospor, and 7% potassium (Nasrul and Maimun, 2009). The Oil palm empty fruit bunches compost has several advantages including being able to improve soil structure to become loose, helping to dissolve nutrients needed for plant growth, to be homogeneousand reduce the risk of carrying plant pests. The Oil palm empty fruit bunches compost is not easily washed and quickly seeps into the soil and canapplied to any season (Myung et al, 2005).

Based on the description above, research is needed to determine the distanceplanting and dosage of oil palm empty fruit bunches compost that is right for the growth and yield of sweet corn.

This study aims to analyze the effect of the interaction between plant spacing and oil palm empty fruit bunch compost fertilizer doses as well as the single factor of spacing and oil palm empty fruit bunch compost fertilizer doses on the growth and yield of sweet corn.

II. Material And Methods

Time and place

The study was held in the village of Padang Pangrapat, Tanah Grogot District, Paser Regency, East Kalimantan. Research carried out from December 2017 until Maret 2018 since the opening of the land until harvest. Based of height place 0-15 m above sea level with red yellow podsolid soil typethe texture of sandy loam and soil pH range from 5.5 to 5.9. Climate type tropics with temperatures of 27-31 C.

Materials and tools

The material used in this study is sweet corn seedBonanza F1 varieties, oil palm empty fruit bunches, curacron insecticide, Furadan 3G, inorganic fertilizer (Urea, SP36) and dolomite lime.

The tools used are hoes, sickles, sprayers, write writing, signposts treatment, Gembor, pH meter, scales, meter, digital camera, termshoves and rulers

Experimental design

This study used a factorial Randomized Block Design (RBD)2 factors with 3 tests. As the first factor is the spacing (J) consisting of 3 levels, they are :

j1 = 60 x 20 cm
j2 = 60 x 30 cm
j3 = 60 x 40 cm

And the second factor is the compost of oil palm empty fruit bunches (K) consisting of 3 levels, they are :

k1 = 2 tons ha-1 is equivalent to 1.2 kg plot-1
k2 = 4 tons ha-1 is equivalent to 1.4 kg plot -1
k3 = 6 tons ha-1 is equivalent to 1.6 kg plot-1

Research Implementation

1. Land Preparation
2. Composting
3. Installation of research signs
4. Provision of Compost
5. Planting
6. Plant Elimination
   -Watering
   -Embroidery
   - Weeding and piling
   - Pest and Disease Control
7. Harvest

Observation

1. Plant Height (cm)
2. Number of leaves (strands)
3. COB Diameter (cm)
4. Cob Length (cm)
5. Planting cob weight (g)
6. Weight of Cob per hectare (kg)

Data analysis

The additive linear model used in analyzing each observed variable is:

$$\mathbf{Yijk = \mu + \alpha i + \beta j + \sigma k + (\beta\sigma)\, jk + \varepsilon ijk}$$

They are :

i = 1,2,3 (groups)
j = 1,2,3 (plant spacing treatment)
k = 1,2,3 treatments of OPEFB compost dose
Yijk = observation response to the i experimental unit which obtained a combination of j-level treatment from factor I and k-level from factor II
μ = general midpoint
αi = the influence of the i
βj = the influence of the j-level from the plant spacing treatment

σk = the influence of the k-level ofOPEFB compost treatment
(βσ) jk = the influence of factor j level I intekasi from the plant spacing treatment and factor II from the OPEFB compost treatment
εijk = random effect of the experimental unit receiving the j-I and k-II factors in the i

To find out the growth and yield of sweet corn plants by spacing and giving OPEFBcompost, data analysis was done using variance analysis. If the F calculated treatment <from F Table at the 0.05 level is not carried out further tests, but if the F calculated treatment> of F table at the level of 0.05 then carried out further tests using a 0.05 BNT test.

III. Result

Plant Height (cm)

The results of the analysis of variance analysis showed that the interaction treatment (J x K) as well as the single factor of spacing (J) and OPEFB compost significantly affected the average height of sweet corn 6 weeks after planting can be seen in table 3.

Table 3. Average Plant Height (cm) Sweet Corn Age 6 Weeks After Planting in the Plant Spacing Treatment and OPEFB Compost

Planting Distance (J)	OPEFB Compost (K)			Average
	k1	k2	k3	
j1	130.09^{bc}	113.14^{cd}	121.27^{c}	121,50
j2	111.60^{d}	146.54^{a}	132.79^{b}	130.31
j3	93.30^{e}	127.15^{bc}	117.23^{cd}	112,56
Average	111.66	128.94	123.76	

* The average number followed by unequal letters shows significantly different in the 0.05 BNT test (Interaction BNT = 9.52)

The BNT test 0.05 showed an interaction (JxK) in the j2k2 treatmentyields the highest plant 146.54 cm significantly different from the treatmentothers. Whereas the j2k3 treatment was significantly different from the j1k3 treatment,j3k3, j1k2, j2k1, j3k1 but not significantly different in treatment j1k1, j3k2. Onj1k3 treatment was significantly different from j2k1, j3k1 treatment but it was not differentreal j3k3, j1k2.

Number of Leaves (strands)

The results of the analysis of variance analysis showed that the interaction treatment (J x K) had a significant effect while the single factor of spacing (J) and compost OPEFB had no significant effect on the average number of leaves aged 6 weeks after planting can be seen attable 6.

Table 6. Average Number of Leaves (strands) of Sweet Corn aged 6 Weeks after Planting in the Distance Spacing Treatment and Giving OPEFB Compost

Planting Distance (J)	OPEFB Compost (K)			Average
	k1	k2	k3	
j1	9.33^{a}	7.67^{bc}	8.33^{b}	8,44
j2	8.00^{bc}	9.67^{a}	9.00^{a}	8,89
j3	7.33^{c}	9.00^{a}	9.00^{a}	8.44
Average	8.22	8.78	8.78	

* The average number followed by unequal letters shows significantly different in the BNT 0.05 (Interaction BNT = 0.80)

Based on BNT 0.05 showed the interaction treatment (J x k) on j2k2 treatment produced the average number of leaves at most 9.75 (strands) significantly differentwith all treatments except j1k1, j3k2.

Cob Diameter (cm)

The results of the analysis of variance analysis showed that the interaction treatment (J x K) and single factor both spacing (J) and compost OPEFB (K) had no significant effect on cob diameter.

Cob Length (cm)

The results of analysis of variance analysis showed that the interaction treatment (J x K) and single factor both spacing (J) and compost OPEFB (K) had no significant effect on the length of the cob.

Planting Cob Weight (g)

The results of the analysis of variance analysis showed that the interaction treatment (J x K) and single factor both spacing (J) and compost OPEFB (K) had no significant effect on the weight of plant cobs.

Cob Weight per Plot(kg)

The results of analysis of variance showed the treatment of single factor plant spacing (J) significantly affected while the interaction (JxK) and single factor compost OPEFB (K) had no significant effect, on the average yield per plot of sweet corn can be seen in table 7.

Table 7. Average Results of Sweet Corn Plots in the Distance Spacing Treatment and Giving OPEFB Compost

Planting Distance (J)	compost OPEFB (K)			Average
	k1	k2	k3	
j1	6.682	5.331	6.839	6.284[a]
j2	5.244	6.002	5.418	5.555[a]
j3	2.733	3.938	4.157	3.609[b]
Average	4.89	5.09	5.47	

* The average number followed by unequal letters shows significantly different in the BNT 0.05 (BNT J = 1.52).

Based on the BNT 0.05 showed that j1 spacing treatment gave the heaviest average yield per plot of 6,284 kg which was significantly different from j3 treatmentbut not significantly different from j2.

IV. Discussion

Based on the analysis of plant spacing (J) treatments on average plant height significantly affected the addition of plant height, addition of number of leaves, and yield of plots. The BNT 0.05 showed that j2 spacing with a size of 60 x 30 cm produced a plant height of 6 MST that was better than the treatment. It is suspected that light reception and absorption of nutrients are more efficient. In accordance with the opinion (Asro 'Laelani Indrayanti, 2010) a wide planting distance gives optimum growth space forget sunlight, nutrients and water so that a wide spacing can increase plant growth. Hidayat further (2011), said that the increase in plant height with wider spacing will increase growth because plant nutrients are sufficient. Another opinion from the results of the study (Sudarka 1994) in (Jasman.J. 2016) which states that the density of plants can also affect the population and the efficiency of the use of light, water and nutrients.

The BNT Test 0.05 test results showed that the planting distance of j2 60x30 cm showedvery significant effect on the average number of leaves aged 4 weeks afterplanting during the vegetative period is thought to be spacing 60x30 cm enough to givespace for leaf development so that leaf growth grows optimallyand lack of competition between plants. According to Supriono (2000) that the use of spacing is getting tighter the smaller the number of leaves. This is due to the dense spacing, overlapping plants will occur. Furthermore, plants will respond by reducing leaf formation. The results of various plant spacing (J) treatments had no significant effect on average cob diameter, cob length and cob weight of planting. It is suspected that the diameter of the cob, the length of the cob, the weight of the cob of the crop is more influenced by environmental factors, such as high rainfall causing the area of the plant to be inundatedexcessive water so that the growth and yield of corn does nothave a real impact. According to Barbieri and his friends (2000), climatic factors affectcorn production. The general effect of excess water or flooding is deficiencyOxygen, while lack of water or drought will resultdehydration in plants that affects the turgor cell zonecan further inhibit plant growth (Fallah, 2006) agreewith Champel 2003, plants doused with too much water could experiencelack of oxygen because the soil runs out of the air space that it providesoxygen as for root cellular respiration. But there is a tendency onbar chart of planting distance j2 against the three planting distance parameters 60x30 cmshowed quite good results.

The results of analysis of plant spacing (J) treatment on j1 60x20 cm on average plot production have a very significant effect on the number of production per plot. BNT Test 0.05 showed that the treatment distance of j1 60x20 cm produced the most corn production per plot compared to j2 and j3 treatments. This is suspected treatmenta denser planting distance such as 60x20 cm is the optimum planting distance forthe purpose of sweet corn production. According to Hasan Basri Jumin (2002) thatplant density has an inseparable relationship with the amount of yield to be obtained from a plot of land. Added (Erawati.and her friends. 2016), Plant population (spacing) is one of the factorscan affect crop yields. Increased corn yields can be soughtthrough setting the planting density to reach the optimal population.Based on the results of analysis of various kinds of compost bunches of empty treatmentsoil palm (K) at k2 4 ton ha-1 at an average plant height showsvery significant effect on plant height 4 and 6 weeks afterplanting. This is suspected by giving oil palm empty fruit bunches compostcan improve soil conditions and be able to provide nutrients insoil. so that the nutrients needed by

sweet corn plants in phasevagetatif fulfilled by the provision of oil palm empty fruit bunches compostwhich is a source of elements N, P, K and micro nutrients inneed when plants are still young. This is consistent with the statement (Hidayat,2011) On the vegetative growth of maize plants actively absorb N nutrients for the formation of chlorophyll and P elements for enlargement of stem diameter. This is different when the corn plant enters the generative phase, the existing P element is more widely used by plantsfor seed formation and vegetative plant growth will decrease.

Based on the analysis of the variety of treatments of OPEFB compost on the average number of leaves, ear diameter, ear length, and ear weight per crop had no significant effect. It is suspected that compost has been givenmany experience leaching and loss of nutrients neededplants due to high rainfall. This results in soil conditionsnot good and the soil becomes less loose so it inhibits ncorn growth. In accordance with the opinion (Fallah, 2006) Corn plantsneed a medium that is loose and fertile because of this plantrequires good aeration and drainage.

Results of analysis of the various treatments at the average yield per plot. no real effect. This is allegedly by giving oil palm empty fruit bunches compost cannot trigger production per plot because of high rainfall, until the filling period cob. OPEFB compostdo not have macro nutrients andsufficient microstructure for plants because it has been dissolved by the intensity of rainfallwhich is quite high. It is assumed that the elements N, P and K are not optimal formeet the needs of nutrients for plants. The P element is very influentiain the process of growth and formation of results (Warisno, 2007). If a plantN and P deficiency will cause imperfect cob development. Whereas K also uses in the formation of cob and seeds. So ifplants lack K, the resulting cob is small and the tip is tapered (Efendi 2001).

The results of variance showed that the treatment of plant spacing and compost of oil palm empty fruit bunches (J x K) had a very significant effect on plant height and number of leaves aged 6 weeks after the plant. This is presumably because the wide spacing gives optimum growth space to get sunlight, nutrients and water so the spacing the width can increase plant growth. In accordance with the opinion of Hidayat (2011) which says that the increase in plant height with wider spacing will increase growth because plant nutrients are sufficient. And the provision of oil palm empty fruit bunches(OPEFB) compost can trigger the growth of vegetative parts of plants such as leaves and roots of sweet corn plants. Oil palm empty fruit bunches(OPEFB) compost can improvesoil structure, so that soil conditions can store enough water, and water functions to carry nutrients into the plant tissue through the roots for further processing in photosynthesis, which in turn stimulates vegetative and generative formation. OPEFB compost, in addition to containing macro and micro nutrients, also contains organic matteruseful for improving physical, chemical and biological soil properties. Agree with (Erwinsyah 2007) in (Rudy Hartono 2007) that the application of compost improves soil physical and chemical properties, in addition to being able to significantly increase plant height and weight.

V. Conclusion

Based on influence of the distance cropping and provision of compost bunches of empty palm oil on growth and results of sweet corn.

Could be concluded as follows:

1. Treatment distance planting influential very real on the parameter tall plant age 6mst, number of leaves 4mst and heavy perpot cobs.
2. Measurement doses of fertilizer compost an empty palm oil on have an effect very real on the parameter of higher plants age 4 and 6 mst.
3. An interaction between treatment the distance cropping and the provision of turned into fertilizer compost bunches of empty oil palm has had a significant effect very real on high in plant age 2, 4, and 6 mst will number of leaves age 2 mst

References

[1]. Asro' LaelaniIndrayanti, L.A. 2010. Pengaruh Jarak Tanam dan Jumlah
[2]. Benih Terhadap Pertumbuhan Vegetatif Jagung Muda. MediaSains, Volume 2 Nomor 2 Oktober 2010 Universitas PGRI Palangka Raya.
[3]. Budi Heryawan, Jurnawaty, HusnaYetti. 2015. Pemberian KomposTandan Kosong Kelapa Sawit dan Pupuk N, P dan K TerhadapPertumbuhan dan Produksi Tanaman Jagung Manis (Zea mays. LVarsaccarataSturt) . Jurnal Online Mahasiswa FakultasPertanian Universitas Riau (JomFapertaUnri). 2(2): 12-14.
[4]. Champel, dkk. 2003. Biologi Jilid 2. Jakarta: Erlangga.Erawati.T.,Hipi.A. (2016). Pengaruh Jarak Tanam terhadap Pertumbuhandan Hasil Beberapa Varietas Jagung Hibrida di KawasanPengembangan Jagung Kabupaten Sumbawa. ProsidingSeminarNasional Inovasi Teknologi Pertanian Banjarbaru.
[5]. Effendi, S. 2001. Bercocok Tanam Jagung. Yasa Guna Jakarta.
[6]. Fallah, Affan Fajar. 2006. Perspektif pertanian dalam lingkungan yangterkontrol . http:io.ppi jepang.org. Diakses pada tanggal 1 juli2019.
[7]. Hasan BasriJumin, 2002. Agronomi. PT. RajaGrafindo Persada. Jakarta.
[8]. Hidayat, H., 2011. Pengelolaan Limbah Tandan KosongKelapa Sawit dan Aplikasi BiomassaChromolaenaOdorataTerhadap Pertumbuhan dan hasil tanaman padi serta sifat tanahsulfaquent. Jurnal Teknologi Pengelolaan Limbah.

[9]. Jasman. J. 2016. Pengaruh Jarak Tanam dan Jumlah Benih PerLubangTerhadap Pertumbuhan dan Hasil Tanaman Jagung. Bogor (ID):Institut Pertanian Bogor.
[10]. Makkasau, A. dan S. Mansjur. 2006. Kajian tentang risalah penelitianjagung dan serealia lain. Jurnal Perpustakaan Pertanian 15: 19-20.
[11]. Myung, Ho Um and Youn Lee. 2005. Quality Control for CommercialCompost in Korea. National Institute of Agricultural Science and
[12]. Technology (NIAST) and Rural Development andNasrul, &Maimun, T. (2009). Jurnal Rekayasa dan Lingkungan: PengaruhPenambahan Jamur Pelapuk Putih (white Rot Fungi) Pada ProsesPengomposan Tandan Kosong Kelapa Sawit, 1-2.
[13]. http://www.bio.unsoed.ac.id. [Diakses pada tanggal 27 Mei2019].
[14]. Purwono, M.S, R. Hartono, 2007. Bertanam Jagung Unggul. Penebar
[15]. Swadaya, Jakarta.
[16]. Rudy Hartono. 2007. Pengaruh kompos kelapa sawit dan jarak tanam terhadappertumbuhan tanaman Jahe (ZingiberOfficenaleRosc). Tanah Grogot:STIPERMuhammdiyah Tanah Grogot.
[17]. Suprapto, H.S dan Marzuki. 2005. Bertanam Jagung. Penebar Swadaya,
[18]. Jakarta.
[19]. Supriono, 2000. Pengaruh Dosis Urea Tablet dan Jarak Tanam TerhadapPertumbuhan dan Hasil Kedelai KultivarSindoro. AgrosainsVolume 2 No 2, 2000..Bandung.
[20]. Warisno, 2007. Jagung Hibrida. Kanisius, Yogyakarta.

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