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Interaction the doses of fertilizer organic baglog mushroom and potassium to the growth and the results of sweet corn (*Zea mays* L. Saccharata)

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Abstract

This study aims to get a combination account the cost of fertilizer doses of compost produced by local of mushroom is just in baglog the cost of fertilizer and inorganic (KCl) that can reduce the use of a dose inorganic account the cost of fertilizer without depressing growth and the results of sweet corn in dry fields. This study using a random group with two factors namely manure compost baglog mushroom factors first doses (B_0) without fertilizer baglog, fungi (B_1) fertilizer baglog mushroom with dose of 10 tons/ha (B_2) fertilizer baglog mushroom with dose of 20 tons /ha (B_3) fertilizer baglog mushroom with dose of 30 tons/ha. The second factor which is made up of doses of fertilizer KCl (K_0) without fertilizer KCl, (K_1) fertilizer KCl with dose of 75kg/ha, (K_2) fertilizer KCl with dose of 100kg/ha, (K_3) fertilizer KCl with dose of 125kg/ha. So there will be 16 combination treatments, each of which repeated three times. The research results show that the fertilizer baglog mushroom had significant on all parameter that observed, while the fertilizer KCl show had significant to height of plant and the diameter of cob/sample, but to the number of lines seeds/cob, the weight of the cob/sample and a plot no significant. The interaction of the provision of fertilizer compost baglog mushroom with fertilizer KCl indicates had no significant to all parameter that observed. B_3 K_3 treatment is the best for all parameter that observed.

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Introduction

Sweet corn (*Zea mays saccharata* Sturt) is enough to certain horticultural crops had much cache by people. Besides, have the role of sweet corn quite high in fulfilling nutritional requirements, (Novira *et al.*, 2015). Besides its seeds, another part as stems and young leaves can be used for fodder, stems and leaves old (after the harvest) for green manure compost, the dried stems and leaves for fuel a substitute for firewood, corn young to vegetables, fruit (Syofia *et al.*, 2014). Thus, sweet corn a significant potential to developed in Indonesia.

The production of sweet corn from the farm gate is still low in Indonesia. Many obstacles in commercial operation of sweet corn, one of them is the low soil fertility and high prices chemical fertilizer (inorganic). A plant sweet corn is the plant are responsive to fertilizing. Fertilizing it is important because determining the rate of growth and the results of both quantitative and qualitative. Nitrogen fertilizer is a key player in an effort to increase production of corn (Akil, 2009; Suwardi and Roy Efendi, 2009).

The development of sweet corn business in Indonesia to have the prospect of is a good enough. Corn cute for food harvested when young, usually consumed fresh, dried and frozen or cooled. Every 100 gram of sweet corn wet edible containing 96 calories; 3.5 grams of protein; 1.0 grams fat; 22,8 grams of carbohydrates; 3 mg K; 0.7 mg Fe; 111,0 mg P; 400 the vitamin A; 0.15mg vitamin B; 12mg of vitamin C and 0,727% water (USDA 1963 *in* Ni nyoman, 2007).

Fertilizing is an act of giving an extra nutrient required by the plant. The activities done so that the needs of a plant nutrient could be met so that plants can grow and develop well. According to Marlia, *et al.,* (2006). The content of nutrient on the ground the longer will decrease because frequently used by plant that lives on it, when the state of this constantly be left then stinging lack elements hara so growth and the production of being distracted. One of the work done to improve the quality of the ground with the addition of organic matter very helpful in improve soil degraded, because the use of organic fertilizer can tie elements hara easily lost as well as help in providing nutrient ground so that the efficiency of fertilizing being taller. According to Rismunandar (2011), that organic matter is ground to easily penetrated roots and absorb element in the disturbances that is to support growth and perkembanga plant. Baglog fungi is the fungus contain a planting organic carbon, nitrogen, pospor, potassium (Tombe and Sipayung, 2010).

Organic fertilizers is not ensure the sufficiency organic nutrient to the but to give better conditions for growth so that the roots nutrient optimal disturbances. Addition of material to the ground will raise the organic exchange cation lost land and reduce nutrient disturbances added through fertilizing so can increase the disturbances in the ground and efficiency fertilizing (Kang *et al.*, 2009).

Research results show that the combination of inorganic fertilizers organic fertilizers to improve growth and the sweet corn (Putu Suratmini, 2009; Kusuma, 2010). Therefore in order to increase the efficiency of the use of fertilizer needed to research on the organic fertilizers with inorganic (KCl), with a view to using a dose of inorganic fertilizers without depressing growth and the production of sweet corn. The purpose of this research is to get a combination of doses of fertilizer baglog fungi and inorganic fertilizers (KCl), which can decrease the use of inorganic fertilizers dose without depressing growth and the sweet corn. in dry fields.

Materials and methodes

Experiment carried out in the district of Simalungun of sub district kerasahan with an elevation place ± 400 mdpl, in December 2018 until February 2019. Material used of seeds sweet corn of **master sweet** variety, compost baglog mushroom, fertilizer Urea, TSP and KCl. An instrument used in experiments are among others a hoe, the meter, stationery, rope plastic, mizzen term, weight, hands prayer, machete, drill and the other required.

The experiment using a random group (shelf) factorials consisting of two factors .

* The first factor dose of fertilizers baglog mushroom consisting of 4 standard:

- B_0 : without fertilizer baglog mushroom,
- B_1 : fertilizers baglog mushroom with a dose of 10 tons/acre,
- B_2 : fertilizers baglog mushroom with a dose 20 tons/ acre,
- B_3 : fertilizers baglog mushroom with a dose of 30 tons/ acre.

* The second factor is the doses of fertilizer KCl consisting of 4 standard:

- K_0 : without fertilizer KCl,
- K_1 : fertilizer KCl with 75 kg/ acre,
- K_2 : fertilizer KCl with 100 kg/ acre,
- K_3 : fertilizer KCl with 125 kg/ acre.

So there will be a 16 combination treatment each of which repeated three times.

Results and discussion

Height of Plant

Based on the results of analysis height of plant indicates the significant difference for the use of organic fertilizers baglog. Increase height of plant with increase in doses fertilizer at the age of 4.6 and 8 week of after plant but at the age of 2 week of after plant treatment B_2 higher of plant B_3. This may be due to not decompose by perfect organic fertilizers so the content not enough to element to the needs of vegetative plants. Vachirapatama *et al.,* (2011) said that baglog be a pleasant growing mushroom which a composition has one of them is fertilizer Urea .Fertilizer urea is manure which contains elements nitrogen that is badly needed to growth vegetative.

Treatment of fertilizer KCl, at 2,4 and 6 week of after planting indicates significant of the influence between K_0 to K_2 and K_3 while at of 8 week after planting K_0 indicates significant of the influence that only in K_3 (Table 1). It is suspected that this is because the doses given in accordance with the early plants especially. plant roots for growth. Rooting growth levels will support the supply of organic element into the tissues of plants so will support the growth of plants corn, in addition the Kvery affect the elongation of stems especially on the active split on the tip of plant tissue (meristem). Masdar (2003), said that naturally, k diffuses through the land at the root of a plant growing rooting and K effects. clear about the plant.

Table 1. Test different mean height of plant of sweet corn with response organic fertilizers baglog and KCl to growth of sweet corn at 2, 4, 6 and 8 week after planting (WAF).

Treatment	Mean Height of Plant (cm)			
	2 WAF	4 WAF	6 WAF	8 WAF
B_0	4.521 c	58.917 c	92.271b	143.292 c
B_1	4.750 bc	59.875 b	93.333 a	143.938 bc
B_2	5.125 a	60.625 ab	93.479 a	145.458 b
B_3	5.083 ab	61.146 a	93.792 a	147.167 a
K_0	4.667 b	59.000 c	92.167 c	143.292 b
K_1	4.833 ab	60.021 b	92.896 bc	144.667 b
K_2	4.917 ab	60.417 ab	93.333 b	145.000 b
K_3	5.063 a	61.125 a	94.479 a	146.896 a
B_0K_0	4.333	58.417	90.917	141.583
B_0K_1	4.500	58.833	92.083	143.417
B_0K_2	4.667	59.083	92.417	143.417
B_0K_3	4.583	59.333	93.667	144.750
B_1K_0	4.417	58.833	92.250	142.417
B_1K_1	4.750	59.500	93.167	143.667
B_1K_2	4.750	59.833	93.750	144.083
B_1K_3	5.083	61.333	94.167	145.583
B_2K_0	4.917	58.833	92.333	143.750
B_2K_1	5.083	60.750	92.917	144.500
B_2K_2	5.083	61.000	93.917	145.833
B_2K_3	5.417	61.917	94.750	147.750
B_3K_0	4.500	59.917	93.167	145.417
B_3K_1	4.500	61.000	93.417	147.083
B_3K_2	5.167	61.750	93.250	146.667
B_3K_3	5.167	61.917	95.333	149.500

The interaction of fertilizer baglog mushroom with KCl is highest in B_3K_3 (149.500cm) and the lowest is in treatment B_0K_0 (141.583cm).

Weight of Cob

Based on the results of analysis weight of cob indicates significant difference for the use of organic fertilizers baglog, especially B_0 is significant to B_2 and B_3 only to B_1 is no significant (Table 2). It is suspected that this happened because the bigger doses organic fertilizers baglog rendered especially after plants into phase jouvenil plant nutrients and need more and can be seen in Table 2 that the more doses given baglog fertilizer plants have the ability and the best needs disturbances plants so as to have the heaviest weights cobs (Firmansyah 2009).

The treatment of fertilizer KCl weight of cob (Table 2) shows the influence of no significant for all treatment. This is because at a higher level, plants will provide feedback to manuring with the result or his appearance. By providing a complete disturbances of each nutrient disturbances in accordance with their needs plants can stimulate growth and development vegetative parts plant.

Table 2. Mean of weight of cob a sample and a plot cause of the fertilizer baglog fungi with KCl.

Treatment	Mean Weight of Cob (gr)	
	Sample	Plot
B_0	1.874 c	9.370 c
B_1	2.053 bc	10.253 bc
B_2	2.217 ab	11.086 ab
B_3	2.371 a	11.857 a
K_0	2.048 a	10.242 a
K_1	2.127 a	10.632 a
K_2	2.097 a	10.482 a
K_3	2.242 a	11.210 a
B_0K_0	1.783	8.917
B_0K_1	1.893	9.477
B_0K_2	1.860	9.293
B_0K_3	1.960	9.793
B_1K_0	1.977	9.877
B_1K_1	2.097	10.463
B_1K_2	2.020	10.087
B_1K_3	2.117	10.583
B_2K_0	2.175	10.880
B_2K_1	2.192	10.960
B_2K_2	2.292	11.460
B_2K_3	2.208	11.043
B_3K_0	2.258	11.293
B_3K_1	2.325	11.627
B_3K_2	2.217	11.087
B_3K_3	2.683	13.420

According to Kasniari and Supadma (2007). Nutrient K play an important role in increase turgor, increase the lignin and cellulose and as aktivator an enzyme. Meanwhile Phallus and Marsono (2007) stated that nutrient K play an important role in the formation of carbohydrates and the activity of an enzyme.

Next according to Kasniari and Supadma (2007), that nutrient K play an important role in increase in size and heavy seeds. In addition the number of K taken from the ground by plants higher than P (Djalil, 2003) so that K enough to be able to increase growth and crop yield. Interaction between the fertilizer baglog fungi with potassium of weight of cobs per samples and per plot sweet corn plant show an influence not significant for all treatment .This can be seen in Fig. 1.

Diameter Cob

Based on the results of analysis indicates significant difference for the use of organic fertilizers baglog, that B_0 is significant to B_1, B_2 dan B_3 (Table 3). It is suspected that this happened because the use of waste media mushroom white in a media planting will increase the growth and result of plants, because the waste of baglog mushroom is a mixture sawdust, the bran and cornmeal by comparison 20: 4: 1. Sawdust contains nutrient nitrogen (N), Phosphorus (P), and Potassium (K) allowing using as medium growing plants (Sugiarti *et al.*, 2007).

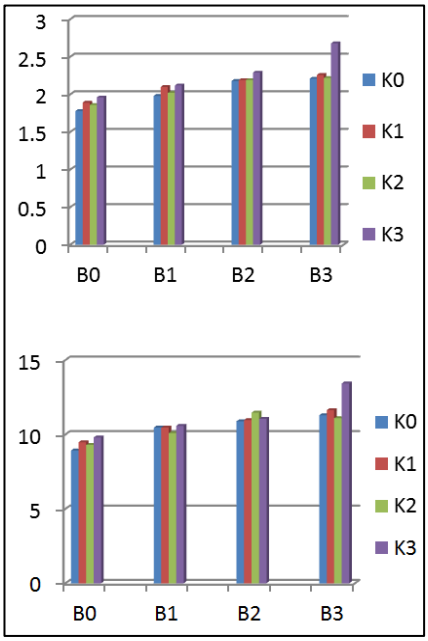

Fig 1. Histogram Interaction Between The Fertilizer Baglog Mushroom With KCl For Weight of Cobs (kg) to Sample and Plot Sweet Corn.

The treatment of fertilizer KCl for diameter cobs (Table 3) shows that treatment K_0 was significant to K_2 and K_3 while treatment K_0 to K_1 was not significant. It is suspected because of met nutrient of plants especially potassium to strengthen the trunk, micro nutrient serves as an enzyme increasing growth weight plants, weight cobs and weight cob corn.

Diameter cobs was not significant may be due to the formation of that are determined by gene in plants. As opinion of Sitompul and Guritno (1995) said, Performance plant controlled by gene plant besides need for N, P and K in supporting growing raising diameter cobs. Sutanto (2002) added that in the race for competition nutrient was possibly large plants is less competitive, so that the lack of nutrient because of nutrient was largely used by microorganisms to their metabolism. This is same as the statement Sutedjo (2002) and Iskandar (2003) stating that the plant would not give maximum results when elements

hara necessary is not available. Interaction between fertilizers baglog mushroom with KCl for diameter of cob/sample shows that is not significant to all treatment. It can be seen in Fig 2-3.

Table 3. Mean of diameter of cob sample cause of the fertilizer baglog fungi with KCl

Treatment	Diameter of Cob (cm)
B_0	2.560 b
B_1	2.851 a
B_2	3.000 a
B_3	2.982 a
K_0	2.669 b
K_1	2.844 ab
K_2	2.944 a
K_3	2.935 a
B_0K_0	2.353
B_0K_1	2.567
B_0K_2	2.687
B_0K_3	2.633
B_1K_0	2.677
B_1K_1	2.803
B_1K_2	2.927
B_1K_3	2.997
B_2K_0	2.763
B_2K_1	3.190
B_2K_2	2.993
B_2K_3	3.053
B_3K_0	2.883
B_3K_1	2.817
B_3K_2	3.170
B_3K_3	3.057

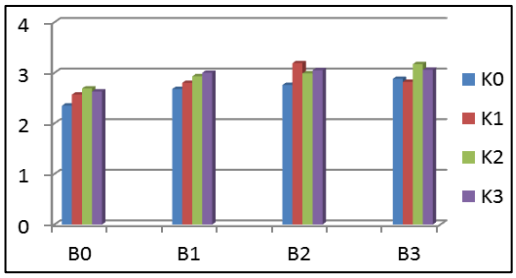

Fig 2. Histogram Interaction Between The Fertilizer Baglog Mushroom With KCl For Diameter of Cobs (cm) to Sample and Plot Sweet Corn.

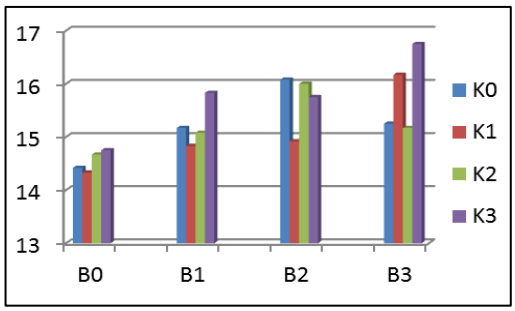

Fig 3. Histogram interaction between the fertilizer baglog mushroom with KCl for number line of seed/cob sweet corn.

Number of Line Seed/Cob

Based on the results of analysis to number of line/cob indicates significant difference the use of organic fertilizers baglog, as treatment B_0 was significant to B_2 and B_3, therefore B_0 was no significant to B_1, (Table 4). This might have been caused by the higher nitrogen content within certain limits if the flowering began to spur growth and the formation of line seeds/cob

Table 4. Mean of number line of seed/cob cause of fertilizers baglog mushroom with KCl.

Treatment	Mean of Number Line of Seed/Cob
B_0	14.542 b
B_1	15.229 ab
B_2	15.688 a
B_3	15.833 a
K_0	15.229 a
K_1	15.063 a
K_2	15.229 a
K_3	15.771 a
B_0K_0	14.417
B_0K_1	14.333
B_0K_2	14.667
B_0K_3	14.750
B_1K_0	15.167
B_1K_1	14.833
B_1K_2	15.083
B_1K_3	15.833
B_2K_0	16.083
B_2K_1	14.917
B_2K_2	16.000
B_2K_3	15.750
B_3K_0	15.250
B_3K_1	16.167
B_3K_2	15.167
B_3K_3	16.750

The provision of sufficient doses of fertilizer and supported by environmental optimum conditions, causing metabolism operating well and the results be translocated to form number of line seed/cobs sweet corn. According to Nur Hayati (2006), growth the production and the quality of the results of sweet corn influenced by two factors, namely genetic factor and environmental factors like soil fertility (granting fertilizer). The provision of fertilizer KCl treatment to the number line seeds/cob (Table 4) shows that between fertilizer KCl treatment shows the influence not significant for all treatments and treatment K_3 give the largest the number of lines/cob as 15.771 lines. This might have been caused by very influenced by factor genetic dan factor environmental (Nesia, 2014).

Conclusion

The result of research show that:

a. Fertilizer baglog mushroom was significant to height of plant (cm) in 2, 4, 6 and 8 week after planting, diameter of cob (cm), number line of seed/cob, weight of cob (kg) for sample and cob (kg).
b. Fertilizer KCl was no significant for number line of seed/cob, weight of cob (kg) for sample and cob (kg).
c. Interaction between fertilizer baglog mushroom with KCl were no significant for all parameters that observed (height of plant (cm), diameter of cob (cm), number line of seed/cob, weight of cob (kg) for sample and cob (kg).

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