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Response of two functional corn varieties to various NPK fertilizer doses

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Abstract

Functional corn is a special corn that has distinctive properties, namely containing higher nutrients than other corn. One of the things that affect the quality of corn is fertilization in the growth phase. This study aims to determine the most appropriate fertilizer dosage for 2 functional corn varieties. The research was carried out in Bone Regency, South Sulawesi Province. This research lasted for three months, starting from December 2023 to March 2024. This study was prepared using a separate plot design with 3 replicates consisting of 2 main plot treatment levels, namely glutinous corn and purple corn and the treatment of plot children, namely fertilizer doses: 100 kg, 200 kg and 300 kg. The results showed that the purple corn variety gave a better response to the parameters of plant height observation at the 4th week 54.8 cm, the number of leaves at the 4th week 8.5 pieces, the male flowering age was 45.0 DAP and the female flowering age was 47.5 DAP. Meanwhile, the NPK fertilizer dose of 300 kg/ha gave a better response to the parameters of the number of leaves in the 8th week of 12.9 cm, the weight of the cob with the cob was 98.4 grams and the weight of the cob without the cob was 84.0 grams. There was also an interaction between purple corn with a dose of NPK fertilizer of 300kg/ha on the parameters of cob weight per hectare of 5.58 tons/ha and dry seed weight per hectare of 4.24 tons/ha.

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Introduction

Corn plants (*Zea mays* L.) are a strategic commodity in the development of agriculture and the Indonesian economy, considering that this commodity has a dual function, both for food and feed. The use of corn for food in Indonesia has reached 50 percent of total demand. Corn has the potential as a raw material for various foods, beverage, chemical and pharmaceutical industries, as well as other industries. The need for corn as raw material for the food and feed industry is increasing by 10-15 percent per year. Thus, corn production affects the performance of the livestock industry, which is the community's main source of protein.

According to BPS, Indonesia's corn production in 2021 is 29.02 million tons. Nationally, the province with the largest corn production, namely East Java, contributed 23.16% to national corn production in 2020. The producer level corn price in 2021 was recorded at IDR. 4,888, per kg, rural consumers Rp.7,223,- per kg shows an increasing pattern during the 2018 - 2020 period. Meanwhile, the average monthly price of corn on the international market from the end of 2020 to May 2021 was observed to experience a high spike. The average price in 2021 until May reached USD 259.68 per ton.

Functional corn is special corn that has unique properties, namely that it contains higher nutrients than other corn. One type of functional corn is pulut corn. Pulut corn (*Zea mays* var. *ceratina* Kulesh) is a type of corn that has a special character, namely starch in the form of 100% amylopectin, which has a sweet, soft taste and an attractive appearance that other corn does not have, so it is much loved by the public (Mahendradatta and Tawali, 2008). One thing that influences the quality of corn is fertilization during the growth phase. Fertilizers commonly used are organic and inorganic fertilizers. According to Dewanto (2013), inorganic fertilizer is fertilizer that has been engineered chemically, physically and biologically and is the result of the industry or fertilizer manufacturing factory.

Apart from organic materials, NPK nutrients are also thought to support the growth and development of plants, especially corn. The availability of N, P and K nutrient sources which are more responsive to plants is currently very difficult to find on farmers' land, one of the reasons is due to the intensity of land use, which is high without paying attention to the provision of inputs to the land, so that farmers' land is often found in less fertile conditions (Prihartini, 2016). According to Hidayat *et al.* (2018), applying NPK fertilizer of 300 kg/ha can produce a cob weight of 13.25 tons/ha and the need for nitrogen (N), phosphate (P), and also potassium (K) nutrients in Corn plants must be given appropriately and in a balanced manner. Improper application of fertilizer to corn plants, such as a lack of one of the essential nutrients, NPK, will cause a decrease in the weight of cobs and seeds so that the quality of corn production will also decrease.

Tandisau and Thamrin (2009), with a deficiency of nutrient N, the yield of maize will decrease by 30%, while if there is a deficiency of nutrient P, the yield of maize will decrease by up to 20%, and the deficiency of nutrient K can cause the yield of maize to decrease by 10%. Thus, it can be concluded how important it is to provide essential nutrient fertilizers, especially NPK, which are appropriate and balanced for corn plants, especially functional corn of 2 varieties. Considering several important requirements related to the requirements for growing corn plants, one of which is in the form of the need for necessary nutrients. Considering how important it is to apply the right fertilizer to plants, this study aims to determine the most appropriate fertilizer dosage for 2 functional corn varieties, namely glutinous corn and purple corn.

Materials and methods

Time and Place of Implementation

This research was carried out in Cingkang Village, Barebbo District, Bone Regency, South Sulawesi Province. This research will take place for approximately three months, starting in December 2023- March 2024. It is located at an altitude of 50

meters above sea level with an average rainfall of 2081 mm/year and has a Mediterranean soil type.

Materials and tools

The materials used in the research were purple corn seeds (*yellow heroine I variety*), pulut corn (*local variety*), and NPK 16: 16: 16 fertilizer. The tools used in this research were hoes, measuring tapes, buckets, scoops, machetes, jugs, gembors, scissors, scales, tractors and digital cameras.

Research methods

This research was carried out in the form of an experiment which was arranged based on a split plot design with 3 replications consisting of 2 levels of treatment, namely the first factor was variety (a) as the main plot which consisted of two levels, namely

PU: a1: Purple corn

a2: Glutinous corn

The second factor is the dose of NPK fertilizer (b) as a subplot which consists of four levels, namely:

AP: b0: No fertilizer

b1: 100 kg/ha

b2: 200 kg/ha

b3: 300 kg/ha

Research implementation

Preparation of tillage

Land aims to improve soil conditions, and provide favorable conditions for root growth. Through soil tillage, poor drainage and aeration will be repaired. The soil is treated in moist conditions but not too wet. Loose soil is only generally cultivated. Furthermore, 24 experimental plots with a size of 2.25 m × 2 m were made with a distance of 30 cm between the plots.

Planting and watering

Planting is carried out by cutting ± 3 cm deep and inserting 2 corn seeds into each planting hole, then the planting hole is covered with soil. The planting distance used is, 75 cm × 20 cm, so as to obtain a population of 30 corn plants per experimental plot, so that for 24 experimental plots a total population of 720 plants is obtained. In the watering process, use water around the farmland. Watering is carried out depending on the moisture of the soil, if it is felt to be sufficiently moist, then watering is not necessary.

Thinning and mulching

Are carried out when the plants are 7 days after planting (DAP) old by leaving 1 plant in each planting hole. Planting is carried out when the plant is 7 years old by digging a trench between the beds and the soil behind the root part of the plant. This is intended so that corn plants do not collapse easily and make them sturdier to support the stems and fruit candidates that will grow. Excavations in the trenches allow water to enter. The water will be absorbed by the plant easily.

Fertilization and weed control

Fertilizer application is carried out 2 times, the first fertilization is carried out when the plant is 10 DAP old as much as 50% of each treatment. And the 2nd fertilization is carried out when the plant is 50 DAP old with a dose of 50% of each treatment. Weed control activities on corn plants are carried out manually, namely using hoes and pulling grass by hand. Weeding aims to control grass or weeds that grows in the area of corn plants.

Harvesting corn

Harvesting is carried out when the cobs are at their maximum, the seeds are dense (full) at the age of 105 DAP. Corn should be harvested in dry and brownish-yellow conditions. The determination of the harvest time criteria is as follows: the seeds are shiny, dry, hard and do not leave marks when pressed with a fingernail then the corn is ready to be harvested.

Observation parameters

Plant height

Plant height is measured from the root neck to the highest leaf tip using a meter. Measurement begins when the plant is 2 weeks old after planting (WAP) with an interval of 2 weeks until the plant appears to flower.

Number of leaves (strands) and leaf length (cm)

Observation of the number of leaves is carried out by counting the number of leaves that have opened perfectly in each corn plant. The observation of the number of leaves is carried out when the corn plant is 2 weeks old after planting (WAP), with an interval of 2 weeks. The observation of the number of leaves was carried out 4 times. Observation of leaf length is carried out by calculating the length of leaves that have opened perfectly in each corn plant. Observation of leaf length is carried out when the corn plant is 2 weeks old after planting (WAP), with an interval of 2 weeks. The observation of the number of leaves was carried out 4 times.

Male and female flowering age (DAP)

The flowering age is observed by calculating from the time of planting until the plant produces male flowers (pollen). Observations were made on each sample in each plot. The flowering age is observed by calculating from the time of planting until the plant produces female flowers (visible ± 2 cm). Observations were made on each sample in each plot.

The height of the cob (cm) and the weight of the cob with the cob (g)

The height of the cob is measured when the plant has begun to contain corn kernels. The height of the cob is measured when the plant has begun to contain corn kernels.

Weight of cobs without cobs and weight of cobs with seeds per hectare

The weight of cobs without cobs is calculated by weighing corn cobs on each sample crop plot using scales at the time of harvest. It is done by calculating the weight of each cob per plot and then confered into hectares.

Production of harvest weight

It was carried out by calculating the seed weight of each study after the corn was dried, aired for approximately one week and had been pipiled and then confined into hectares.

Results

Plant height (cm) week 4 after planting

The results of observations and variations in plant height 4 weeks after planting are presented in appendices 1a and 1b. The analysis of variance showed that the variety treatment had a very real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on plant height 4 weeks after planting (Table 1). The smallest significant difference test result α 0.05 shows that the variety has a real influence on the height of the corn plant. Variertas (a2) gives the highest results compared to Variertas (a1).

Table 1. Response of 2 functional corn varieties and various doses of NPK fertilizer on the height of week old corn plants

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	39,3	42,0	41,6	41,0	40,9a	3,2
a2	50,6	56,0	55,3	57,3	54,8b	
Rate-rate	44,9	49,0	48,5	49,2		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Plant height 8 week after planting

The results of observations and variations in plant height 8 weeks after planting are presented in appendices 2a and 2b. The analysis of variance showed that the variety treatment did not have a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on plant height 8 weeks after planting (Table 2). The results of the smallest significant difference test α 0.05 show that the variety and fertilizer dosage do not have a real influence on the height of corn plants 8 weeks after planting.

Table 2. Response of 2 functional corn varieties and various doses of NPK fertilizer to the height of 8 week old corn plants

Variety corn	Fertilizer dosage				Rate-rate
	b0	b1	b2	b3	
a1	181,3	192,6	180,3	187,3	185,4
a2	185,0	182,6	193,3	203,3	191,1
Rate-rate	183,2	187,6	48,5	195,3	

Table 3. Response of 2 functional corn varieties and various doses of NPK fertilizer on the number of leaves of 4 week old corn plants

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	7,0	7,6	8,0	7,6	7.6a	0,1
a2	8,0	8,6	8,6	8,6	8,5b	
Rate-rate	7,5	8,1	8,3	8,1		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Table 4. Response of 2 functional corn varieties and various doses of NPK fertilizer on the number of leaves of 8 week old corn plant

Variety corn	Fertilizer dosage				Rate-rate
	b0	b1	b2	b3	
a1	12,3	13,0	12,0	13,3	12,6
a2	11,3	11,6	12,0	12,6	11,8
Rate-rate	11,8a	12,3c	12,0b	12,9d	

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Number of leaves 4 weeks after planting

The results of observations and variations in the number of leaves 4 weeks after planting are presented in appendices 3a and 3b. The analysis of variance showed that the variety treatment had a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on the number of leaves 4 weeks after planting (Table 3). The results of the smallest significant difference test α 0.05 showed that the number of leaves aged 4 weeks after planting was highest in the functional corn variety treatment, namely in (a2) as many as 8.5 pieces.

Number of leaves age 8th weeks after planting

The results of observations and variations in the number of leaves 8 weeks after planting are presented in appendices 4a and 4b. The analysis of variance showed that the variety treatment did not have a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on the number of leaves 8 weeks after planting (Table 4). The results of the smallest significant difference test α 0.05 showed that the highest number of leaves aged 8 weeks after planting in the fertilizer dose (b3) treatment was 12.9 pieces.

Leaf length 4th week after planting

The results of observations and variations in leaf length 4 weeks after planting are presented in appendices 5a and 5b. The analysis of variance showed that the variety treatment did not have a significant effect, the NPK fertilizer dose had no significant effect, the interaction between dose and variety did not have a significant effect on the number of leaves 4 weeks after planting (Table 5). The results of the smallest significant difference test α 0.05 indicate that the treatment level of the variety and fertilizer dose had no significant influence on the observation parameters of leaf length at 4 weeks old.

Table 5. Response of 2 functional corn varieties and various doses of NPK fertilizer on leaf length of 4 old corn plants

Variety corn	Fertilizer dosage				Rate-rate
	b0	b1	b2	b3	
a1	40,0	44,6	40,6	36,0	40,3
a2	40,6	40,3	37,0	39,6	39,3
Rate-rate	40,3	42,5	38,8	36,3	

Table 6. Response of 2 functional corn varieties and various doses of NPK fertilizer on leaf length of 8 week old corn plants

Variety corn	Fertilizer dosage				Rate-rate
	b0	b1	b2	b3	
a1	67,0	74,0	73,0	73,6	71,9
a2	75,6	77,6	81,3	78,6	78,3
Rate-rate	71,3	75,8	77,2	76,1	

Table 7. Response of 2 functional corn varieties and various doses of NPK fertilizer on male flowering age

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	52,3	50,0	50,3	51,0	50.9b	0,8
a2	45,0	45,0	46,0	44,0	45.0a	
Rate rate	48,7	47,5	48,2	47,5		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Table 8. Response of 2 functional corn varieties and various doses of NPK fertilizer on female flowering age

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	55,0	54,0	54,6	53,3	54,2b	0,1
a2	47,3	47,3	48,3	47,0	47,5a	
Rate rate	51,2	50,2	51,5	50,1		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Leaf length 8th week after planting

The results of observations and variations in leaf length 8 weeks after planting are presented in appendices 6a and 6b. The analysis of variance showed that the variety treatment did not have a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on the number of leaves 8 weeks after planting (Table 6). The results of the smallest significant difference test α 0.05 indicate that the treatment level of the variety and fertilizer dose had no significant influence on the observation parameters of leaf length at 8 weeks of age.

Male flowering age

The results of observations and variations in male flowering age are presented in appendices 7a and 7b. The analysis of variance showed that the variety treatment had a significant effect, the NPK fertilizer dose had no significant effect, the interaction between dose and variety did not have a real effect on the parameters of male flowering age (Table 7). The results of the smallest significant difference test α 0.05 showed that the fastest flowering age was at the treatment level for corn varieties, namely (a2) 45 days after planting and the longest for corn varieties (a1), namely 50.9 days after planting.

Female flowering age

The results of observations and variations in female flowering age are presented in appendices 8a and 8b. The analysis of variance showed that the variety treatment had a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and

variety did not have a real effect on the parameters of female flowering age (Table 8). The results of the smallest significant difference test α 0.05 showed that the fastest flowering age was at the corn variety treatment level, namely (a2) 47.5 DAP and the longest was for the corn variety (a1), namely 54.2 DAP.

Cob height

The results of observations and variations in cob height are presented in appendices 9a and 9b. The variance test showed that the variety treatment did not have a real effect, the NPK fertilizer dose had no real effect, the interaction between dose and variety did not have a real effect on the cob height parameter (Table 9). The results of the smallest significant difference test α 0.05 indicate that the treatment level of the variety and fertilizer dose had no significant influence on the observed parameters.

Weight of cobs with lobs

The results of observations and variations in the weight of cobs and husks are presented in appendices 10a and 10b. The variance test showed that the variety treatment did not have a real effect, the NPK fertilizer dose had a very real effect, the interaction between dose and variety did not have a real effect on the weight of cobs and husks (Table 10). The results of the smallest significant difference test α 0.05 showed that the weight of cobs with husks was highest in the fertilizer dose (b3) treatment with 98.4 grams. Meanwhile, the weight of the cob with the lowest husk was (b0) with 59.1 grams.

Table 9. Response of 2 functional corn varieties and various doses of NPK fertilizer to cob height

Variety corn	Fertilizer dosage				Rate-rate
	b0	b1	b2	b3	
a1	92,6	93,3	95,6	95,6	95,2
a2	92,6	90,6	98,6	100,6	95,6
Rate-rate	92,6	94,9	95,9	98,3	

Table 10. Response of 2 functional corn varieties and various doses of NPK fertilizer to the weight of cobs with husks

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	55,6	95,3	94,6	97,6	85,8	8,7
a2	62,6	79,6	89,0	99,3	82,6	
Rate-rate	59,1a	87.4b	91,8bc	98,4c		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Table 11. Response of 2 functional corn varieties and various doses of NPK fertilizer to cob weight without husk

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	45,7	81,3	77,0	84,0	72,0	15,20
a2	54,3	65,3	73,6	84,0	69,3	
Rate-rate	50.0a	73.3b	75.3b	84,0b		

Weight of cobs without excess

The results of observations and analysis of variations in the weight of cobs without husks showed that the variety did not have a real influence on the weight of cobs without husks but the fertilizer dose had a real influence on the weight of cobs without husks of corn plants (Table 11). The smallest honest difference test result α 0.05 shows that the weight of the cobs without husks was highest in the fertilizer dose (b3) treatment with 72.0 grams. Meanwhile, the weight of the cob with the lowest husk is (b0) with 69.3 grams.

Weight of cobs with seeds per hectare (tons)

The results of observations and analysis of variations in cob weight per hectare showed that variety, fertilizer dosage and interaction had a real influence on cob weight per hectare. Parameter data for observations of cob weight per hectare with variety treatment level and fertilizer dose

along with the characteristics of the variety can be seen in appendix 14. Cob weight per hectare for 2 corn varieties and various fertilizer doses after further testing at 5% level of BNT is presented in (Table 12) below. The results of the smallest significant difference test α 0.05 indicate that the highest interaction between variety and fertilizer dose was in treatment (a1b3) with 5.58 tons per hectare. Meanwhile, the lowest interaction was in treatment (a2b0) with 3.13 tons per hectare.

Table 12. Response of 2 functional corn varieties and various doses of NPK fertilizer to cob weight per hectare

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	3,50ax	5,17by	5,36bx	5,58bx	4,90	a = 0,72
a2	3,13ax	4,00bx	5,05cx	5,05cx	4,37	x = 0,51
Rate-rate	2,32	4,60	5,21	5,45		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Table 13. Response of 2 functional corn varieties and various doses of NPK fertilizer to dry seed weight per hectare

Variety corn	Fertilizer dosage				Rate-rate	NP. BNT
	b0	b1	b2	b3		0,05
a1	2.59ax	3,99by	4,11by	4,24bx	3,73	a = 0,51
a2	2,42ax	2,88ax	3,53bx	3,89bx	3,18	x = 0,88
Rate-rate	2,51	3,44	3,82	4,07		

The average value followed by the same letter means that it is not significantly different according to the BNT test at the 5% level.

Dry seed weight per hectare (tons)

The results of observations and analysis of variations in seed weight per hectare showed that variety, fertilizer dosage and interactions had a real influence on ear weight per hectare. Parameter data for observations of cob weight per hectare with variety treatment level and fertilizer dose along with the characteristics of the variety can be seen in Appendix 15. Cob weight per hectare for 2 corn varieties and various fertilizer doses after further testing at 5% level of BNT is presented in (Table 13) below. The results of the smallest significant difference test α 0.05 show that the highest interaction between variety and fertilizer dose was in treatment (a1b3) with 3.75 tonnes per hectare. Meanwhile, the lowest interaction was in treatment (a2b0) with 2.42 tons per hectare.

Discussion

Plant growth and development is a very important process in the life and development of a species. Growth and development occur continuously throughout the life cycle of a plant. Factors that influence growth are genetic factors and environmental factors. The better the environmental conditions for plants to grow, the plants will express their genotypic characteristics well so that the plants can grow normally (Herlina and Fitriani, 2017).

Corn plant height

The results of research that has been carried out on varieties and fertilizer doses have a real influence on plant height. This is thought to be due to the influence of genetic factors and environmental factors so that the provision of fertilizer and selection of corn varieties has a real influence on plant height growth. According to Fiqriansyah *et al.* (2021), plants really need genetic factors and environmental factors in the vegetative growth phase, so that plants can easily accelerate the growth of plant height, stem circumference, number of branches and leaf formation.

Number of leaves and leaf length

The results of the research showed that the variety factor had a significant effect on the leaf number

parameters in the 4th week of the plant. Meanwhile, the fertilizer dosage factor did not have a significant effect on the leaf number parameters in week 4. The number of leaves aged 8 weeks showed that the variety did not have a real effect, whereas the fertilizer dose had a real effect. Based on tables 3 and 4 above, it shows that giving a fertilizer dose of 300 kg/ha produced the highest number of leaves with 8.5 leaves in the 4th week, while giving a fertilizer dose of 300 kg/ha in the 8th week produced a total of 12 leaves.

Flowering age

The results of research that has been carried out on varieties have a real influence on flowering time, while fertilizer doses do not have a real influence on flowering time of corn plants. It is suspected that the flowering age of corn plants is influenced by genetic factors and environmental factors which cause differences between the flowering age of the two corn varieties and the results of research. In accordance with Siswanda's statement (2021) that the growth of a plant will be influenced by internal factors, namely the plant itself, such as the anatomical and physiological conditions of the plant. Meanwhile, external factors are environmental factors such as soil, temperature, humidity, sunlight and so on.

Weight of dry cobs with husks and without husks

Observation of the weight of the cobs with husks and the weight of the cobs without husks was carried out by weighing the cobs with husks, then separating the husks and cobs and then weighing them. This observation variable shows the results that varieties do not increase both variables. NPK fertilizer dosage increased both variables. The interaction between variety and dose is not significant. According to research by Syarifuddin (2012), water content and N dosage result in differences in the weight of cobs with husks, cob weight without husks, and cob length and can also be influenced by genetic factors.

NPK dose of 300 kg ha-1 had higher results in the cob weight variable with husks which reached 98.4 grams, while the dose of 200 kg ha-1 only reached 91.8 grams. The cob weight variable without husks at the NPK dose of 300 kg ha-1 was also higher, reaching 84 grams, while the NPK dose of 200 kg ha-1 only reached 75.3 grams. Ramanta's research (2008), inorganic fertilizer increases the weight of cobs without husks. Subekti (2007) added that giving the right dose of fertilizer needs to be done to balance nutrients so that plants can grow and develop well.

Yield per hectare

Yield per hectare to determine the level of production of a crop. Variety treatment increased yield per hectare-1. The dose of NPK fertilizer also increases crop yields per hectare-1. The yield with cob variety (a1) was higher, reaching 4.90 tons/ha, while the variety (a2) reached 4.37 tons/ha the difference between these two variable varieties is 0.53 tons/ha. The highest yield of dry pipil harvest with the interaction of variety treatment and fertilizer dose was (a1b3) reaching 5.58 tons/ha. Meanwhile, the lowest was (a2b0) with 3.13 tons/ha. A decrease in yield can occur if there is a lack of water during the flowering phase, male and female flowers appear, and during the pollination process. Aqil (2007) stated that the impact of this is that the seed filling process is hampered because the female flowers or cobs dry out so that the number of seeds in the cobs decreases.

According to Asghar *et al.* (2010) that corn yields increase with the use of NPK fertilizer. According to Taufik *et al.* (2004), nutrient availability is related to the seed filling process. The nutrients absorbed will be accumulated in the leaves to become proteins that form seeds. The accumulation of metabolic materials during seed formation will increase, so that the seeds formed have maximum size and weight. This occurs when nutrient needs are met which causes metabolism to run optimally.

Conclusion

The results of observations and fingerprints of seed weight variations per hectare showed that the variety and dose of fertilizer had a real influence on the weight of cobs per hectare. The results of the smallest real difference test α 0.05 showed that the highest interaction between varieties and fertilizer doses was

in the treatment (a1b3) with 3.75 tons per hectare. Meanwhile, the lowest interaction was in the treatment (a2b0) with 2.42 tons per hectare. Variety treatment increases the yield per hectare. The NPK fertilizer dose also increases the yield per hectare. The yield with cobs of the higher variety (a1) reached 4.90 tons/ha, while the variety (a2) reached 4.37 tons/ha. The difference between these two variable varieties is 0.53 tons/ha. The NPK fertilizer dose of 300 kg/ha gave a better response to the parameters of number of leaves in week 8 of 12.9 cm, weight of cobs with husks of 98.4 grams and weight of cobs without husks of 84.0 grams.

The yield of functional corn increased, both glutinous corn and purple corn with the use of NPK fertilizer. The availability of nutrients is related to the seed filling process. The absorbed nutrients will accumulate into the leaves into proteins that form seeds. The accumulation of metabolic material in seed formation will increase, so that the seeds formed have the maximum size and weight, this occurs if the nutrient needs that cause the metabolism to run optimally are met. There is an interaction between purple corn and an NPK fertilizer dose of 300kg/ha on the parameters of cob weight per hectare of 5.58 tonnes/ha and dry seed weight per hectare of 4.24 tonnes/ha.

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