



## Growth and Production of Several Corn Varieties at Various NPK Fertilizer Dosages

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### Abstract

Increasing corn production in Indonesia is one of the government's concerns to ensure the strengthening of food towards self-sufficiency. Improvement of fertilization methods and the use of superior varieties are parts of the intensifications to increase crop productivity. The purpose of this study was to determine the effect of NPK fertilizer doses, types of varieties, and their interactions on the growth and production of corn. This study was conducted from July to October 2022 at Bajeng Cereal Research Center (KP) Experimental Garden, Bajeng Sub-district, Gowa District, South Sulawesi at 27.2 m asl, specifically 5°18'21.5" S, 119°28'38.6" E. The study used a split-plot design with fertilizer doses N:P:K as the main plot (P), namely N:P:K 60% = 120:90:60, N:P:K 80% = 160:120:80, N:P:K 100% = 200:150:100, N:P:K 120% = 240:180:120, and N:P:K 140% = 280:210:140. The varieties were used as subplots (V), namely *Sinhas 1* (V1), *Jakarin 1* (V2), *Nasa 29* (V3), *JH 36* (V4), *Bisi 18* (V5), *ADV* (V6), and *Pioner* (V7). The results of the study showed that the combination of the fertilizer doses of N:P:K 100% = 200:150:100 with *Pioner* variety (P3V7) obtained the highest average yield of 11.81 t. ha<sup>-1</sup> among other combinations of N:P:K fertilizer doses with varieties

**Keywords:** Corn, N P K, Yield

## A. Introduction

Corn is one of the most important food crops after rice. Corn has a strategic role and economic value, and has the opportunity to be developed. Corn is the main source of carbohydrates and protein after rice. Corn is also used as a raw material for food and animal feed industries and as an export commodity. The wide use of corn in various industries causes the demand for corn to increase.

Based on data on corn production in Indonesia for the last 7 years, corn production has always been below the target since 2016, in 2016 corn production was 23.18 million tons and lower than the target of 24 million tons. Corn production in 2017 and 2018 was also below the target of 25.2 million tons and 26.5 million. In 2019, corn production was only 27.61 million tons of the target of 27.8 million tons, and in 2020 corn production was 28.63 million tons, still lower than the target of 29.05 million tons (Directorate General of Food Crops of the Republic of Indonesia, 2020). Based on data from the Ministry of Agriculture of the Republic of Indonesia, the volume of corn imports throughout mid-2019 reached 0.58 million tons. The mid-2019 achievement was closed to the previous year's imports of 0.74 million tons. In line with the increased national maize production, efforts are needed to significantly increase corn productivity to meet demand, increase exports, and reduce imports. The yield of corn can be increased by selecting varieties and doses of fertilizer.

A method to increase corn yields is through the use of quality seeds from superior varieties to produce high production. However, the use of superior varieties is also not enough to support high production, it is necessary to apply fertilizer to meet the nutrition needs of the plants. The use of early maturing superior varieties that are responsive to the application of macronutrients N, P, and K has succeeded in significantly increasing crop production (Agricultural Research and Development Agency, 2021).

The synthetic fertilizer commonly used by farmers is NPK which contains nutrients N, P, and K which are essential nutrients for plants. Increasing the dose of N fertilization in the soil can directly increase protein content (N) and corn production, but meeting only N without P and K elements may cause plants to fall easily, be sensitive to pest attacks and decrease production quality (Pusparini, Yunus and Harjoko, 2018). However, farmers provide inorganic fertilizers excessively which has a negative impact on the environment

Considering these explanations, it is necessary to study the appropriate dosage of NPK fertilizer to optimize the growth and productivity of corn plants.

## B. Methodology

This study was carried out at the Experimental Garden of the Bajeng Cereal Research Institute (KP), Bajeng Sub-District, Gowa Regency, South Sulawesi at 27.2 m asl, with coordinates of 5°18'21.5"S, 119°28'38.6"E. The study was conducted from July to October, 2022. This study used a split-plot design in a randomized block design, with fertilizer doses of N:P: K as the main plot (P), that is N:P: K 60% = 120:90:60, N:P: K 80% = 160:120:80, N:P: K 100% = 200:150:100, N:P: K 120% = 240:180:120, and N:P:K 140% = 280:210:140. Varieties was used as subplots (V), namely *Sinhas 1* (V1), *Jakarin 1* (V2), *Nasa 29* (V3), *JH 36* (V4), *Bisi 18* (V5), *ADV* (V6), and *Pioner* (V7). Based on these treatment combinations, 35 combinations were used with three replications, resulting in 105 experimental units.

Parameters observed in this study were plant height, number of leaves, stem diameter, cob weight, number of rows of seeds, and productivity. Observational data were analyzed using analysis of variance, analysis of heritability, and analysis of genetic diversity. If there is a treatment effect on the analysis of variance, a further test is carried out to differentiate the means between treatments using the Honest Significant Difference (HSD) test at a 95% confidence level.

## C. Result and Discussion

Table 1 shows that the interaction between fertilizer dose of N:P:K 100% = 200:150:100 (P3) with *JH 36* (V5) suggests plant height with an average of 211.65 cm and was significantly different from *Nasa 29* (V3), *Sinhas 1* (V1), *Jakarin* (V2), *Bisi 18* (V5), *ADV* (V6), and *Pioner* (V7) and were not significantly different from the fertilizer dose of N:P:K 80% = 160:120:80 (P2) with *Pioner* (V7). In the fertilizer dose of N:P:K 60% = 120:90:60 (P1) the plant height of *ADV* (V6) was significantly different from *Pioner* (V7), *JH 36* (V4), and *Sinhas 1* (V1), and not significantly different from *Bisi 18* (V5), *Nasa 29* (V3), and *Jakarin* (V2).

**Table 1. Plant height (cm) at various doses of fertilizer and varieties**

Variety	Treatment					Average	NP (V) LSD 0.05
	P1	P2	P3	P4	P5		
V1	172.33 <sub>c<sub>r</sub></sub>	183.93 <sub>c<sub>qr</sub></sub>	198.88 <sub>ab<sub>p</sub></sub>	195.48 <sub>bc<sub>pq</sub></sub>	201.00 <sub>ab<sub>p</sub></sub>	190.33	
V2	198.23 <sub>ab<sub>p</sub></sub>	178.50 <sub>c<sub>q</sub></sub>	201.74 <sub>ab<sub>p</sub></sub>	201.27 <sub>ab<sub>p</sub></sub>	203.47 <sub>ab<sub>p</sub></sub>	196.64	
V3	201.50 <sub>ab<sub>p</sub></sub>	199.98 <sub>b<sub>p</sub></sub>	196.92 <sub>b<sub>p</sub></sub>	189.60 <sub>bc<sub>p</sub></sub>	192.23 <sub>b<sub>p</sub></sub>	196.05	
V4	208.07 <sub>a<sub>p</sub></sub>	206.27 <sub>b<sub>pq</sub></sub>	<b>211.65<sub>a<sub>p</sub></sub></b>	194.60 <sub>bc<sub>q</sub></sub>	205.80 <sub>a<sub>pq</sub></sub>	205.28	8.68
V5	195.47 <sub>ab<sub>qr</sub></sub>	200.40 <sub>b<sub>pqr</sub></sub>	207.09 <sub>ab<sub>pq</sub></sub>	209.23 <sub>a<sub>p</sub></sub>	190.27 <sub>b<sub>r</sub></sub>	200.49	
V6	206.08 <sub>ab<sub>p</sub></sub>	198.67 <sub>b<sub>p</sub></sub>	197.67 <sub>b<sub>pq</sub></sub>	185.68 <sub>c<sub>q</sub></sub>	200.58 <sub>ab<sub>p</sub></sub>	197.73	
V7	193.84 <sub>b<sub>r</sub></sub>	<b>220.15<sub>a<sub>p</sub></sub></b>	210.10 <sub>ab<sub>pq</sub></sub>	202.23 <sub>ab<sub>pq</sub></sub>	210.05 <sub>a<sub>pq</sub></sub>	207.27	
Mean	196.50	198.27	203.43	196.87	200.49		
NP (P) LSD 0.05	<b>8.83</b>						

**Note:** Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test <sub>0.05</sub>.

Plant height is affected by N in the vegetative phase, this is in line with the opinion of Bloom (2015), Leghari, S.J., N.A. Wahocho, G.M. Laghari, A.H. Laghari, G.M. Bhabhan, K.H. Talpur, T.A. Bhutto, S.A. Wahocho, & A.A. Lashari (2016), and Ueda, Y., Konishi, M., Yanagisawa (2017), nitrogen fertilization correlated with net photosynthate, amount of chlorophyll pigment, leaf area, seed weight, seed number, and plant biomass. Yovita (2022) reported that plant height, cob height, cob diameter, number of seed rows, 1000 seed weight, and cob weight had a significant effect on productivity, so these characters were used as a standard.

The further test results of the HSD test in table 2 show that the interaction that suggests the highest average number of leaves is the fertilizer dose of N:P:K 100% = 200:150:100 (P3) with *Bisi 18* (V5) and is significantly different from the fertilizer dose of N:P:K 80% = 160:120:80 (P2) with *Nasa 29* (V3), *ADV* (V6), and *Sinhas 1* (V1) and not significantly different with fertilizer dose of N:P:K 80% = 160:120:80 (P2) for *Pioner* (V7).

**Table 2. Number of leaves (strands) at various fertilizer doses and varieties**

Variety	Treatment					Average	NP (V) HSD 0.05
	P1	P2	P3	P4	P5		
V1	10.27 <sub>a<sub>pq</sub></sub>	10.80 <sub>ab<sub>p</sub></sub>	11.03 <sub>a<sub>p</sub></sub>	11.17 <sub>a<sub>p</sub></sub>	8.87 <sub>c<sub>q</sub></sub>	10.43	
V2	10.04 <sub>a<sub>p</sub></sub>	10.67 <sub>ab<sub>p</sub></sub>	11.60 <sub>a<sub>p</sub></sub>	11.03 <sub>a<sub>p</sub></sub>	10.70 <sub>ab<sub>p</sub></sub>	10.81	
V3	10.70 <sub>a<sub>p</sub></sub>	11.23 <sub>ab<sub>p</sub></sub>	12.20 <sub>a<sub>p</sub></sub>	11.03 <sub>a<sub>p</sub></sub>	10.83 <sub>ab<sub>p</sub></sub>	11.20	
V4	11.27 <sub>a<sub>p</sub></sub>	10.54 <sub>b<sub>p</sub></sub>	11.90 <sub>a<sub>p</sub></sub>	11.03 <sub>a<sub>p</sub></sub>	11.10 <sub>ab<sub>p</sub></sub>	11.17	1.13
V5	10.31 <sub>a<sub>p</sub></sub>	10.74 <sub>ab<sub>p</sub></sub>	<b>12.27<sub>a<sub>p</sub></sub></b>	10.83 <sub>a<sub>p</sub></sub>	10.40 <sub>abc<sub>p</sub></sub>	10.91	
V6	10.32 <sub>a<sub>pq</sub></sub>	10.00 <sub>b<sub>pq</sub></sub>	10.67 <sub>a<sub>p</sub></sub>	10.67 <sub>a<sub>pq</sub></sub>	10.13 <sub>bc<sub>q</sub></sub>	10.36	
V7	10.37 <sub>a<sub>p</sub></sub>	<b>12.27<sub>a<sub>p</sub></sub></b>	11.90 <sub>a<sub>p</sub></sub>	10.93 <sub>a<sub>p</sub></sub>	11.87 <sub>a<sub>p</sub></sub>	11.47	
Mean	10.47	10.89	11.65	10.96	10.56	10.91	
NP (P) HSD 0.05	1.09						

**Note:** Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test <sub>0.05</sub>.

The number of leaves has a significant effect on the production of corn plants, this is in line with the opinion of Surtinah (2018), who reports that leaves that function as a place for photosynthesis contribute to production, leaves that actively carry out photosynthesis effects a large contribution to the accumulation dry material that furtherly be sent to the sink as a result of production.

The LSD test results in table 3 show that the interaction between fertilizer dose of N:P:K 60%= 120:90:60 (P1) with *Nasa 29* (V3) shows the best average stem diameter with a value of 25.60 mm and significantly different from *JH 36* (V4), *Bisi 18* (V5), *Pioner* (V7), *Sinhas 1* (V1), and *ADV*

(V6) and not significantly different with the interaction of fertilizer dose of N:P:K 140%=280:210:140 with *ADV* (V6), and the interaction of fertilizer dose of N:P:K of 100%=200:150:100 (P3) with *Nasa 29* (V3).

**Table 3. Stem diameter (mm) at various fertilizer doses and varieties**

Variety	Treatment					Average	NP (V) HSD 0.05
	P1	P2	P3	P4	P5		
V1	20.24 <sup>bc<sub>p</sub></sup>	19.82 <sup>bc<sub>p</sub></sup>	19.40 <sup>bc<sub>p</sub></sup>	18.92 <sup>a<sub>p</sub></sup>	19.83 <sup>cd<sub>p</sub></sup>	19.64	
V2	19.88 <sup>c<sub>pq</sub></sup>	17.97 <sup>cd<sub>q</sub></sup>	20.13 <sup>bc<sub>pq</sub></sup>	15.21 <sup>b<sub>r</sub></sup>	21.25 <sup>bc<sub>p</sub></sup>	18.89	
V3	<b>25.60<sup>a<sub>p</sub></sup></b>	16.09 <sup>d<sub>s</sub></sup>	<b>22.17<sup>a<sub>p</sub></sup></b>	19.20 <sup>a<sub>r</sub></sup>	21.39 <sup>bc<sub>q</sub></sup>	20.89	
V4	22.08 <sup>b<sub>p</sub></sup>	21.98 <sup>a<sub>p</sub></sup>	21.20 <sup>ab<sub>p</sub></sup>	20.80 <sup>a<sub>p</sub></sup>	22.79 <sup>ab<sub>p</sub></sup>	21.77	3.34
V5	20.55 <sup>bc<sub>p</sub></sup>	19.52 <sup>bc<sub>p</sub></sup>	20.49 <sup>abc<sub>p</sub></sup>	19.41 <sup>a<sub>p</sub></sup>	19.02 <sup>d<sub>p</sub></sup>	19.80	
V6	18.72 <sup>c<sub>pq</sub></sup>	20.05 <sup>ab<sub>pr</sub></sup>	18.52 <sup>c<sub>r</sub></sup>	20.68 <sup>a<sub>q</sub></sup>	<b>23.55<sup>a<sub>p</sub></sup></b>	20.30	
V7	20.75 <sup>bc<sub>q</sub></sup>	19.60 <sup>bc<sub>q</sub></sup>	19.91 <sup>bc<sub>q</sub></sup>	18.89 <sup>a<sub>p</sub></sup>	23.07 <sup>ab<sub>p</sub></sup>	20.44	
Mean	21.12	19.29	20.26	19.01	21.56	20.25	
NP (P) HSD 0.05						3.40	

**Note: Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test 0,05.**

The size of the stem diameter is thought to be influenced by N which supplies nitrogen needs in corn plant tissues. Nitrogen is an essential element for plant growth and development because nitrogen is important in cell division. This is in accordance with Gardner, F.P., R.B. Pearce & R.L. Mitchell (1991) who stated that nitrogen is important nutrition in the building blocks of amino acids, amides, nucleotides, and nucleoproteins and is essential for cell division, and cell enlargement and therefore also important for plant growth.

The HSD test in table 4 shows that the interaction between the fertilizer dose of N:P:K 140% = 280:210:140 (P5) with *ADV* (V6) suggests the highest average peel cob weight of 26.08 kg and is significantly different from other varieties. The interaction between the fertilizer dose of N:P:K 100% = 200:150:100 with *Pioneer* (V7) is significantly different from the fertilizer dose of N:P:K 120% = 240:180:120 (P4) with *Jakarin* (V2).

**Table 4. The average cob weight (kg) at various doses of NPK fertilizer and varieties**

Variety	Treatment					Average	NP (V) HSD 0.05
	P1	P2	P3	P4	P5		
V1	10.38 <sup>f<sub>r</sub></sup>	10.49 <sup>f<sub>r</sub></sup>	6.59 <sup>g<sub>s</sub></sup>	12.15 <sup>d<sub>q</sub></sup>	13.63 <sup>e<sub>p</sub></sup>	10.65	
V2	14.61 <sup>e<sub>p</sub></sup>	10.68 <sup>f<sub>s</sub></sup>	12.93 <sup>d<sub>r</sub></sup>	6.44 <sup>f<sub>t</sub></sup>	14.35 <sup>d<sub>q</sub></sup>	11.80	
V3	17.65 <sup>d<sub>p</sub></sup>	13.77 <sup>e<sub>q</sub></sup>	11.98 <sup>f<sub>r</sub></sup>	12.03 <sup>d<sub>r</sub></sup>	10.76 <sup>g<sub>s</sub></sup>	13.24	
V4	21.53 <sup>c<sub>p</sub></sup>	15.20 <sup>g<sub>q</sub></sup>	12.37 <sup>e<sub>r</sub></sup>	11.53 <sup>e<sub>t</sub></sup>	11.86 <sup>f<sub>s</sub></sup>	14.50	0.23
V5	22.10 <sup>b<sub>s</sub></sup>	24.18 <sup>a<sub>q</sub></sup>	16.79 <sup>c<sub>t</sub></sup>	23.81 <sup>a<sub>r</sub></sup>	25.64 <sup>b<sub>p</sub></sup>	22.50	
V6	23.80 <sup>a<sub>r</sub></sup>	16.62 <sup>c<sub>t</sub></sup>	24.36 <sup>b<sub>q</sub></sup>	23.15 <sup>b<sub>s</sub></sup>	<b>26.08<sup>a<sub>p</sub></sup></b>	22.80	
V7	23.61 <sup>a<sub>r</sub></sup>	22.82 <sup>b<sub>s</sub></sup>	25.28 <sup>a<sub>t</sub></sup>	16.06 <sup>c<sub>t</sub></sup>	24.30 <sup>c<sub>q</sub></sup>	22.41	
Mean	19.10	16.25	15.76	15.03	18.09	16.84	
NP (P) HSD 0.05						0.25	

**Note: Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test 0,05.**

The weight of the peeled cob has a great effect on the production of corn plants. According to a hybrid corn study by Priyanto, S.B., A. Muhammad, & T.M. Andi (2018), one of the characteristics that have a very significant correlation with yield is the weight of the peeled cobs. This proves that the weight of the cobs affects the yield where the grain yield increases significantly along with the increase in the weight of the cob. The increase in the weight of cobs with husks and cobs without husks on corn plants will be in line with the yields obtained. This is in line with the study by Pratikta, Sri, and Ketut (2013) which states that cob weight affects corn production because the greater the cob weight, the greater the corn production.

The results of the HSD test in table 5 show that the interaction between the fertilizer dose of N:P:K 80% = 160:120:80 (P2) with *Jakarin* (V2) suggests an average number of seed rows at 18.11 rows are significantly different from other varieties, but not significantly different with the interaction of fertilizer dose of N:P:K 100% = 200:150:100 (P3) with *ADV* (V6) and N:P : K 120% = 240:180:120 (P4) with *Bisi 18* (V5).

**Table 5. The average number of seed rows (rows) at various N:P:K fertilizer doses and varieties**

Variety	Treatment					Average	NP (V) HSD 0.05
	P1	P2	P3	P4	P5		
V1	14.07 <sup>a</sup> <sub>p</sub>	15.11 <sup>ab</sup> <sub>p</sub>	15.27 <sup>a</sup> <sub>p</sub>	16.27 <sup>a</sup> <sub>p</sub>	15.84 <sup>a</sup> <sub>p</sub>	15.31	
V2	14.78 <sup>a</sup> <sub>q</sub>	<b>18.11</b> <sup>a</sup> <sub>p</sub>	16.18 <sup>a</sup> <sub>pq</sub>	14.96 <sup>a</sup> <sub>q</sub>	16.13 <sup>a</sup> <sub>pq</sub>	16.03	
V3	14.31 <sup>a</sup> <sub>p</sub>	16.11 <sup>ab</sup> <sub>p</sub>	16.20 <sup>a</sup> <sub>p</sub>	16.00 <sup>a</sup> <sub>p</sub>	16.02 <sup>a</sup> <sub>p</sub>	15.73	
V4	14.13 <sup>a</sup> <sub>p</sub>	15.42 <sup>ab</sup> <sub>p</sub>	15.62 <sup>a</sup> <sub>p</sub>	15.82 <sup>a</sup> <sub>p</sub>	16.73 <sup>a</sup> <sub>p</sub>	15.55	2.39
V5	9.25 <sup>b</sup> <sub>r</sub>	13.47 <sup>b</sup> <sub>q</sub>	15.80 <sup>a</sup> <sub>pq</sub>	16.73 <sup>a</sup> <sub>p</sub>	15.60 <sup>a</sup> <sub>pq</sub>	14.17	
V6	15.69 <sup>a</sup> <sub>p</sub>	16.18 <sup>ab</sup> <sub>p</sub>	16.44 <sup>a</sup> <sub>p</sub>	15.83 <sup>a</sup> <sub>p</sub>	16.02 <sup>a</sup> <sub>p</sub>	16.03	
V7	14.84 <sup>a</sup> <sub>p</sub>	15.78 <sup>ab</sup> <sub>p</sub>	15.47 <sup>a</sup> <sub>p</sub>	15.56 <sup>a</sup> <sub>p</sub>	15.69 <sup>a</sup> <sub>p</sub>	15.47	
Mean	13.87	15.74	15.85	15.88	16.01	15.47	
NP (P) HSD 0.05	<b>2.37</b>						

**Note:** Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test  $\alpha_{0.05}$ .

The highest number of seed rows in this study was 18.11 rows, the more seeds contained on the cob will affect corn production. Sitepu & Adiwirman (2017) reported that the greater the number of seed rows, the higher the production of corn plants.

The HSD test results in table 6 show that the interaction of fertilizer dose of N:P:K 100% = 200:150:100 (P3) with *Pioner* (V7) indicates the highest average productivity of 11.81 t.ha<sup>-1</sup> and not significantly different from *ADV* (V6), but significantly different from *JH 36* (V4), *Bisi 18* (V5), and *Sinhas 1* (V1). Interaction of the fertilizer dose of N:P:K 80% = 160:120:80 (P2) with *Pioner* (V7) is not significantly different from the interaction of the fertilizer dose of N:P:K 120% = 240:180:120 (P4) with *Bisi 18* (V5).

**Table 6. The average productivity (t.ha<sup>-1</sup>) at various N:P:K fertilizer doses and varieties**

Variety	Treatment					Average	NP (V) HSD 0.05
	P1	P2	P3	P4	P5		
V1	4.75 <sup>c</sup> <sub>q</sub>	4.68 <sup>d</sup> <sub>q</sub>	3.02 <sup>d</sup> <sub>r</sub>	5.90 <sup>bc</sup> <sub>p</sub>	6.14 <sup>b</sup> <sub>p</sub>	4.90	
V2	6.76 <sup>b</sup> <sub>p</sub>	4.86 <sup>d</sup> <sub>q</sub>	6.07 <sup>c</sup> <sub>p</sub>	2.94 <sup>d</sup> <sub>r</sub>	6.11 <sup>b</sup> <sub>p</sub>	5.35	
V3	7.81 <sup>b</sup> <sub>p</sub>	6.46 <sup>c</sup> <sub>q</sub>	5.97 <sup>c</sup> <sub>qr</sub>	5.33 <sup>c</sup> <sub>rs</sub>	4.65 <sup>b</sup> <sub>s</sub>	6.04	
V4	9.71 <sup>a</sup> <sub>p</sub>	6.55 <sup>bc</sup> <sub>q</sub>	5.18 <sup>c</sup> <sub>r</sub>	5.45 <sup>c</sup> <sub>r</sub>	5.08 <sup>b</sup> <sub>r</sub>	6.39	0.96
V5	9.97 <sup>a</sup> <sub>r</sub>	10.36 <sup>a</sup> <sub>qr</sub>	8.63 <sup>b</sup> <sub>s</sub>	11.22 <sup>a</sup> <sub>pq</sub>	11.80 <sup>a</sup> <sub>p</sub>	10.40	
V6	10.32 <sup>a</sup> <sub>r</sub>	7.98 <sup>b</sup> <sub>s</sub>	11.53 <sup>a</sup> <sub>p</sub>	10.45 <sup>a</sup> <sub>qr</sub>	11.43 <sup>a</sup> <sub>pq</sub>	10.34	
V7	10.25 <sup>a</sup> <sub>q</sub>	10.89 <sup>a</sup> <sub>pq</sub>	<b>11.81</b> <sup>a</sup> <sub>p</sub>	7.09 <sup>b</sup> <sub>r</sub>	10.67 <sup>a</sup> <sub>q</sub>	10.14	
Mean	8.51	7.40	7.46	6.91	7.98	7.65	
NP (P) HSD 0.05	<b>0.99</b>						

**Note:** Numbers followed by the same letters in columns (a,b,c,d) and rows (p,q) indicate that they are not significantly different on the HSD test  $\alpha_{0.05}$ .

Based on the results of the variance of productivity, the combination of fertilizer doses of N:P:K 100% = 200:150:100 with *Pioneer* (P3V7) showed the highest productivity results among other treatment combinations at 11.81 t. ha<sup>-1</sup>. To support crop production, nutrients, especially N, P, and K during the growth and breeding phases are necessary. Mulyani (2008) reported that N plays a role in the formation of carbohydrates, proteins, and fats as well as other organic compounds and P plays a role in the formation of the generative parts of plants. K plays a role in stimulating the transfer of carbohydrates from leaves to plant organs. The use of inorganic fertilizers sufficiently can also increase crop production. This is in line with the study by Stephen O, Animasaun DA, Bello AA, Agboola OO (2014), the use of inorganic fertilizers to increase productivity is effective in just a few years, according to consistent use on a long-term basis.

#### D. Conclusion

Based on the results, it can be concluded that the combination of fertilizer dose of N:P:K 100% = 200:150:100 with *Pioneer* (P3V7) suggested the highest productivity compared to other combinations of fertilizer dose of N:P:K and other varieties with a yield of 11.81 t.ha<sup>-1</sup>. The variety with the highest production compared to other varieties was *Bisi 18* (V5) with a value of 10.40 t.ha<sup>-1</sup>.

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