



## **Effect of Nitrogen Fertilizer on Growth and Yield of Maize Composite Variety Lamuru**

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### **Abstract**

This research was conducted at Seed Center Canru of Sabbangparu Subdistrict Wajo district, from August to November 2015. The research aimed to study the effect of nitrogen fertilizer on growth and yield of maize composite variety Lamuru. This research used the Randomized Block Design with the treatment of three doses of nitrogen ie 0 kg N/ha, 75 kg N/ha, and 150 kg N/ha. The results showed that the fertilization dose of 75 kg N / ha tended to serve the best effect to the length of cobcorn, moisture content, yield and productivity of maize crop. While that the highest maize plant and corncob position was produced by maize treated with the fertilization of 150 kg N/ha.

**Keywords:** nitrogen, maize, growth, yield

## A. Introduction

Maize (corn) is the second main food crop after rice which is cultivated by most farmers in Indonesia. For the farmers who suffered the rice harvest failure due to pest attacks, maize cultivation is an alternative to gain profit or at least to cover the losses.

Based on the land resources and the availability of technology, Indonesia actually has an opportunity to be self-sufficient in corn consumption and even has the opportunity to become a supplier in the world market due to the increasing demand and the depletion of the maize stock in the international market. Furthermore, based on cultivation aspect, maize crops are also not difficult to cultivate as it grows almost in all soil types, however, it requires fertile, loose and rich humus soils for a good yield. Therefore, until now the production of Indonesian maize has not been able to properly meet the country needs.

According to the Ministry of the Agriculture Republic of Indonesia, the target of corn production in 2015 reaches 23-25 million tons. This target is higher than the Medium Term Development Plan which projecting the maize production in 2015 of 20.31 million tons. In 2014, the national maize production was 19.03 million or increased to 2.81% compared to that production in 2014. The planting area of 2014 reached 3.91 million ha with the harvested area amounted to 3.83 million hectares (ha) with the productivity of 4.9 ton per ha. Meanwhile, based on preliminary data for the balance of demand and availability of maize in 2014, the demand for maize reached 19.97 million tons. Thus, there was a deficit of about 941,399 tons (Anonymous, 2015)

Various efforts of the government in order to suppress the amount of imported maize which reaches 3.5 million tons are through the program of expansion of new planting areas, subsidized seeds, and assistance of agricultural machinery. On the other hand, maize (corn) production growth is not balanced with demand so that the deficit continues to grow. Currently, the growth of corn production is 5% per year, while feed industry demand is increased to 12% per year (Anonymous, 2015)

One of the causes of low maize productivity is the growth and development of maize, which strongly influenced by the availability of nutrients, especially nitrogen. Nitrogen is essential for plant growth, particularly in the vegetative phase, it is also useful during the formation process of leaf forage or chlorophyll that are very useful to help the photosynthesis process.

Nitrogen can be obtained through urea fertilization, a kind of artificial fertilizer. This fertilizer is preferred to be used due to its high nitrogen content compared to the other nitrogen fertilizers, moreover, its price is cheap and easy to access.

Application of nitrogen fertilizer to plants can improve the plant growth, such as the growth of root, stems, and leaves. The growth of roots leads plants to further expand into the soil and can easily to uptake water available in the underground layer. Plants with sufficient nutrients can complete their life cycle faster, while plants with insufficient nitrogen will be harvested more slowly, otherways, the excess nutrient can harm the plants thereby disrupting the growth process of the plant. To reduce the excess nutrients, proper fertilization needs to determine, where fertilization with the right dosage is one aspect to obtain fast and good plant growth.

## B. Methodology

This research was conducted at Seed Center Canru of Sabbangparu Sub-district, Wajo District from August to November 2015. The research used randomized block design with Nitrogen fertilizer doses treatment of (N): n0: Dose 0 kg N / ha, n1: dose 75 Kg N / ha and n2: dose 150 kg N / ha.

## C. Result and Discussion

### Plant Height

The variance of the plant height showed that nitrogen dosage treatment had no significant effect on the height of maize.

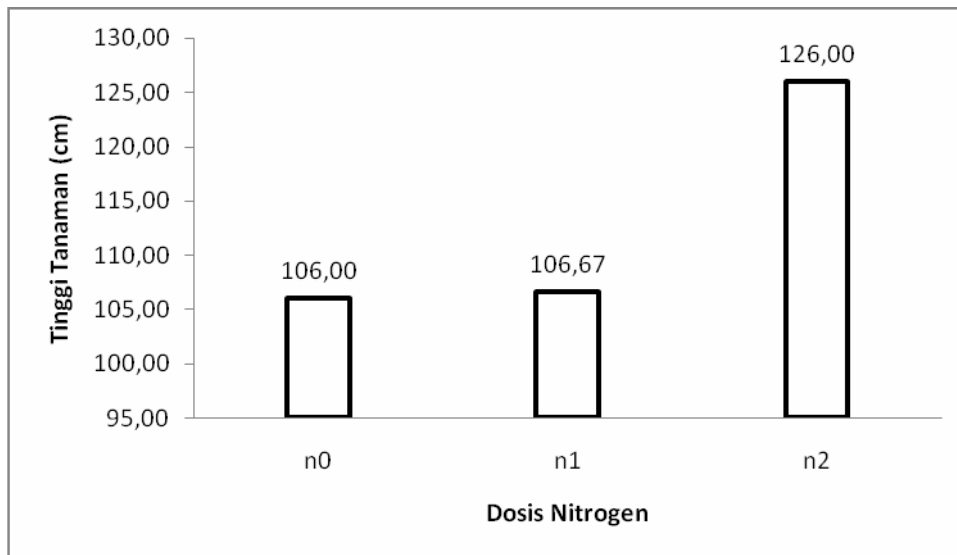


Figure 1. Chart of average Plant height of maize

Figure 1 shows that the highest maize yield was obtained by the treatment of nitrogen dose of 150 kg N / ha (n2).

### Height of corncobs position

The variance of the height of corncobs position showed that nitrogen dosage treatment had no significant effect on the height of corncob position.

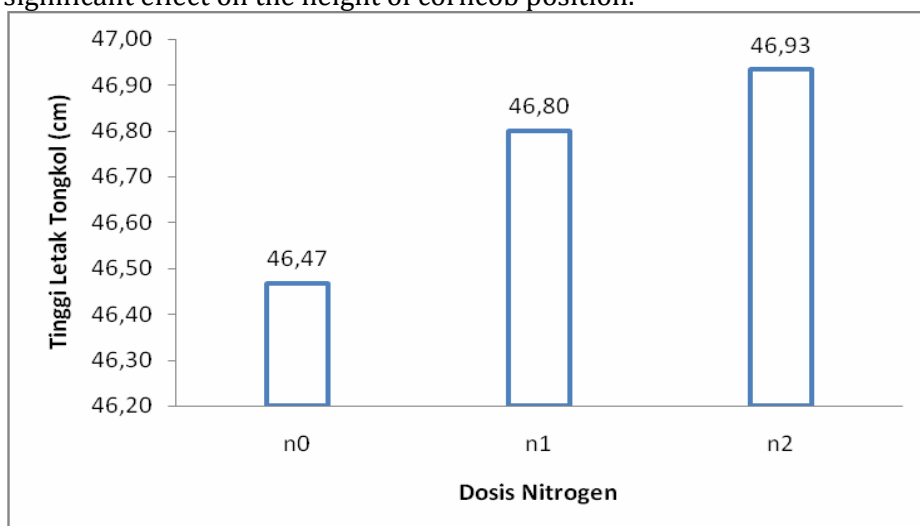


Figure 1. Chart of average height of corncob position

Figure 2 shows that the highest corncob position was produced in the treatment of nitrogen dose of 150 kg N / ha (n2).

### Length of Corcob

The length of corncob showed that nitrogen dosage treatment had no significant effect on corncob length.

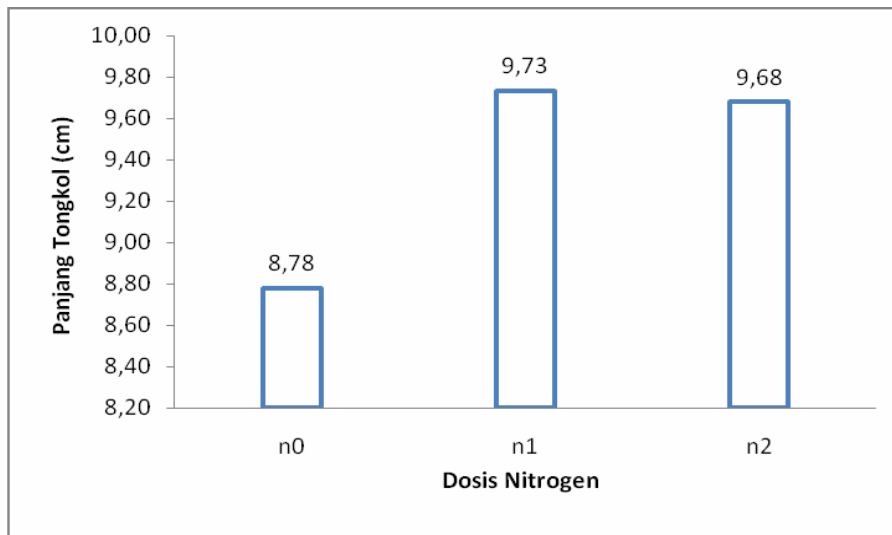


Figure 1. Chart of average length of corn chop

Figure 3 shows that the highest average of the length of corncob was obtained by the treatment of the nitrogen dose of 75 kg N / ha (n1).

### Grain moisture content at harvesting time

The variance of the grain moisture content of maize showed that the nitrogen dosage treatment had a very significant effect on the grain moisture content of maize.

Table 1. Average grain moisture content of Maize

Nitrogen dose	Grain moisture content of Maize (%)	CV LSD
n0	27,67b	8,76
n1	27,10b	
n2	31,17a	

Description: The numbers followed by the same letter mean not significantly different in LSD  $\alpha$  0.05 test..

Table 1 shows that the treatment of nitrogen dose of 75 kg N / ha (n1) showed the highest grain moisture content and significantly different with the maize treated with nitrogen dose of 0 kg N/ha (n0) and 75 kg N/ha. Furthermore, grain moisture content between the treatment of nitrogen dose of 75 kg N / ha (n1) and 0 kg N / ha (n0) did not show any significant difference.

### Seed yield at harvesting time

The variance of maize seed yield showed that the nitrogen dosage treatment had a significant effect on the yield of maize seeds.

Table 2 Average yield of maize seed

Nitrogen dose	Maize seed yield (%)	CV LSD
n0	0,63c	0,15
n1	0,83a	
n2	0,81b	

Description: The numbers followed by the same letter mean not significantly different in LSD  $\alpha$  0.05 test..

Table 2 shows that the treatment of 75 kg N/ha nitrogen dose (n1) revealed the highest yield of maize seed and significantly different with the treatment of (n0) 0 kg N / ha and (n2) 150 kg N / ha nitrogen doses.

### Maize Productivity

The variance of productivity of maize per hectare showed that nitrogen dosage treatment had no significant effect on maize productivity.

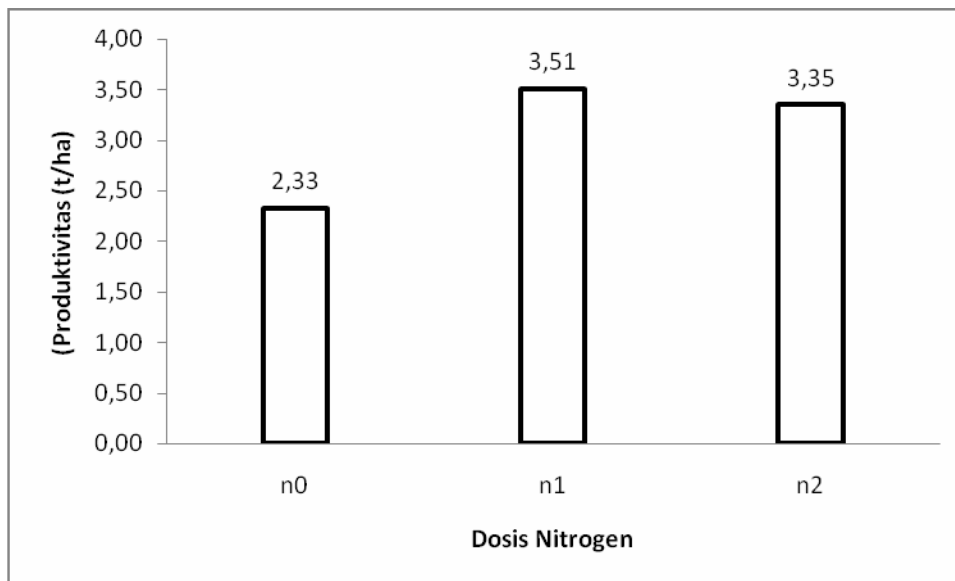


Figure 4 Chart of Average maize Productivity

Figure 4 shows that the highest productivity of maize tended to be obtained by the treatment of the nitrogen dose of 75 kg N / ha (n1).

The result of statistic analysis showed that the nitrogen dosage treatment on maize cultivation had a highly significant effect on the grain moisture content as well as on seed yield of maize. While that on the observation of plant height, the height of the corncob position, and the length of corncob did not show any significant effect.

Application of Nitrogen dose of 75 kg N/ha in general showed a better effect on the length of corncob, grain moisture content, the yield of seeds and productivity of maize. The result of LSD test showed that the use of nitrogen fertilizer of 75 kg N/ha resulted in lower percentage of grain moisture content of maize and significantly different with the treatment of nitrogen dose of 150 kg N/ha, but did not show any significant difference with the treatment of 0 kg N/ha. The result of LSD test on yield of rendement of seed also showed higher result on nitrogen dose treatment of 75 kg N/ha which was significantly different with the seed yield of maize in treatment of nitrogen dose of 150 kg N/ha and nitrogen dose of 0 kg N/ha. Similarly, in Figure 3 and 4, the results of the variance analysis showed an unstable effect on the length of corncob and productivity of maize, but the effect tended to be higher in treatment of nitrogen dose of 75 kg N/ha than for other treatments. This is might be caused by the nitrogen dose of 75 kg N/ha has a sufficient and balanced nutrients to support the growth and yield of the plant. This is in line with research finding by Setyamidjaja (1986) that nutrients needed by plants in sufficient and balanced quantities. Nitrogen needed by plants for formation process of leaf forage or chlorophyll to increase the protein content of plants. Phosphorus serves to spur the growth of roots and growth of plant tissue as well as potassium to facilitate the process of photosynthesis and improve the quality of crops.

Furthermore, in Figures 1 and 2 on the observation of plant height and the height of the corncob position, the effect tends to be higher in the nitrogen dose of 150 kg N/ha, but the yield and productivity are lower than the treatment of nitrogen dose of 75 kg N/ha. This is might be caused by the higher dosage of nitrogen in the vegetative growth of plants, which is higher and more dense, and may also cause vegetative phase of the plant longer than the generative phase. According to Darmawan (2014), the vegetative phase is a growth phase that mostly uses carbohydrates formed by the process of photosynthesis. This phase mainly occurs in the development of roots, stems, branches, and leaves. While the generative or productive phase is a growth phase that hoard most of the carbohydrates formed during the photosynthesis process. Carbohydrates are used for the formation of flowers, fruits, and seeds, or enlargement/maturation of storage structures or food reserves such as tubers

Furthermore, in the treatment without nitrogen fertilizer, the growth and yield of maize tend to be lower than other treatments. This is due to the lack of nutrients in the soil which stimulate its growth of which nitrogen is naturally available only in the environment where maize is grown.

#### **D. Conclusion**

Based on the results of the research, it can be concluded that the fertilization dose of 75 kg N/ha tends to give the best effect on the length of corncob, moisture content, seed yield and productivity of maize. While the height of the plant and the best corncobs position is produced on the fertilization of 150 kg N/ha.

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