



## The technology rising corn production on dry land

Fenty Ferayanti\*, Idawanni

*Aceh Assessment Institute for Agricultural Technology, Indonesia*

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### Abstract

The study was to analyzed the technology rising corn production on dry land. The study was conducted in Aceh 2016. Randomized block design was arranged with 3 replications and 2 factorial. This research used some varieties of corn. There were 7 levels of varieties of corn treatment including bima 15, bima 19, bima 20, Lamuru sukmaraga, pioneer and bisi. The Basic of fertilizer is organic fertilizer was used 3 ton ha<sup>-1</sup>, urea 450 kg ha<sup>-1</sup>a and NPK 325 kg ha<sup>-1</sup>.Treatment of fertilizer was conducted once. There were 2 levels of treatment of recommendations on fertilizing local farmers and fertilizing recommendation based on soil nutrient. The Observation parameters to be taken were on vegetative and yield of maize. The best vegetative and yields of corn was found in BIMA 20 on patterns of farmers and introduction. The lowest of vegetative was found in BISI, PIONER. The BIMA was produced the highest from other varieties.

\*Corresponding Author: Fenty Ferayanti ✉ [fen\\_aceh@yahoo.com](mailto:fen_aceh@yahoo.com)

## Introduction

Heavy industry using corn as for base material. In Aceh, corn is one of the best commodities which may has a fairly economical prospect that can influence the development of economic at the moment and in the future. Aceh has massive land to plant the corn but the availability is dry land. This land has characteristics of poor nutrients and water efficiency (BPS, 2015).

Drought stress is a condition water deficiency. If these conditions occur continuously, it's can be decrease yield (Fitriana *et al.*, 2018). According to Komatsu (2013) said that photosynthesis needs a lot of water supply. Metabolism will be disrupted if water deficiency. but if it is well managed, corn will be risen. This land can be controlled by using the technology such as the best varieties and balanced fertilization.

The best varieties of corn which may has increasing the corn of production. Heavy varieties of corn which are available but only a few varieties have better-quality of value. The greater varieties are varieties that can increase the production of maize maximum on agricultural of land (BPS, 2016). Beside that, using the finer of varieties also need to be considered in terms of fertilizer application. The balanced of fertilization heavy benefit for growth and yield of maize. It is the provision of fertilization into the soil to achieve the nutrient all essential in the soil to increase the production and quality of agricultural product. The purpose of this study to observed the best of maize varieties and balanced fertilization to increase production on dry land.

## Material and method

### *Place of study*

The research was conducted at Regency of North Aceh is a lowland with an average height of  $\pm$  125 meters above sea level, located at position 04.46.000 - 05.00. 400 North Latitude and 6.52.000 - 97.31.000 East Longitude, with an area of 3,296.86 km<sup>2</sup> which is divided into 27 Sub districts spread from 70 Settlements and 852 Villages. Based on elevation (altitude of sea level), the terrain in North Aceh District consists of: 0 m - 100 m = 4.69%, 101 m - 500 m = 3.52%, 501 m - 1000 m = 84.98% and 1,001 m and above = 6.81%.

Regency of North Aceh in general tropical climate with two seasons, namely dry season and rainy season. The dry season ranges from January to June. The rainy season, usually ranges from August to December, with an average rainfall per year of 1402 mm<sup>3</sup>. The average air temperature in Aceh Utara District ranges from 31.6°C - 34.8°C. Aceh Besar District also experiences dry and rainy seasons.

### *Media planting*

Dry land was used as planting medium to growth and yield of corn. Is generally based of soil analysis has a sandy loam soil texture is 23,73 %, 26,80 %, 49,48 %. pH-H<sub>2</sub>O 6,00 and C organic 1,73; N total is 0.01. C/N is 123,55. Hcl 25%- P<sub>2</sub>O<sub>5</sub> 3,79 mg 100 g<sup>-1</sup> and K<sub>2</sub>O is 36,15 mg 100 g<sup>-1</sup>. Bray P and morgan for P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O is 0,88 ppm and 8,03 ppm.

### *Corn plants*

The seeds used were heavy varieties of corn, obtained from Agricultural Technology Assessment Center Aceh, Indonesia.

### *Varieties*

This research used some varieties of corn. There were 7 levels of varieties of corn treatment including bima 15, bima 19, bima 20, Lamuru sukmaraga, pioneer and bisi.

### *Treatment of fertilizer*

The Basic of fertilizer is organic fertilizer was used 3 ton ha<sup>-1</sup>, urea 450 kg ha<sup>-1</sup>a and NPK 325 kg ha<sup>-1</sup>. Treatment of fertilizer was conducted once. There were 2 levels of treatment of recommendations on fertilizing local farmers and fertilizing recommendation based on soil nutrient.

### *Maintenance*

Maintenance includes watering, fertilizing, weeding.

### *Data analysis*

Data analysis was using micro soft excel. This study used Randomized Block Design (RAK) with 3 replications and consisted of 2 factors.

*Parameters*

The Observation parameters to be taken were:

1. Height of maize

Plant height (cm) Measuring the height of the plant from the base of the batag to the longest end of the leaf when harvest.

2. Diameter of cob (cm),

The diameter is measured in the middle of the medium with a sliding range.

3. Length of cobs

The length of cobs is measured from base of cob to the shoot of the cob.

4. Dry weight without cob

Dry weight without weighting weighed at harvest

5. Dry weight of biomass (g tan<sup>-1</sup>)

Dry weight of biomass weighed at harvest

6. Dry weight of beans (g tan<sup>-1</sup>)

Dry weight of beans weighed at harvest. The beans are dried using the help of sunlight and after dry it can be weighed using scales.

7. Weight of 1000 beans (g)

Dry weight of beans weighed at harvest. The beans are dried using the help of sunlight and after dry it, take a beans 1000 and put on scales to accumulated the data.

8. Maize Yield ton ha<sup>-1</sup>

The number of seeds is calculated after harvest.

**Results and discussion**

*Results*

*Vegetative and yields on Varieties of corn and Balanced of Fertilizer*

Table 1 and 2. showed the best vegetative and yields of corn was found in BIMA 20 on patterns of farmers and introduction. The lowest of vegetative was found in BISI, PIONER. The BIMA was produced the highest from other varieties.

**Table 1.** The avarage vegetative of corn on patterns of farmers and introduction in different of varieties and balance of fertilizer.

Varieties	Pattern of famer			introduction		
	height of maize (cm)	Diameter of cobs (cm)	Length of cobs (cm)	Length of maize (cm)	Diameter of cobs (cm)	Length of cobs (cm)
BIMA 15	169.2 <sup>a</sup>	2.8 <sup>b</sup>	119.0 <sup>b</sup>	200.3 <sup>b</sup>	3.3 <sup>a</sup>	130.0 <sup>a</sup>
BIMA 19	177.6 <sup>c</sup>	2.9 <sup>b</sup>	120.0 <sup>b</sup>	201.3 <sup>b</sup>	3.4 <sup>a</sup>	135.0 <sup>b</sup>
BIMA 20	185.8 <sup>d</sup>	3.1 <sup>c</sup>	121.0 <sup>b</sup>	215.2 <sup>c</sup>	3.6 <sup>b</sup>	139.0 <sup>c</sup>
LAMURU	173.4 <sup>b</sup>	2.2 <sup>a</sup>	119.7 <sup>b</sup>	202.8 <sup>b</sup>	3.1 <sup>a</sup>	138.3 <sup>c</sup>
SUKMARAGA	173.4 <sup>b</sup>	2.2 <sup>a</sup>	112.3 <sup>a</sup>	202.8 <sup>b</sup>	3.0 <sup>a</sup>	138.1 <sup>c</sup>
PIONER	165.3 <sup>a</sup>	2.3 <sup>a</sup>	113.0 <sup>a</sup>	180.0 <sup>a</sup>	3.0 <sup>a</sup>	137.0 <sup>c</sup>
BISI	167.0 <sup>a</sup>	2.2 <sup>a</sup>	118.5 <sup>b</sup>	189.8 <sup>b</sup>	3.0 <sup>a</sup>	133.5 <sup>a</sup>

On patterns of famers the height of maize plant was found in BIMA 20 is value 185,8 cm and the lowest was found in BISI is 167,0 cm. The diameters of cob was found in BIMA 20 is 3,1 cm and the lowest was found in PIONER and LAMURU is 2,2 cm. The height of cobs was found in BIMA 20 is value 121,0 cm and the lowest was found in SUKMARAGA is 112,3 cm. On introduction the height of maize plant was found in BIMA 20 is value 215,2 cm and the lowest was found in PIONER is 180,0 cm. The diameters of cob was found in BIMA 20 is 3,6 cm and the lowest was found in BISI and PIONER is 3,0 cm. The height of cobs was

found in BIMA 20 is value 139,0 cm and the lowest was found in BIMA 15 is 130,0 cm.

On patterns of famers the cobs of maize was found in BIMA 20 is value 326,8 g and the lowest was found in SUKMARAGA is 217,5 g. the cobs was found in BIMA 20 is 304,8 g and the lowest was found in SUKMARAGA is 195,5 g. The dry cheeks was found in BIMA 20 is 129,2 g and the lowest was found BIMA 15 is 112, 2 g. The weight of 1000 beans was found in BIMA 20 is value 50,7 g and the lowest was found in BIMA 15 is 47,7 g.

**Table 2.** The average yield of corn on patterns of farmers and introduction in different of varieties and balance of fertilizer.

Varieties	Pattern of famer					Introduction				
	Cobs (g)	Cobs peeled (g)	Dry cheeks (g)	1000 bean (g)	Yield Ton/Ha <sup>-1</sup>	cobs (g)	Cobs peeled (g)	Dry cheeks (g)	1000 bean (g)	Yield Ton/Ha <sup>-1</sup>
BIMA 15	272.1 <sup>d</sup>	250.1 <sup>c</sup>	112.2 <sup>a</sup>	47.7 <sup>a</sup>	4.4 <sup>a</sup>	399.1 <sup>d</sup>	377.1 <sup>c</sup>	138.2 <sup>a</sup>	57.7 <sup>a</sup>	5.5 <sup>a</sup>
BIMA 19	281.3 <sup>e</sup>	259.3 <sup>c</sup>	120.2 <sup>b</sup>	49.5 <sup>a</sup>	4.8 <sup>a</sup>	402.4 <sup>e</sup>	380.4 <sup>c</sup>	146.2 <sup>b</sup>	59.5 <sup>a</sup>	5.8 <sup>a</sup>
BIMA 20	326.8 <sup>f</sup>	304.8 <sup>d</sup>	129.2 <sup>c</sup>	50.7 <sup>a</sup>	5.1 <sup>b</sup>	469.7 <sup>f</sup>	447.7 <sup>d</sup>	155.2 <sup>c</sup>	65.7 <sup>c</sup>	6.2 <sup>b</sup>
LAMURU	229.5 <sup>c</sup>	207.5 <sup>b</sup>	114.7 <sup>a</sup>	49.5 <sup>a</sup>	4.5 <sup>a</sup>	349.5 <sup>e</sup>	327.4 <sup>b</sup>	140.7 <sup>a</sup>	55.5 <sup>a</sup>	5.6 <sup>a</sup>
SUKMARAGA	217.5 <sup>a</sup>	195.5 <sup>a</sup>	115.2 <sup>a</sup>	50.1 <sup>a</sup>	4.6 <sup>a</sup>	277.5 <sup>a</sup>	255.5 <sup>a</sup>	141.2 <sup>a</sup>	55.4 <sup>a</sup>	5.6 <sup>a</sup>
PIONER	221.2 <sup>b</sup>	199.2 <sup>a</sup>	118.9 <sup>b</sup>	49.8 <sup>a</sup>	4.7 <sup>a</sup>	261.5 <sup>a</sup>	239.5 <sup>a</sup>	144.9 <sup>b</sup>	54.8 <sup>a</sup>	5.7 <sup>a</sup>
BISI	280.6 <sup>e</sup>	258.6 <sup>c</sup>	120.0 <sup>b</sup>	48.2 <sup>a</sup>	4.8 <sup>a</sup>	300.0 <sup>b</sup>	278.0 <sup>a</sup>	146.0 <sup>b</sup>	52.9 <sup>a</sup>	5.8

The yield on hectare was found in BIMA 20 is 5,1 ton ha<sup>-1</sup> and the lowest was found in LAMURU is 4,5 ton ha<sup>-1</sup>.

On introduction the cobs of maize was found in BIMA 20 is value 469,7 g and the lowest was found in PIONER is 261,5 g. The cobs was found in BIMA 20 is 447,7 g and the lowest was found in PIONER is 239,5 g. The dry cheeks was found in BIMA 20 is 155,2 g and the lowest was found BIMA 15 is 138, 2 g. The weight of 1000 beans was found in BIMA 20 is value 65,7 g and the lowest was found in BISI is 52,9 g. The yield on hectare was found in BIMA 20 is 6,2 ton ha<sup>-1</sup> and the lowest was found in LAMURU is 5,5 ton ha<sup>-1</sup>.

## Discussion

### *Varieties of corn and Balanced of Fertilizer*

The maize will be increased if its growth on the better land, because the great land already all nutrition in the soil.

The study of Efthimiadou *et al.*, (2010), Foster *et al.*, (2016) and Shah *et al.*, (2016) said the plant can be produce the better production if the nutrition of plant is enough. Without nutrition, the growth of plant will be decrease, because when photosynthesis, the plant needed to heavy nutrient.

Avre (2011) reported that plants will be adapted to drought stressed by using controlled mechanism. According to Taiz and Zeiger (2002) that the water decrease content tested due to drought stress was that suffer from by using controlled roots.

While the availability of the water is not increased. Plants is water deficits will make osmotic adjustments, such as by increasing the dissolved compound that lead to decreased of the osmotic potential of the cell and allowed ground water to enter the plant cell.

The result showed by using varieties of BIMA 20 would give impact to the plant growth and yield. It can be proved that BIMA has system to increase growth and yield of maize. The research of Zakky *et al* (2018) BIMA 20 High yield potential of 12.5 ton ha<sup>-1</sup>, resistant to gout, tolerance of rust and leaf spot, drought tolerant, resistant to root / stem and stay green. Sundari 2017 said One way to overcome low productivity of maize is by improving varieties.

The study of Jemrifm *et al* (2013); Nurchayati and Yuliana (2006) The ability of the plant to adapt depends on the type of plant itself. in corn plants have a high adaptability if compared with other plants. The difference in plant height is due to the genetic characteristics and characteristics and adaptability of each different variety to its environment.

## Conclusion

The best vegetative and yields of corn was found in BIMA 20 on patterns of farmers and introduction. The lowest was found in BISI, PIONER.

### *Contribution*

BIMA 20 can be recommended to other lands which has water deficiency and poor nutrient.

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