

## Results of field Test of Maize with Bio-plant and Pro-plant liquid fertilizers in Zanzibar

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### 1. Background:

A Memorandum of Understanding was signed between **Zanzibar Agricultural Research Institute** and **Salad Greenhouse (EA) Ltd. Zanzibar** regarding the testing of Bio-Plant and Pro-Plant, 100% organic, liquid bio-fertilizers in Zanzibar.

The purpose of the field test was to demonstrate to the government of Zanzibar that Bio-Plant and Pro-Plant provide the effective means to enable the government to phase out chemical agriculture throughout the country with these two bio-fertilizers. Initially the testing was carried out with rice crop but unfortunately the experiment failed due to erratic weather conditions. The testing was re-carried out using maize crop.

### 2. Introduction:

Agriculture is the dominant economic activity in Zanzibar, accounting for an average of 32.8% (2010) of the GDP, providing about 75% of the foreign exchange earnings and 70% of the population engages directly or indirectly in the agriculture sector. Agriculture Sector has a direct contribution on food security, nutrition and health status of the people and indirect impact on many other aspects of livelihood.

Agricultural production in Zanzibar is challenged with low productivity for the most crops grown by farmers. The government through its national and sector policies have developed strategies to modernize agricultural production. Among the strategies is the issue of the use of fertilizers as important input to improve crop productivity. Application of chemical fertilizers has been widely adopted by farmers but is faced the challenges of availability and accessibility when needed. Furthermore, there is limitation on the amount of chemical fertilizer that can be applied due to its effects on environment.

**Objective:** the testing of bio-plant and pro-plant liquid fertilizers is intended to provide data to convince policy makers to decide on alternative and effective means of fertilizing crops which are more sustainable and friendly to the environment.

### 3. Materials and Methods

**Establishment of the trial:** The trial was established using **Artemis & Angel Co. Ltd.** Field Test Guidelines for Maize.

**Test Area:** there were two plots one for bio-fertilizer and the other one control. Each plot had a size of 5m wide and 8m length making an area of 40 square meters.

**Soil preparation:** 45 kg of farm yard manure was mixed with bio-plant solution containing 10 cc of bio-plant in 10 litres of water. The treated organic manure was then spread in the

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bio-plant plot and ploughed in by hand hoe. The control plot was also ploughed but without manure. The bio-plant plot was watered after every two days until after two weeks when it was ready for sowing.

#### ***Maize Seed Preparation:***

Maize seeds were wrapped in a cloth and soaked into a bio-plant solution containing 1cc of bio-plant and 1 cc of pro-plant in 1 liter of water for 18 hours.

The following day, the seeds were removed from the solution and sown to bio-plant and pro-plant field plot at a spacing of 0.75m between rows and 0.30m between holes in each row. Maize seed for the control plot were sown without treatment using the same spacing. In both plots, only a single seed of hybrid maize was sown for each hole. Sowing was carried out on 10<sup>th</sup> June, 2016. In four days bio-plant treated seeds had germinated by 90% but untreated seed by 10%, three days later all seeds had germinated.

#### ***Spraying Pro-Plant:***

According to **Artemis & Angel Co. Ltd.** Field Test Guidelines for Maize, first spray of pro-plant should start 7 days after germination. Table 1 below shows the schedule of spray and the amount of pro-plant sprayed according to age of maize plants in the field.

Table 1: Schedule of pro-plant spraying in the maize pro-plant field test experiment, Kizimbani Zanzibar

Date	Stage	Amount of pro-plant sprayed
21-06-16	First Spray with Pro-plant	ratio of 1cc pro-plant + 1 cc of water
27-06-16	2nd spray	ratio of 1cc pro-plant + 1 cc of water
04-07-16		ratio of 1cc pro-plant + 1 cc of water
11-07-16		ratio of 1cc pro-plant + 1 cc of water
18-07-16		ratio of 4 cc pro-plant + 3 liters of water
25-07-16		ratio of 4 cc pro-plant + 3 liters of water
01-08-16		ratio of 4 cc pro-plant + 3 liters of water
08-08-16		ratio of 4 cc pro-plant + 3 liters of water
15-08-16		ratio of 1cc pro-plant + 1 cc of water
22-08-16		ratio of 1cc pro-plant + 1 cc of water
29-08-16	11 <sup>th</sup> spray	ratio of 1cc pro-plant + 1 cc of water

**Application of mulch:** The bio-plant plot was applied with mulch to control weeds as well as maintain soil moisture a better environment for microbial proliferation in the soil. The field was regularly supplemented with tap water when conditions showed requirement.

#### **Data collection:**

Data was collected at vegetative and maturity stages to evaluate the effect of the liquid fertilizers on plant growth and on yield and yield parameters of maize. The following parameters were employed:

- Plant height

- Culm width
- Cob length
- Cob width and
- Cob weight

Twenty plants were sampled for each parameter and the results in Table 2 are the average values.

#### 4. Results and Discussions

Table 2 below shows the results of bio-plant and pro-plant liquid fertilizers on growth and yield of maize crop in an exploratory test conducted at Kizimbani Agricultural Center of Zanzibar Agricultural Research Institute. The results show a high percent increase of plant height and culm width at vegetative stage due to application of bio-plant and pro-plant when compared to non-application. This has an implication that the liquid fertilizers influenced the maize plant to grow more quickly at vegetative stage. However, at maturity the results show that overall the liquid fertilizers influenced plant height by 27% and culm width by 40%.

On cob width and cob length the liquid fertilizers managed to improve these parameters by 25.6% and 23% respectively. The two yield components and possibly to others which have not been measured have contributed to the performance of cob weight to 94.5% compared to the yield of the control plot.

**Table 2: Effect of bio-plant and pro-plant on growth and yield parameters of maize, Kizimbani-Zanzibar, 2016**

Parameter	Stage of data collection	Treatment		Improvement due to bio-plant and pro-plant fertilizers
		Control	Bio-fertilizer	
Plant height (cm)	Vegetative	132.8	218.5	85.7 (64.5%)
Culm width (cm)		2.6	4	1.4 (87.5%)
Plant height (cm)	Maturity	214.8	272.9	58.1 (27%)
Culm width (cm)		2.01	2.82	0.81 (40.3%)
Cob width (cm)		3.95	4.96	1.01 (25.6%)
Cob length (cm)		24.15	29.7	5.55 (23%)
Cob weight (g)		150.04	291.8	141.76 (94.5%)

#### 5. Conclusions and recommendations

The test conducted to evaluate the effect of bio-plant and pro-plant liquid fertilizers on maize has shown that the fertilizers have the ability to improve crop productivity to a great extent and therefore indicated the possibility to replace or supplement chemical fertilizers in crop production. However, to be able to convince policy makers we need to evaluate these

benefits more scientifically by employing replicated trial which will be able to generate statistics (coefficient of variation, significant difference values) that would be used to draw tangible conclusions and therefore recommendations.

## 6. Acknowledgement

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## References

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