

EFFECTS OF SELECTED ORGANIC SOURCES ON THE VEGETATIVE GROWTH OF DIFFERENT MAIZE (*Zea mays* L.) VARIETIES IN SANDY REGOSOL OF BATTICALOA DISTRICT

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INTRODUCTION

The popularity of organic cultivation is increasing in Sri Lanka due to attitude change of the people towards their health and environmental aspects. The increased demand for organically grown products also induces the scientists to disseminate the knowledge to the farmers. Maize is a popular coarse grain crop in Sri Lanka, grown in the second highest extent of land next to rice. Maize is used as a raw material in various industries and the demand is increasing continuously. Maize has demand in foreign countries and there are possibilities to export maize from Sri Lanka. In this context, organically produced maize would be more attractive to foreign consumers and earn more foreign exchange. As such this research was carried out to evaluate the effects of selected organic sources on the growth of traditional and hybrid maize varieties and to select best manure for organic maize cultivation in the sandy regosol of Batticaloa district.

METHODOLOGY

A field experiment was conducted at the crop farm, Eastern University, Sri Lanka during Yala 2013. Varieties of maize and selected organic sources were arranged in two factor factorial randomized complete block design (RCBD) with three replications. Each replication contained twenty plants and an experimental unit consisted of one plant.

Treatments:

- F1V1 – Var. *Bhadra* + Recommended* dosage of inorganic fertilizers (Control)
- F1V2 – Var. *Pacific* 984 + Recommended dosage of inorganic fertilizers (Control)
- F2V1 - *Bhadra* + Cowdung at the rate of 20 t ha⁻¹
- F2V2 - *Pacific* 984 + Cowdung at the rate of 20 t ha⁻¹
- F3V1 – *Bhadra* + Compost at the rate of 20 t ha⁻¹
- F3V2 – *Pacific* 984 + Compost at the rate of 20 t ha⁻¹
- F4V1 – *Bhadra* + Glyricidia (*Gliricidia sepium*) fresh leaves at the rate of 20 t ha⁻¹
- F4V2 – *Pacific* 984 + Glyricidia fresh leaves at the rate of 20 t ha⁻¹
- F5V1 – *Bhadra* + Liquid organic mixture once a week
- F5V2 – *Pacific* 984 + Liquid organic mixture once a week

All the organic manures were applied as basal except liquid organic mixture. Liquid organic mixture (*Jeewamirta*) was prepared with the ingredients at the rate of 10kg of dung and 10 L of urine from indigenous cow, 2kg of Jaggery, 2 kg of pulse powder and a handful of farm soil (ingredients for one acre). All six ingredients were mixed in a plastic barrel and stirred well. Then the barrel was covered with a gunny mat and placed under shade. The mixture was stirred clockwise twice a day in order to accelerate microbial activities. The prepared *Jeewamirta* was applied after three days of fermentation. *Jeewamirta* was diluted 10 times with water before application. Plants were arranged at a spacing of 60cm x 30cm and one plant per hill. All other management practices were followed uniformly. Destructive sampling method was practiced and samples were selected randomly for measurements. Measurements were taken one month after planting (vegetative stage). Growth parameters viz. plant height

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(cm), leaf area (cm²), and plant biomass (g) were measured. Analysis of variance (ANOVA) was performed to determine significant differences among treatments (p<0.05).

RESULTS AND DISCUSSION

Different organic manures influenced the growth of maize varieties significantly (p<0.05). The interactive effect of the maize varieties and manures on the measured growth parameters was not significant (p<0.05) (Table 1). In all measured growth parameters viz. plant height, leaf area and biomass, maize varieties grown in fertilizer treatments F1 and F4 performed significantly (p<0.05) higher than other treatments. Further, there were no significant (p<0.05) differences between treatments F1 and F4 in measured growth parameters.

Table 1: Effect of different organic inputs on the growth of maize varieties at one month after planting

Fertilizers	Variety	Plant height (cm)	Leaf area (cm ²)	Biomass (g)
F1	V1	119.67 ^a	2,694.82 ^a	49.17 ^a
	V2	108.67 ^{ab}	1,746.30 ^{ab}	31.96 ^{ab}
F2	V1	66.83 ^c	631.79 ^{bc}	4.00 ^c
	V2	73.00 ^c	727.62 ^{bc}	5.18 ^c
F3	V1	80.00 ^{b c}	862.94 ^{bc}	9.49 ^{bc}
	V2	72.00 ^c	720.78 ^{bc}	12.92 ^{bc}
F4	V1	113.50 ^a	2,467.04 ^a	45.92 ^a
	V2	118.43 ^a	2,776.37 ^a	55.96 ^a
F5	V1	67.00 ^c	459.98 ^{bc}	6.59 ^c
	V2	59.03 ^c	323.99 ^c	5.57 ^c
P value	Fertilizers	0.000	0.000	0.000
	Varieties	0.455	0.345	0.886
	Interaction	0.568	0.223	0.519
F value		*	*	*

Value represents mean of three replicates. F test: * represents significant at p<0.05

Means followed by the same letter in each column are not significantly different according to DMRT at 5 % level

In this experiment, Glyricidia leaves application significantly increased the vegetative growth of maize varieties than other organic manures. The plants treated with Glyricidia leaves showed almost equal growth to plants that received recommended dosage of inorganic fertilizers. Glyricidia is an excellent organic fertilizer (Liyanage, 1987). Several studies revealed that, addition of Glyricidia leaves as green manure increases growth and yield of many crops (Kidd and Taogaga, 1985; Budelman, 1989 and Gonzal and Raros, 1988).

Nitrogen influences the vegetative growth of plants. Boroujerdnia and Ansari, (2007), pointed out that, application of nitrogen fertilizer stimulates vegetative growth by increasing the number of leaves and leaf area (LA). Glyricidia consists of high amount of nitrogen. Patil (1989) reported that 1 tonne dry weight of Glyricidia leaves was equivalent to 27 kg Nitrogen. Green manures release nitrogen quickly and have low C:N ratio. The higher nitrogen content and rate of release of Glyricidia leaves would have increased the vegetative growth of maize plant. It could be the reason for highest LA produced by the Glyricidia leaves treated plants. LA is the most important photosynthesis acceptor and varies among cultivation practices (Bavec *et al.*, 2007). LA greatly influences the rate of photosynthesis and accumulation of plant biomass. As such, in this experiment, biomass production was in accordance with the trend of variances for leaf area and highest biomass was produced by maize varieties subjected to treatment F4. Performance of Var. *Pacific* 984 was higher in Glyricidia treatment than var. *Bhadra*. It may be due to hybrid vigour of this variety.

CONCLUSION

In this experiment, maize varieties received fresh *Glyricidia* leaves as organic manure showed higher plant height, leaf area and biomass accumulation. In addition, there were no significant differences between the plants treated with fresh *Glyricidia* leaves and recommended dosage of inorganic fertilizers in measured vegetative growth parameters. Therefore, the results of this study revealed that fresh *Glyricidia* leaves at the rate of 20 t ha⁻¹ can increase the vegetative growth of maize which is equivalent to recommended dosage of inorganic fertilizers in the sandy regosol.

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