EFFECTS OF DIFFERENT LEVELS OF TANK SILT APPLICATION ON LEAF AREA AND BIOMASS PARTITIONING OF MAIZE (*ZEA MAYS* L.)

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Introduction

Tank silt is an organic sediment, which can be collected from tanks and ponds during dry season. Tank silt is rich in nutrients and it is an easily available organic source. Maize is a popular crop in Sri Lanka. But the productivity depends on soil fertility and fertilizer cost reduces the profit of cultivation. Further popularity of organic cultivation is increasing rapidly in Sri Lanka. It is mainly due to attitude change of the society towards their health and environmental aspects. Therefore it is essential to find feasible organic sources for maize cultivation. As such this study was conducted to find out suitable amount of tank silt necessary to replace the Department of Agriculture (DOA) recommended fertilizer for maize.

Methodology

This study was conducted at the crop farm, Eastern University, Sri Lanka during October 2009 to January 2010. Maize (*cv.* Bhadra) plants were raised in polyethylene bags and the agronomic practices were followed according to the DOA recommendations except fertilizer application. Treatments were arranged in a completely randomized design with five replications for each under shade (50%) house. Six treatments were defined viz. T_1 – tank silt at the rate of 20 tonnes per hectare (t ha^{-1}), T_2 – tank silt at the rate of 30 t ha^{-1}, T_3 – tank silt at the rate of 40 t ha^{-1}, T_4 – tank silt at the rate of 50 t ha^{-1}, T_5 – recommended dosage of fertilizer and T_6 – control. Leaf area and biomass were measured during vegetative stage and statistically analyzed.

Discussion and Conclusion

Tank silt application had a significant effect ($p<0.05$) on leaf area (LA) and biomass partitioning of maize (Table 1).

Table 1: Effects of different levels of tank silt application on leaf area and biomass partitioning at 70 days after planting

Treatments	Leaf area (cm^2)	Biomass partitioning (g)		
		Leaf	Stem	Root
T_1	195.8 c	9.04 c	25.4 c	19.83 c
T_2	224.8 bc	10.36 c	30.8 c	29.90 b
T_3	258.8 abc	12.84 b	43.3 b	32.50 b
T_4	313.8 ab	19.61 a	59.8 a	50.00 a
T_5	344.8 a	21.25 a	61.3 a	47.30 a
T_6	233.0 bc	10.25 c	28.5 c	23.80 c
Probability	0.000	0.000	0.000	0.000

Means within the same column followed by the same letter are not significant at $p = 0.05$

The plants were subjected to T_5 produced highest leaf area and biomass. There were no significant differences ($p<0.05$) between T_4 and T_5 in LA and biomass partitioning. These

processes depend on soil fertility level. Leaf area index significantly was differed among nitrogen treatments within varieties (Bavec *et al.*, 2007). LA of T_4 plants was approximately equal to plants belongs to T_5. Therefore the rate of release of nutrients in T4 would have been similar to recommended dosage of inorganic fertilizer.

Biomass production potential is correlated with the capacity of crop to intercept light. Light interception is a function of foliage production, life span and distribution. Of these factors foliage production is believed to be the most important in determining potential productivity (Wang and Jarvis, 1990). A strong correlation between biomass production and leaf area has been demonstrated by several researchers. In this experiment, biomass production were in accordance with the trend of variances for LA ($R^2 = 0.95$). Highest biomass partitioning was obtained in T4 and T5 as LA of those were higher.

Photosynthesis plays major role in biomass accumulation. But photosynthetic rates are directly associated with leaf nitrogen concentration (Lindquist, 2001). Hence the biomass partitioning was nearly identical in T_4 and T_5 during vegetative stage, it could be stated that, application of tank silt at the rate of 50 t ha^{-1} would have provided nutrients equivalent to recommended dosage of inorganic fertilizer.

The application of tank silt at the rate of 50 t ha^{-1} produced plant growth nearly identical to the performance of plants grown with DOA recommendation. Hence, for first time in Sri Lanka it has been proved that the farmers can utilize freely available tank silt for better crop production with low cost. Further natural organic manures are environmentally friendly option for agriculture.

References

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