

EFFECT OF COW AND POULTRY MANURES AS BASAL FERTILIZERS ON MARKETABLE FRUIT YIELD OF OKRA (*ABELMOSCHUS ESCULENTUS* L)

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ABSTRACT

An experiment was conducted to study the influence of cow and poultry manures on the marketable yield of okra (*Abelmoschus esculentus* L) on sandy regosol. The treatments included basal applications of inorganic fertilizer (control) and combined use (10t/ha) of cow plus poultry manures (CM: PM) at ratios of 5:0, 4:1, 3:2, 2:3, 1:4 and 0:5. Significantly higher ($P < 0.05$) marketable yield (13t/ha) was recorded in plots treated with CM: PM at 3:2 ratio as compared to the control (9t/ha).

Key words: Cattle manure, marketable fruit yield, okra, poultry manure

INTRODUCTION

Okra (*Abelmoschus esculentus* L) is one of the most important warm season fruit vegetables grown throughout the tropics and valued for its edible green pods that are popular vegetable in Sri Lanka, ranked fourth in cultivated extent (Anon 2007). Pods are tender bright green and not fibrous (Boelje and Eidman 1984). Okra plays an important role to improve the palatability of many dishes and is generally used as nutritional supplements for vitamin C and A, B complex *etc.* (Adebooye and Oputa 1996).

Most of the inorganic fertilizers used in conventional agriculture mainly contain NPK and it depletes the available trace minerals from the soil and affects the soil living organisms and human mineral consumption (Reijntes *et al.* 1992). Application of excess inorganic fertilizer leads to higher pest and disease attacks and also destroys the soil microorganisms. Hence, sustainable farming looks for making the best use of natural resources without damaging the environment and indigenous agricultural knowledge is a vital part of the process of making agriculture sustainable (Ramprasad *et al.* 2009). The cow and poultry manures are source of plant nutrients and a good depositor of major and minor mineral elements for enhancing soil fertility on application (Thomas 1997). Information pertaining to the combined effect of cow and poultry manures as the basal

fertilizer in okra cultivation is scanty. Therefore, this field experiment was conducted to select the best proportion of cow and poultry manures on marketable fruit yield of okra on sandy regosol.

MATERIALS AND METHODS

The study was conducted in 2010/2011 at the Eastern region of Sri Lanka (81° 34' latitude and longitude 7° 48') and at an elevation of 100m above MSL. The texture of soil is sandy regosol. The annual mean temperature is 31±2°C and the mean rainfall ranges from 1,800 to 2,100mm and the humidity is 60% - 90%. It was carried out in a Randomized Complete Block Design (RCBD) with seven treatments and three replications. The treatments included combined application of cow and poultry manures (10t/ha) at the different ratios (CM: PM at 5:0, 4:1, 3:2, 2:3, 1:4 and 0:5) (treatment from T2 to T7) as a basal fertilizer application and recommended inorganic fertilizer as a control (T1). The plot size was 2.4m x 3.0m. The air dried cow and poultry manures were collected and then poultry manure was sieved to remove unwanted materials before being used in this experiment.

The required amount of cow and poultry manures according to the ratio was added two weeks before planting to each plot as assigned

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in different treatments, T2-T7 and recommended inorganic fertilizer (150kg/ha urea, 200kg/ha triple super phosphate and 75kg/ha muriate of potash) was applied two days before planting to T1 plot (control) as basal fertilizer. The okra seeds *cv* Haritha were soaked overnight and planted at the space of 60cm between rows and 60cm within rows. Three seeds were placed into each hole and after two weeks of planting, excess seedlings were thinned out in order to maintain two plants per hole. Watering was done twice a day until germination then it was irrigated at alternative days according to the weather condition. Weeding was done manually and 30 days after planting, urea (150kg/ha) and muriate of potash (75kg/ha) were applied as top dressing to all the experimental plots (T1 to T7). No pesticide was used because of less pest attacks.

The length of each marketable fruit was measured at picking and the numbers of fruits per plant were counted. Yield per hectare based on fresh basis were calculated. The data was analyzed using SAS 9.1 version statistical software package. The means were compared by using Duncan's Multiple Range Test at 5% level.

RESULTS AND DISCUSSION

There was significant ($P < 0.05$) difference in length of fruits among the treatments (Table 1). The maximum length of 18.4cm was recorded in cow and poultry manures (CM:PM) at 3:2 (T4) and the minimum value of 16.7cm was in inorganic fertilizer (T1). This is attributed due to the application of organic manures which may improve soil properties resulting in better supply of macro and micro nutrients for better growth of okra and maintaining soil fertility. The superiority of poultry manure for crop growth has been reported by Wijewardena and Yapa (1999).

The maximum value of 233.9g with highest number of cumulative fruits was recorded in T4 (Tables 1&2) and inorganic treatment (T1) gave relatively lowest fresh weight of fruits

(161.2g) with lowest number of cumulative fruits than the other treatments. This result is supported with Xu *et al.* (1997) who reported that organic fertilizers promote root growth and activity of sweet corn plants than inorganic fertilizers. Fertilizer is one of the most important inputs contributing to fruit production.

Table 1: The fruit length and number of fruits per plant in each treatment (N=3)

Treatment	Fruit length (cm)	Number of fruits per plant
T1 (control)	16.7 ± 0.3 b	6.8 ± 0.3 b
T2	16.9 ± 0.4 ab	7.7 ± 0.2 a
T3	17.0 ± 0.6 ab	7.8 ± 0.2 a
T4	18.4 ± 0.5 a	8.5 ± 0.2 a
T5	17.2 ± 0.4 ab	8.0 ± 0.3 a
T6	17.4 ± 0.7 ab	7.9 ± 0.1 a
T7	17.6 ± 0.1 ab	7.8 ± 0.4 a
F test	*	*

Generally the plant having a better system can absorb more water and support for photosynthesis. Addition of both cow and poultry manures to soil causes to increase soil organic matter content that has the capacity to improve water holding capacity and retain nutrients for a longer period. On the contrary, inorganic fertilizers release nutrients quickly and it remains for a short period and excess nutrients may leach out especially on sandy soil. Several workers have been reported longer residual effect of organic manures when apply to the soil (Adeniyani and Ojeniyi 2003).

Table 2: The fresh weights of cumulative marketable fruits in each treatment (N=3)

Treatment	Fruit weight (g) per plant	Fruit yield t/ha
T1 (control)	161.2 ± 9.9 d	09.0 d
T2	173.1 ± 8.7 cd	09.6 cd
T3	194.8 ± 6.3 bc	10.8 bc
T4	233.9 ± 5.0 a	13.0 a
T5	202.1 ± 8.0 b	11.2 b
T6	200.9 ± 8.9 b	11.2 b
T7	211.3 ± 7.5 b	11.7 b
F test	*	*

The present results indicated that the cow and poultry manures at the ratio of 3:2 applied as basal fertilizer (T4) gave high yield of 13t/ha followed by T7 (11.7t/ha) but there was re-

markable ($P < 0.05$) variation between them. The reason may be due to incorporation of poultry manure which contains high NPK content (Waddington 1998). However, it leads to increase acidity in the soil. Kiyonori (1990) reported that the low C/N ratio of poultry litter results in the loss of nitrogen through ammonia volatilization. This causes nutrient imbalance in the crop and also reduction in the uptake of certain nutrients (Ewulo *et al.* 2008). The increase application of cow manure leads to increase the rate of photosynthesis (Sanwal *et al.* 2007). Hence, proper amount of good organic manures are required to supply the nutrients for crop growth and development. Ayoola and Adeniyani (2006) reported that nutrient from mineral fertilizers enhance the establishment of crop while organic manure promotes yield when both fertilizers were combined. The combined use of organic manure and inorganic fertilizer could narrow down the negative nutrient balance substantially in many cropping systems (Singh and Yadav 1994).

CONCLUSION

Application of cow and poultry manures (CM: PM) at 3:2 ratio significantly increased marketable fruit yield (13t/ha) of okra as compared with the other ratios (CM: PM at 5:0, 4:1, 2:3, 1:4 and 0:5) and inorganic fertilizer applied as basal application on sandy regosol.

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