



Response of Sweet Corn (*Zea mays* L.) to Different Sources of Organic Manures

S Pande, S M Muneendra Naidu and N Sunitha

Department of Agronomy, S V Agricultural College, Tirupati - 517 502, (A.P), India

ABSTRACT

A field experiment was conducted at S.V. Agricultural College, Tirupati (ANGRAU), during *rabi*, 2010-2011 to study the response of sweet corn to different sources of organic manures. In this investigation, various growth and yield parameters of crop were significantly influenced by varied manurial practices. Application of 100 per cent recommended dose of fertilizer (120-60-60 N, P₂O₅ and K₂O kg ha⁻¹) recorded highest yield attributes, green cob and green fodder yield along with best quality and higher economic returns. This was followed by 75 per cent N through poultry manure in combination with application of 25 per cent N through foliar spraying of *panchagavya*. Lowest yields and economic returns were obtained with 100 per cent N through green manuring.

Key words : Fertilizer, *Panchagavya*, Poultry manure, Sheep manure, Sweet corn.

Out of various specialty corns, sweet corn is a mutant type with one or more recessive alleles in homozygous condition, which enables the endosperm to accumulate twice the sugar content as that of seed corn (Creech, 1965) and controls the conversion of sugar into starch inside the endosperm of kernel. It is of short duration, picked when immature (milk stage) and eaten as a vegetable, rather than as grain. Sweet corn can be grown all round the year under irrigated conditions, enabling it to fit in intensive cropping systems. The chemical farming impart deleterious traits due to which the produce may not acceptance in the international market. Keeping in view the significance of organic manures in maintaining the soil health and quality of the produce, a study was conducted on response of sweet corn to different sources of organic manures.

MATERIAL AND METHODS

A field experiment was conducted during *rabi*, 2010-11 at Dryland Farm of S.V. Agricultural College, Tirupati to study the response of sweet corn to different sources of organic manures. The field experiment was laid out in a randomized block design with three replications. There were eleven treatments comprising of T₁-Recommended dose of nitrogen (120 kg ha⁻¹ through urea-F N₁₀₀), T₂-100 per cent N through farm yard manure (FYM N₁₀₀), T₃-100 per cent N through Sheep manure (SM N₁₀₀), T₄-100 per cent N through poultry manure (PM N₁₀₀), T₅-

100 per cent N through green manuring through *Glyricidia maculata* (GM N₁₀₀), T₆-100 per cent N through vermicompost (VC N₁₀₀), T₇-75 per cent N through FYM + 25 per cent N through *panchagavya* foliar spray (FYM N₇₅ + PG N₂₅), T₈-75 per cent N through sheep manure + 25 per cent N through *panchagavya* foliar spray (SM N₇₅ + PG N₂₅), T₉-75 per cent N through poultry manure + 25 per cent N through *panchagavya* foliar spray, (PM N₇₅ + PG N₂₅), T₁₀-75 per cent N through green manuring + 25 per cent N through *panchagavya* foliar spray (GM N₇₅ + PG N₂₅) and T₁₁-75 per cent N through vermicompost + 25 per cent N through *panchagavya* foliar spray (VC N₇₅ + PG N₂₅). Different manures were applied as per treatment schedule on equal nitrogen basis. Entire quantity of phosphorus and potassium were applied as a basal dose through single super phosphate and muriate of potash, respectively. *Panchagavya* is a mixture of cow dung (1 kg), cow urine (750 ml), cow milk (500 ml), cow curd (500 ml), and cow ghee (250 ml). In addition with sugarcane juice (750 ml), tender coconut water (750ml), pure honey (250 ml) and ripened bananas (250 g) were also added to accelerate the fermentation process. After fifteen days of fermentation, the contents were filtered to get the clear stock solution of *panchagavya*. The stock solution was diluted to 5 per cent spray solution. It was applied as foliar spray @ 260 l ha⁻¹ to sweet corn crop as per the treatments at fortnightly intervals starting from 15 DAS to 75 DAS. High pore

Table 1. Drymatter production (kg ha⁻¹) and yield (kg ha⁻¹) of sweet corn as influenced by different sources of organic manures

Treatments	Drymatter production (kg ha ⁻¹) at harvesting stage	Green cob yield (kg ha ⁻¹)	Green fodder yield (kg ha ⁻¹)
T ₁ : F N ₁₀₀	4512	3930	15951
T ₂ : FYM N ₁₀₀	3669	2286	12808
T ₃ : SM N ₁₀₀	3846	2302	12912
T ₄ : PM N ₁₀₀	3859	2411	13000
T ₅ : GM N ₁₀₀	3490	1769	8795
T ₆ : VC N ₁₀₀	3548	2250	12222
T ₇ : FYM N ₇₅ +PG N ₂₅	4059	2855	14324
T ₈ : SM N ₇₅ +PG N ₂₅	4146	2961	15226
T ₉ : PM N ₇₅ +PG N ₂₅	4207	3052	15282
T ₁₀ : GM N ₇₅ +PG N ₂₅	4009	2497	13094
T ₁₁ : VC N ₇₅ +PG N ₂₅	4014	2800	14262
SEm ±	98.6	48.44	44.90
CD (P=0.05)	290.8	142.90	132.42

size nozzle was used to facilitate adequate interception by the crop foliage. The test cultivar of sweet corn was Madhuri which was released from ANGRAU.

RESULTS AND DISCUSSION

Performance of sweet corn with different sources of organic manures was assessed based on productivity (total biomass production and total economic yield) and net returns (Table 1). At all the stages of crop growth tallest plants, largest leaf area index and maximum drymatter production were recorded in T₁ (F N₁₀₀). The nitrogen applied in two splits might be efficiently taken up by the crop matching with its physiological needs compared to other organic manures. Nitrogen being a constituent of protoplasm plays a positive role through increased cell division and multiplication resulting in taller plants. The next best treatment was T₉ (PM N₇₅ + PG N₂₅). This might be because of higher N content in poultry manure (2.42 % N) and *panchagavya* spray (2.30 % N) along with easy and fast decomposition. The lowest plant height, leaf area index and dry matter production were recorded in T₅ (GM N₁₀₀) might due to slow mineralization process of green manure and non availability of the required quantity of nitrogen to meet the plant demand. (Tejeswara Rao, 2006)

The beneficial effect of application of recommended dose of fertilizer (T₁-F N₁₀₀) on growth parameters was subsequently reflected on improved yield attributes viz., cob length, cob weight and

number of kernels cob⁻¹. This might be due to higher drymatter accumulation and effective partitioning of assimilates to the sink as a results of availability of nitrogen matching physiological needs of the crop (Vadivel et al. (2000). Among the various organic manures T₉ (PM N₇₅ + PG N₂₅) recorded improved yield attributes might be because of higher per cent of nutrient value, as nearly four times more than FYM. Therefore physiologically proper partitioning from source to sink resulted in improvement of the yield attributes. Lower stature of yield attributes obtained with T₅ (GM N₁₀₀) might be due to inadequate availability of nutrients with slow decomposition of green manure in soil.

The highest green cob yield of 3930 kg ha⁻¹ and green fodder yield of 15951 kg ha⁻¹ were recorded with T₁ (F N₁₀₀), which was significantly superior to all other treatments. Early flower initiation and greater development of reproductive system might be possible consequences for higher yield. Adequate biomass production and better nutrient uptake and enhanced the yield. The results are in conformity with the findings of Sahoo and Mahapatra (2005), Tejeswara Rao (2006).

Application of 75 per cent N through poultry manure with 25 per cent N through *panchagavya* (T₉-PM N₇₅ + PG N₂₅) resulted in highest green cob and green fodder yield among the various organic manures tried in the experiment. It might be due to supply of nutrients in soluble form for a quiet longer period instead of allowing the entire soluble form

Table 2. Quality parameters (%) and net returns (Rs ha⁻¹) of sweet corn as influenced by different sources of organic manures

Treatments	Reducing sugars (%)	Non reducing sugars (%)	Protein (%)	Net returns (Rs ha ⁻¹)
T ₁ : F N ₁₀₀	0.079	0.524	13.50	58950
T ₂ : FYM N ₁₀₀	0.052	0.342	12.47	34290
T ₃ : SM N ₁₀₀	0.056	0.359	12.50	34533
T ₄ : PM N ₁₀₀	0.058	0.362	12.51	36165
T ₅ : GM N ₁₀₀	0.048	0.295	12.11	26535
T ₆ : VC N ₁₀₀	0.051	0.322	12.27	33750
T ₇ : FYM N ₇₅ +PG N ₂₅	0.069	0.392	13.08	42825
T ₈ : SM N ₇₅ +PG N ₂₅	0.072	0.474	13.13	44415
T ₉ : PM N ₇₅ +PG N ₂₅	0.075	0.516	13.25	45780
T ₁₀ : GM N ₇₅ +PG N ₂₅	0.062	0.374	12.51	36880
T ₁₁ : VC N ₇₅ +PG N ₂₅	0.065	0.386	13.01	42000
SEm ±	0.002	0.013	0.013	226.7
CD (P=0.05)	0.005	0.037	0.038	669.0

into solution, thereby minimizing fixation and precipitation. So that the plant roots can very well compete with loss mechanisms and absorb more nutrients leading to better yield. Besides serving as a nutrient source, poultry manure was reported to show strong influence on soil physical properties of increased infiltration rate and reduced bulk density due to addition of organic matter to the soil (Mohandas *et al.*, 2008).

The lowest green cob yield and green fodder yield was recorded with T₅ (GM N₁₀₀) due to the deflated stature of growth parameters as well as yield components. Even though green manure contains both macro and micro nutrients could not meet the requirement of the crop in the initial stages due to slow decomposition.

Quality parameters *viz.*, protein, reducing sugars and non-reducing sugars were found to be highest with the recommended dose of fertilizer (T₁-F N₁₀₀) (Table 2). This might be due to the better physiological and biochemical activity of sweet corn under comfortable nutrition, which leads to more nitrogen uptake and resulted in higher values of all these quality parameters. Lowest quality parameters were recorded in T₅ (GM N₁₀₀). These findings were in accordance with Raja (2001).

The present study revealed that highest yield of sweet corn with better quality and net returns could be produced with 100 per cent recommended dose of nitrogen. However, application of poultry

manure along with *panchagavya* was found to be next best alternative manurial practice for obtaining better yield and net returns in sweet corn.

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