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Npk Rate Effects on Growth and Yield of Sweet Corn.

Key words : NPK rates, yield attributes, yield, sweet corn.

Sweet corn can't be regarded as a staple food but it is consumed fresh as a confection. The green cobs are eaten, roasted or boiled. Out of various specially corns, sweet corn has very big market potential and has great genetic variability and scope to improve its nutritive value. Starch is the most predominant carbohydrates component of sweet corn. Sweet corn has highest edible quality in milk stage. In sweet corn best nutritional quality depends on moisture (72.7%) and total solids (22.3%) comprising of carbohydrate (81%), protein (13%) and lipids (3.5%).

The fertilization recommendation addresses commercial yield and quality, the economics of crop production, and protection of the environment. Corn being an exhaustive crop, its requirement for fertilizers especially for nitrogen is prominent. It is essential to know the best level of nitrogen application for getting a higher crop yield so that maximum benefits could be achieved. Phosphorus (P) is an essential element in plants which is required for vital structural and metabolic functions. Potassium (K+) is an essential element for plant growth and development and is the most abundant cation in plants, making up 3–5% of a plant's total dry weight. The present investigation was carried out to study the response of sweet corn with varrying rates of NPK fertilizers to sustain the higher productivity under the condition of Bapatla.

A field experiment was conducted at Agricultural College Farm, Bapatla during *rabi* 2012. It was laid out in Randomized Block Design with five replications consisting of varying rates of NPK, to study the effect of NPK rates on sweet corn. The NPK rates were, four rates (T1-120:60:60, T2-150:75:75, T3-180:90:90 and T4-210:105:105 NPK kg ha^{-1}) were laid out. The calculated quantity of N, P_2O_5 and K_2O in the form of urea, single super phosphate, and muriate of potash, respectively were applied as per the treatments. Half the dose of N and full dose of P_2O_5 and K_2O were applied as a basal application and and crop was top dressed with the remaining half dose of N, 30 days after sowing (DAS). All other cultural and plant protection measures were followed as recommended.

Five plants $plot^{-1}$ were selected randomly in the net plot and tagged for observations at 30, 60 DAS and at harvest for recording growth and yield parameters. Destructive sampling was followed to record dry weights at different stages. The number of cobs $plant^{-1}$ harvested from the five tagged plants and average was recorded number of cobs $plant^{-1}$, number of grains from five cobs was recorded and average number of grains cob^{-1} was computed (number of grains cob^{-1}), grain weight cob^{-1} were recorded after drying of cobs from selected plants and average weight of grains was computed, 100 grain weight was recorded from the selected cobs after drying 100 grains counted and recorded average weight of grains. When the crop attained milky stage, cobs from each net plot were harvested (78-82 DAS) and weighed fresh and expressed in kg ha^{-1}, stover yield was recorded after harvesting of green cobs plant cut close to the ground level and dried for 8-10 days expressed in kg ha^{-1}, Harvest index is the ratio of cob yield to the total biological yield (cob + stover) and expressed in per cent.

Harvest index = Economic yield/ Biological yield (S. S. Singh 2001).

Yield Attributes:

The yield attributes were significantly influenced by the increasing NPK rates (Table 1). The differences in number of cobs $plant^{-1}$ were non significant among NPK rates. The highest number of cobs $plant^{-1}$ (1.20) was recorded with (T4) 210:105:105 kg NPK ha^{-1}, whereas, the minimum number of cobs $plant^{-1}$ (1.10) was produced in (T1) 120:60:60 kg NPK ha^{-1} similar findings were found by Sahoo and Mahapatra

Table 1. Number of cobs plant^{-1}, number of grain cob^{-1} and grain weight cob^{-1} (g) of sweet corn as influenced by NPK rates.

Treatment (NPK kg ha^{-1})	No. of cobs plant^{-1}	No of grains cob^{-1}	Grain wt cob^{-1} (g)	Test weight (g)
T1: (120:60:60)	1.10	531	41.6	8.8
T2 : (150:75:75)	1.16	562	44.3	9.4
T3 : (180:90:90)	1.18	606	46.8	10.0
T4 : (210:105:105)	1.20	614	47.1	10.4
SEm±	0.03	7.26	0.44	0.11
CD (p= 0.05)	NS	22.4	1.4	0.4
CV (%)	12.1	6.3	4.8	5.8

Table 2. Green Cob yield, stover yield and harvest index of sweet corn as influenced by NPK rates.

Treatment (NPK kg ha^{-1})	Green Cob yield (kg ha^{-1})	Stover yield (kg ha^{-1})	Harvest Index(%)
T1: (120:60:60)	9299	10904	46.0
T2: (150:75:75)	10380	11781	46.6
T3: (180:90:90)	11067	12208	47.5
T4: (210:105:105)	12327	13013	48.6
SEm±	141.8	128.5	0.27
CD (p= 0.05)	437.0	395.9	0.8
CV (%)	6.6	5.4	2.9

(2004). Significant increase in number of grains cob^{-1} was recorded with each increment of NPK from 120:60:60 to 210:105:105 kg ha^{-1}. The treatment (T4) 200:105:105 kg NPK ha^{-1} (614) to sweet corn recorded higher number of grains cob^{-1} which was at par with the 150:75:75 180:90:90 and 120:60:60 kg NPK ha^{-1}. However the minimum number of grains recorded under (T1)120:60:60 kg NPK ha^{-1} (531) to sweet corn. Grain weight cob^{-1} increased significantly with increased levels of NPK from 120:60:60 to 210:105:105 kg ha^{-1}. And it was significantly superior to at 210:105:105 kg NPK ha^{-1} (47.1 g) compared to that of other lower rates. However, the lowest grain weight cob^{-1} (41.6 g) were recorded with the application of 120:60:60 kg NPK ha^{-1}. Among the treatments 210:105:105 kg NPK ha^{-1} to sweet corn recorded the highest (10.4 g) test weight which, was comparable with 180:90:90, 150:75:75 and 120:60:60 kg NPK ha^{-1}. However, 120:60:60 kg NPK ha^{-1} to sweet corn recorded the (8.8 g) lowest test weight. Higher accumulation of dry matter in plants and effective translocation of photosynthates from source to sink which intern helped in early formation of reproductive structures at higher levels of NPK might have increased yield attributes. Similar findings were also reported by Selvaraju and Iruthayaraj (1994) and Arun Kumar *et al*. (2007).

Yield:

Yield significantly influenced by rates of NPK application (Table 2). The maximum cob yield of (12327 kg ha^{-1}) was obtained with the application of 210:105:105 kg NPK ha^{-1} which was significantly superior over that of lower rates of NPK. The per cent increase in green cob yield was (25%) during study with rates of NPK application from (120:60:60 to 210:105:105 kg NPK ha^{-1}). NPK rates also exhibited significant differences in producing the stover yield. The treatment with 210:105:105 kg NPK ha^{-1} to sweet corn recorded highest (13013 kg ha^{-1}) stover yield which was significantly superior to the treatment 180:90:90 kg NPK ha^{-1} to sweet corn. The harvest index (48.6%) was recorded with the application of 210:105:105 kg NPK ha^{-1} during study followed by T3 (180:90:90 kg NPK ha^{-1}) to sweet corn. Among all the treatments, 120:60:60 kg NPK ha^{-1} to sweet corn recorded lowest stover yield (10904 kg ha^{-1}) and harvest index (46.0%). The continuous availability of nutrients throughout the crop growth period without any interruption for nutrient requirements, because extra NPK to sweet corn crop might fulfil the needs of plants who can accumulate their required nutrients, there by resulting in better performance of the crop. The higher availability of source under higher NPK rates created more sink than at lower rates. This might be due to better utilization of NPK supply Reddy and Ahmed (2000), Singh and Sarkar (2001), Asghar *et al.* (2010).

CONCLUSION

The sweet corn responded positively significant with increasing the NPK rates. Among the NPK rates, there was a progressive increase in yield attributes and yield with increasing NPK rates from 120:60:60 to 210:105:105 kg NPK ha^{-1} but significantly higher with 210:105:105 kg NPK ha^{-1}.

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Department of Agronomy,
Agricultural College,
Bapatla 522101,
Andhra Pradesh

Nilesh Panchbhai
K Mosha
Ch Pulla Rao
Y Ashoka Rani

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