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Research Paper

Relationship latent on integrated nutrient management on yield attributes and economics of sweet corn (*Zea mays* L.)

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ABSTRACT

Field experiment was conducted at Agronomy farm B.A.College of Agriculture, Anand Campus, Anand during *Kharif* season of the year 2004-05 to study the effect of organic and inorganic fertilizer on seed yield of sweet corn (*Zea mays* L.). The experiment was studied with split plot design having two levels of inoculation (PSB), FYM and phosphorus as main plot treatments along with five levels of nitrogen as sub plot treatment. Applications of organic manure had significantly increased height and all crop growth and 5.75 per cent more grain yield with application of FYM@10 ha^{-1}. Seed inoculation with *Pseudomonas* gave significantly increased growth and grain yield increased by 8.24 per cent. Application of phosphorus significantly increased plant height at all crop growth stages and higher grain yield was recorded 6.74 per cent than central. Seed yield of sweet corn as well as growth and yield attributes were significantly increased due to varying lends of nitrogen. The higher grain yield (1633 kg ha^{-1}) and strover yield (5783 kg ha^{-1}) was recorded with 120 and 160 kg N ha^{-1}, respectively. The net realization of Rs. 30525 and 29255 ha^{-1} was recorded with 10 t FYM ha^{-1} +seed inoculation gave 31485 Rs. ha^{-1} and application of P_2O_5 at 0 and 50 kg. P_2O_5 ha^{-1} and higher with varying levels of N recorded significantly higher net realization. The yield attributes such as plant height of 84 DAS, no. of barren plants / plot, no. of rows / cob, no. of cobs / plant, no. of grains / cob, grain wt. / cob, test weight and fodder yield were found significantly correlated with grain yield of sweet corn. Significant negative correlation was found between grain yield and no. of barren plants / plot (r=-0.7642). It also means that 58.40 per cent variation in grain yield of sweet corn is due to variation in number of barren plants / plot. The highest net return obtained with N_3 (120kgN/ha), followed by C_1 (Rs. 31485), N_2 (Rs. 30828) and P_1 (Rs.30645), respectively. Whereas the CBR was observed highest with C_1 (1:7.97) followed by N_3 (1:7.93), FO (1:7.50) and P_2 (1:7.46), respectively.

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KEY WORDS : Maize, Nitrogen, Phosphorous, Integrated nutrient management, Sweet corn, Yield attributes, Correlation, Net realization

Sweet corn (*Zea mays* L.) popularity known as maize is one of the most important cereal of the world, ranking third amongst the food crops, next to rice and wheat both in respect of area and production. In Gujarat maize is one of the important traditionally grown crops of tribal areas. Comprising the districts of Panchmahals, Sabarkantha, Banaskantha and Part of Baroda and Kheda districts, now recently this crop may be introduce in South Gujarat districts like Surat, Tapi. Among these districts Panchmahals is a leading district. Among various types of maize, sweet corn is very popular for the use of its green cabs in the United States of America. It differs from the field corn due to its higher sweetness, as it has high amount of sugar and alcoholic material. Besides, its consumption as vegetable purpose, it is also utilized for extracting sucrose as an industrial purpose. The role of organic mannure for increasing crop production has been universally established, as it plays significant role in improving physical and chemical properties of the soil. Application of 12-15 tonne of FYM helps in increasing the yield of maize crop to the tune of 1.5 to 5.6 per cent / ha. Sweet corn is one of the heavy consumers of plant nutrients. It remains about 72 kg N, 35 kg P_2O_5 and 220 kg K_2O / ha. Nitrogen is the key element in crop growth and is the most limiting nutrient in Indian soils. The importance of nitrogen for increasing the yield has been widely accepted.

Maize is one of the crop that responses well to phosphoric fertilizer in almost all the soil types. It plays vital role in plant nutrition. The deficiency of phosphorus

is soil severely limits root and shoot growth and thereby affecting the yield. The availability of phosphorus is also low as compared to that of N and K. Under such situation, the phosphate solubilizing micro organism plays significant role in making the phosphorus available to plants by secretion of organic acids and enzyme phosphatase which solubilizes the insoluble phosphate and thereby it helps in increasing the crop production. Sweet corn is becoming more and more popular as vegetables and as industrial products also. To know the economics and relation with yield attributes, the study was conducted with specific objectives.

RESEARCH PROCEDURE

The field experiment was conducted during the *Kharif* season at Agronomy farm of B.A.College of Agriculture, Anand Agricultural University, Anand. The experiment was laid out on sandy loam soil, locally known as Goradu soil with very deep, well drained and fairly moisture retentive but low as compared to black soil. The experiment was laid out with forty treatments comprising all possible combinations of two levels of O.M. (FYM), two levels of *Pseudomonas*, two levels of phosphoric along with five lends of nitrogen were used in this study with split plot design (SPD). Combination of FYM x inoculation x phosphorus were taken as main plot treatment while levels of nitrogen were taken as subplot treatments with three replication having 5.4 m x 3.6 m gross plot size, 60 cm x 20 cm spacing and dibbling method of sowing. Application of well decomposed FYM as basal at 10 t ha^{-1} as per treatment, 20 per cent. of total nitrogen of respective levels of N compiled with full dose of phosphorus in form of SSP in a previously open furrow at the depth of 8-10 cm. Remaining 80 per cent of nitrogen was applied in two installments, UBC 50 per cent of the total quantity at knee height stage and remaining 30 per cent N of total amount at milking stage. The observations were recorded from five randomly selected plots from net plot area (Plant height, moos barren plants) on growth and yield attributing character and also economics of (length of cob, no. of kernel row per cob, no. of kernel per cob, grain and strover yield) of sweet corn.

RESEARCH ANALYSIS AND REASONING

The data recorded during the course of investigation were tabulated, statistically analysed and results are intepreted here under appropriate heads:

Correlation studies:

Yield is a complex quantitative character which depends on different interrelated characters. These components may show varying degree of association, favourable as well as unfavourable. Hence, while coming at the rational improvement in yield, the knowledge of the correlation among these characters is essential. Correlation reflects the extent of association between a particular character and yield.

The data presented in Table 1 indicated that plant height at 84 DAS, no. of rows/cob, no. of cobs/plant, no. of grains/cob, grain wt. / cob, test wt and fodder yield had significantly positive correlation with grain yield of sweet corn.

Table 1 : Correlation between grain yield of sweet corn and different variables and its coefficient of determination

Sr. No.	Description of variables	'r' values	Coefficient of determination (r^2 x 100)
1.	Plant height of 84 DAS	0.7757*	60.17
2.	No. of barren plants / plot	-0.7642*	58.40
3.	No. of rows / cob	0.9199**	84.62
4.	No. of cobs / plant	0.8534**	72.82
5.	No. of grains / cob	0.9041**	81.73
6.	Grain wt. / cob	0.9636**	92.85
7.	Test weight	0.9292**	86.34
8.	Fodder yield	0.8366**	69.98

* and ** indicate significance of values at P=0.05 and 0.01, respectively

The correlation between grain yield and grain wt. / cob (r=0.9636) was the highest followed between grain yield and test wt. (r=0.9292), no. of rows/cob (r=0.9199), no. of grains/cob (r=0.9041), no. of cob/plant (r=0.8534), fodder yield (r=0.8366) and plant height at 84 DAS (r=0.7757). This means the 92.85 per cent variation in grain yield of sweet corn is explained by variation in grain weight per cob. Similarly, 86.34,84.62,81.73,72.82,69.98 and 60.17 per cent variation in grain yield were attributed on variation in test weight, no. of rows/cob, no. of grains/ cob, no. of cobs/plant, fodder yield and plant height at 84 DAS, respectively.

Significant negative correlation was found between grain yield and no. of barren plants / plot (r=-0.7642). It also means that 58.40 per cent variation in grain yield of sweet corn is due to variation in number of barren plants / plot. The highest net return were obtained with N_3 (120kgN/ha), followed by C_1 (Rs. 31485), N_2 (Rs. 30828) and P_1 (Rs.30645), respectively. Whereas the CBR was observed highest with C_1 (1:7.97) followed by N_3 (1:7.93), F_0 (1:7.50) and P_0 (1:7.46), respectively (Table 2). Patra *et al.* (1998) reported the same results.

Table 2: Gross and net realization (Rs. /ha) and BCR as influenced by FYM, inoculation, phosphorus and nitrogen

Treatments	Yield (kg/ha)		Gross realization (Rs./ha)	Total cost of cultivation (Rs./ha)	Net realization (Rs./ha)	BCR
	Grain	Stover				
O.M.(FYM)						
F_0	1253	4575	33155	3900	29255	1:7.50
F_1	1325	4752	35025	4500	30525	1:6.78
Inoculation(PSB)						
C_0 uninoculated	1238	4481	32745	3900	28845	1:7.39
C_1 Inoculated	1340	4838	35435	3950	31485	1:7.97
Phosphorus						
P_0	1247	4550	32995	3900	29095	1:7.46
P_1	1332	4777	35185	4540	30645	1:6.75
Nitrogen						
N_0	1013	3447	26703	3900	22803	1:5.84
N_1	1128	3935	29774	4272	25502	1:5.96
N_2	1341	4671	35371	4543	30828	1:6.78
N_3	1633	5481	43017	4815	38202	1:7.93
N_4	1331	5783	35588	5087	30501	1:5.99

Conclusion:

It can be concluded from the experiment that an applications of organic manure had significantly increased the plant height at all crop growth stages and 5.75 per cent more grain yield with application of FYM@10 t ha^{-1}. Seed inoculation with *Pseudomonas* gave significantly augmented the growth and grain yield increased by 8.24 per cent.

Application of phosphorus significantly increased plant height at all crop growth stages and higher grain yield was recorded 6.74 per cent than central. Seed yield of sweet corn as well as growth and yield attributes were significantly increased due to varying lends of nitrogen. The higher grain yield (1633 kg ha^{-1}) and strover yield (5783 kg ha^{-1}) was recorded with 120 and 160 kg N ha^{-1}, respectively. The net realization of Rs. 30525 and 29255 ha^{-1} was recorded with 10 t FYM ha^{-1} +seed inoculation gave 31485 Rs. ha^{-1} and application of P_2O_5 at 0 and 50 kg. P_2O_5 ha^{-1} and higher with varying levels of N were recorded significantly higher net realization. The yield attributes such as plant height of 84 DAS, no. of barren plants / plot, no. of rows / cob, no. of cobs / plant, no. of grains / cob, grain wt. / cob, test weight and fodder yield were found significantly correlated with grain yield of sweet corn. Significant negative correlation was found between grain yield and no. of barren plants / plot (r=-0.7642). It also means that 58.40 per cent variation in grain yield of sweet corn is due to variation in number of barren plants / plot. The highest net return obtained with N_3 (120kg N/ha), followed by C_1 (Rs. 31485), N_2 (Rs. 30828) and P_1 (Rs.30645). Whereas the CBR was observed highest with C_1 (1:7.97) followed by N_3 (1:7.93), F_0 (1:7.50) and P_2 (1:7.46), respectively. The ideal combination found was $C_1F_1P_1N_3$ for getting highest net return and CBR.

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