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EFFECT OF DIFFERENT FERTILITY LEVELS ON GROWTH PARAMETERS AND YIELD OF SWEET CORN (*ZEA MAYS* L. SSP. SACCHARATA) VARIETIES

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KEYWORDS

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ABSTRACT

A field experiment was conducted at Udaipur during *Kharif*season of 2013 to evaluate the Performance of Sweet corn (*Zea mays* L. Ssp. saccharata) Varieties at Varying Fertility Levels. . The treatment consisted combinations of four sweet corn varieties and four fertility levels. These 16 combinations were evaluated under factorial randomized block design with three replications. The variety "Sugar 75" had highestgreen cob yield (92.9 q/ha), green fodder yield (204.0q/ha), biological yield (296.9q/ha), Dry matter accumulation (116.7 g/plant), crop growth rate (2.96 g/m^2/day), relative growth rate and leaf area index (3.3). On application of 110 kg N + 50 kg P_2O_5 ha^{-1} Dry matter accumulation, Leaf area index, CGR and RGR (from 50 DAS to harvest), green cob yield, green fodder yield, biological yield.

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INTRODUCTION

Sweet corn is a hybridized variety of maize specifically breeds to increase the sugar content (Kumar, 2008). Its consumption at immature stage as roasted and boiled ears is a popular practice as the kernels are sweet (content 12– 20% sugar), creamy, tender, crispy and tests almost shellless (Choudhari and Channappagouda, 2015). After harvesting green cobs, the plants of sweet corn are used as green fresh or dry fodder. This speciality corn with its high market value is gaining popularity and now a day's its cultivation is the first choice of the farmers. Recently, few sweet corn varieties have been released by private and public sector. Farmers are growing these varieties with existing fertilizer recommendations made for composite and hybrids maize. The needs of a sweet corn crop for supplemental nutrients can vary greatly among fields, seasons and crop growing conditions.Nitrogen is a component of protein and nucleic acids and when nitrogen is sub-optimal, growth isreduced (Singh *et al.,* 2013). Hence, there is need to evaluate sweet corn varieties under optimum combination of nitrogen and phosphorus fertilization under prevailing agroclimatic conditions. The paper deals with effect of different fertility levels on growth parameters and yield of Sweet corn.

MATERIALS AND METHODS

The field experiment was carried out during the rainy (kharif) season of 2013 at the Instructional Farm, Rajasthan College of Agriculture, Udaipur, Rajasthan, which is situated at 24º35' N latitude, 72º42' E longitude and at an altitude of 579.5 meter above mean sea level. The soil was clay loam in texture, having slight alkaline reaction (pH 7.8). The soil was medium in available nitrogen (290.3 kg ha^{-1}) and phosphorus (18.1kg ha^{-1}) and high in available potassium (305.4 kg ha^{-1}).The treatment consisted combinations of 4 sweet corn varieties ('Sugar 75', 'Misthi', 'Madhuri' and 'HI Brix-51') and 4 fertility levels (70 + 30, 90 + 40, 110 + 50 and 130 + 60 kg N + P_2O_5/ha). Sixteen treatment combinations were evaluated under factorial randomized block design with 3 replications. The seed was sown manually on 10 July 2013 by placing 2 seeds at a depth of 5-6 cm maintaining rows and plants spacing at 60 × 25 cm respectively. The experimental plot size was 15 m^2. Thinning was carried out 15 days after sowing to maintain required plant population. The green cobs were harvested 15 days after silking, when grains were in milky stage. Phosphorus as per treatments was applied basal, whereas nitrogen was applied in 3 equal splits, viz. One-third as basal, one-third at knee high stage and remaining one-third at initiation of tassel. In order to minimize weed competition, pre-emergence application of atrazine at 0.5 kg/ha followed by one hoeing and earthing up to be carried out 20 days after sowing. Leaf-area index, crop-growth rate (CGR) and relative growth rate (RGR) were worked out by using standard methods for analysis and formula.

RESULTS AND DISCUSSION

Sweet corn variety 'Sugar 75' attained maximum plant height (Table 1), which was

Table 1: Effect fertility levels on growth attributes of sweet corn varieties

Treatments	50 DAS Plant height (cm)	Dry matter (g plant^{-1})	LAI	At harvest Plant height(cm)	Dry matter (g plant^{-1})	LAI	Days to 50 % tasseling	Days to 50% silking
Varieties								
Madhuri	161.4	40.1	2.33	186.8	112.8	3.10	47.8	53.7
Hi-Brix-51	173.8	39.0	2.24	202.2	110.5	2.97	48.3	54.8
Misthi	182.3	37.6	2.04	211.8	97.4	2.88	46.3	52.2
Sugar-75	184.6	42.7	2.38	212.1	116.7	3.30	46.4	52.3
S. Em. ±	1.01	0.23	0.03	1.19	0.60	0.02	0.17	0.20
C. D. (P = 0.05)	2.91	0.67	0.06	3.43	1.73	0.05	0.48	0.60
Fertility levels (kg ha^{-1})								
70 kg N + 30 kg P_2O_5	165.7	37.3	2.03	191.3	98.5	2.81	47.3	53.2
90 kg N + 40 kg P_2O_5	178.7	40.3	2.30	206.5	111.3	3.12	47.3	53.2
110 kg N + 50 kg P_2O_5	178.9	40.9	2.33	207.8	113.5	3.15	47.1	53.5
130 kg N + 60 kg P_2O_5	178.8	40.9	2.33	207.3	114.1	3.17	47.1	53.0
S. Em. ±	1.01	0.23	0.03	1.19	0.60	0.02	0.17	0.20
C. D. (P = 0.05)	2.91	0.67	0.04	3.43	1.73	0.05	NS	NS

Table 2: Effect fertility levels on growth parameters and yield of sweet corn varieties

Treatments	From 25 DAS-50DAS		From 50 DAS-at harvest		Yield (q ha^{-1})		
	CGR(g m^{-2} day^{-1})	RGR(g g^{-1} day^{-1})	CGR (g m^{-2}day^{-1})	RGR(g g^{-1} day^{-1})	Green cob	Green fodder	Biological
Madhuri	0.889	0.211	2.91	0.268	68.9	137.9	206.7
Hi-Brix-51	0.886	0.212	2.86	0.257	63.7	133.5	197.1
Misthi	0.880	0.206	2.39	0.254	59.1	126.9	185.9
Sugar-75	0.890	0.237	2.96	0.275	92.9	204.0	296.9
S. Em. ±	0.010	0.004	0.03	0.004	0.50	1.06	1.55
C. D. (P = 0.05)	NS	0.012	0.08	0.012	1.45	3.05	4.49
70 kg N + 30 kg P_2O_5	0.870	0.210	2.45	0.259	62.5	132.1	194.5
90 kg N + 40 kg P_2O_5	0.885	0.221	2.84	0.270	72.4	153.1	225.5
110 kg N + 50 kg P_2O_5	0.895	0.218	2.91	0.271	74.8	159.0	233.8
130 kg N + 60 kg P_2O_5	0.899	0.217	2.93	0.273	74.7	158.2	232.9
S. Em. ±	0.010	0.004	0.03	0.004	0.50	1.06	1.55
C. D. (P = 0.05)	NS	NS	0.09	0.012	1.45	3.05	4.49

statistically at par with 'Misthi'. However 'Sugar 75' produced highest dry matter at harvest, leaf-area index (LAI), CGR, RGR from 50 days after sowing to harvest and Hi-Brix-51 took highest days to 50 % tasseling and silking compared to the other varieties (Sugar-75) consequently produced highest green cobs and fodder yield over rest of the varieties. Under present investigation all varieties were grown under identical conditions; however, marked variation in growth parameter and yield could be ascribed on account of their genetic capabilities to exploit available resources for their growth and developments.

The better performance of 'Sugar 75' seems to be on account of higher uptake of N and P (Table 2) from soil and its reallocation in grain and plant. The higher availability of N and P seems to have promoted development of morphological structure by virtue of multiplication of cell division which is well reflected through increased LAI, CGR, RGR and yields of 'Sugar 75' Kumar (2008) and Suthar *et al.* (2014). The next best variety in order of superiority of green fodder and cobs yields 'Madhuri'. An application of 90 kg N + 40 kg P_2O_5/ha significantly enhanced plant height, dry matter, LAI, CGR and RGR and consequently, green cobs and green fodder yields over 70 kg N + 30 kg P_2O_5/ha. Further increase in fertility levels though increased these parameters, failed to record statistical significance P or superiority. The significant response up to 90 kg N + 40 kg P_2O_5/ha might be on account of enrichment of soil with these two major nutrients (N and P) to the level of sufficiency which in turn promoted growth of plant right from early stage Kumar (2008) and Suthar *et al.* (2014). This might be on account of higher yield of green cobs and green fodder yields. Further increase in nutrient level though increased green cobs and fodder yields but marginal increase in green cob and fodder yields unable to compensate higher prices of fertilizer (Nath et al., 2009). It was concluded that under prevailing agro-climatic conditions, sweet corn variety 'Sugar 75' fertilized with 90 kg N + 40 kg P_2O_5/ha proved most efficient.

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