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GJ Patel
Tribal Research cum Training Center, Anand Agricultural University, Devgadh Baria, Gujarat, India

CJ Patel
Tribal Research cum Training Center, Anand Agricultural University, Devgadh Baria, Gujarat, India

YB Chauhan
Tribal Research cum Training Center, Anand Agricultural University, Devgadh Baria, Gujarat, India

AY Makani
Tribal Research cum Training Center, Anand Agricultural University, Devgadh Baria, Gujarat, India

Corresponding Author:
GJ Patel
Tribal Research cum Training Center, Anand Agricultural University, Devgadh Baria, Gujarat, India

Performance of *rabi* sweet corn (*Zea mays* L. Saccharata. Sturt.) Under different levels of nitrogen, phosphorus and potash applied through drip system

GJ Patel, CJ Patel, YB Chauhan and AY Makani

Abstract
A field experiment was conducted at Tribal Research cum Training Centre, Anand Agricultural University, Devgadh Baria, Dist. Dahod, Gujarat during the *rabi* season of the year 2019-20, 2020-21 and 2021-22. The experiment was carried out in split plot design with eighteen treatments replicated three times. The treatments details included T_1: $N_1P_1K_0$ (80:20:00 NPK kg/ha), T_2: N_1P_1K1 (80:20:40 NPK kg/ha), T_3: $N_1P_2K_0$ (80:40:00 NPK kg/ha), T_4: $N_1P_2K_1$ (80:40:40 NPK kg/ha), T_5: $N_1P_3K_0$ (80:60:00 NPK kg/ha), T_6: $N_1P_3K_1$ (80:60:40 NPK kg/ha), T_7: $N_2P_1K_0$ (100:20:00 NPK kg/ha), T_8: $N_2P_1K_1$ (100:20:40 NPK kg/ha), T_9: $N_2P_2K_0$ (100:40:00 NPK kg/ha), T_{10}: $N_2P_2K_1$ (100:40:40 NPK kg/ha), T_{11}: $N_2P_3K_0$ (100:60:00 NPK kg/ha), T_{12}: $N_2P_3K_1$ (100:60:40 NPK kg/ha), T_{13}: $N_3P_1K_0$ (120:20:00 NPK kg/ha), T_{14}: $N_3P_1K_1$ (100:20:40 NPK kg/ha), T_{15}: $N_3P_2K_0$ (120:40:00 NPK kg/ha), T_{16}: $N_3P_2K_1$ (120:40:40 NPK kg/ha), T_{17}: $N_3P_3K_0$ (120:60:00 NPK kg/ha) and T_{18}: $N_3P_3K_1$ (120:60:40 NPK kg/ha). Sugar 75 variety of sweet corn was used as a test crop. The results revealed that due to different levels of nitrogen, the highest Green cob yield (17053, 18253, 19153 and 18152 kg/ha) were found with treatment N_3: (120 kg N/ ha) in first year, second year, third year and in pooled basis, respectively. While in case of phosphorus, the highest Green cob yield (16893, 18093, 18993 and 17993 kg/ha) were found with treatment P_3 - (60 kg P_2O_5/ha) in first year, second year, third year and in pooled basis, respectively. Same trend was found in case of green fodder yield (kg/ha). From the present investigation, it could be concluded that growing *rabi* hybrid sweet corn through drip irrigation system (0.8 PEF) are recommended to fertilize the crop with 120 kg N/ha {(105 kg N through Urea & 15 kg N through Urea phosphate) (24 kg as basal and remaining 96 kg in four equal splits at 20, 30, 40 and 50 DAS)} and 40 kg P_2O_5/ha through urea phosphate (08 kg as basal and remaining 32 kg in four equal splits at 20, 30, 40 and 50 DAS) through fertigation to get higher green cob yield and net return.

Keywords: Sweet corn, *Zea mays* L. Saccharata. Sturt.

Introduction
Sweet corn (*Zea mays* L. Saccharata Sturt.) also known as sugar corn, is a hybrid of maize (*Zea mays* L.) specifically bred to increase the sugar content. Sweet corn is introduced from the USA. The fruit of the sweet corn plant is the corn kernel. It has a sugary rather than a starchy endosperm and a creamy texture. The low starch level makes the kernel wrinkled rather than plumpy Chaturvedi and Chandel (2005) [3]. Sweet corn cannot be regarded as a staple food, but it is consumed fresh as a confection. Sweet corn is a variety of maize with high sugar content. Sweet corn is the result of a naturally occurring recessive mutation in the genes which control the conversion of sugar to starch inside the endosperm of the corn kernel. Unlike field corn varieties, which are harvested when the kernels are dry and mature (dent stage), sweet corn must be picked when immature (milk stage) and prepared and eaten as a vegetable, rather than a grain Anonymous, (2021) [1]. Among all types of maize, Sweet corn (*Zea mays* saccharine) has commercial importance. Many experimental findings revealed that higher crop yield of maize grown for grain could obtain only when the plant get sufficient quantities of nutrients during there lifespan. Hence, the balanced fertilization is very important to get the maximum yield, so it was felt necessary to study the effect of fertilizer levels on growth and yield of sweet corn. Fertilized the crop through fertigation or artificial are substances containing chemical elements that improve growth and productiveness of plants. Maize crop responds very well to water and nutrient application. To achieve higher water use efficiency, traditional irrigation methods should be replaced with micro irrigation systems. Drip irrigation is one of the best alternate in delivering water to the plant. Maize is one of the amenable crops for drip irrigation system, which is an efficient method of irrigation

(Zhu *et al.*, 2007) [11].

The introduction of simultaneous micro-irrigation and fertilizer application (fertigation) opens new possibilities for controlling water and nutrient supplies to crops, besides maintaining the desired concentration and distribution of nutrients and water into the soil (Bar-Yosef, 1999) [12]. Hence Adoption of micro irrigation, may help in saving significant amount of water and increase the quality and quantity of produce.

In view of paucity of appropriate research, "Performance of *rabi* sweet corn (*Zea mays* L. Saccharata. Sturt.) under different levels of nitrogen, phosphorus and potash applied through drip system" experiment was conducted at Tribal Research cum Training Centre (TRTC), Anand Agricultural University, Devgadh Baria, during *rabi* season of 2019-20, 2020-21 and 2021-22.

Materials and Methods

A field experiment was conducted at Tribal Research cum Training Centre, Anand Agricultural University, Devgadh Baria, Dist. Dahod, Gujarat during the *rabi* season of the year 2019-20, 2020-21 and 2021-22. The experimental soil was sandy loam with good drainage and fair moisture retention capacity. The experimental soil was low in available nitrogen (228 kg/ha), medium in available phosphorous (35 kg/ha) and fairly medium in available potash (145 kg/ha). The soil was free from acidity and salinity. The experiment was carried out in split plot design with eighteen treatments replicated three times. The treatments details included T_1: $N_1P_1K_0$ (80:20:00 NPK kg/ha), T_2: N_1P_1K1 (80:20:40 NPK kg/ha), T_3: $N_1P_2K_0$ (80:40:00 NPK kg/ha), T_4: $N_1P_2K_1$ (80:40:40 NPK kg/ha), T_5: $N_1P_3K_0$ (80:60:00 NPK kg/ha), T_6: $N_1P_3K_1$ (80:60:40 NPK kg/ha), T_7: $N_2P_1K_0$ (100:20:00 NPK kg/ha), T_8: $N_2P_1K_1$ (100:20:40 NPK kg/ha), T_9: $N_2P_2K_0$ (100:40:00 NPK kg/ha), T_{10}: $N_2P_2K_1$ (100:40:40 NPK kg/ha), T_{11}: $N_2P_3K_0$ (100:60:00 NPK kg/ha), T_{12}: $N_2P_3K_1$ (100:60:40 NPK kg/ha), T_{13}: $N_3P_1K_0$ (120:20:00 NPK kg/ha), T_{14}: $N_3P_1K_1$ (100:20:40 NPK kg/ha), T_{15}: $N_3P_2K_0$ (120:40:00 NPK kg/ha), T_{16}: $N_3P_2K_1$ (120:40:40 NPK kg/ha), T_{17}: $N_3P_3K_0$ (120:60:00 NPK kg/ha) and T_{18}: $N_3P_3K_1$ (120:60:40 NPK kg/ha). Sugar 75 variety of sweet corn was used as a test crop.

Soil analysis was made after taking a composite common soil sample from the entire experimental area initially and after harvest, the samples were drawn separately from each net plot and subjected to chemical analysis. The conventional procedures were used to determine the major soil physico-chemical parameters such as soil texture, organic carbon, EC, pH and available soil nutrients such as N, P_2O_5, K_2O, S and Fe. The statistical analysis of the various growth, yield and quality characters studied during the course of investigation was carried out by using statistical method appropriate to Randomized Block Design by computer system at the computer center, Department of the Agricultural Statistics, BACA, AAU, Anand, Gujarat as per the procedure described by Cochran and Cox (1967) [4]. The variances of different sources of variation in ANOVA were tested by "F-test" and compared with the value of Table-F at 5% level of significance. To elucidate the treatment effect, summary tables along with S.Em. ± and CD at 5% are given in chapter "experimental results" and their analysis of variance are given in the Appendices at the end.

Results and Discussion

Effect of treatments on growth attributes

Performance of *rabi* Sweet corn under different levels of nitrogen, phosphorus and potash applied through drip system were found non-significant influence on the plant population recorded at 30 DAS and at harvest in pooled. The interaction effect between nitrogen, phosphorus and potash of plant height at 30 DAS and at harvest was also found non-significant. Performance of *rab*i Sweet corn under different levels of nitrogen, phosphorus and potash applied through drip system were found non-significant influence on the plant height recorded during the year at 30 DAS. While in case of plant height at harvest, the result of the pooled analysis revealed that the tallest plant were found with treatment N_3-(120 kg N/ha) and treatment P_3-(60 kg P_2O_5/ha) in pooled basis. The different levels of potash applied through drip system were found non-significant influence on the plant height recorded at harvest. The interaction effect between nitrogen, phosphorus and potash on plant height was absent in pooled basis. Pasuquin *et al.* (2013) [7] and Fuller and Harvey (2006) [5] discovered a similar finding. More cell division and elongation which are favoured by high metabolic activity as a result of adequate nutrient availability may be the cause of increased plant height under high fertilizer application (Pal and Bhatnagar, 2012) [6].

Effect of treatments on yield attributes and yield

The result of the pooled analysis results revealed that due to different levels of nitrogen, the highest cob length (20.76 cm) were found with treatment N_3-(120 kg N/ha) in pooled basis, respectively. While, in case of phosphorus the results revealed that due to different levels of phosphorus, the highest cob length (20.37 cm) were found with treatment P_3-(60 kg P_2O_5/ha) in pooled basis, respectively. Cob length might be due to favorable conditions during the crop growth stage, increasing the nutrient use efficiency of applied through drip and supplying it continuously to the plant during the crop growth period and incentivizing various physiological activities in the plant that are thought to be essential for proper plant growth and development. These results was also reported by Vyas and Kushwah (2015) [8] and Billore and Srivastava (2015) [2]. The different levels of potash applied through drip system were found non-significant influence on the cob length recorded at harvest. The interaction effect between nitrogen, phosphorus and potash on cob length was found non-significant in pooled basis. Performance of *rabi* Sweet corn under different levels of nitrogen, phosphorus and potash applied through drip system were found significant influence on the Cob girth (cm) recorded at harvest in all the three years as well as in pooled. The interaction effect of cob girth was also found non-significant.

The results revealed that due to different levels of nitrogen, the highest Green cob yield (17053, 18253, 19153 and 18152 kg/ha) were found with treatment N_3-(120 kg N/ha) in first year, second year, third year and in pooled basis, respectively. A perusal of data given in (Table 1) results revealed that due to different levels of phosphorus, the highest Green cob yield (16893, 18093, 18993 and 17993 kg/ha) were found with treatment P_2-(60 kg P_2O_5/ha) in first year, second year, third year and in pooled basis, respectively. Performance of *rabi* Sweet corn under different levels of potash applied through drip system were found non-significant influence on the Green cob yield recorded at harvest Vavilov (1951) [9]. The

interaction effect between nitrogen and phosphorus was found significant in second year and third year on Green cob yield.

Among different interactions, N×P interaction was found significant in second and third year. A perusal of data (Table 2) showed that treatment combination N_3P_2 (120 kg N/ha and 40 kg P_2O_5/ha) gave significantly the highest Green cob yield (20262) which was remained at par with treatment combination N_2P_3 (100 kg N/ha and 60 kg P_2O_5/ha).

The results revealed that due to different levels of nitrogen, the highest Green fodder yield (25314, 29239, 27856 and 27470 kg/ha) were found with treatment N_3-(120 kg N/ha) in first year, second year, third year and in pooled basis, respectively. A perusal of data given in (Table 1) results revealed that due to different levels of phosphorus, the highest Green fodder yield (24890, 28311, 27039 and 26747 kg/ha) were found with treatment P_3-(60 kg P_2O_5/ha) in first year, second year, third year and in pooled basis, respectively. Performance of *rabi* Sweet corn under different levels of potash applied through drip system were found non-significant influence on the Green fodder yield recorded at harvest.

Among different interactions, N×P interaction was found significant in second and third year. A perusal of data (Table 2) showed that treatment combination N_3P_2 (120 kg N/ha and 40 kg P_2O_5/ha) gave significantly the highest Green fodder yield (29179 kg/ha,) which was remained at par with treatment combination N_3P_3 (120 kg N/ha and 60 kg P_2O_5/ha).

Table 1: Green cob yield (kg/ha) and Green fodder yield (kg/ha) of Sweet corn as influenced by different treatments

Treatments	Green cob yield (kg/ha)				Green fodder yield (kg/ha)			
	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled
Nitrogen levels								
N_1-(80 kg N/ha)	13858	15058	15958	14958	22184	25880	24280	24114
N_2-(100 kg N/ha)	16431	17631	18531	17531	24170	27617	25760	25848
N_3 - (120 kg N/ha)	17053	18253	19153	18152	25314	29239	27856	27470
SEm±	516.23	536.53	467.50	293.05	599.11	636.93	662.86	365.74
C.D. at 5%	2027	2107	1836	903	2352	2501	2603	1127
C.V. %	13.88	13.41	11.09	12.75	10.64	9.80	10.83	10.41
Phosphorus levels								
P_1-(20 kg P_2O_5/ha)	14443	15643	16543	15543	22772	26519	24697	24663
P_2-(40 kg P_2O_5/ha)	16006	17206	18106	17105	24006	27906	26160	26024
P_3-(60 kg P_2O_5/ha)	16893	18093	18993	17993	24890	28311	27039	26747
SEm±	482.09	501.74	455.47	277.21	498.83	493.95	490.56	285.47
C.D. at 5%	1392	1449	1316	780	1441	1427	1417	803
Potash levels								
K_0-(00 kg K_2O/ha)	15610	16810	17710	16709	23792	27492	26074	25786
K_1-(40 kg K_2O/ha)	15952	17152	18052	17051	23986	27666	25857	25836
SEm±	393.63	409.67	371.89	226.34	407.29	403.31	400.54	233.09
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
N × P	Sig	Sig	Sig	Sig	NS	Sig	Sig	Sig
N × K	NS	NS	NS	NS	NS	NS	NS	NS
P × K	NS	NS	NS	Sig	NS	NS	NS	NS
N × P × K	NS	NS	NS	NS	NS	NS	NS	NS
Year (Y)								
SEm±	-	-	-	293.06	-	-	-	365.74
C.D. at 5%	-	-	-	Sig	-	-	-	Sig
Y × T	-	-	-	NS	-	-	-	NS
C.V. %	12.96	12.54	10.81	12.06	8.86	7.60	8.02	8.13

Table 2: Interaction effect of nitrogen and phosphorus on Green cob yield (kg/ha) and Green fodder yield (kg/ha) of Sweet corn as influenced by different treatments on pooled

Treatment combination	Green cob yield (kg/ha)			Green fodder yield (kg/ha)		
	Pooled			Pooled		
	P_1	P_2	P_3	P_1	P_2	P_3
N_1	14502	14884	15488	24282	23784	24276
N_2	16282	16170	20137	25186	25106	27253
N_3	15842	20262	18353	24519	29179	28710
SEm±		480.14			494.46	
C.D. at 5%		1352			1392	
C.V. %		12.06			8.13	

Table 3: Interaction effect of phosphorus and potash on Green cob yield (kg/ha) of Sweet corn as influenced by different treatments on pooled

Treatment combination	Green cob yield (kg/ha) Pooled	
	K_0	K_1
P_1	14723	16363
P_2	17284	16927
P_3	18122	17864
SEm±	392.03	
C.D. at 5%	1103	
C.V. %	12.06	

Table 4: Plant population of Sweet corn as influenced by different treatments

Treatments	Plant population							
	At 30 DAS				At Harvest			
	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled
Nitrogen levels								
N_1-(80 kg N/ha)	153.70	157.24	151.60	154.18	153.43	156.98	151.33	154.00
N_2-(100 kg N/ha)	157.36	155.41	153.31	155.36	157.09	155.14	153.04	155.08
N_3-(120 kg N/ha)	156.30	155.31	155.44	155.69	156.03	155.04	155.17	155.41
SEm±	2.21	0.96	3.34	1.37	1.08	1.10	3.60	1.30
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %	6.03	2.62	9.23	6.51	2.95	3.00	9.98	6.20
Phosphorus levels								
P_1-(20 kg P_2O_5/ha)	155.54	159.26	153.54	156.12	155.28	158.99	153.27	155.84
P_2-(40 kg P_2O_5/ha)	154.15	153.00	151.99	153.04	153.88	152.73	151.72	152.77
P_3-(60 kg P_2O_5/ha)	157.68	155.71	154.82	156.07	157.41	155.44	154.55	155.79
SEm±	2.09	1.90	1.94	1.14	2.50	2.01	2.03	1.26
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
Potash levels								
K_0-(00 kg K_2O/ha)	155.78	156.03	153.72	155.18	155.51	155.76	153.45	154.90
K_1-(40 kg K_2O/ha)	155.80	155.95	153.18	154.97	155.53	155.68	152.91	154.70
SEm±	1.71	1.55	1.59	0.93	2.04	1.64	1.66	1.03
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
N × P	NS	NS	NS	NS	NS	NS	NS	NS
N × K	NS	NS	NS	NS	NS	NS	NS	NS
P × K	NS	NS	NS	NS	NS	NS	NS	NS
N × P × K	NS	NS	NS	NS	NS	NS	NS	NS
Year (Y)								
SEm±	-	-	-	1.37	-	-	-	1.31
C.D. at 5%	-	-	-	NS	-	-	-	NS
Y × T	-	-	-	NS	-	-	-	NS
C.V. %	5.70	5.16	5.37	5.42	6.82	5.47	5.62	6.00

Table 5: Plant height (cm) of Sweet corn as influenced by different treatments

Treatments	Plant height (cm)							
	At 30 DAS				At Harvest			
	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled
Nitrogen levels								
N_1-(80 kg N/ha)	35.62	35.84	35.74	35.73	176.69	161.69	187.25	175.21
N_2-(100 kg N/ha)	35.67	36.98	37.26	36.63	179.31	165.09	190.74	178.38
N_3-(120 kg N/ha)	35.77	37.23	37.43	36.81	184.12	167.91	194.16	182.06
SEm±	0.21	0.75	0.54	0.31	0.43	0.79	1.00	0.45
C.D. at 5%	NS	NS	NS	NS	1.69	3.12	3.92	1.38
C.V. %	2.48	8.62	6.20	6.34	1.02	2.04	2.22	1.84
Phosphorus levels								
P_1-(20 kg P_2O_5/ha)	35.17	36.71	35.68	35.85	176.36	160.14	186.30	174.26
P_2-(40 kg P_2O_5/ha)	35.66	36.67	37.42	36.58	178.52	164.30	190.51	177.77
P_3-(60 kg P_2O_5/ha)	36.22	36.68	37.32	36.74	185.25	170.25	195.34	183.61
SEm±	0.35	0.44	0.55	0.26	2.28	2.38	2.43	1.37
C.D. at 5%	NS	NS	NS	0.74	6.58	6.86	7.01	3.84
Potash levels								
K_0-(00 kg K_2O/ha)	35.43	36.33	36.44	36.07	181.68	166.37	192.83	180.29
K_1-(40 kg K_2O/ha)	35.94	37.04	37.17	36.72	178.40	163.42	188.60	176.80
SEm±	0.29	0.36	0.45	0.22	1.86	1.94	1.98	1.11
C.D. at 5%	NS	NS	NS	0.60	NS	NS	NS	3.13
N × P	NS	NS	NS	Sig	NS	NS	NS	Sig

N × K	NS	NS	NS	NS	NS	NS	NS	NS
P × K	NS	NS	NS	NS	NS	NS	NS	NS
N × P × K	NS	NS	NS	NS	NS	NS	NS	NS
Year (Y)								
SEm±	-	-	-	0.31	-	-	-	0.44
C.D. at 5%	-	-	-	NS	-	-	-	Sig
Y × T	-	-	-	NS	-	-	-	NS
C.V. %	4.18	5.10	6.36	5.31	5.37	6.11	5.40	5.61

Table 6: Plant dry matter (g) of Sweet corn as influenced by different treatments

Treatments	Plant dry matter (g)							
	At 30 DAS				At Harvest			
	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled
Nitrogen levels								
N_1-(80 kg N/ha)	7.19	7.35	8.39	7.64	160.72	175.99	185.99	174.23
N_2-(100 kg N/ha)	7.54	7.49	8.54	7.85	160.77	175.77	185.76	174.09
N_3-(120 kg N/ha)	7.55	7.51	9.07	8.04	165.21	180.21	190.21	178.54
SEm±	0.12	0.08	0.35	0.13	2.31	2.96	4.05	1.84
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
C.V. %	6.97	4.74	17.07	11.82	6.04	7.08	9.18	7.70
Phosphorus levels								
P_1-(20 kg P_2O_5/ha)	7.23	7.41	8.47	7.70	161.95	177.10	187.10	175.38
P_2-(40 kg P_2O_5/ha)	7.43	7.43	8.76	7.87	162.10	177.22	187.21	175.51
P_3-(60 kg P_2O_5/ha)	7.62	7.52	8.78	7.97	162.64	177.64	187.64	175.97
SEm±	0.12	0.12	0.14	0.07	2.10	2.71	2.88	1.49
C.D. at 5%	NS	NS	NS	0.20	NS	NS	NS	NS
Potash levels								
K_0-(00 kg K_2O/ha)	7.37	7.39	8.59	7.78	160.76	175.76	185.76	174.09
K_1-(40 kg K_2O/ha)	7.48	7.51	8.74	7.91	163.70	178.88	188.87	177.15
SEm±	0.10	0.10	0.12	0.06	1.71	2.21	2.35	1.22
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS
N × P	NS	NS	NS	NS	NS	NS	NS	NS
N × K	NS	NS	NS	NS	NS	NS	NS	NS
P × K	NS	NS	NS	NS	NS	NS	NS	NS
N × P × K	NS	NS	NS	NS	NS	NS	NS	NS
Year (Y)								
SEm±	-	-	-	0.22	-	-	-	1.84
C.D. at 5%	-	-	-	NS	-	-	-	Sig
Y × T	-	-	-	NS	-	-	-	NS
C.V. %	6.72	6.91	7.04	6.92	5.48	6.49	6.52	6.24

Table 7: Cob length (cm), Cob girth (cm) and No. of cobs/plant of Sweet corn as influenced by different treatments

Treatments	Cob length (cm)				Cob girth (cm)				No. of Cobs/plot			
	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled	2019-20	2020-21	2021-22	Pooled
Nitrogen levels												
N_1-(80 kg N/ha)	17.72	18.87	19.87	18.81	15.46	14.76	16.06	15.43	185.22	189.22	194.67	189.70
N_2-(100 kg N/ha)	18.18	19.09	20.09	19.12	15.84	15.09	16.44	15.79	189.06	192.78	198.78	193.54
N_3-(120 kg N/ha)	19.62	20.83	21.83	20.76	16.59	15.94	17.19	16.57	193.17	197.44	203.78	198.13
SEm±	0.32	0.36	0.38	0.21	0.42	0.33	0.35	0.22	1.39	1.54	1.29	0.82
C.D. at 5%	1.27	1.40	1.50	0.63	NS	NS	NS	0.66	5.47	6.06	5.05	2.51
C.V. %	7.40	7.72	7.90	7.70	11.29	9.12	9.06	9.88	3.12	3.39	2.74	3.08
Phosphorus levels												
P_1-(20 kg P_2O_5/ha)	17.98	19.13	20.13	19.08	15.53	14.77	16.13	15.47	184.56	188.83	194.28	189.22
P_2-(40 kg P_2O_5/ha)	18.31	19.21	20.21	19.24	16.08	15.43	16.68	16.06	189.33	193.06	199.06	193.81
P_3-(60 kg P_2O_5/ha)	19.23	20.44	21.44	20.37	16.29	15.59	16.89	16.25	193.56	197.56	203.89	198.33
SEm±	0.30	0.31	0.32	0.18	0.25	0.25	0.29	0.15	2.28	2.32	2.29	1.32
C.D. at 5%	0.87	0.89	0.93	0.50	NS	NS	NS	0.43	6.60	6.71	6.60	3.73
Potash levels												
K_0-(00 kg K_2O/ha)	18.48	19.50	20.50	19.49	15.89	15.19	16.49	15.85	189.15	192.96	198.81	193.64
K_1-(40 kg K_2O/ha)	18.54	19.69	20.69	19.63	16.04	15.34	16.64	16.01	189.15	193.33	199.33	193.94
SEm±	0.25	0.25	0.26	0.15	0.21	0.20	0.24	0.12	1.87	1.90	1.87	1.88
C.D. at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
N × P	NS	NS	NS	Sig	NS	NS	NS	NS	NS	NS	NS	NS
N × K	NS	NS	NS	Sig	NS	NS	NS	NS	NS	NS	NS	Sig
P × K	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	Sig
N × P × K	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Year (Y)												
SEm±	-	-	-	0.20	-	-	-	0.21	-	-	-	0.82
C.D. at 5%	-	-	-	Sig	-	-	-	Sig	-	-	-	Sig
Y × T	-	-	-	NS	-	-	-	NS	-	-	-	NS
C.V. %	6.90	6.66	6.61	6.72	6.68	6.93	7.48	7.05	5.12	5.10	4.87	5.03

Table 8: Quality parameters of Sweet corn as influenced by different treatments (Third Year)

Treatments	Protein (%)	Total soluble sugar (%)	Total soluble solid (Brix)
Nitrogen levels			
N_1-(80 kg N/ha)	3.62	7.06	15.56
N_2-(100 kg N/ha)	3.74	7.75	16.37
N_3-(120 kg N/ha)	3.70	7.67	16.00
SEm±	0.07	0.18	0.23
C.D. at 5%	NS	NS	NS
C.V. %	7.51	10.44	6.06
Phosphorus levels			
P_1-(20 kg P_2O_5/ha)	3.62	7.26	15.76
P_2-(40 kg P_2O_5/ha)	3.69	7.50	16.00
P_3-(60 kg P_2O_5/ha)	3.75	7.72	16.18
SEm±	0.09	0.15	0.18
C.D. at 5%	NS	NS	NS
Potash levels			
K_0-(00 kg K_2O/ha)	3.72	7.54	16.01
K_1-(40 kg K_2O/ha)	3.65	7.45	15.95
SEm±	0.07	0.13	0.15
C.D. at 5%	NS	NS	NS
N × P	NS	NS	NS
N × K	NS	NS	NS
P × K	NS	NS	NS
N × P × K	NS	NS	NS
Year (Y)			
SEm±	-	-	-
C.D. at 5%	-	-	-
Y × T	-	-	-
C.V. %	10.51	8.69	4.91

Table 9: Soil status after harvest of Sweet corn as influenced by different treatments (Third Year)

Treatments	pH	EC (dS/m)	OC (%)	P_2O_5 (kg/ha)	K_2O (kg/ha)
Initial Soil status	7.82	0.14	0.79	55.00	201.0
Nitrogen levels					
N_1-(80 kg N/ha)	7.58	0.13	0.75	62.06	204.57
N_2-(100 kg N/ha)	7.65	0.14	0.74	61.74	203.28
N_3-(120 kg N/ha)	7.67	0.14	0.73	65.14	199.78
Phosphorus levels					
P_1-(20 kg P_2O_5/ha)	7.61	0.13	0.74	62.10	207.94
P_2-(40 kg P_2O_5/ha)	7.62	0.14	0.73	62.62	199.57
P_3-(60 kg P_2O_5/ha)	7.66	0.14	0.75	64.22	200.11
Potash levels					
K_0-(00 kg K_2O/ha)	7.68	0.14	0.74	62.48	202.51
K_1-(40 kg K_2O/ha)	7.59	0.13	0.73	63.48	202.57

Table 10: Economics of Sweet corn as influenced by different treatments

Treatments	Green cob yield (kg/ha)	Green fodder yield (kg/ha)	Gross Realization (Rs.)	Cost of cultivation (Rs.)	Net Realization (Rs.)	BCR
Nitrogen level						
N_1-(80 kg N/ha)	14958	24115	323275	48138	275137	5.72
N_2-(100 kg N/ha)	17531	25849	376469	48410	328059	6.78
N_3-(120 kg N/ha)	18153	27470	390530	48688	341841	7.02
Phosphorus level						
P_1-(20 kg P_2O_5/ha)	15543	24663	335523	48150	287372	5.97
P_2-(40 kg P_2O_5/ha)	17106	26024	368144	49239	318905	6.48
P_3-(60 kg P_2O_5/ha)	17993	26747	386607	50328	336279	6.68
Potash level						
K_0-(00 kg K_2O/ha)	16710	25786	359986	47036	312950	6.65
K_1-(40 kg K_2O/ha)	17052	25836	366876	49511	317365	6.41

Green cob price: 20.0 Rs/kg.
Green fodder price: 1.0 Rs/kg.

Table 11: Economics of Sweet corn as influenced by different treatment combinations

Treatment combinations	Green cob yield (kg/ha)	Green fodder yield (kg/ha)	Gross Realization (Rs.)	Cost of cultivation (Rs.)	Net Realization (Rs.)	BCR
$N_1P_1K_0$	15737	24854	339594	49252	290343	5.90
$N_1P_1K_1$	15851	24871	341891	51727	290165	5.61
$N_1P_2K_0$	16258	25308	350468	50340	300128	5.96
$N_1P_2K_1$	16372	25325	352765	52815	299950	5.68
$N_1P_3K_0$	16554	25549	356622	51429	305193	5.93
$N_1P_3K_1$	16668	25549	358902	53904	304998	5.66
$N_2P_1K_0$	16595	25433	357326	52161	305165	5.85
$N_2P_1K_1$	16709	25449	359623	51999	307624	5.92
$N_2P_2K_0$	17116	25886	368200	50613	317587	6.27
$N_2P_2K_1$	17230	25903	370496	55725	314771	5.65
$N_2P_3K_0$	17411	26127	374354	51701	322653	6.24
$N_2P_3K_1$	17525	26144	376651	54176	322474	5.95
$N_3P_1K_0$	16802	25973	362013	52440	309573	5.90
$N_3P_1K_1$	16916	25990	364310	52277	312032	5.97
$N_3P_2K_0$	17323	26427	372887	50891	321995	6.33
$N_3P_2K_1$	17437	26443	375183	53366	321817	6.03
$N_3P_3K_0$	17619	26667	379041	51980	327061	6.29
$N_3P_3K_1$	17733	26684	381338	54455	326883	6.00

Green cob price: 20.0 Rs/kg.
Green fodder price: 1.0 Rs/kg.

Effect of treatments on quality parameters

Performance of *rabi* Sweet corn under different levels of nitrogen, phosphorus and potash applied through drip system were found non-significant influence on the protein content (%), total soluble sugar (%) and total soluble solid (Brix) recorded after harvest of the crop as in the method described by Yoshida *et al*., (1972) [10].

Economics

The regional adaptability of any agronomic practices in the yield of any crop is completely based on the highest economic return of a treatment. Therefore, it is necessary to work out economics of different treatments for valid comparison of agronomic practices and sound recommendation. Among the different treatments, clearly revealed that the sweet corn crop was fetched the highest net realization (341841 Rs/ha) with maximum BCR value of 1:7.02 in the treatment N_3 120 kg N/ha which was remained at par with N_2: 100 kg N/ha. While in case of phosphorus, the highest net realization (336279 Rs/ha) with maximum BCR value of 1:6.68 in the treatment P_3 60 kg P_2O_5/ha which was remained at par with P_2 40 kg P_2O_5.

Economics of different treatment combinations the data revealed that the highest net return worth 327061 Rs./ha was secured under treatment combination $N_3P_3K_0$ followed by $N_2P_3K_0$ (322653 Rs/ha) with regard to cost: benefit ratio, treatment combination $N_3P_3K_0$ recorded the maximum value (1:6.29) followed by treatment combinations $N_2P_3K_0$ (1.6.27). The lowest CBR value of 1:5.61 was recorded under treatment combination $N_1P_1K_1$.

Conclusion

On the basis of results obtained from the present investigation, it could be concluded that growing *rabi* hybrid Sweet corn through drip irrigation system (0.8 PEF) are recommended to fertilize the crop with 120 kg N/ha {(105 kg N through Urea & 15 kg N through Urea phosphate) (24 kg as basal and remaining 96 kg in four equal splits at 20, 30, 40 and 50 DAS)} and 40 kg P_2O_5/ha through urea phosphate (08 kg as basal and remaining 32 kg in four equal splits at 20, 30, 40 and 50 DAS) through fertigation to get higher green cob yield and net return.

System details

- Lateral spacing-90 cm.
- Dripper spacing-45 cm.
- Dripper discharge-4 liter Per Hour (lph).
- Operating pressure-1.2 kg cm^2.
- Operating frequency-Alternate day.
- Operating time-55 Minutes.

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