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Original Research Article

Effect of Different Levels of Nitrogen and Potassium on Yield and Quality of Sweet Corn

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A B S T R A C T

A field investigation on Effect of different levels of nitrogen and potassium on yield and quality of sweet corn (*Zea mays* (L). var. *Saccharata*) was carried out at Instructional Farm, Department of Vegetable Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during summer season of year 2018-19.The experiment was laid out in Factorial Randomized Block Design having fifteen (15) treatment combinations and three (3) replications. Among the two factors studied, the factor A *i.e.* nitrogen (N) was applied in five different levels *i.e.* N_1 (150 kg ha^{-1}), N_2 (175 kg ha^{-1}), N_3 (200 kg ha^{-1}), N_4 (225 kg ha^{-1}) and N_5 (250 kg ha^{-1}). While, the another factor B *i.e.* potassium (K) was applied in 3 different levels such as K_1 (60 kg ha^{-1}), K_2 (80 kg ha^{-1}), K_3 (100 kg ha^{-1}).Yield parameter like number of cobs per plant, quality parameters like cob length, girth and TSS were influenced by N_4 (225 kg ha^{-1}) level of nitrogen and other yield parameters like cob weight with husk per plant, cob weight without husk per plant, cob weight with husk per ha and cob weight without husk per ha were influenced by N_5 (250 kg ha^{-1}). All the yield parameters and the quality parameters like cob length and cob girth were influenced by K_2 (80 kg ha^{-1}) level of potassium. Again all the yield parameters and the quality parameters like cob length and cob girth were influenced by treatment combination N_4K_2 (225 kg N+ 80 kg K_2O ha^{-1}).

Keywords

Nitrogen, Potassium, Sweet corn, Yield, Quality, Reducing sugar and Non reducing sugar

Introduction

Vegetables are important part of healthy living and provide a source of many nutrients, including potassium, vitamin A, E and C. Obviously it is most important part of daily diet but it can be required in proper quantity. Being rich in vitamins and minerals, vegetable are called as protective food (Gopalakrishnan, 2007). Sweet corn is one of the most popular cultivar of maize. It is not considered as a staple food rather than it is consumed as a fresh vegetable. Sweet corn has very big market potential and has a great genetic variability and has a wide scope to improve its nutritive value. In many parts of the world corn is the most important food source and one of the most efficient field crop. Sweet corn is a warm season vegetable crop that can be grown in all seasons in Maharashtra and in any garden with

sufficient light. It is photo insensitive crop and it is monoecious in nature, *i.e.* staminate and pistillate flowers are born on separate inflorescence on the same plant. According to genetic background it is divided into 3 distinct types: Natural Sugary, Sugary Enhance, Super Sweet corn.

The grains of sweet corn has a sugary rather than starchy endosperm and has creamy texture. It is consumed fresh as a confection rather than regarded as a staple food. Mainly sweet corn is grown for the processing purpose, for preparing products such as frozen cobetts, canned kernels and frozen kernels, etc.

Compared to the global growth in the production and consumption of corn, the production of corn is not showing adequate growth in India (Venkatraman, 2007). The yield per hectare of corn in India is much lower as compared to USA and China so, as a result of these the price of corn in India is increasing. It is very essential to cultivate sweet corn with good improved fertilizer doses for getting good yield and good returns.

It is a dual purpose crop *i.e*. corns are used as vegetables and leaves stems and other plant parts is used as best fodder for animals. So, improving corn yields as well as fodder yield by improved nitrogen and potassium doses is of vital importance in India.

Materials and Methods

Experimental site

The present investigation of field experiment was laid out during summer season of year 2018-19 at the Instructional Farm, Department of Vegetable Science, Dr.Panjabrao Deshmukh Krishi Vidyapeeth, Akola (MS).

Climate and weather conditions

Akola is situated in sub-tropical region between 22.20^0 N latitude and 77.02^0E longitudes. The altitude of place is 307.2m above mean sea level. The climate of Akola is semi-arid and characterized by three distinct seasons, *i.e*. warm humid and rainy monsoon from June to October, mild cold winter from November to February and hot dry summer from March to May. The experiment was laid out in Factorial Randomized Block Design having fifteen (15) treatment combinations and three (3) replications. Among the two factors studied, the factor A *i.e*. nitrogen (N) was applied in five different levels *i.e*. N_1 (150 kg N ha^{-1}), N_2 (175 kg N ha^{-1}), N_3 (200 kg N ha^{-1}), N_4 (225 kg Nha^{-1}) and N_5 (250 kg Nha^{-1}). While, the another factor B *i.e*. potassium (K) was applied in 3 different levels such as K_1 (60 kg K_2Oha^{-1}), K_2 (80 kg K_2Oha^{-1}), K_3 (100 kg K_2Oha^{-1}).

Results and Discussion

Yield attributes

Different nitrogen and potassium levels yielded significant results for yield attributes. Number of cobs per plant was recorded maximum at level N_4, level K_2 and treatment combination N_4K_2. Cob weight with husk per plant, cob weight without husk per plant, cob weight with husk per ha. and cob weight without husk per ha. were recorded maximum at level N_5, level K_2 and treatment combination N_4K_2.

These results might be due to better vegetative growth and enhanced photosynthesis due to the effects of nitrogen and potassium might helps to produce more number of cobs per plant, it's early emergence and good grain filling capacity leads to set more cobs per plant and eventually increases the weight of cobs. Such

kind of similar findings were also reported by Kunjir (2004), Arun Kumar *et al*., (2007), Thakur *et al*., (2009) in sweet corn, Srikanth *et al*., (2009) and Asghar *et al*., (2010) in baby corn (Table 1).

Table.1 Effect of nitrogen and potassium levels on different yield attributes of sweet corn.

Treatments	No of Cobs/ plant	Cob wt. with husk/plant (g)	Cob wt. without husk/plant (g)	Cob wt. with husk/ha (t ha^{-1})	Cob wt. without husk/ha (t ha^{-1})
N_1	1.02	284.47	204.78	21.23	15.16
N_2	1.20	327.82	234.15	24.28	17.34
N_3	1.44	351.31	250.94	26.02	18.58
N_4	1.69	379.59	270.66	28.06	20.05
N_5	1.62	381.47	272.48	28.40	20.18
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.08	6.25	3.81	0.20	0.17
CD at 5%	0.22	19	11.04	0.57	0.49
K_1	1.35	334.59	239.94	24.88	17.77
K_2	1.44	352.81	251.72	26.10	18.64
K_3	1.40	347.40	248.14	25.82	18.38
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.06	5.08	2.95	0.15	0.13
CD at 5%	0.17	14.72	8.55	0.44	0.38
Interaction					
$N_1 K_1$	1.00	259.18	189.89	19.69	14.06
$N_1 K_2$	1.00	291.19	208.00	21.57	15.40
$N_1 K_3$	1.07	303.03	216.45	22.44	16.03
$N_2 K_1$	1.13	323.14	230.81	23.93	17.09
$N_2 K_2$	1.20	326.57	233.26	24.19	17.27
$N_2 K_3$	1.27	333.75	238.39	24.72	17.65
$N_3 K_1$	1.40	341.70	244.07	25.31	18.07
$N_3 K_2$	1.47	354.44	253.17	26.25	18.75
$N_3 K_3$	1.47	357.80	255.57	26.50	18.93
$N_4 K_1$	1.60	366.92	262.09	27.17	19.41
$N_4 K_2$	1.80	400.16	284.40	29.49	21.06
$N_4 K_3$	1.67	371.70	265.50	27.53	19.66
$N_5 K_1$	1.60	381.99	272.85	28.29	20.21
$N_5 K_2$	1.73	391.69	279.78	29.01	20.72
$N_5 K_3$	1.53	370.73	264.81	27.90	19.61
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.
SE(m)±	0.13	11.36	6.60	0.34	0.29
CD at 5%	0.38	32.92	19.11	0.99	0.84

Table.2 Effect of nitrogen and potassium levels on different quality attributes of sweet corn

Treatments	Cob length (cm)	Cob girth (cm)	Reducing Sugar (%)	Non-reducing Sugar (%)	Total Sugar (%)	Total Soluble Solids (TSS) (%)
N_1	20.76	15.34	4.37	1.64	6.01	13.72
N_2	22.19	15.83	4.48	1.70	6.18	14.51
N_3	23.40	16.53	4.59	1.77	6.36	15.09
N_4	24.82	17.22	4.77	1.83	6.59	16.16
N_5	24.60	17.00	4.62	1.74	6.36	15.58
'F' test	Sig.	Sig.	NS	NS	NS	Sig
SE(m)±	0.15	0.14	0.12	0.06	0.14	0.23
CD at 5%	0.44	0.41	-	-	-	0.66
K_1	22.91	16.25	4.54	1.72	6.26	14.90
K_2	23.50	16.63	4.58	1.77	6.35	15.29
K_3	23.06	16.28	4.58	1.71	6.29	14.85
'F' test	Sig.	Sig.	NS	NS	NS	NS
SE(m)±	0.12	0.11	0.09	0.05	0.11	0.18
CD at 5%	0.34	0.32	-	-	-	-
Interaction						
N_1 K_1	20.17	15.00	4.34	1.62	5.96	13.41
N_1 K_2	20.67	15.39	4.35	1.63	5.97	13.81
N_1 K_3	21.43	15.62	4.42	1.67	6.09	13.96
N_2 K_1	21.91	15.63	4.44	1.68	6.12	14.32
N_2 K_2	22.14	15.89	4.49	1.71	6.20	14.50
N_2 K_3	22.53	15.98	4.51	1.71	6.22	14.70
N_3 K_1	22.90	16.24	4.51	1.73	6.25	14.84
N_3 K_2	23.21	16.42	4.58	1.78	6.36	15.07
N_3 K_3	24.09	16.93	4.69	1.79	6.48	15.36
N_4 K_1	24.63	17.06	4.73	1.84	6.57	16.22
N_4 K_2	26.02	17.93	4.86	1.94	6.80	16.67
N_4 K_3	23.82	16.68	4.71	1.70	6.41	15.59
N_5 K_1	24.93	17.30	4.65	1.74	6.39	15.70
N_5 K_2	25.44	17.52	4.63	1.80	6.44	16.39
N_5 K_3	23.43	16.18	4.56	1.68	6.24	14.66
'F' test	Sig.	Sig.	NS	NS	NS	Sig
SE(m)±	0.26	0.25	0.20	0.11	0.24	0.39
CD at 5%	0.76	0.71	-	-	-	1.14

Quality attributes

Different nitrogen and potassium levels yielded following results for quality attributes. Cob length and cob girth was recorded maximum at level N_4, level K_2 and treatment combination N_4K_2. The application of nitrogen and potassium would might be responsible for vigorous plant growth and greater synthesis of carbohydrates in plants which might be resulting in higher grain set and ultimately increases the cob length and girth. While Reducing sugar, non-reducing sugar, total sugar and TSS were non significantly influenced by the nitrogen and potassium levels. Such kind of similar findings were also observed by Gosavi (2006) and Zende (2006) in sweet corn, Kumar and Bohra (2014), Bhatt *et al.*, (2013) and Asghar *et al.*, (2010) in baby corn (Table 2).

From the above results, it can be concluded that nitrogen and potassium levels recorded positive effects on all the yield parameters and all the parameters were found maximum at treatment combination N_4K_2 (225 kg N + 80 kg K_2O ha^{-1}) and some of the quality parameters viz. cob length and cob girth were also found maximum with same treatment combination, whereas the other quality parameters like reducing, non-reducing and total sugar and TSS were not significantly influenced.

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