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Response of baby corn to fertilizer levels during summer season

DL Patil, YR Jadhav and JB Patil

Abstract
A field experiment was conducted to study response of baby corn to fertilizer levels during summer season on medium black soil at R.C.S.M. College of Agriculture, Kolhapur summer during 2017. The 27 treatment combinations comprising of three nitrogen levels *viz.*, N_1 (00 Kg Nha^{-1}), N_2 (50 Kg Nha^{-1}) and N_3 (100 Kg Nha^{-1}), three phosphorous levels *viz.*, P_1 (00 Kg $P_2O_5ha^{-1}$), P_2 (25Kg $P_2O_5ha^{-1}$) and P_3 (50 Kg $P_2O_5ha^{-1}$) and three potassium levels *viz.*,K_1 (00 Kg K_2Oha^{-1}), K_2 (25Kg K_2Oha^{-1}) and K_3 (50 Kg K_2Oha^{-1}). The results revealed that, the growth characters, yield attributes and yield of baby corn were significantly increased up to 100Kg N, 50 Kg P_2O_5 and 50 Kg K_2O ha^{-1}. Application of 100 Kg N with 50 Kg P_2O_5 ha^{-1} recorded significantly higher yield attributes, baby corn yield and green fodder yield over rest of N and P_2O_5 levels.

Keywords: Baby corn, nutrient levels (NPK)

Introduction
Maize (*Zea mays* L) ranks third as a food grain crop after wheat and rice and it is not only as a cereal but also as vegetable and fodder crop having high yield potentiality, high versatile uses and wider adaptability crop. Maize is also cultivated in different types such as a flint, pop, waxy, dent, pod, soft corn, baby and sweet corn. Baby corn is not a separate type of corn; any type of corn can be use as baby corn and is the unfertilized young cob, which can be profitably used in prolific type of corn, which bear two or more cobs per plant. The economic product is harvested just after the silk emergence which is called as baby corn. The total annual removal of nutrients by crop and cropping system being much higher than the amount added through fertilizers which have resulted in negative nutrient balance in the soil and decline the soil productivity. The role of balanced and adequate nutrition is recognized as one of the important factors in realizing the maximum yield of baby corn and its quality. As such adequate and balanced supply of nitrogen, phosphorus and potassium to baby born crop favored greater availability of these nutrients that ultimately resulted in to enhanced growth of the plants (Kumar *et al*., 2015) [2]. In view of the above consideration, the present investigation entitled "Response of baby corn to fertilizer levels during summer season" was conducted at Kolhapur during 2017.

Materials and Methods
The field experiment in factorial randomized block design comprising 27 treatments combinations of three nitrogen levels *viz.*,N_1(00Kg Nha^{-1}), N_2(50 Kg Nha^{-1})andN_3(100 Kg Nha^{-1}), three phosphorous levels *viz.*, P_1(00 Kg $P_2O_5ha^{-1}$), P_2(25Kg $P_2O_5ha^{-1}$) and P_3(50 Kg $P_2O_5ha^{-1}$) and three potassium levels *viz.*,K_1(00 Kg K_2Oha^{-1}), K_2(25Kg K_2Oha^{-1})and K_3(50 Kg K_2Oha^{-1}) with three replications was conducted at Post Graduate Research Farm, R.C.S.M. College of Agriculture, Kolhapur during summer season of 2017. The experimental site was located at 16^0 42' North latitudes and 74^0 14' East longitudes with average annual rainfall of 1057 mm. The soil of experimental field was medium black (vertisols) with 90 cm depth, low in organic carbon content (0.52%), medium in available N (217 kg ha^{-1}),available P_2O_5 (28 kg ha^{-1}) and available K_2O (268 kg ha^{-1}). The electrical conductivity and pH values were 0.34 dS m^{-1} and 7.7, respectively. The gross plot size was 5.0 m x 3.6 m and net plot size of 4.6 m x 2.4 m.

The certified seed of baby corn hybrid CPB-468 was obtained from Neena Foods Pvt. Ltd. at Gokul Shirgaon, Kolhapur private seed company and was treated with fungicide (Bavistin) and Azotobactor @ 3 g kg^{-1} and 250 g for 10 kg^{-1} of seed,

respectively to avoid bacterial diseases and nutrient fixation. The ridges and furrows were opened at 60 cm distance. Baby corn was sown on 22nd February, 2017 by dibbling two seeds manually per hill on one side of ridge by keeping 20 cm intra row spacing. Application of 1/3 rd N and full dose of phosphorus and potash fertilizers applied as basal dose to all plots at sowing on one side of ridge as per treatments. The next 1/3 rd N dose of fertilizer was applied at 30 DAS and remaining 1/3 rd N dose of fertilizer was applied at 45 DAS. The organic manure 5 t FYM $ha^{-1}$was incorporated at last harrowing. The thinning was carried out at 15 DAS by keeping one healthy seedling per hill. The recommended packages of practices were carried out during crop growth period. The first harvesting of baby cobs were carried out 62 days after sowing (26-04-2017) and subsequently green cobs harvested in 3-4 pickings.

Results and Discussion

Effect on growth parameters

The growth characters of baby corn significantly differed due to different nitrogen, phosphorous and potassium levels (Table 1). Application of 100 kg N ha^{-1}recorded significantly higher plant height, number of functional leaves per plant, leaf area per plant and dry matter production per plant over rest of nitrogen levels (00 and 50 kg N ha^{-1}). Similarly, an application of 50 kg P_2O_5 and K_2O recorded significantly higher growth characters over remaining phosphorous and potassium levels. The higher plant height, number of functional leaves per plant, leaf area per plant and dry matter production per plant under higher nitrogen, phosphorous and potassium levels may be due to increase in cell division, assimilation rate and metabolic activities in plant.Similar, results were reported by Patil (1997) [5], Thakur *et al.* (1997) [8] and Bindhani *et al.* (2007) [1].

Effect on yield attributes and yield

The yield attributes and yield of baby corn significantly influenced due to different nitrogen, phosphorous and potassium levels **(**Table 2). The nitrogen level of100 kg N ha^{-1}recorded significantly higher number of cobs per plant, cob length and cob girth without husk, baby corn yield (17.21 q ha^{-1}) and green fodder yield (293.29 q ha^{-1}) as compared to rest of nitrogen levels (00 and 50 kg N ha^{-1}). Similarly, the phosphorous and potassium levels of 50 kg P_2O_5 and K_2O recorded significantly higher number of cobs per plant, cob length and cob girth without husk, baby corn yield and green fodder yield as compared to rest of phosphorous and potassium levels. The higher nitrogen, phosphorous and potassium levels increased nutrients availability to plants, which resulted into higher values of yield attributes and yield under higher levels of NPK. The results corroborated with those reported by Rao *et al*. (2009) [6], Kunjir *et al*. (2009) [3], Muthukumar *et al*. (2005) [4] and Sobhana *et al*. (2012) [7].

Interaction effect of nitrogen and phosphorus on yield of baby corn and green fodder yield

The yield of baby corn and green fodder yield significantly influenced due to interaction between nitrogen and phosphorous levels (Table 3 and 4). Application of 100 kg N ha^{-1}along with 50 kg $P_2O_5ha^{-1}$ recorded significantly higher baby corn yield (19.32q ha^{-1}) and green fodder yield (332.61q ha^{-1}) over remaining treatment combinations between nitrogen and phosphorous. The combination of higher levels of nitrogen and phosphorous increased yield of baby corn and similar results was also reported by Yakadri *et al*. (2001). It can be concluded that, the growth characters, yield attributes and yield of baby corn were favorably influenced by individual application of 100 Kg N, 50 Kg P_2O_5 and 50 Kg K_2O ha^{-1}. Among the interactions, an application of 100 Kg N along with 50 Kg P_2O_5 ha^{-1} recorded significantly highest yield attributes, baby corn yield and green fodder yield.

Table 1: Effect of nitrogen, phosphorus and potassium levels on growth parameters of baby corn at harvest

Treatments	Plant height (cm)	Number of functional leaves $plant^{-1}$	leaf area $plant^{-1}$ (dm^2)	Dry matter production $plant^{-1}$ (g)
Nitrogen levels				
N_1-00 (Kg ha^{-1})	169.87	6.68	54.74	118.01
N_2-50 (Kg ha^{-1})	174.25	8.03	60.57	122.11
N_3-100 (Kg ha^{-1})	179.08	9.22	64.06	124.88
S.E. ±	0.35	0.19	0.56	0.62
C.D.at 5%	0.98	0.57	1.59	1.75
Phosphorus levels				
P_1-00 (Kg ha^{-1})	172.29	7.03	57.80	119.88
P_2-25 (Kg ha^{-1})	174.76	8.24	60.21	122.05
P_3-50 (Kg ha^{-1})	176.26	8.65	61.36	123.07
S.E. ±	0.35	0.19	0.56	0.62
C.D.at 5%	0.98	0.57	1.59	1.75
Potassium levels				
K_1-00 (Kg ha^{-1})	172.47	7.25	57.78	119.90
K_2-25 (Kg ha^{-1})	174.37	8.10	60.23	121.96
K_3-50 (Kg ha^{-1})	176.35	8.58	61.35	123.14
S.E. ±	0.35	0.19	0.56	0.62
C.D.at 5%	0.98	0.57	1.59	1.75
Interactions				
N x P/ N x K/P x K				
S.E. ±	0.60	0.35	0.97	1.07
C.D.at 5%	NS	NS	NS	NS
N x P x K				
S.E. ±	1.04	0.60	1.69	1.85
C.D.at 5%	NS	NS	NS	NS

Table 2: Effect of nitrogen, phosphorus and potassium levels on yield attributes and yield of baby corn at harvest

Treatments	No. of cobs plant^{-1}	Length of cob without husk (cm)	Girth of cob without husk (cm)	Baby corn yield (q ha^{-1})	Green fodder yield (q ha^{-1})
Nitrogen levels					
N_1-00 (Kg ha^{-1})	1.54	7.14	1.12	8.72	196.06
N_2-50 (Kg ha^{-1})	2.96	9.26	1.65	13.37	251.70
N_3-100 (Kg ha^{-1})	3.40	11.12	2.13	17.21	293.29
S.E. ±	0.03	0.19	0.03	0.40	3.40
C.D.at 5%	0.09	0.56	0.09	1.20	9.65
Phosphorus levels					
P_1-00 (Kg ha^{-1})	2.12	7.98	1.43	11.72	216.06
P_2-25 (Kg ha^{-1})	2.65	9.32	1.61	12.97	254.63
P_3-50 (Kg ha^{-1})	3.13	10.21	1.80	14.60	270.34
S.E. ±	0.03	0.19	0.03	0.40	3.40
C.D.at 5%	0.09	0.56	0.09	1.20	9.65
Potassium levels					
K_1-00 (Kg ha^{-1})	2.12	8.08	1.56	11.70	214.69
K_2-25 (Kg ha^{-1})	2.64	9.37	1.69	13.14	257.56
K_3-50 (Kg ha^{-1})	3.11	10.06	1.73	14.44	268.75
S.E. ±	0.03	0.19	0.03	0.40	3.40
C.D.at 5%	0.09	0.56	0.09	1.20	9.65
Interactions					
N x P					
S.E. ±	0.05	0.34	0.08	0.51	5.89
C.D.at 5%	NS	NS	NS	1.52	16.72
N x K/P x K					
S.E. ±	0.05	0.34	0.08	0.51	5.89
C.D.at 5%	NS	NS	NS	NS	NS
N x P x K					
S.E. ±	0.09	0.59	0.13	0.70	10.20
C.D.at 5%	NS	NS	NS	NS	NS

Table 3: The interaction effect between nitrogen and phosphorous levels on yield of baby corn (q ha^{-1})

Phosphorus levels / Nitrogen levels	P_1- 00 (kg ha^{-1})	P_2- 25 (kg ha^{-1})	P_3- 50 (kg ha^{-1})
N_1 - 00 (kg ha^{-1})	7.49	8.69	9.96
N_2 - 50 (kg ha^{-1})	12.24	13.36	14.51
N_3 - 100 (kg ha^{-1})	15.45	16.84	19.32
S. E m±	0.51		
C. D. at 5%	1.52		

Table 4: The interaction effect between nitrogen and phosphorous levels on green fodder yield of baby corn (q ha^{-1})

Phosphorus levels / Nitrogen levels	P_1- 00 (kg ha^{-1})	P_2-25 (kg ha^{-1})	P_3- 50 (kg ha^{-1})
N_1 - 00 (kg ha^{-1})	169.29	211.90	206.81
N_2 - 50 (kg ha^{-1})	226.28	257.23	271.59
N_3 - 100 (kg ha^{-1})	252.52	294.75	332.61
S. E m±	5.89		
C. D. at 5%	16.72		

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