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Response of micronutrients and bio inoculants on growth of sweet corn in sweet corn - groundnut cropping system

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Abstract
An investigation was carried out at Post Graduate Institute Research Farm, MPKV, Rahuri Maharashtra (India) on "Response of *rabi* sweet corn - *summer* groundnut cropping system to micronutrients and bio inoculants" was conducted during 2021-22 and 2022-23. The texture of experimental field soil was clayey and it was slightly alkaline in reaction. The experiment was laid out in split plot design with three replications. The result revealed that mean higher growth attributes *viz*., plant height (25.77, 92.57, 163.61, 170.61 and 173.79 cm during first year and 29.54, 97.82, 168.30, 172.41 and 175.35 cm during second year at 30, 45, 60, 75 DAS and at harvest respectively), number of leaves plant^{-1} (3.80, 7.24, 9.57, 10.08 and 6.55 during first year and 5.36, 7.53, 9.88, 11.34 and 9.25 during second year at 30, 45, 60, 75 DAS and at harvest respectively), leaf area plant^{-1} (4.96, 14.79, 26.51, 33.54 and 30.01 dm^2 during first year and 6.24, 15.95, 28.80, 36.70 and 31.83 dm^2 during second year at 30, 45, 60, 75 DAS and at harvest respectively) and dry matter plant^{-1} (22.18, 97.25, 177.74, 281.99 and 295.27 g during first year, 25.21, 100.16, 182.02, 287.24 and 297.34 g during second year and 23.69, 98.70, 179.88, 284.61 and 296.30 g on pooled mean basis at 30, 45, 60, 75 DAS and at harvest respectively) recorded under GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} with seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB for *rabi* sweet corn.

Keywords: Micronutrient, bio inoculants, sweet corn

Introduction

Maize (*Zea mays* L.) belong to *Gramineae* family is one of the largest producing cereal crop in the world grown in more than 150 countries. In India, it is cultivated on an area of 9958 ha with a production of 33730 tons of grain and productivity is 3387 kg ha^{-1} (Anonymous, 2022-23). In Maharashtra, maize is grown over an area of 1251 hectares with an annual production of 3584.78 tons with an average productivity of 2882 kg ha^{-1} during 2021- 22. (Anonymous, 2022-23) and in *kharif* and *rabi* season area under maize is 811.47 and 439.56 hectares with an annual production is 2186.10 and 1398.68 tons with an average productivity 2694 and 3182 kg ha^{-1}. In Maharashtra, the cultivation of sweet corn is mostly concentrated in Kolhapur, Satara and Pune districts. The area under *kharif* sweet corn in Kolhapur district was 13.9 hectares with production of 43.2 metric tons and productivity of 3108.3 kg ha^{-1} during the year 2022-23.

Maize is considered as the "Queen of Cereal". Being a C_4 plant, it is capable to utilize solar radiation more efficiently even at higher radiation intensity. Sweet corn is a mutant type with one or more recessive alleles in homozygous condition that enable the endosperm to accumulate twice the sugar content as that of seed corn. Out of the various specialty corns, sweet corn (*Zea mays* L. var. *saccharata sturt*) has a big market potential it is particular maize species which differ genetically from the field maize. Its kernels are tender, delicious and eaten as a vegetable in many cuisines worldwide. In contrast to the traditional field corn, sweet corn crops are harvested while their corn ears have just attained the milky stage. The higher content of a water soluble polysaccharide in the kernel adds texture and quality in addition to sweetness. In sweet corn best nutritional quality depends on moisture (72.7 %) and total solids (22.3 %) comprising of carbohydrate (81 %), protein (13 %) and lipids (3.5 %). Approximately 40 % of such corn is frozen and rest canned while processing. Sweet corn is a good source of energy. About 20 % dry matter is sugar, compared with only 3 percent in dent maize at green stage (Hile *et al*., 2023) [5].

Material and methods

The field experiment was conducted during *rabi* season 2021 and 2022 at the Research Farm of Post Graduate Institute, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.), situated at 19°48' and 19°57' North latitude and between 74° 32' and 74° 10' East longitude. The altitude is 511 meter above mean sea level. The topography of experimental field was levelled and well drained. The meteorological data on important weather parameters during the crop growth period for the year 2021-22 and 2022-23 was recorded at Meteorological Observatory located at AICRP on Irrigation Water Management Project, MPKV, Rahuri. (M. S.). The experiment was conducted in split plot design with three replications during *rabi* season in a fixed layout. The treatments consist of six main plot treatments of micronutrients *viz.*, M_1- Absolute control, M_2-GRDF only, M_3-GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1}, M_4-GRDF + soil application of $FeSO_4$ @ 25 kg ha^{-1}, M_5-GRDF + soil application of Borax @ 5 kg ha^{-1} and M_6-GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} were split into three sub plot treatments

of bio inoculants *viz.*, B_1-seed treatment with *Azotobacter* + PSB + KSB, B_2-drenching at 30 DAS liquid *Azotobacter* + PSB + KSB and B_3-seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB for *rabi* sweet corn. Farm yard manure was applied @ 10 t ha^{-1} to sweet corn 10 days before sowing. The recommended dose of fertilizer and micronutrients (120: 60: 40 kg N, P_2O_5 and K_2O ha^{-1}) was by using urea (46 % N), Single super phosphate (16 % P_2O_5), muriate of potash (60 % K_2O) and $ZnSO_4$ @ 20 kg, $FeSO_4$ @ 25 kg, Borax @ 5 kg. The 50 % recommended dose of nitrogen and full dose of phosphorus and potassium was applied at the time of sowing and remaining 50 % nitrogen was applied at 30 days after sowing. Sweet corn seed was treated with *Azatobacter*, phosphate solubilizing bacteria (PSB) and potassium solubilizing bacteria (KSB) @ 25 g kg^{-1} seeds according to treatments, drenching of liquid *Azatobacter* + PSB + KSB was done @ 5 lit. Of bio inoculant for 500 lit. Of water ha^{-1} during both years to *rabi* sweet corn. The various growth parameters *viz*., plant height (cm), number of leaves $plant^{-1}$, leaf area $plant^{-1}$ (dm^2), dry matter $plant^{-1}$ (g) in sweet corn were recorded on five randomly selected plants. The growth observations were recorded at an interval of 15 days commencing from 30 DAS till at harvest during both years.

Result and discussion

Plant height (cm)

Effect of micronutrients

Data presented in Table 1 indicated that the plant height of sweet corn was influenced significantly due to micronutrients during both the years. The treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} (M_6) to sweet corn recorded significantly higher plant height at 30, 45, 60, 75 DAS and at harvest during both years. However, it was at par with the treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} (M_3) at 30, 45, 60, 75 DAS and at harvest during both years. Maximum plant height was recorded might be due to the improvement in plant height due to balanced application of fertilizers attributed to proper nourishment of crop and optimum growth. Addition of FYM helps in the release of micronutrients favourable for the crop growth. Also, there is an increase activity of meristamatic cells and cell elongation with the application of micronutrients as they were known to have favourable effect on the metabolic process. The results were supported by Daphade et *al*. (2019) [2], Prajapati and Kewalanand (2019) [11] and Waghmare *et al*. (2022) [15].

Effect of Bio inoculants

The seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB (B_3) recorded significantly higher plant height at 30, 45, 60, 75 DAS and at harvest (Table 1) might be due to the positive effect of dual inoculation of bio inoculants providing extra N by atmospheric nitrogen and rendering the insoluble phosphorus and potassium into available form. The enhanced availability of phosphorus and potassium favoured nitrogen fixation and rate of photosynthesis and consequently led to better plant height. These results are in accordance with those reported by Aheswari and Elakkiya (2014) [1], Iwuagwu *et al*, (2013) [6], Tripathi *et al*. (2014) [14] and Kant *et al*. (2016) [7].

Number of leaves $plant^{-1}$

Effect of micronutrients

Data presented in Table 2 revealed that the numbers of leaves $plant^{-1}$ were influenced significantly due to different micronutrients during both the years. The treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} (M_6) to sweet corn crop recorded significantly maximum number of leaves $plant^{-1}$ at 30, 45, 60, 75 DAS and at harvest during both years, than rest of the micronutrient treatments. However, it was at par with GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} (M_3) during both years at all the stages of growth. The maximum leaves was recorded might be due to a balanced and adequate supply of fertilizer, which ultimately increases the number of functional leaves and leaf area $plant^{-1}$. These results were confirmed by Hassan *et al.* (2018) [4], Daphade *et al*. (2019) [2] and Waghmare *et al*. (2022) [15].

Effect of bio inoculants

Data presented in Table 2 implicated that the numbers of leaves $plant^{-1}$ of sweet corn was influenced significantly due to different bio inoculants. The seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB (B_3) recorded significantly higher numbers of leaves $plant^{-1}$ at 30, 45, 60, 75 DAS and at harvest during both years, respectively than other bio inoculant treatment at all the crop growth stages. This might be due to enhanced biological nitrogen fixation and transformation of N in plants inoculation of KSB strains which can synergistically solubilized rock K that were added into soil and make them much more available for uptake by plant resulted in better crop growth manifested by higher number of leaves $plant^{-1}$. These results are in conformity with those reported by Tripathi *et al*. (2014) [14], Singh *et al*. (2018) [13] and Karanjaikar *et al*. (2020)

Leaf area $plant^{-1}$ (dm^2)

Effect of micronutrients

Data presented in Table 3 revealed that the leaf area $plant^{-1}$ (dm^2) was influenced significantly due to different micronutrients during both the years. The treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} (M_6) to sweet corn recorded significantly maximum the leaf area $plant^{-1}$ at 30, 45, 60, 75 DAS and at harvest during both years than rest of the micronutrient treatments. However, it was at par with treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} (M_3) at 30, 45, 60, 75 DAS and at harvest during both year respectively. The significantly maximum leaf area $plant^{-1}$ might be due to higher availability of macro and micronutrients with organic sources of nutrients FYM corresponding increase in vegetative growth, thereby increasing the number of leaves. Enhance the cell division which resulted in more expansion of leaf surface. These results are supported by Navyashree *et al*. (2015) [10], Hassan *et al*. (2018) [4] and Daphade *et al*. (2019) [2].

Effect of bio inoculants

Data presented in Table 3 implicated that leaf area plant^{-1} of sweet corn was influenced significantly due to different bio inoculants at all the stages of crop growth during both the years. The seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB (B_3) recorded significantly higher leaf area plant^{-1} at 30, 45, 60, 75 DAS and at harvest during both the years. The maximum leaf area might be due to increased availability of nitrogen and phosphorus leading to better nutritional environment in the root zone for growth and development. Nitrogen is the main constituent of chlorophyll that keeps leaf greener for longer period and also improved photosynthesis that finally resulted into better leaf growth and ultimately increases leaf area plant^{-1}. These results are in conformity with those reported by Gudadhe *et al*. (2005) [3], Reedy *et al*. (2018) and Karanjikar *et al*. (2020) [8].

Dry matter plant^{-1} (g)

Effect of micronutrients

Data presented in Table 4 revealed that dry matter plant^{-1} (g) was influenced significantly due to different micronutrients during both the years. The treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} (M_6) to sweet corn recorded significantly maximum dry matter plant^{-1} at 30, 45, 60, 75 DAS and at harvest during first year, second year and on pooled mean basis than rest of the micronutrient treatments. However, it was on par with GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} (M_3) at 30, 45, 60, 75 DAS and at harvest during both years and on pooled mean basis. The maximum dry matter plant^{-1} might be due to availability of these micronutrients to the crop at appropriate vegetative stage, resulted in increase in plant growth and it also might have improvement in photosynthetic area of plant that cumulatively contributed to higher dry matter accumulation. These results are in accordance with Muhammad *et al*, (2020) [9], Raghuramakrishnan *et al*. (2021) [12] and Waghmare *et al*. (2022) [15].

Effect of bio inoculants

Data presented in Table 4 implicated that dry matter plant^{-1} of sweet corn was influenced significantly due to different bio inoculants at all the stages of crop growth during both the years and pooled mean basis. The significantly higher dry matter plant^{-1} was registered by seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB (B_3) at 30, 45, 60, 75 DAS and at harvest during both years and on pooled mean basis. The higher dry matter plant^{-1} was recorded might be due to symbiotic nitrogen fixers and phosphorus solubilizers and release of more potassium might open the door for increased utilization of essential nutrients and light absorption for higher photosynthesis and the development of photosynthates, which are transported to plant reproductive and vegetative organs which enhances biomass production by plant. Similar results were also reported by Gudadhe *et al*. (2005) [3], Singh *et al*. (2018) [13] and Karanjikar *et al*. (2022).

Table 1: Plant height of sweet corn as influenced periodically by different treatment

Treatments	Plant height (cm)									
	2021					2022				
	30 DAS	45 DAS	60 DAS	75 DAS	At harvest	30 DAS	45 DAS	60 DAS	75 DAS	At harvest
(A) Micronutrients- (M)										
M_1- Absolute control	18.05	87.56	155.79	161.58	166.87	22.87	92.67	161.36	162.25	168.60
M_2-GRDF only	21.19	89.64	158.98	165.46	170.56	28.89	95.45	165.37	166.74	170.78
M_3-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1}	31.65	95.84	168.50	176.86	179.19	32.98	100.74	172.53	178.82	181.29
M_4-GRDF + Soil application of $FeSO_4$ @ 25 kg ha^{-1}	27.54	93.77	165.32	171.77	174.03	29.97	98.62	168.59	174.79	175.46
M_5-GRDF + Soil application of Borax @ 5 kg ha^{-1}	24.37	91.71	162.16	169.43	171.20	27.64	97.82	167.80	170.77	172.41
M_6-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1}	31.83	96.90	170.94	178.56	180.86	34.89	101.65	174.17	181.05	183.59
SE m ±	1.00	0.65	1.00	1.36	1.24	1.69	0.60	1.12	1.27	1.31
CD (P = 0.05)	3.14	2.04	3.14	4.28	3.92	5.31	1.88	3.54	4.00	4.11
(B) Bio inoculants- (B)										
B_1-Seed treatment with *Azotobacter* + PSB + KSB	26.25	92.36	162.97	169.54	172.75	29.12	97.00	168.11	171.35	173.95
B_2-Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	24.57	91.68	162.47	168.49	171.69	28.31	96.92	166.78	170.23	173.25
B_3-Seed treatment with *Azotobacter* + PSB + KSB + Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	26.50	93.67	165.41	173.80	176.92	31.18	99.56	170.02	175.63	178.86
SE m ±	0.97	0.37	0.48	1.26	1.29	0.82	0.33	0.46	1.18	1.36
CD (P = 0.05)	NS	1.09	1.39	3.68	3.76	NS	0.97	1.34	3.46	3.97
Interaction (M x B)										
Between two sub plots means at same level of main plot means										
SE m ±	2.37	0.914	1.16	3.09	3.15	2.00	0.813	1.12	2.90	3.32
CD (P = 0.05)	NS	NS	3.41	NS	NS	NS	NS	3.28	NS	NS
Between two main plots means at same level of sub plot means										
SE m ±	2.18	0.99	1.38	2.86	2.86	2.35	0.89	1.45	2.69	3.02
CD (P = 0.05)	NS	NS	4.20	NS	NS	NS	NS	4.44	NS	NS
General mean	25.77	92.57	163.61	170.61	173.79	29.54	97.82	168.30	172.41	175.35

Table 2: Number of leaves plant^{-1} of sweet corn as influenced periodically by different treatment

Treatments	Number of leaves plant^{-1}									
	2021					2022				
	30 DAS	45 DAS	60 DAS	75 DAS	At harvest	30 DAS	45 DAS	60 DAS	75 DAS	At harvest
(A) Micronutrients- (M)										
M_1- Absolute control	2.73	5.08	8.49	9.04	6.13	4.31	5.22	8.66	9.64	8.59
M_2-GRDF only	3.16	5.93	9.49	9.42	6.17	4.80	6.23	9.14	10.99	8.62
M_3-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1}	4.49	8.71	9.93	10.88	7.02	5.94	9.01	10.61	12.24	9.98
M_4-GRDF + Soil application of $FeSO_4$ @ 25 kg ha^{-1}	4.06	7.84	9.74	10.06	6.28	5.52	8.08	10.15	11.68	9.18
M_5-GRDF + Soil application of Borax @ 5 kg ha^{-1}	3.59	6.97	9.67	9.92	6.22	5.39	7.15	9.69	11.01	8.72
M_6-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1}	4.76	8.89	10.10	11.14	7.49	6.19	9.47	10.99	12.49	10.49
SE m ±	0.13	0.26	0.11	0.17	0.19	0.08	0.29	0.14	0.17	0.17
CD (P = 0.05)	0.42	0.83	0.35	0.54	0.59	0.26	0.91	0.45	0.54	0.53
(B) Bio inoculants- (B)										
B_1-Seed treatment with *Azotobacter* + PSB + KSB	3.76	7.10	9.63	10.13	6.67	5.31	7.40	9.90	11.45	9.34
B_2-Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	3.63	6.71	9.03	9.51	5.94	5.30	6.96	9.36	10.70	8.70
B_3-Seed treatment with *Azotobacter* + PSB + KSB + Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	4.01	7.90	10.05	10.59	7.04	5.48	8.21	10.37	11.88	9.75
SE m ±	0.13	0.24	0.08	0.08	0.09	0.21	0.23	0.08	0.10	0.09
CD (P = 0.05)	NS	0.69	0.22	0.24	0.27	NS	0.67	0.23	0.30	0.25
Interaction (M x B)										
Between two sub plots means at same level of main plot means										
SE m ±	0.32	0.58	0.18	0.20	0.23	0.51	0.56	0.19	0.25	0.21
CD (P = 0.05)	NS	NS	0.54	NS	NS	NS	NS	0.57	NS	NS
Between two main plots means at same level of sub plot means										
SE m ±	0.30	0.54	0.19	0.24	0.27	0.43	0.54	0.22	0.27	0.24
CD (P = 0.05)	NS	NS	0.57	NS	NS	NS	NS	0.65	NS	NS
General mean	3.80	7.24	9.57	10.08	6.55	5.36	7.53	9.88	11.34	9.25

Table 3: Leaf area plant^{-1} of sweet corn as influenced periodically by different treatment

Treatments	Leaf area plant^{-1} (dm^2)									
	2021					2022				
	30 DAS	45 DAS	60 DAS	75 DAS	At harvest	30 DAS	45 DAS	60 DAS	75 DAS	At harvest
(A) Micronutrients- (M)										
M_1- Absolute control	3.34	11.70	20.76	27.82	24.69	4.35	12.67	24.73	30.18	23.63
M_2-GRDF only	3.91	13.00	23.39	32.16	27.06	4.96	14.06	26.12	34.90	29.96
M_3-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1}	6.47	16.88	30.27	36.06	33.49	7.43	18.21	31.73	39.39	35.96
M_4-GRDF + Soil application of $FeSO_4$ @ 25 kg ha^{-1}	5.02	15.59	27.64	34.85	31.34	6.83	16.84	29.79	37.79	33.50
M_5-GRDF + Soil application of Borax @ 5 kg ha^{-1}	4.46	14.30	25.00	33.36	29.19	6.22	15.45	27.28	37.26	31.05
M_6-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1}	6.56	17.26	32.01	37.00	34.29	7.63	18.49	33.14	40.67	36.88
SE m ±	0.17	0.41	0.83	0.38	0.67	0.19	0.43	0.79	0.41	0.77
CD (P = 0.05)	0.54	1.28	2.60	1.19	2.12	0.60	1.37	2.48	1.29	2.44
(B) Bio inoculants- (B)										
B_1-Seed treatment with *Azotobacter* + PSB + KSB	4.86	14.46	26.20	33.67	29.64	6.17	15.63	28.49	36.74	31.30
B_2-Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	4.80	14.39	25.60	32.64	29.33	6.11	15.58	27.90	35.77	30.95
B_3-Seed treatment with *Azotobacter* + PSB + KSB + Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	5.22	15.51	27.73	34.31	31.06	6.43	16.65	30.01	37.59	33.25
SE m ±	0.12	0.25	0.40	0.20	0.47	0.11	0.23	0.42	0.28	0.53
CD (P = 0.05)	NS	0.74	1.16	0.58	1.36	NS	0.67	1.21	0.82	1.54
Interaction (M x B)										
Between two sub plots means at same level of main plot means										
SE m ±	0.29	0.61	0.97	0.48	1.14	0.27	0.56	1.01	0.68	1.29
CD (P = 0.05)	NS	NS	2.83	NS	NS	NS	NS	2.97	NS	NS
Between two main plots means at same level of sub plot means										
SE m ±	0.29	0.65	1.14	0.55	1.15	0.29	0.63	1.15	0.69	1.31
CD (P = 0.05)	NS	NS	3.48	NS	NS	NS	NS	3.47	NS	NS
General mean	4.96	14.79	26.51	33.54	30.01	6.24	15.95	28.80	36.70	31.83

Table 4: Dry matter plant^{-1} of sweet corn as influenced periodically by different treatment

Treatments	Dry matter plant^{-1} (g)														
	30 DAS	30 DAS	Pooled mean	45 DAS	45 DAS	Pooled mean	60 DAS	60 DAS	Pooled mean	75 DAS	75 DAS	Pooled mean	At harvest	At harvest	Pooled mean
	2021	2022		2021	2022		2021	2022		2021	2022		2021	2022	
(A) Micronutrients- (M)															
M_1- Absolute control	19.70	22.46	21.08	93.00	96.20	94.60	173.00	175.70	174.35	276.00	277.36	276.68	284.73	286.07	285.40
M_2-GRDF only	21.00	23.89	22.44	94.60	97.74	96.17	174.06	178.95	176.50	277.40	280.72	279.06	289.34	290.20	289.77
M_3-GRDF + Soil application of $ZnSO_4$ @ 20 kg ha^{-1}	24.20	27.79	25.99	101.09	103.90	102.50	182.00	185.98	183.99	287.01	294.06	290.53	302.10	305.30	303.70
M_4-GRDF + Soil application of $FeSO_4$ @ 25 kg ha^{-1}	21.86	24.56	23.21	96.80	99.49	98.14	177.23	181.46	179.35	282.00	289.05	285.53	296.00	299.04	297.52
M_5-GRDF + Soil application of Borax @ 5 kg ha^{-1}	21.29	24.20	22.75	96.00	98.61	97.30	176.10	179.96	178.03	279.50	283.97	281.74	293.44	294.00	293.72
M_6-GRDF + Soil application of $ZnSO_4$ @ 25 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1}	25.00	28.38	26.69	102.00	105.00	103.50	184.02	190.05	187.03	290.03	298.25	294.14	306.02	309.40	307.71
SE m ±	0.62	0.73	0.480	0.29	0.35	0.227	1.06	1.20	0.801	1.16	1.12	0.807	1.29	1.18	0.874
CD (P = 0.05)	1.95	2.31	1.41	0.91	1.10	0.67	3.33	3.80	2.36	3.65	3.54	2.38	4.08	3.70	2.57
(B) Bio inoculants- (B)															
B_1-Seed treatment with *Azotobacter* + PSB + KSB	22.16	25.18	23.67	97.15	100.15	98.65	177.25	181.62	179.44	281.47	286.89	284.18	294.43	296.35	295.39
B_2-Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	21.66	24.89	23.28	96.17	99.16	97.66	176.11	180.45	178.28	280.58	285.75	283.17	293.01	294.91	293.96
B_3-Seed treatment with *Azotobacter* + PSB + KSB + Drenching at 30 DAS liquid *Azotobacter* + PSB + KSB	22.71	25.57	24.14	98.43	101.17	99.80	179.84	183.99	181.91	283.92	289.07	286.49	298.37	300.75	299.56
SE m ±	0.42	0.49	0.32	0.25	0.32	0.20	0.47	0.58	0.37	0.71	0.74	0.51	1.14	0.90	0.72
CD (P = 0.05)	NS	NS	NS	0.73	0.93	0.57	1.37	1.70	1.06	2.08	2.16	1.46	3.31	2.62	2.05
Interaction (M x B)															
Between two sub plots means at same level of main plot means															
SE m ±	1.02	1.19	0.78	0.61	0.78	0.49	1.15	1.43	0.91	1.75	1.82	1.25	2.78	2.20	1.77
CD (P = 0.05)	NS	NS	NS	NS	NS	NS	3.36	4.16	NS	NS	NS	NS	NS	NS	NS
Between two main plots means at same level of sub plot means															
SE m ±	1.04	1.22	0.80	0.58	0.73	0.46	1.42	1.68	1.09	1.84	1.86	1.30	2.61	2.14	1.69
CD (P = 0.05)	NS	NS	NS	NS	NS	NS	4.31	5.09	NS	NS	NS	NS	NS	NS	NS
General mean	22.18	25.21	23.69	97.25	100.16	98.70	177.74	182.02	179.88	281.99	287.24	284.61	295.27	297.34	296.30

Conclusion

Based on two years of experimentation it could be concluded that the treatment GRDF + soil application of $ZnSO_4$ @ 20 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} + Borax @ 5 kg ha^{-1} (M_6) and seed treatment with *Azotobacter* + PSB + KSB + drenching at 30 DAS liquid *Azotobacter* + PSB + KSB (B_3) to *rabi* sweet corn obtained higher growth parameters *viz*., plant height (cm), number of leaves plant^{-1}, leaf area plant^{-1} (dm^2) and dry matter plant^{-1} (g) in sweet corn - groundnut cropping sequence.

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