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Effect of organics and micronutrients on the growth, yield of groundnut in coastal soil

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ABSTRACT
To evaluate different organics in combination with micronutrients on the growth, yield and nutrient uptake of groundnut in coastal soil, a pot experiment was carried out using coastal soil collected from Pichavaram coastal village near Chidambaram which represented sandy texture and had a pH-8.45, EC-1.14 dS m^{-1} and available NPK of 112.0, 7.5 and 169.0 Kg ha^{-1} respectively. The available zinc and boron were below the critical level. The treatment schedule was T_1-Absolute control ; T_2 : 100% recommended NPK : T_3-T_2 + ZnSO4 @ 25 Kg ha + Borax @ 10 Kg ha^{-1} ; T_4 – T_2 + Zn + B + Composted Coir Pith @ 10 t ha^{-1} ; T_5 – T_2 + Zn + B + Humic acid @ 20 Kg ha^{-1} ; T_6 – T_2 + Zn + B + Composted Coir Pith and Humic acid. The results revealed that the combined application of Zn + B along with Composted Coir Pith and Humic acid significantly increased the growth and yield of ground nut by recording a pod and haulm yield of 33.40 and 48.07 g pot^{-1} respectively besides increasing the soil available nutrients.

Key words : Organic, Micro, Nutrients, Groundnut, Coastal soil.

INTRODUCTION
In the coastal areas of Tamilnadu, groundnut is the second dominant crop being cultivated next to rice in coarse textured and nutrient deprived sandy soil. In these soils application of organics and micronutrients would of greater value for increasing the growth and yield of groundnut. Hence a study was undertaken to find out the influence of different organics supplemented with Zn and B on the growth, yield and nutrient uptake of groundnut in coastal soil.

MATERIALS AND METHODS
A pot experiment was conducted to evaluate different organics along with Zn and Boron the growth, yield and nutrient uptake of groundnut in a coastal sandy soil. The experimental soil was collected from Pichavaram coastal village near chidambaram area which represented sandy texture and had a pH-8.45, EC-1.14 dS m^{-1} and available NPK of 112.0, 7.5 and 169.0 Kg. ha^{-1} respectively. Six treatments viz. T_1-Absolute control ; T_2-recommended NPK ; T_3-T_2 – $ZnSO_4$ @ 25 kg ha^{-1} + Borax @ 10 kg ha^{-1}; T_4 - T_2 + T_3 composted coirpith @ 10 t ha^{-1}; T_5 – T_2 + T_3 + Humic acid @ 20 kg ha^{-1}; T_6 – T_4 + T_5, with three replications were studied under randomized block design using groundnut var. VRI 2. In one foot cement pots, 30 kg of soil was failed. Required quantities of different organics as per the treatments schedule were incorporated Calculated amount of fertilizer doses of 17:34:54 kg of N.P.K. per ha were applied according to the treatment. At harvest, pod and haulm yield were recorded. Plant and soil sample were taken and analyzed for the concentration of NPK, Zn and B as per standard procedure of Jakson (1973).

RESULTS AND DISCUSSION
All the organics evaluated along with Zn and B significantly influenced the growth, yield and nutrient uptake of groundnut. The maximum height of plants and DMP at all the three stages were registered with treatment T_6, the combined application of Zn + B along with composted coirpith and humic acid, and was followed by T_4, application of Zn + B along with composted coirpith alone. The increased plant height and dry matter production might be due to the increased nutrient supply with the addition of organics. Further, humic acid might had direct effect on plant growth like auxin activity (O'Donnell, 1973) contributing to increase in plant height and DMP. The yield of groundnut was also significantly increased with T6, the combined application of Zn + B along with composted coirpith and humic acid. It recorded a pod yield of 34.40 g pot^{-1} and a haulm yield of 48.07 g pot-1. The increased yield with the application of micronutrients and humic acid might be due to the increased production of indole acetic acid (IAA) in plants thereby contributing growth promotion and yield maximization coupled with the increased availability of nutrients and uptake by the crop. This corroborates the earlier report of Babu (1989) and Parasuraman and Mani (2003).

The uptake of major nutrients were found maximum with combined application of composted coirpith and humic acid along with micronutrients (T_6). It registered a nitrogen uptake of 1437.4 and 1098.3 mg pot^{-1}, P uptake of 172.32 and 189.32 mg pot^{-1} and K uptake of

Table 1 : Effect of organics and micronutrients on the growth and yield of Groundnut.

Treatments	Plant height (Cm)			DMP(g pot^{-1})			No of pods $plant^{-1}$	Yield (g pot^{-1})	
	FS	PFS	Har	FS	PFS	Har		Pod	Haulm
T1	19.50	31.27	42.47	16.33	33.27	43.23	12.33	22.00	33.52
T2	21.53	37.50	52.70	21.27	38.13	46.30	15.67	25.19	39.37
T3	20.33	33.23	49.67	18.80	34.33	44.70	16.00	26.95	39.46
T4	25.20	42.13	58.50	28.40	45.57	50.93	20.67	31.03	44.64
T5	23.73	39.07	55.23	24.57	41.13	47.30	18.33	29.71	41.76
T6	27.43	44.83	63.10	31.06	49.23	54.13	22.00	34.40	48.07
SEd	0.84	0.65	1.63	1.72	1.83	1.02	0.43	1.10	1.26
CD (p=0.005)	1.67	1.30	3.25	2.43	2.67	2.05	0.86	2.19	2.52

T_1-Absolute control; T_2-100% NPK ; T_3-T_2+$ZnSO_4$ @ 25 kg ha^{-1} + Borax @ 10 kg ha^{-1}, T_4-T_2 + T_3 + Composted Coirpith @ 10t ha^{-1}; T_5 - T_2 + T_3 + Humic acid @ 20 kg ha^{-1}; T_6-T_2+T_3+ Composted Coirpith and Humic acid.

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Table 2 : Effect of different organics and micronutrients on the nutrient uptake of groundnut.

Treatments	N (mg pot^{-1})		P (mg pot^{-1})		K (mg pot^{-1})		Zn (mg pot^{-1})		B (mg pot^{-1})	
	Pod	Haulm	Pod	Haulm	Pod	Haulm	Pod	Haulm	Pod	Haulm
T1	774.00	653.15	73.41	82.95	201.97	543.90	10.95	16.65	46.77	147.71
T2	975.92	784.06	105.27	121.14	272.14	679.50	13.25	19.85	65.81	183.51
T3	990.38	802.34	110.33	125.94	281.89	692.59	13.68	20.46	68.30	201.17
T4	1325.1	967.56	150.23	161.19	351.57	824.12	16.48	24.19	91.68	260.50
T5	1185.8	870.93	129.28	145.65	314.30	733.22	14.48	21.43	83.36	229.45
T6	1437.4	1098.3	172.32	189.32	379.91	879.78	17.15	25.14	105.54	284.36
SEd	42.31	38.54	6.87	6.01	11.81	32.58	0.43	1.04	3.12	7.85
CD (p=0.005)	84.62	77.10	13.74	12.03	23.62	65.16	0.86	2.08	6.23	15.70

379.91 and 879.78 mg pot^{-1} by pod and haulm respectively. This was followed by the individual application of composted coirpith and humic acid. The uptake of Zn and B were also found maximum with the combined application of composted coirpith and humic acid along with micronutrients (T6). The applied organics helped in for the reduction of soil pH by the way of organic acid production and further by the mechanism of chelation favored for greater nutrient availability. Further, humic acid have myriad of functional groups which chelat nutrient cations (Decock, 1955), thereby preventing their precipitation and increase their availability to crop plants.

The analysis of the post harvest soil indicated that the treatment T6 had maximum macro and micro nutrient availability in soil. The reduction in pH, reduced volatilization loss on N and the increased solubility of P due to acid production with the application of composted coirpith and humic acid might be asdribed for the greater nutrient availability in the soil (Savithri and Hameed Khan 1994 ; Tan and Lopez – Falcon, 1987). Further the complexation of humic acid and applied organics with micronutrients might have mobilized and increased the availability of Zn and B (Babu, 1989).

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