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RESPONSE OF SESAME (*Sesame indicum* L.) TO POTASSIUM MANGANESE*

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An attempt has been made to estimate potassium and manganese requirement to sesame. Application of potassium at the rate of 30kg K_2O/ha and of 12.5 kg $MnSO_4$/ha was found to be optimum in increasing the yield as well as net return in sesame.

India occupied a pride place as one of the largest producers and net exporter of oilseeds and oils prior to 1955 but later on it has acquired the status of the largest importer of edible oils in the whole world. Sesame is one of the important oilseeds in India and occupies an area of 23.84 lakh ha producing a total quantity of 3.71 tonnes of seeds. The low per ha yield is attributed to lack of high yielding varieties and poor management of the crop. Fertilization is one of the important production factors to increase the productivity of seasame. Hence this study was undertaken to find out the optimum requirement of potassium and manganese for sesame.

MATERIAL AND METHODS

Field experiments were conducted during *Kharif* 1981 and summer 1982 at Agricultural College and Research Institute, Coimbatore and Agricultural Research Station, Bhavanisagar respectively, with the pre-release culture TNAU 2. The treatments were : Potassium levels 0 (K_0), 10 (K_1), 20 (K_2), 30 (K_3) and 40 (K_4) kg K_2O/ha Manganess levels 0 (M_0), 12.5 (M_1), 25 0 (M_2) and 37.5 (M_3) kg $MnSO_4$/ha. The treatments were tried in split plot design with the levels of potassium in the main plots and manganese levels in sub-plots. The nutrient status of the soil was low in nitrogen, low in phosphorus, high in potassium and high in manganese in Coimbatore where as at Bhavanisagar, it was low in all the nutrients.

RESULTS AND DISSCUSSION

Branches (Table 1)

Both primary and secondary branches were not alterad significantly due to the addition of K during *Kharif* at Coimbatore. In summer, at Bhavanisagar where the soil was low in available K, the added K produced a significant increase in primary branches. Both primary and secondary branches were increased with increasing levels of K. However, the difference between 30 kg and 40 kg K_2O/ha was not significant. In both the seasons, the fovourable influence of $MnSO_4$ application was seen on number of branches per plant. The increase in number of primary as well as secondary branches on both 60th day after sowing and harvest was significant only upto 12.5 kg $MnSO_4$/ha.

Number of capsules (*Table* 2)

Number of capsules,on main stem, primary and secondary branches and the total number of capsules per plant were not significantly increased due to K application during *kharif* at Coimbatore. In Bhavanisagar, during summer, the number of capsules was increased with the addition of K. At lower level of 10 kg K_2O/ha, though there was an increase in number of capsules the increase was not significant over control. But at 20, 30 and 40 kg levels significant increase in the number of capsules over control was noticed.

Application of $MnSO_4$ exerted a favourable influence on the number of capsuls on the main stem, primary and secondary branches and the total number of capsules in both the seasons. The progressive increase was significant only up to 12.5 kg $MnSO_4$/ha and the differences between 12.5, 25 and 37.5 kg levels were not significant.

Seed yield (*Table* 3)

In *kharif* season at Coimbatore, the yield differences between the levels of K were not significant. This might be due to higher availability of soil K. But in summer at Bhavanisagar, K application had a remarkable influence on seed yield. Among the levels tried viz., 30 and 40 kg K_2O/ha were both significantly superior to others. However, the difference between 30 and 40 kg levels was not significant. The response for added K may be attributed due to a low availability of soil K. Similar results were odtained by Rao and Govindarajan, (1954) in groundnut and Gowda and Krishnamurthi, (1977) in sesame. Application of 12.5 kg $MnSO_4$/ha gave significant increase in seed yield over control and was on par with the other levels. This is in confirmity with the earlier findings of Sureshkumar (1974) in soybean.

Oil content in seed (Table 4)

A slight, though not significant, improvement in oil content due to application of K was noticed during *kharif* in the black soil of Coimbatore. In summer, at Bhavanisagar, where the soil was low in available K, increase in oil content with the addition of K fertilizer was clearly noticed. Significant increase in oil content was noticed due to the application of 30 and 40 kg K_2O/ha over control but the difference between these two levels was not significant. Similar increase in oil content for added K was observed by Sathyanarayana *et al.*, (1978) in sesame.

Mn application increased the oil content significantly in both the seasons. Application of 12.5 kg $MnSO_4$/ha was found to be adequate.

Economics (*Table 5*)

In *kharif* season, a marginal increase in net return was observed for the application of 30 and 40kg K_2O/ha. But the net return per rupee invested was reduced with addition of K. In Bhavanisagar, addition of K registered

increased net return and net income per rupee invested. The increase was noticed upto the maximum level of 40 kg K_2O/ha.

Though the net return and the net income per rupee invested were maximum for the application of 40 kg K_2O/ha, the seed yield was not significantly increased beyond application of 30 kg/ha. So the economic dose of K to attain the maximum profit in sesame was 30 K_2O/ha at Bhavanisagar. Application of $MnSO_4$ at 12.6 kg/ha recorded the highest net return in both the locations.

Application of 30 kg K_2O/ha was found to be economical in low K soils.

Application of 12.5 kg $MnSO_4$/ha is adequate to get high yield and net income in sesame.

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Table 1 Number of branches

Treatment	Kharif '81'				Summer '82'			
	Primary branches		Secondary branches		Primary branches		Secondary branches	
	60th	90th	60th	90th	60th	90th	60th	90th
K_0	7.48	8.41	6.60	7 47	8.39	8.45	7.22	8.12
K_1	7.50	8.43	6.73	7.34	8.95	8 94	7.48	8 68
K_2	7.41	8 46	6.66	7.66	9.24	9.32	8 17	8.65
K_3	7 54	8 39	6 93	7.66	9 40	10.25	8.38	9.17
K_4	7.94	8 73	6 86	7 68	9.40	10.32	8.39	9.41
S. E D.	0.15	0.22	1.13	0.19	1.15	0.35	0,19	0·22
C D (P=0 05)	N S.	N. S.	N. S.	N. S.	0,33	0.76	0.45	0.48
K_0	7.25	8.12	6.49	7.13	8.59	8.76	7 46	8.01
K_1	7.85	8.82	7.10	7.90	9.29	9.72	8.08	9.05
K_2	7.61	8.59	6.80	7.57	9.22	9.68	8.03	9.02
K_3	7.59	8.42	6 64	7.67	9.20	9.65	8.13	9.13
S. E D	0.08	0.15	0.30	0.13	0.15	0.22	0.15	0.15
C. D (P=0 05)	0.17	0.30	0.60	0.26	0.30	0.45	0.30	0.30

N. S. Not significant.

Table 2 Number of capsules (at harveat)

Treatment	Kharif '81				Summer 82'			
	Main stem	Primary branches	Secondary branches	Tatal	Main stem	Primary branches	Secondary branches	Total
K_0	37.4	70.2	26.7	134.5	37 7	80.1	38.3	156.4
K_1	38.3	70.8	26.5	135.6	39.8	83 0	41.7	164.8
K_2	38.6	71.8	26.9	138.3	42.8	86.5	43.6	172.2
K_3	38.5	71.7	27.1	137 8	44.1	93.2	46.8	183.4
K_4	38.4	72.0	27.2	137.6	44.7	94.6	46.7	186.4
S. ED	1.35	1.51	1.12	3.84	1.87	2.67	1.43	4.96
C.D. (P—0 05)	N.S.	N.S.	N.S.	N.S.	4 07	5.82	3.12	10,81
M_0	34.6	64.8	22.7	121 1	37.9	83.0	40.1	161.6
M_1	39 6	73 0	28 4	141.6	42.1	88.5	44,4	175,8
M_2	39.4	73.6	28.2	141.3	43.0	89.2	44.6	176,9
M_3	39 8	73.7	28.3	141.8	43.3	89.3	45.1	177.0
S. ED	1.12	1.18	0.97	3.47	1.08	2,26	2.26	4 60
C.D. (P—0 05)	2.26	2,38	1.96	6,99	4.07	4 56	2.54	9 27

N.S —Not Significant

Table 3 Seed yield (kg/ha)

Treatment	Kharif '81						Summer '82					
	K_0	K_1	K_2	K_3	K_4	Mean	K_0	K_1	K_2	K_3	K_4	Mean
M_0	850	814	872	904	899	858	828	899	988	1044	1066	965
M_1	931	927	912	946	953	934	972	1022	1081	1156	1216	1089
M^2	941	923	924	933	938	932	977	1034	1078	1148	1163	080
M_3	899	926	917	905	905	910	989	1042	1058	1149	1182	1084
Mean	905	897	906	922	923		942	999	1051	1124	1156	

	S. ED	C. D (P=0.05)	S. ED	C. D. (P=0.05)
K	9.38	N. S	27 99	60.80
M	15 44	49.12	35.17	50.84
K at M	31.92	N. S.	73.60	N. S.
M at K	34.50	N. S.	78 60	N. S.

N. S — Not significant

Table 4
Oil content in seed (per cent)

Treatments	*Kharif* '81	Summer '82
K_0	50.4	49.3
K_1	50 6	50 3
K_2	50.7	50.9
K_3	51.3	51.8
K_4	51.5	51.7
S. E D	1.07	0.93
C. D. (P=0.05	N. S.	2.03
M_0	49.3	48.6
M_1	52.5	51.5
M_2	51.6	51.7
M_3	51.2	51.8
S. E D	0.90	0.87
C. D. (P=0.05)	1.82	1.76

N. S. = Not Significant

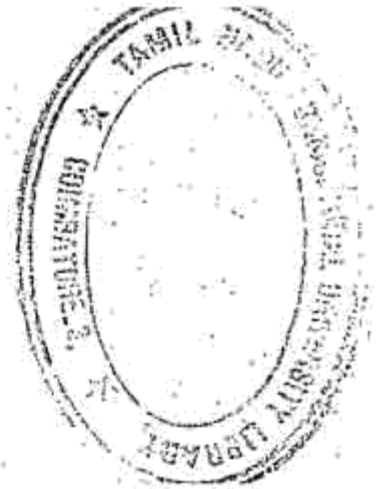

Table 5 *Net return (Rs/ha)

Treatments	Kharif '81						Summer '82					
	K_0	K_1	K_2	K_3	K_4	Mean	K_0	K_1	K_2	K_3	K_4	Mean
M_0	2605	2423	2664	2788	2746	2645	2506	2806	3186	3418	3497	3083
M_1	2870	2832	2744	2877	2889	2842	2883	3259	3505	3822	4072	3508
M_2	2815	2714	2698	2719	2721	2733	2977	3213	3391	3686	3734	3400
M_3	2526	2627	2567	2488	2473	2536	2931	3149	3201	3591	3719	3318
Mean	2704	2649	2668	2718	2707		2824	3107	3321	3629	3759	

* Data not statistically analysed