

Nutrient Content and Uptake by Sesame Varieties as Influenced by Fertilizer and Population Levels Under Summer Irrigated Conditions*

In India, 85 per cent of oilseed production is from rainfed areas of poor and marginal soils and hence there are wide fluctuations in production owing to monsoon vagaries. By careful management and shifting to irrigated areas wherever possible, could boost the production potential. Oilseeds crop like sesame is one of the best choice for the tail end farmers of Tungabhadra Project Area. They are forced to grow arable crops due to scarce supply of water after kharif paddy. With paucity of information on irrigated sesame, this study enables to reveal the concentrations and uptake pattern as influenced by certain management practices.

A field experiment was conducted during the summer of 1993 at Agricultural Research Station, Siruguppa, Bellary District, Karnataka. The soil was deep black clay, medium in available N (262.5 kg/ha), P_2O_5 (46.8 kg/ha) and rich in K_2O (625 kg/ha) in 0-15 cm soil layer. The experiment was laid-out in split plot design with four replications. The main plots were allotted with two sesame genotypes (DS-1 and E-8). The sub plots included combinations of three fertilizer levels (40:50:40, 60:75:40 and 80:100:40 kg NPK/ha) and two plant population levels (3.33 and 6.66 lakh/ha). The seeds were hand sown on 10th January 1993 and nutrients were applied in the form of diammonium phosphate and muriate of potash as basal dose of fertilizer (50% N, 100% P and K) and top dressed with remaining N at 30 days after sowing through urea. Varieties DS-1 and E-8 were harvested on 16th and 21st April, 1993, respectively.

The concentration of N, P and K at harvest

(Table 1) and their total uptake in various plant parts (Table-2) did not differ significantly due to genotypes. However, DS-1 recorded slightly higher concentration of nutrients, uptake and seed yield. The uptake of N, P and K in seed was to the tune of 64, 67 and 12 per cent of total uptake, respectively and the rest was found in stalk. On an average, these genotypes showed that they had greater demand for N (104 kg/ha) followed by K (85.0 kg/ha) and P (15.1 kg/ha).

Increase in the levels of N and P from 40 and 50 kg/ha to 60 and 75 kg/ha respectively in presence of constant quantity of K (40 kg/ha) application indicated that the concentration of N, P and K in various plant parts increased significantly at harvest (Table-1). Further increase in the level of N and P to 80 and 100 kg/ha, respectively did not have any significant effect. The nutrient uptake and seed yield also recorded similar trend due to application of fertilizers (Table-2). The total uptake of N, P and K at 60:75:40 kg NPK/ha was 113.18, 16.16 and 94.4 kg/ha, respectively. Similar results were obtained by Kalra and Tripathi (1980) in sunflower.

The comparison between plant population levels for nutrient content at harvest (Table-1) indicated that N, P and K content increased significantly at 3.33 lakh plant/ha, but nutrient uptake either at 3.33 or 6.66 lakh plant/ha did not show any significant difference (Table 2). By virtue of higher plant population, 6.66 lakh/ha recorded higher seed yield (1736 kg/ha) than 3.33 lakh/ha (Table 2). Similar trend were also obtained by Krishnegowda (1974) in sesame crop.

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Table 1. N, P and K concentration in different plant parts of sesame varieties at harvest as influenced by fertilizer and population levels

Treatments	Nitrogen (%)				Phosphorus (%)				Potassium (%)			
	Leaf	Stem	Empty capsule	Seed capsule	Leaf	Stem	Empty capsule	Seed capsule	Leaf	Stem capsule	Empty	Seed
VARIETY												
DS-1 (V ₁)	1.81	0.3	1.14	3.99	0.215	0.090	0.125	0.591	1.722	1.760	1.705	0.619
E-8 (V ₂)	1.71	0.50	1.09	3.89	0.217	0.083	0.118	0.576	1.598	1.723	1.863	0.602
S.Em±	0.06	0.004	0.04	0.06	0.016	0.012	0.010	0.013	0.047	0.035	0.033	0.014
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
FERTILIZER LEVEL (Kg NPK/ha)												
40:50:40 (F ₁)	1.65	0.45	1.00	3.88	0.185	0.074	0.107	0.567	1.611	1.654	1.575	0.568
60:75:40 (F ₂)	1.82	0.56	1.16	4.02	0.232	0.092	0.127	0.599	1.761	1.794	1.741	0.632
80:100:40 (F ₃)	1.81	0.53	1.19	4.00	0.231	0.094	0.130	0.583	1.753	1.775	1.736	0.631
S.Em±	0.02	0.01	0.02	0.02	0.004	0.002	0.002	0.004	0.012	0.009	0.009	0.005
CD (P=0.05)	0.06	0.04	0.05	0.06	0.012	0.005	0.005	0.011	0.035	0.025	0.025	0.013
PLANT POPULATION LEVELS												
3.33 lakh/ha (P ₁)	1.83	0.58	1.18	4.03	0.227	0.097	0.138	0.599	1.761	1.800	1.743	0.627
6.66 lakh/ha (P ₂)	1.70	0.44	1.06	3.85	0.205	0.076	0.105	0.567	1.660	1.682	1.625	0.594
S.Em±	0.02	0.01	0.01	0.02	0.003	0.001	0.001	0.003	0.010	0.007	0.007	0.004
CD (P=0.05)	0.05	0.03	0.04	0.05	0.009	0.004	0.004	0.009	0.029	0.021	0.021	0.011

NS - Non significant

Table 2. N, P and K uptake (kg ha⁻¹) in plants and its distribution in seeds and stalks as influenced by fertilizer and population levels in sesame genotypes at harvest

Treatments	Uptake in seeds			Uptake in stalk			Total uptake(kg/ha)			Seed yield (kg/ha)
	N	P	K	N	P	K	N	P	K	
VARIETY										
DS-1 (V ₁)	68.84	10.27	10.55	38.51	5.02	77.28	107.39	15.29	87.83	1722
E-8 (V ₂)	64.52	9.51	9.92	35.74	4.65	73.33	100.26	14.16	83.25	1635
S.Em±	5.08	0.85	0.88	3.63	0.68	6.29	8.66	1.53	7.17	104
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
FERTILIZER LEVEL (Kg NPK/ha)										
40:50:40 (F ₁)	58.92	8.24	8.68	29.68	3.83	63.59	88.60	12.07	72.27	1523
60:75:40 (F ₂)	71.85	10.89	11.06	51.53	5.27	83.34	113.18	16.16	94.40	1777
80:100:40 (F ₃)	69.47	10.54	10.96	40.18	5.41	78.98	109.64	15.95	89.92	1737
S.Em±	1.67	0.27	0.28	1.19	0.17	2.15	2.78	0.39	2.38	41
CD (P=0.05)	4.83	0.79	0.81	3.83	0.47	6.30	8.03	1.13	6.87	117
PLANT POPULATION LEVELS										
3.33 lakh/ha (P ₁)	65.80	9.82	10.24	38.95	5.27	75.78	104.75	15.09	85.02	1621
6.66 lakh/ha (P ₂)	67.56	9.96	10.22	35.30	4.40	74.83	102.86	14.36	85.06	1736
S.Em±	1.37	0.22	0.23	0.97	0.13	1.78	2.27	0.32	1.94	33
CD (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	98

NS - Non significant

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