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Effect of time of nitrogen application on irrigated sesame (*Sesamum indicum*)

P. BALASUBRAMANIYAN[1]

Regional Research Station, Tamil Nadu Agricultural University, Vridhachalam 606 001

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ABSTRACT

A field experiment was conducted to elicit information on the effect of time of N application in sesame (*Sesamum indicum* L.) varieties under irrigated condition. Nitrogen at 25 and 50 kg/ha was applied all basal, 3 weeks after sowing (WAS) and 50 kg N/ha applied in splits at basal + 3 WAS, basal + 6 WAS and with no N (control). Split application of 50 kg N/ha equally at basal and 3 WAS gave higher yield of sesame by promoting plant growth and producing more number of capsules/plant. Higher nutrient-use efficiency as well as economic returns were also obtained with the adoption of split application of N than all basal dressing.

Sesame (*Sesamum indicum* L.) is an important oilseed crop in the North-Eastern Zone of Tamil Nadu. It is raised as irrigated crop during the summer season. Among various crop-production inputs, fertilizer is the costlier and most critical to get higher yield. Of the various nutrients, nitrogen-use efficiency (NUE) is of major concern because of its lion share (64%) in total NPK use and its susceptibility to various losses. Split application increases the NUE considerably by supplying N at the critical stages when the crop requirement is more (Biswas and Tewatia, 1994). Generally N is applied to sesame at the time of sowing. However, beneficial effect of split application of N at basal + 4 weeks after sowing (WAS) (Gaur and Trehan, 1973) and 3 WAS + 6 WAS (Singh and Kaushal, 1973) has been reported for rainfed sesame. The present experiment was conducted to study the influence of time of N application for irrigated sesame.

MATERIALS AND METHODS

The field experiment was conducted during summer 1992 and 1993 at Regional Research Station, Vridhachalam, representing North-Eastern Zone of Tamil Nadu. Experimental soil was red sandy loam classified as Typic Paleustalfs, with pH 6.8. It is low in available N (185 kg/ha), medium in available P (19.1 kg/ha) and low in available K (112.0 kg/ha) with organic carbon content of 0.30%. The experiment was laid out in a factorial randomized block design with 3 replications. Varieties, viz. 'TMV 4' and 'TMV 6', recommended for summer season of this region were used. Application of N tested were : control (no N), 25 and 50 kg N/ha applied all basal, 3 WAS and 50 kg N/ha split applied equally at basal + 3 WAS and

Present address: [1]Associate Professor, Department of Agronomy, Agricultural College and Research Institute, Madurai 625 104

Table 1. Effect of N application on sesame varieties

Treatment	1992						1993					
	Plant height (cm)	Capsules/ plant	Grain yield (q/ha)	Agronomic efficiency (kg grain/ kg/N)	Net income (Rs/ha)	Benefit: cost ratio	Plant height (cm)	Capsules/ plant	Grain yield (q/ha)	Agronomic efficiency (kg grain/ kg/N)	Net income (Rs/ha)	Benefit: cost ratio
Variety												
'TMV 4'	99.6	53	6.09	3.64	2,400	1.43	102.5	69	6.75	3.44	3,224	1.58
'TMV 6'	107.0	51	5.94	1.70	2,176	1.39	107.7	74	6.80	3.16	3,287	1.59
CD (P = 0.05)	4.8	NS	NS				NS	3	NS			
N (kg/ha)												
0	93.1	35	5.06		1,568	1.31	86.5	57	5.58		2,250	1.45
25 (basal)	101.2	49	5.74	2.70	1,926	1.35	95.0	68	6.28	2.80	2,640	1.48
50 (basal)	103.3	56	6.23	2.33	2,396	1.42	110.5	75	6.98	2.79	3,378	1.59
25 (3 WAS)	103.3	51	5.61	2.20	1,793	1.32	102.0	73	6.48	3.52	2,875	1.52
50 (3 WAS)	104.8	58	6.15	2.21	2,298	1.40	111.0	76	7.23	3.28	3,696	1.65
50 (50% basal + 50% 3 WAS)	110.2	59	6.94	3.76	3,325	1.58	116.7	81	7.58	3.99	4,158	1.73
50 (50% basal + 50% 6 WAS)	106.5	57	6.48	2.86	2,721	1.48	114.0	70	7.30	3.43	3,793	1.67
CD (P = 0.05)	7.3	6	0.31				7.6	5	0.83			

WAS, weeks after sowing

basal + 6 WAS. Nitrogen was applied in the form of urea as per the treatments. Phosphorus (superphosphate) and potash (muriate of potash) were basally applied each at 25 kg/ha. Gypsum at 200 kg/ha was uniformly applied at the time of sowing. Agronomic efficiency as kg grain per kg nutrient N was worked out from the yield. Economic returns (net income and benefit : cost ratio) were calculated at the prevailing market rate.

RESULTS AND DISCUSSION

Growth and yield parameters

Among the varieties compared, 'TMV 6' grew taller than 'TMV 4'; however, number of branches were similar. Variety 'TMV 6' had more number of capsules/plant than 'TMV 4' in 1993. These parameters varied due to methods of N application. Split application of 50 kg N/ha equally at basal + 3 WAS or basal + 6 WAS induced the plants to grow taller than application of 25 kg N/ha all basal and the control (Table 1). Better plant growth owing to split application of N also reflected on the production of more number of branches in 1993 and higher number of capsules/plant in both the years. Adequate nutrient availability particularly at the critical periods of plant growth would have benefited plant growth and yield attributes. Sinharoy *et al.* (1990) reported positive influence of 30 or 60 kg N/ha on sesame growth and capsule numbers.

Yield and economic returns

The yield between the varieties was not significant, while N application methods significantly varied the yield. Split application of 50 kg N/ha applied at basal + 3 WAS or basal + 6 WAS gave higher yield than all basal application. Among these 2 treatments, however, increase in yield than control was more in the former (37.2 and 35.8%) during 1992 and 1993 respectively. With the split application of N, plants efficiently utilized the applied nutrients. This was very well reflected on the increase in agronomic efficiency with the split application of N (3.76 and 3.99 kg seed/kg N) than all basal application. The results also showed non-significant yield difference between 25 and 50 kg N/ha when applied all basal. But significant yield difference was noticed due to split application of 50 kg N/ha equally at basal and 3 WAS. Reddy (1981) recommended split application of N as 50% basal and remaining 50% top-dressed about 30–35 days after sowing. Higher net returns (Rs 3,325 and Rs 4,158/ha) and benefit : cost ratio (1.58 and 1.73 during respective years) were also obtained with split application of N.

It could be concluded that application of 50 kg N/ha equally at basal and 3 WAS recorded higher yield of sesame. Nutrient efficiency and monetary benefits were more by resorting split application of N than all basal dressing.

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