

Performance of linseed (*Linum usitatissimum*) varieties under varying sowing and fertilizer management in rainfed condition

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Received: January 1999

ABSTRACT

Yield performance of 4 linseed (*Linum usitatissimum* L.) varieties was tested under different sowing methods and fertilizer levels in rainfed condition on clay-loam soils of Raipur, during winter season of 1993–94 and 1994–95. 'Kiran' linseed gave the maximum seed yield, followed by 'R 552', 'RLC 29' and 'Local'. Branches/plant, capsules/plant and seeds/capsule mainly contributed to the seed yield. Skip-row sowing (missing seeding in a row after 3 regular rows) achieved by using three-fourths of the quantity of recommended seeds and fertilizers (18.5 kg seed, 22.5 kg N, 30 kg P_2O_5 /ha and 15 kg K_2O /ha) and resulted in the maximum seed and straw yields, and the yields were significantly higher than those obtained from regular sowing with recommended quantity of seeds and fertilizer (25 kg seed, 30 kg N, 40 kg P_2O_5 and 20 kg K_2O /ha). Increase in fertilizer dose beyond recommended dose did not increase the yields.

Key words : Linseed, sowing, Fertilizer, yield

Linseed is an important oilseed crop preferably for growing under rainfed conditions. The low average yield (283 kg/ha) of linseed in Chhattisgarh region is a major concern in its cultivation. Varietal improvement is promising in raising its productivity level. However, selection of proper variety necessitates suitable agronomic management for exploiting the genetic yield potential. Towards accomplishing this objective suitable sowing and fertilizer management appears to be useful. Hence

the present investigation was undertaken.

MATERIALS AND METHODS

The field experiment was carried out with linseed under rainfed conditions at Indira Gandhi Agricultural University, Raipur, Chhattisgarh, during winter (*rabi*) season of 1993–94 and 1994–95. The soil of the experimental field was clay loam and neutral (pH 7.2) in reaction. It had low available N (218 kg/ha) and medium available P_2O_5 (12.5 kg/ha) and high

Table 1. Seed and straw yields and harvest index of linseed varieties as influenced by sowing and fertilizer management

Treatment	Seed yield (q/ha)			Straw yield (q/ha)			Harvest index		
	1993-94	1994-95	Mean	1993-94	1994-95	Mean	1993-94	1994-95	Mean
<i>Sowing methods and fertilizer level</i>									
Regular sowing with 25 kg seed and 30, 40, 20 kg N, P, K/ha	2.92	6.3	4.61	7.69	11.46	9.57	27.53	32.47	30.0
Skip row sowing with 18.5 kg seed and 30, 40, 20 kg N, P, K/ha	4.18	6.24	5.21	10.07	12.19	11.13	29.33	32.85	31.0
Skip-row sowing with 18.5 kg seed and 22.5, 30, 15 kg N, P, K/ha	4.33	6.58	5.45	11.21	10.83	11.02	27.88	33.79	30.8
Skip-row sowing with 18.5 kg seed and 45, 60, 30 kg N, P, K/ha	4.09	5.7	4.89	10.58	10.85	10.40	27.97	31.55	28.8
CD (P = 0.05)	0.99	NS	0.82	0.42	0.99	0.72	NS	NS	NS
<i>Variety</i>									
'Local'	3.5	5.29	4.39	9.18	12.04	10.67	27.8	31.59	29.6
'R 552'	3.8	5.82	4.81	9.9	10.43	10.16	28.23	33.19	30.7
'Kiran'	4.34	5.49	4.92	11.23	11.13	11.18	28.95	33.81	31.4
'RLC 29'	3.87	5.23	4.55	10.23	11.71	10.97	28.87	32.94	30.9
CD (P = 0.05)	NS	NS	NS	0.42	0.99	0.07	NS	NS	NS
CV%	15.17	12.67	14.12	14.98	10.45	12.75	12.88	16.23	15.2

Table 2. Growth and yield-attributing characters of linseed varieties as influenced by sowing and fertilizer management

Treatment	Plant height (cm)		Branches/ plant		Capsules/ plant		Seeds/ capsule		100-seed weight (g)	
	1993-94	1994-95	1993-94	1994-95	1993-94	1994-95	1993-94	1994-95	1993-94	1994-95
<i>Sowing methods and fertilizer level</i>										
Regular sowing with 25 kg seed and 30 : 40 : 20 kg NPK/ha	41.9	46.7	3.13	3.88	35.3	47.8	6.2	6.78	6.14	7.03
Skip-row sowing with 18.5 kg seed and 30 : 40 : 20 kg NPK/ha	44.1	47.3	3.34	4.21	37.1	50.4	6.55	7.1	6.39	7.09
Skip-row sowing with 18.5 kg seed and 22.5 : 30 : 15 kg NPK/ha	44.4	46.8	3.44	4.22	41.2	56.3	6.72	7.43	6.6	7.02
Skip-row sowing with 18.5 kg seed and 45 : 60 : 30 kg NPK/ha	42.6	48.8	3.27	3.73	39.2	45.8	6.63	6.85	6.13	6.99
CD (P = 0.05)	NS	NS	NS	NS	2.9	4.5	0.31	NS	0.27	NS
<i>Variety</i>										
'Local'	38.5	44.6	2.82	3.24	33.4	44.7	6.29	6.55	5.75	6.92
'R 552'	43.9	50.6	3.37	4.42	39.8	55.8	6.55	7.13	6.52	7.04
'Kiran'	48.2	48.7	3.71	4.21	43.4	53.1	6.72	7.32	6.34	7.02
'RLC 29'	42.3	45.3	3.43	4.17	36.1	47.1	6.54	7.12	6.44	7.14
CD (P = 0.05)	2.1	2.6	0.22	0.31	2.9	4.6	0.31	NS	0.27	NS
CV%	5.8	6.56	8.16	9.38	9.31	10.76	5.77	11.92	5.6	3.66

available (K_2O 310 kg/ha). The annual rainfall from June to February was 1,434 and 1,472 mm during 1993–94 and 1994–95, respectively, out of which 19.5 and 72.2 mm was received during the cropping season in the 2 respective years. Treatment details are given in Table 1. The experiment was laid out in randomized block design with 4 replications. Sowing was done on 20 and 24 October in 1993 and 1994 respectively. The row-to-row spacing was 25 cm. All fertilizers were placed 2–3 cm below the seeds at sowing. Harvesting was done on 24 and 28 February during 1994 and 1995 respectively.

RESULTS AND DISCUSSION

Sowing and fertilizer management

The skip-row sowing by 18.5 kg seeds and $N_{22.5}$, P_{30} and K_{15} (22.5, 30 and 15 kg N, P and K/ha) resulted in higher seed and straw yields than regular sowing with 25 kg seeds and N_{30} P_{40} K_{20} in both the years (Table 1). The former treatment consistently resulted in higher seed and straw yields among all the treatments. The yield performance of all the skip-row treatments was at par. The yields in skip-row sowing were reduced when fertilizer doses were increased to a limit of 15, 60 and 30 kg N, P and K/ha, but rate of reduction was not significant. Plant height, number of branches and capsules/plant and seeds/capsule were higher under skip-row sowing than the regular sowing (Table 2). However, the differences were not significant for plant height and branches/plant. Test weight of seeds and harvest index were unaffected by different sowing and fertilizer management. Capsules/plant, seeds/capsule and test

weight mainly contributed to seed yield, while plant height and branches to straw yield (Gupta and Godawat, 1981). Efficient utilization of space, light and soil moisture by skip-row sowing under rainfed conditions most probably helped to increase the yields. Rathore and Mishra (1985) also recorded that leaving 1 row unsown of 3 regular rows in linseed did differ in yield than uniform regular sowing in linseed. There were good rains (71.2 mm) during crop season in the second year. Thereby the range of variations in yields became narrow in second year because of less competition between plants for moisture.

There was no significant intraction between sowing methods and fertilizer levels with different varieties. Linseed variety 'Kiran' sown by skipping 1 row after 3 regular rows along with $N_{22.5}$ P_{30} K_{15} was more promising than others under rainfed conditions in Chhattisgarh region.

Performance of varieties

On the basis of average yields of 2 years varieties were in the order of 'Kiran' > 'R 552' > 'RLC 29' > 'Local' for seed yields, and in order of 'Kiran' > 'RLC 29' > 'Local' > 'R 552' for straw yields (Table 1). On an average, 'Kiran' had superiority in growth and yield-attributing parameters, viz. plant height, number of branches and capsules/plant and seeds/capsule, to rest of varieties and thus it outyielded the other varieties tested (Table 2). Harvest index did not vary significantly among the varieties. Tomar *et al.* (1989) and Singh and Verma (1993) also reported similar variation in seed yield of linseed variety due to their genetic constitution.

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