

Response of linseed (*Linum usitatissimum*) varieties to fertility levels under rainfed condition

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ABSTRACT

A field experiment was conducted at Regional Research Station, Bhawaniapatna, during the winter seasons of 1993–94 to 1995–96, to find out suitable linseed (*Linum usitatissimum* L.) varieties for rainfed condition along with economic optimum fertility level. Variety 'Laxmy 27' outyielded other varieties with a yield level of 588.41 kg/ha. This was found to be statistically on a par with varieties 'Pusa 3' (550.59 kg/ha) and 'Kiran' (524.19 kg/ha). The economic optimum dose of fertilizer was found to be 40, 20 and 10 kg N, P and K/ha, with yield level of 594.72 kg/ha with a benefit : cost ratio of 1.46.

Key words : Linseed varieties, Fertility level, Rainfed condition

Linseed is an important oilseed crop, which is grown extensively in the residual moisture condition even in the drought-prone district of Kalahandi, Orissa. The productivity of linseed is very low due to very rare or no use of fertilizers. Lack of suitable high-yielding variety for the area is also a production constraint. Sharma and Rajput (1984) reported that productivity of rainfed linseed can be increased with improved agronomic practices like substitution of traditional variety and application of fertilizer. Khurana *et al.* (1989) also corroborated the fact that linseed varieties respond considerably to fertility levels under rainfed condition. With this in view, present experiment was undertaken to find out a suitable linseed

variety along with its economic optimum fertilizer requirement to increase the productivity of rainfed linseed in Kalahandi.

MATERIALS AND METHODS

A field experiment was conducted during winter seasons of 1993–94 to 1995–96 at Regional Research Station, Bhawaniapatna, Orissa. The soil of the experimental field was loamy clay in texture, with pH 7.1. The organic carbon content of the experimental plot was 0.48%, available P 8.9 kg/ha and available K 289 kg/ha. The experiment was laid out in factorial randomized block design with 3 replications. The treatments consisted of 4 varieties of linseed ('Laxmy 27', 'Pusa 3',

Table 1. Effect of varieties and fertility levels on biometrics, yield and economics of linseed (average data of 3 years)

Treatment	Plant height (cm)	Branches/ plant	Capsules/ plant	Seeds/ capsule	1,000-seed weight (g)	Seed yield (q/ha)	Stover yield (%)	Harvest index (Rs/ha)	Gross return (Rs/ha)	Cost of cultivation (Rs/ha)	Benefit : cost ratio
<i>Variety</i>											
'Laxmy 27'	50.5	3.8	19.9	7.3	7.7	5.9	16.6	26.2	10,556	4,125	1.56
'Pusa 3'	53.3	3.6	19.7	8.4	6.2	5.5	15.6	26.1	9,887	4,125	1.40
'Kiran'	45.1	3.2	18.9	8.0	6.2	5.2	15.3	25.6	9,476	4,125	1.30
'Bhavanipatna Local'	50.5	3.5	12.2	6.8	6.4	3.6	11.2	24.2	6,537	4,125	0.58
CD (P=0.05)	4.7	0.4	5.0	1.0	1.0	0.8	3.3		2,145		
<i>Fertility level (N₂, P₂O₅)</i>											
0 0 0	40.0	3.0	11.8	4.8	6.2	3.2	11.0	22.6	6,063	3,600	6.68
20 10 5	47.6	3.6	16.3	7.7	6.5	5.3	15.4	25.6	9,581	3,950	1.42
40 20 10	57.3	3.7	21.0	9.1	6.8	5.9	16.0	27.1	10,562	4,300	1.46
60 30 15	59.8	3.8	21.6	8.8	6.9	5.6	16.1	25.8	10,109	4,650	1.17
CD (P=0.05)		12.6	0.4	5.2	2.1	0.3	1.7	3.3		2,842	

Cost of seed and stover; Rs 1,400 and Rs 140/q respectively

'Kiran' and 'Bhawanipatna Local') and 4 fertilizer levels (20, 10 and 5 kg; 40, 20 and 10 kg; 60 30 and 15 kg N, P and K/ha and control). 'Laxmy 27', 'Pusa 3' and 'Kiran' are high-yielding varieties, whereas 'Bhawanipatna Local' is a local variety.

All the fertilizers were applied basal at the time of final land preparation. A seed rate of 30 kg/ha was used at a row spacing of 30 cm in all the 3 years. Sowing was done on 28, 25 and 21 October in first, second and third years. The precipitation received during the cropping season was 101, 55 and 135 mm in respective years.

RESULTS AND DISCUSSION

Effect of variety

The biometric characters, yield attributes and grain and stover yields were significantly different for different linseed varieties. The plant height and branches/plant were at par amongst the varieties, 'Laxmy 27', 'Pusa 3' and 'Bhawanipatna Local'. The variety 'Kiran' produced the lowest plant height and branches/plant. This could be attributed to its genotypic characters. 'Bhawanipatna Local' produced the lowest capsules, whereas that of the other 3 varieties were at par with each other. The maximum seeds/capsule were recorded in 'Pusa 3' and the variety was followed by 'Kiran'. The 1,000-seed weight of 'Laxmy 27' was the highest and significantly superior to that of other varieties (Table 1).

'Laxmy 27', 'Pusa 3' and 'Kiran' produced similar grain and stover yields and were superior to 'Bhawanipatna Local'. However, the 'Laxmy 27' expressed higher harvest index, followed by 'Pusa 3'. This might be attributed to its genetic ability to translocate condition. The benefit:cost ratio

followed the same trend and was 1.56 and 1.40 respectively. The lowest benefit:cost ratio was observed with 'Bhawanipatna Local'.

Fertility level

The biometric observations, yield attributes and yield were statistically at par with all the fertilizer treatments except control, i.e. no fertilizer application. However, the harvest index indicated that better sink : source ratio was obtained with fertilizer dose of 40, 20 and 10 kg N, P and K/ha. The benefit : cost ratio also confirmed the same with a ratio of 1.46. Yadav *et al.* (1990) also reported that maximum monetary return could be obtained from application of 40 kg N and 20 kg P/ha. Awasthi *et al.* (1989) and Khare *et al.* (1996) also found that high-yielding varieties of linseed respond to moderate dose of fertilizer in rainfed condition.

REFERENCES

- Awasthi, U.S., Jha, G., Namdeo, K.N., Sukla, P.P. and Singh, R. 1989. Response of linseed to nitrogen and phosphorus levels. *Indian Journal of Agronomy* 34 (4) : 432-433.
- Khare, J.P., Sharma, R.S. and Dubey, M.P. 1996. Effect of row spacing and nitrogen on rainfed linseed. *Indian Journal of Agronomy* 41 (1) : 116-118.
- Khurana, D.K., Dubey, D.P. and Namdeo, K.N. 1989. Response of linseed to nitrogen and phosphorus. *Indian Journal of Agronomy* 34 (1) : 142-144.
- Sharma, R.S. and Rajput, V.S. 1984. Performance of seven linseed varieties with and without use of fertilizer. *Research Journal, Jawaharlal Nehru Krishi Vishwa Vidyalyaya* 18 (1-4) : 195-196.
- Yadav, L.N., Jain, A.K., Singh, P.P. and Vyas, M.D. 1990. Response of linseed to nitrogen and phosphorus. *Indian Journal of Agronomy* 35 (4) : 427-428.