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## Performance of varieties under different fertility levels for higher yield and quality of linseed

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### Abstract

A field experiment consisted of three linseed varieties and four levels of fertility was conducted with the objectives to select out suitable linseed variety and fertility level of NPK for getting higher yield of seed and oil content. Among the varieties, JLS 73 proved its superiority with respect to yield (907.0 Kg/ha) and content of oil (41.10%). Whereas application of 60:30:30 Kg NPK/ha produced significantly higher seed yield of 940 Kg/ha with higher content of oil (41.37%) and protein (21.56%).

**Keywords:** *Linum usitatissimum* L, linseed, fertility level, NPK

### Introduction

Linseed (*Linum usitatissimum* L.) is extensively grown in Balaghat, Sagar, Damoh, Dindori, Mandala, Shahdol districts of Madhya Pradesh under rainfed conditions. However its cultivation has been widely extended in irrigated areas because of high yield potential and increased demand and prices of its oil in the market. Linseed occupies greater importance among oil seeds owing to its various uses and special qualities. (Tetarwal *et al* 2015) [4]. It is mainly grown for seeds for extracting oil. It is also used for its medicinal use owing to natural source of Omega 3 for vegetarians. Its plants are of short structure having shallow tap root system. Farmers are generally use to grow locally available varieties under low fertility status and not used the fertilizers or other sources of nutrients for its proper growth and yield. The present productivity level of this crop can be increased more than three times if it is grown under the recommended package of practices especially adopting high yielding varieties suitable for rainfed situation and recommended fertilizer doses. Therefore, keeping the above points in view the performance of linseed varieties under different fertility levels for higher seed yield was conducted.

### Materials and Methods

A field experiment was conducted at Krishi Vigyan Kendra, JNKVV, Jabalpur during rabi seasons of 2015-16 and 2016-17 to assess the performance of linseed varieties under different fertility levels for growth and yield. Twelve treatment combinations were arranged in a randomized block design with three replications. Treatment consisted of three varieties (JLS 09, JLS 66 and JLS 73) and four fertility levels (F<sub>0</sub>: no fertilizers, F<sub>1</sub>: 20:10:10 kg NPK / ha, F<sub>2</sub>: 40:20:20 kg NPK / ha, F<sub>3</sub>: 60:30:30 kg NPK / ha). The soil of experimental field was sandy loam in texture with PH of 7.3, low in organic carbon (0.48%), available phosphorus (13.7 kg/ha) and medium in available potassium (348 kg/ha). Crop was sown on 29<sup>th</sup> October and 3<sup>rd</sup> November 2016 and 2017, respectively with seed rate of 30 kg/ha in rows at 30 cm apart. Half dose of Nitrogen and full dose of phosphorus and potassium were applied as basal through urea, single superphosphate and murate of potash, respectively. Remaining dose of nitrogen was given as top dressing at 30 days after sowing of crop as per treatments. Irrigation was given after 30 days of sowing. Crop was harvested on 9<sup>th</sup> and 14<sup>th</sup> March 2016 and 2017, respectively. Observations pertaining to plant height, branches / plant, capsules / plant, seeds / capsule, test weight seed yield as well as quality with respect to content of oil and protein were recorded and statistically analyzed for interpretations.

## Results and Discussion

### Growth

Data in relations to growth components are presented in Table-1 reveal that growth components were significantly changed with the change of varieties and tallest plants (54.5 cm) and branches per plant (4.3/plant) were recorded in variety JLS 73 closely followed by JLS 66. However, variety JLS 09 showed poor performance with respect to growth and recorded shortest plant height (49.5 cm) and bears less number of (3.8/plant) branches. These findings supported the work of Kumar (2002) [2]. The growth contributing parameters also significantly influenced due to various fertility levels. Increasing level of fertility increased the plant height and branches per plant and maximum plant height (63.0 cm) and branches (5.9/plant) were recorded under F<sub>3</sub>: 60:30:30 kg NPK/ha closely followed by F<sub>2</sub> in which 40:20:20 kg NPK / ha were applied. The lowest plant height (45.0 cm) and branches (4.0/plant) were observed under control.

### Yield attributes

Yield attributes with respect to capsules/plant and seeds/capsule significantly varied in different varieties. The highest capsules (32.0/plant) and seeds/capsule (7.0) were recorded in variety JLS 73 and found at par with JLS 66. The variety JLS 09 recorded lowest number of (22.2 and 6.4 capsules /plant and seeds / capsule, respectively. However, test weight did not change due to varieties. The increasing level of fertility significantly increased the yield attributes. The highest capsules (34.1/plant), number of seeds (7.3/capsule) and test weight of 8.09 g were recorded under F<sub>3</sub> fertility level in which 60:30:30 kg NPK/ ha were applied. These parameters were found to be significantly superior over lower level of 20:10:10 kg NPK/ha and control but at par with 40:20:20 kg NPK/ha. The judiciously supply of fertilizers, the vegetable growth as well as reproductive activities of plants were encouraged as reported by Dubey (2003) [1].

### Seed yield

Seed yield of varieties were found significantly differ and JLS 73 registered its superiority over JLS 66 and JLS 09. The top ranking variety JLS 73 recorded 907 kg / ha seed yield. Whereas, JLS 09 produced lowest seed yield of 844 kg/ha. The fertility levels also significantly influenced the seed yield (Table-1). The increasing level of fertility increased the seed yield of linseed over preceding level. Moreover, significantly the highest seed yield of 940 kg / ha was recorded under 60:30:30 kg NPK / ha and found at par to 907 kg / ha recorded under 40:20:20 kg NPK / ha. Further, it was also noted that the fertility level of 60:30:30 kg NPK / ha found to be significantly superior over 20:10:10 kg NPK / ha and control. Hence the lowest seed yield of 806 kg / ha was recorded under control. Since the branches and capsules / plant were higher with higher fertility level. The higher fertility level also increased the 1000 seed weigh (test weight). Improved in yield attributes and yield of linseed also been reported by Verma et al. (2005) [5].

### Seed quality

The quality of seed found significantly varied due to varieties as well as various fertility levels. The significantly higher oil content of 41.10% was recorded under JLS73 closely followed by JLS 66 but significantly superior over JLS 09. However, the varieties did not vary in content of protein. Various fertility levels showed significant variations in both of oil and protein contents. All the level of fertility proved significantly superior over control with respect to oil and protein contents. Moreover, the highest fertility level (60:30:30 Kg NPK/ha) contains 41.37 and 21.56% of oil and protein, respectively and proved superior over control and 20:10:10 Kg NPK/ha but found at par to 40:20:20 Kg NPK/ha. These results are in accordance with the findings of Pandey and Singh (2002) [3].

**Table 1:** Growth, yield attributes and yield of linseed varieties under different fertility levels. (Pooled data of two years)

Treatment	Plant height (cm)	Branches / plant	Capsules / plant	Seeds / capsule	Test weight (g)	Seed yield (kg/ha)
V <sub>1</sub> JLS - 9	49.5	3.9	22.2	6.4	7.38	844
V <sub>2</sub> JLS - 66	51.2	4.2	29.6	6.8	7.40	865
V <sub>3</sub> JLS - 73	54.5	4.3	32.0	7.0	7.61	907
SEm±	1.27	0.14	2.33	0.17	0.15	11.2
CD (P = 0.05)	3.90	0.40	7.20	0.50	NS	35.5
Fertility levels (kg NPK / ha)						
F <sub>0</sub> : Control	45.0	4.0	23.7	6.6	7.30	806
F <sub>1</sub> : 20:10:10	50.5	4.6	30.0	6.8	7.63	885
F <sub>2</sub> : 20:10:10	56.2	4.8	32.5	7.1	7.85	907
F <sub>3</sub> : 60:30:30	63.0	5.1	34.1	7.3	8.09	940
SEm±	1.88	0.30	3.1	0.19	0.20	15.1
CD (P = 0.05)	5.69	0.90	9.2	0.60	0.63	46.5

**Table 2:** Effect of different fertility levels on oil and protein contents of linseed varieties. (Pooled data of two years)

Treatment	Oil content in seed (%)	Protein content in seed (%)
Varities		
V <sub>1</sub> : JLS	40.88	20.13
V <sub>2</sub> : JLS	41.02	20.00
V <sub>3</sub> : JLS 73	41.10	19.88
SEm±	0.06	0.19
CD (P = 0.05)	0.17	NS
Fertility levels (kg / ha)		
F <sub>0</sub> : Control	40.60	17.08
F <sub>1</sub> : 20:10:10	40.90	19.44
F <sub>2</sub> : 40:230:20	41.18	21.06
F <sub>3</sub> : 60:30:30	41.37	21.56

SEm±	0.08	0.61
CD (P = 0.05)	0.23	1.94

### Conclusion

Thus, from the above findings it is concluded that among the varieties JLS 73 found to be the best for growth, yield and quality. The fertility status for getting economical seed yield and quality of linseed required to be maintained with the application of 60:30:30 kg NPK/ha.

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