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Yield and economics of linseed (*Linum usitatissimum* L.) as influenced by foliar application of nutrients

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Abstract
Research conducted at Department of Agronomy, VNMKV, Parbhani during *Rabi* season of 2022-23 to study the influence of foliar application of nutrients on yield and economics of linseed. The study revealed that foliar application 2% urea (T_3) recorded significantly higher seed yield (1098 kg ha^{-1}), straw yield (2196 kg ha^{-1}) and biological yield (3199 kg ha^{-1}) and it was found at par with foliar application of 0.2% amino acid (T_6). The foliar application 2% urea (T_3) resulted in the highest B:C ratio and found to be most remunerative for getting good returns.

Keywords: Foliar, linseed, yield, economics, amino acid, nutrients

Introduction
Linseed is important *Rabi* oilseed crop after rapeseed and mustard. It is annual herb belongs to the genus Linum and family Linaceae. The oilseed and fibre type linseed has its origin in South West Africa and Mediterranean region, respectively. It is also known as flax crop. It is grown for its seed and fiber which is used for the manufacture of linen. Linseed oil is edible oil which is used for human consumption. Seed contains 33 to 47% oil it varies according to different varieties as well as it contains 21-25% protein, 28% dietary fiber, 7.7% moisture and 3.3% ashes.

Every part of linseed plant is utilized commercially either directly or after processing. In temperate region the crop is cultivated commercially for flax, while in India, it is cultivated mainly for oil. On a very small scale, seed is directly used for edible purposes and about 80% of oil goes to industries. The oil cake is good feed for milch cattle and is also used as manure having microbial activity. It is used either directly or after processing.

Linseed cake is a very proteinaceous feed for livestock and quick growing animals. It contains more than 30% protein it is an important source of protein for livestock. It contains 11% moisture, 32% protein, 10% oil, 32% carbohydrate, 9% fiber, 6% minerals, the rich source of calcium and phosphorus. It serves as good feed for dairy cattle, sheep and poultry. It is also very good source of organic manure. The cake contains about 5% nitrogen, 1.5% phosphorus and 1.8% potash. The good quality fibre is extracted from its stem. The fibre has good strength, durability and fineness. Flax fibre is about 0.05-0.5 mm diameter and 50-100 cm in length (Prasad, 2013) [7]. The fibre is used in strong twines, canvas and carpet.

Linseed crop is mostly grown on residual soil moisture during *Rabi* season, moisture and other abiotic stresses are common during flowering and grain development stage. Productivity of linseed is low because of its cultivation is restricted to nutrient and moisture starved conditions. This low productivity can be enhanced in sustainable manner by manipulation of production technologies. The major plant nutrients applied through fertilizers may not be taken up properly by roots of crop due to organic carbon content and water holding capacity of soil. Nitrogen requirement varies from soil to soil. Adequate supply of phosphorous hastens the root development and promotes deeper penetration which helps in utilization of subsurface moisture. Adequate quantity of potassium in soil is essential for normal and healthy development of linseed plant (Biradar *et al*., 2016) [2].

Foliar application of fertilizers and crop bio stimulants helps in the rapid translocation of nutrient as compared to soil application which is very pertinent in mitigating stress in plants. Foliar application of nutrients at critical stages of crop growth is the most appropriate and accurate means of treating nutrient shortages and it helps the crop to achieve its maximum potential yield.

Bio-stimulants are substances or microorganisms which have positive impacts on plant growth, yield, chemical composition, biotic and abiotic stress tolerance. In small concentrations, these substances are highly operative, allowing the plant's vital processes to function properly which results in high yield. Nutrients applied through foliar application resulted in a considerable increase in crop growth and yield. Foliar application of fertilizer and crop biostimulant helps to reduce abiotic stress. The response of foliar application of fertilizer and crop biostimulant to linseed needs to be evaluated. Such information and data regarding response of linseed to foliar application of nutrients and biostimulant is scarce. Hence, the present investigation was undertaken to ascertain the economically viable nutrient management for increasing the yield of linseed.

Materials and Methods

Field experiment was conducted during the *Rabi* season of 2022 at Department of Agronomy, VNMKV, Parbhani on clayey texture soil, low in organic carbon, available nitrogen, phosphorous and medium in available potassium with pH 7.8. The altitude was 409 m above mean sea level. Sowing was done during second week of November by dibbling the seeds in rows with seed rate 25 kg ha^{-1}. The variety of linseed used in the experiment was LSL-93. The recommended dose of fertilizer was 60:30:00 NPK kg ha^{-1} applied through urea and single super phosphate. Seven treatments comprised of T_1 - 2% KNO3, T_2 - 2% DAP, T_3 - 2% urea, T_4 - 0.2% seaweed extract, T_5 - 0.25% fulvic acid, T_6 - 0.2% amino acid and T_7 - control. These seven treatments of foliar application were tested in randomized block design (RBD) and three replications. The gross plot size was 5.4 m x 4.5 m in which seeds are dibbled at a spacing of 30 cm x 10 cm. The statistical analysis of data was carried out by analysis of variance method (ANOVA) (Panse and Sukhatme, 1967) [5].

Results and Discussion

Foliar application of fertilizer and crop biostimulant imparted significant influence on seed, straw and biological yield of linseed and presented in Table 1. The foliar application of 2% urea (T_3) at flower bud initiation stage recorded maximum seed yield (1098 kg ha^{-1}), straw yield (2196 kg ha^{-1}) and biological yield (3199 kg ha^{-1}) and it was at par with foliar application of 0.2% amino acid and greater than other foliar nutrition treatments. The harvest index of linseed was found to be non-significant but maximum harvest index (33.28%) was recorded by T_3 treatment (2% urea). Foliar application of 0.2% seaweed extract (T4), foliar application of 2% KNO3 (T_1), foliar application of 2% DAP (T_2) and foliar application of 0.25% fulvic acid (T_5) found at par to each other. Increase in seed yield might be due to adequate supply of nitrogen at peak period of crop growth. Nitrogen plays an important role in synthesis of chlorophyll and amino acid and increases cell division. Foliar application of urea increases linseed seed yield it is mainly because of increasing growth of plant parts and metabolic process such photosynthesis leads to higher photosynthates accumulation and translocation to economic parts of plant. These results are in corroborative with findings of Aggarwal *et al.* (2015) [1] and Pawar *et al.*(2016) [6]. Lowest seed yield, straw yield and biological yield of linseed was obtained in control treatment (T_7).

The foliar application 2% urea (T_3) proved to be most remunerative with net monetary returns and gross monetary returns of ₹ 53101 ha^{-1}, ₹ 82350 ha^{-1} respectively, and followed by foliar application of 0.2% amino acid (T6) which provided ₹ 44650 ha^{-1} and ₹ 74100 ha^{-1} as net returns and gross returns respectively (Table 2). The highest benefit: Cost ratio of 2.82 was found in foliar application of 2% urea (T_3), followed by foliar application of 0.2% amino acid (2.52). The gross monetary return (₹ 42900 ha^{-1}) and net monetary return (₹ 13682 ha^{-1}) was lowest in control treatment (T_7). This might be due to higher economic yield obtained as result of better utilization of nutrients through foliage. These results are in proximity with findings of Dalei *et al.* (2014) [3] and Kirnapure *et al.* (2020) [4]. The lowest B:C ratio (1.47) was noted in control treatment.

Table 1: Mean seed yield, straw yield, biological yield (kg ha^{-1}) and harvest Index of linseed as influenced by different treatments

Trt. No.	Treatments	Seed	Straw	Biological	Harvest index %
T_1	2% KNO3	835	1767	2602	32.09
T_2	2% DAP	779	1758	2537	30.70
T_3	2% Urea	1098	2196	3199	33.28
T_4	0.2% Seaweed extract	886	1788	2674	33.13
T_5	0.25% Fulvic acid	615	1426	2041	30.13
T_6	0.2% Amino acid	988	1995	2983	33.12
T_7	Control	572	1300	1872	30.55
S.E. (m)±		59	125	170	--
C.D. at 5%		182	386	524	--
General mean		827	1774	2558	31.85

Table 2: Economics of linseed production as influenced by different treatments

Trt. No	Treatments	Gross Monetary Returns (₹ ha^{-1})	Net Monetary Returns (₹ ha^{-1})	B:C Ratio
T_1	2% KNO3	62625	32782	2.10
T_2	2% DAP	58425	29063	1.98
T_3	2% Urea	82350	53101	2.82
T_4	0.2% Seaweed extract	66450	36882	2.25
T_5	0.25% Fulvic acid	46125	16782	1.57
T_6	0.2% Amino acid	74100	44650	2.52
T_7	Control	42900	13682	1.47
S.E.(m) ±		3167	2747	-
C.D. at 5%		9760	8466	-
General mean		61853	32420	2.10

Conclusion

From above results, it can be concluded that, foliar application of 2% urea (T_3) was found most efficient with respect to yield and net monetary returns as compared other foliar nutrition treatments.

References

1. Aggarwal N, Singh G, Ram H, Sharma P, Kaur J. Irrigated chickpea's symbiotic efficiency, growth and productivity as affected by foliar application of urea. Int J Agric Sci. 2015;7(5):516-519.
2. Biradar SA, Ajithkumar K, Rajanna B, Savitha AS, Shubha GV, Shankergoud I, et al. Prospects and challenges in linseed (*Linum usitatissimum* L.) Production: A review. J Oilseed Res. 2016;33(1):1-13.
3. Dalei BB, Kheroar S, Mohapatra PM, Panda S, Deshmukh MR. Effect of foliar sprays on seed yield and economics of Niger (*Guizotia abyssinica* (LF) Cass). J Agric Sci. 2014;6(6):143.
4. Kirnapure VS, Choudhary AA, Gawate AN, Potkile SN. Influence of foliar application of nutrients on yield and economics of chickpea. J Pharmacogn Phytochem. 2020;9(3):202-204.
5. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. New Delhi: ICAR Publications; 1967. p. 1-325.
6. Pawar SB. Effect of Foliar Application of Plant Nutrients on Productivity of Rainfed Chickpea. Adv Life Sci. 2016;5(17):7036-7038.
7. Prasad R. Textbook of Field Crops Production. New Delhi: Indian Council of Agriculture Research; c2013.
8. Pattar K, Venkappa P, Vishwanath K, Palanna KB, Muruli K. Influence of foliar spray on seed yield and quality in white quinoa (*Chenopodium quinoa* Willd). Int. J. Agric. Food Sci. 2022;4(1):98-102. DOI: 10.33545/2664844X.2022.v4.i1b.124