

**“To work out the economics of various treatment combinations calculate economics of sulphur and zinc under linseed (*Linum usitatissimum*) Crop.”**

**ABSTRACT**

A study was conducted on To work out the economics of various treatment combinations calculate economics of sulphur and zinc under linseed (*Linum usitatissimum*) Crop, to calculate economics of sulphur and zinc. For the present study factorial randomized block designed was used keeping three replication. Among the S and Zn level treatments performed the best with the highest grain productivity up to 19.84 q ha<sup>-1</sup>, net return up to Rs. 77360 ha<sup>-1</sup>. Treatment interactions were found to be non-significant in case of grain yield – However, the combined application of S and Zn level treatments with dual further raised all these parameters synergistically according to their combined role. Economy in the uses of phosphatic fertilizers may be done with application S and Zn level treatments. The total availability of nutrient i.e. nitrogen, phosphorus and potassium per hectare were also increased in all these treatments with suggests that soil must be recouped every year with NPK nutrients with minimum level on soil test values and the nature of the crop to be grown. This would maintain the nutrients balance in the soil to ensure sustainable crop production per unit area.

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**Key words – linseed, cost of cultivation, sulfur, zinc net return B:C ratio**

**Introduction**

Flax seed (*Linum usitatissimum* L.) is an annual, self-pollinating, diploid (2n=30) species belonging to the family Linaceae and is the only species in the family, which is of economic importance contains 33-45% non edible oil and 24% crude protein. The oilcake left after the oil is pressed out is a most valuable feeding cake for the cattle feed. The protein in flax seed is about 36% linseed used for increasing milk and fat in animals. Its cake is also used as manure. It contains about 5 per cent nitrogen. 1.4 percent phosphorus and 1.8 per cent potash. The use of sulphur is one of the most important factors in increasing yields. It is well known that amino acids, fat parentage,

protein content in is increasing by application of sulphur in linseed crops by many. Balanced use of sulphur commensurate with crop needs and soil nutrient status is indispensable for sustained production of high yield level. Experimental evidences indicate that sulphur is most essential plant nutrient which is generally lacking in Indian soils. To fulfill the necessities for sulphur nutrient, it is necessary to supply these to the hungry soil in concentrated and readily available form i.e. fertilizers. It is also essential to know optimum level of sulphur. Though many workers have worked on this aspect but requirement of sulphur vary from soil to soil and place to place. Even agro-climatic conditions have great influence on the sulphur requirement of crops. Zinc is trace elements hence used in very small amount. Zinc has specific vital role in growth development and quality of crops. It also plays an important role in biosynthesis of proteins and amino acids in crop plants. It is a component of important enzymes such as dehydrogenases and proteinases etc. Flax seeds is important oil crop which contributes significant role in oil production. The whole plants of the linseed are useful. The straw of the linseed have the economic value. On a very small scale, the seed is directly used for edible purposes, and about 20 percent of the total oil produced is used by farmers. About 80 percent of the oil goes to industries for the manufacture of paints, varnish, oilcloth, linoleum, pad-ink, printing ink etc. The fiber of linseed is having excellent quality and blends in many types for making cloths. It is grown predominantly in the states of Madhya Pradesh, Maharashtra, Chhattisgarh, Uttar Pradesh, Bihar, Orissa, and Jharkhand, besides other states on a limited scale. The state of Madhya Pradesh grows linseed on largest area of 1.02 lakh hectares in the country and produces 0.53 lakh tones seed with 520 kg/ha productivity level. The productivity level of linseed in the country and also in the state of Madhya Pradesh is very low as compared to the production potential as realized in the frontline demonstrations. There is sufficient scope of increasing productivity level of linseed even under rainfed condition with proper management practices and optimum use of balanced fertilizers.

### **Research methodology**

The present study entitled “**Studies on the Effect of Sulphur and Zinc fertilization to linseed (*Linum usitatissimum*) under rainfed condition**” was carried out during rabi 2015-16 and 2016-17. The experiment was conducted at Rajoula Agriculture farm of Mahatma Gandhi Chitrakoot Gramodaya

Vishwavidyalaya, Chitrakoot Satna (M.P.). This farm is situated in Bundelkhand Zone of northern Madhya Pradesh. There were 16 treatment combinations of 4-levels of sulphur applied through granular sulphur powder (90%S) and 4-levels of Zinc applied through Zinc Chloride (50% Zinc). The treatments comprised four Sulphur levels (0, 15, 30 and 45 kg ha<sup>-1</sup>) and four treatment of Zinc (0, 2.5, 5 and 7.5 Kg ha<sup>-1</sup>). Nitrogen, phosphorus and potash were applied @ 30 kg N + 15 kg P<sub>2</sub>O<sub>5</sub> + 15 kg K<sub>2</sub>O/ha in all treatment plots uniformly through UREA, DAP and MOP fertilizers, respectively. All fertilizers were applied as basal placement at sowing with the help of funnel attached country plough used for sowing. Sulphur as per treatment was applied through granular powder 'sulfex' (90% S) along with NPK fertilizers. Zinc was applied through application of Zinc Chloride (50% Zn) as per treatment. Recommendation and adoption of any practices by cultivators depends upon the economical grain per hectare from Linseed. Therefore, it becomes essential to work out economics of the different treatments for getting higher net profit (Rs ha<sup>-1</sup>). Thus, the sixteen treatment combinations were laid out in the field in a factorial randomized block design keeping three replications. **Panse, U.G. and Sukhatme, P.V. (1957)**. Linseed ver. JS-26 was sown @ 30 kg seed ha<sup>-1</sup> the details of treatment are given below.

### **Economics of the Treatments**

#### **Cost of Cultivation**

The expenditure incurred under for different treatments was calculated on the basis of prevailing market rate of fertilizer, field preparations, sowing of seeds, labour charges, cultural and intercultural operations etc.

**Gross Return:** For different treatments, gross returns were calculated on the basis of prevailing market rate of produce.

**Net Profit :** It was calculated treatment wise. The total cost of cultivation per hectare

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**Net Profit:** It was calculated treatment wise. The total cost of cultivation per hectare was subtracted from the gross income for computing net returns from each treatment.

$$\text{Net profit (Rs ha}^{-1}\text{)} = \text{Gross return (Rs ha}^{-1}\text{)} - \text{Cost of cultivation (Rs ha}^{-1}\text{)}$$

**Benefits Cost Ratio (BCR):** It was calculated treatment wise. The gross income per hectare of each treatment was divided by the cost of cultivation of respective treatments.

$$\text{Benefit Cost Ratio (BCR)} = \frac{\text{Gross return}}{\text{Cost of cultivation}}$$

### **Results -**

**Net Return per hectare:** The two years pooled data for economic gain Net return Rs. per hectare worked out under different treatments are furnished in table (4.26) their mean sum square have been placed in are also depicted .The two years pooled data economic gain Net return Rs. per hectare significantly due two application of sulphur received from 18078 to 17987 Rs./ha the significantly economic gain Net return Rs. per hectare were recorded with application of sulphur @ 30 Kg/ha (18059) followed by sulphur @ 45 Kg/ha (18078) and significantly lowest were observed under sulphur control treatments(16455 Rs./ha)

The two year pooled data estimate interaction so as received economic gain net return Rs. per hectare due to interactive effect of both elements at stage. At initial ranged from 17646 to 18228 Rs/ha however the combination of Zn @ 7.5 Kg/ha + sulphur@ 30 Kg/ha recorded second highest received economic gain net return Rs. per hectare (18059Rs/ha).

### **Benefit : Cost Ratio (B:C Ratio)**

The two years pooled data for economic gain benefit cost ratio worked out under different treatments are furnished in table (1) their mean sum square have been placed in are also depicted in (Fig.no.1).

The two years pooled data economic gain benefit cost ratio significantly due two application of sulphur received from 1.30 to 1.65 Rs./ha the significantly

economic gain benefit cost ratio were recorded with application of sulphur @ 30 Kg/ha (1.40) the followed by sulphur @ 45 Kg/ha (1.63) were as significantly lowest were recorded under treatments sulphur control (1.17 Rs./ha)

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**Table-1: Economical grain (Rs ha<sup>-1</sup>) from different treatments and their interaction (Pooled for 2 years)**

Zinc	Economic gain				Mean
	S <sub>0</sub>	S <sub>15</sub>	S <sub>30</sub>	S <sub>45</sub>	
<b>Net income (Rs ha<sup>-1</sup>)</b>					
<b>Control</b>	16820	16755	16455	16540	16643
<b>Zn<sub>2.5</sub></b>	17970	18228	17950	17987	18034
<b>Zn<sub>5</sub></b>	17895	18025	17985	18023	17982
<b>Zn<sub>7.5</sub></b>	17898	17986	18059	18078	18005
<b>Mean</b>	17646	17749	17612	17657	17666
<b>B:C ratio</b>					
<b>Control</b>	1.17	1.15	1.22	1.04	1.15
<b>Zn<sub>2.5</sub></b>	1.41	1.30	1.65	1.44	1.45
<b>Zn<sub>5</sub></b>	1.26	1.35	1.34	1.33	1.32
<b>Zn<sub>7.5</sub></b>	1.35	1.39	1.58	1.63	1.49
<b>Mean</b>	1.30	1.30	1.45	1.36	1.35

### Economic Gain

## Net Return per hectare

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## Benefit : Cost Ratio (B:C Ratio)

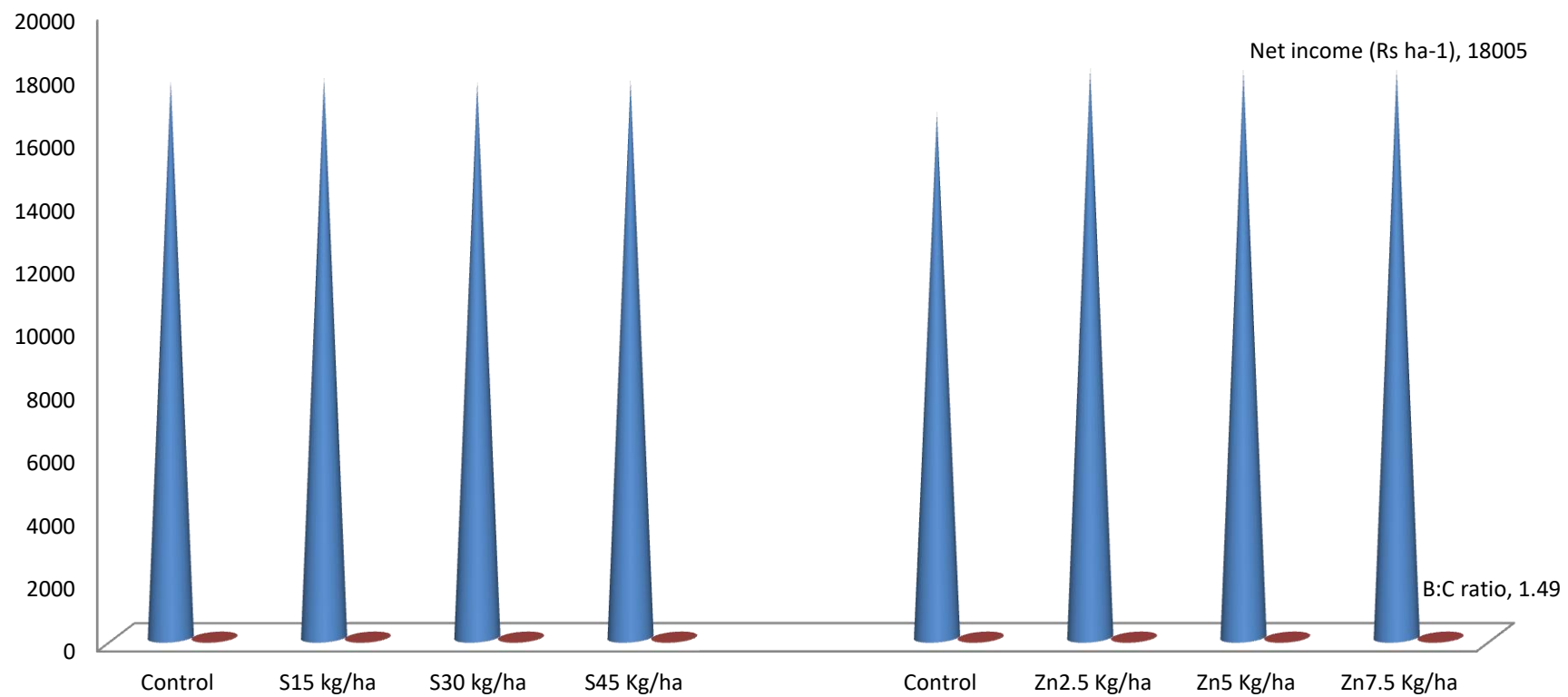
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## CONCLUSION

The crop of linseed (*Linum usitatissimum*) had been an important crop for industrial oil in India. It is mainly grown under rainfed situation with lesser inputs, thus the average yield is poor. Research efforts have been made to increase its productivity. As a result, improved varieties were developed and agronomic package of practices were standardized for different areas of linseed growing. Among such practices, proper nutrition of crop is most important. In this respect, linseed growers may be made up to this very dose. The grain productivity was 10.52 q ha<sup>-1</sup> with the net

return up to Rs. 77305 ha<sup>-1</sup> with the application of S level treatments. Application of Zn level treatments was not found economical up to desirable extent. Among the S and Zn level treatments performed the best with the highest grain productivity up to 19.84 q ha<sup>-1</sup>, net return up to Rs. 77360 ha<sup>-1</sup>. Treatment interactions were found to be non-significant in case of grain yield – However, the combined application of S and Zn level treatments with dual further raised all these parameters synergistically according to their combined role. Economy in the uses of phosphatic fertilizers may be done with application S and Zn level treatments. The total availability of nutrient i.e. nitrogen, phosphorus and potassium per hectare were also increased in all these treatments with suggests that soil must be recouped every year with NPK nutrients with minimum level on soil test values and the nature of the crop to be grown. This would maintain the nutrients balance in the soil to ensure sustainable crop production per unit area.



**Fig.no.1- Economical grain (Rs ha<sup>-1</sup>) from different treatments and their interaction (Pooled for 2 years)**

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