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Effect of Micro-nutrients on Root Development, Water use, Water use Efficiency, yield and net Return of Linseed Crop under Limited Water Supply

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ABSTRACT: An experiment was carried out on “Effect of Micro-nutrients on root development, water use, water use efficiency, yield and net return of linseed crop under limited water supply” during Rabi season of 2021-22 at Oil Seed Farm, of C.S. Azad University of Agriculture & Technology, Kanpur. The experiment consisted 9 treatments viz., T₁: Control, T₂: Soil application of ZnSO₄ @ 25 kg ha⁻¹, T₃: Foliar application of ZnSO₄ @ 0.5% at 45 DAS, T₄: Soil application of ZnSO₄ @ 25 kg ha⁻¹ + Foliar application of ZnSO₄ @ 0.5% at 45 DAS, T₅: Soil application of Borax @ 1.5 kg ha⁻¹, T₆: Foliar application of Borax @ 0.3% at 45 DAS, T₇: Soil application of Borax @ 1.5 kg ha⁻¹ + Foliar application of Borax @ 0.3% at 45 DAS, T₈: Foliar application of ZnSO₄ @ 0.5% + Borax @ 0.3% at 45 DAS and T₉: Soil application of ZnSO₄ @ 25 kg ha⁻¹ + Borax @ 1.5 kg ha⁻¹ in soil. The experiment was laid down in randomized block design with three replication during rabi season of 2020-21. The Linseed cv Shekhar was used in the experiment. The soil of the experimental plot was sandy loam in texture, medium in fertility and slightly alkaline in reaction. The weather conditions during the experimental period was normal and devoid of any extreme conditions. The results in T₈ treatment was significantly maximum in term of seed yield, oil content, net return and water use efficiency as compared to other treatments applied under the test. Treatments indicated that application ZnSO₄ @ 0.5% + Borax @ 0.3% incorporated in the soil have fetched highest net return of Rs. 68463 would be quite remunerative for higher productivity along with water use efficiency in light textured alluvial soil of Uttar Pradesh.

KEYWORDS: Seed yield, net return, water use efficiency.

I. INTRODUCTION

Land and water are the basic natural resources and must be conserved as effectively as possible. Water is basic necessity for the survival of living being and is the most precious natural resource which support the existence of life on the earth. The land degradation due to natural and anthropogenic reasons has been increased significantly over the last two decades. This is more evident in developing countries which directly affected the livelihood security of millions alongwith an equal number of livestock. Soil erosion under mines the world which directly affect global food security. With 2.4% of the world land area 4% water resources, India support 18.11% of world population (Awasthi, 2017). Per capita land availability had been declined from 0.91 ha in 1951 to 0.17 ha in 1991, 0.13 ha in 2001 and 0.10 ha in 2021, respectively (Awasthi, 2022). Similarly in case if availability of water per person in India has been declined from 6003 m³/person, in 1947 to 1816 m³/person in 2001, 1545 m³/person in 2011 and 1486 m³/person in 2021, respectively (Awasthi, 2022).

Variability in distribution of fresh water, with scarcities in some areas leads to unevenness in access to water and excesses in other areas. About 80% of available water is used for agriculture sector alone. Presently, share of ground water in providing irrigation is 60%, which is likely to increase further for expansion of irrigated agriculture and to achieve national targets of food production.

In Indian conditions most of the farmers used non judicious use of fertilizers without knowing the nutrients status of their soil, which adversely affect the soils as well as crops in term of micronutrients deficiency and toxicity either by inadequate or over use of fertilizers. It is anticipated that with higher yield and more intensive agriculture the secondary and micronutrients of deficiency well increases both in amount and extent. Micro-nutrients are more important to maintaining soil health and increasing use efficiency of major nutrients and ultimately the crop productivity. The deficiency of micro nutrients have become major constraints in sustainable crop productivity of soil.

Roots are the principal organ of nutrient absorption. The absorption of nutrients depends upon the distribution of roots in soil. The shallower the root system, the more dependent the plant is on fertilizers. Hence any manipulation, which encourages deep rooting will encourage better utilization of nutrients. It is well known that some plants are better scavengers of certain nutrients than others. This is mainly because of the preferential absorption of these nutrients by the root of those plants.

The efficient management of rainwater with condition moisture conservation practices and fertilizer application are needed for attaining sustainable yield of crops. About 70% of our population depends on agriculture and one-third of our national incomes from it. Water is considered as liquid gold and most intal input in agriculture. Crop yield response to irrigation water input can be helpful for various water management practices in the crops.

Nitrogen is the first fertilizer element usually applied in commercial fertilizers. It is very important nutrients for plants and it seems to have quickest and most pronounced affect. Phosphorus is the second fertilizers element and it is an essential constituent of very living cell. It takes active part in all type of metabolism of plant. Potassium is the third fertilizer element, which acts as a chemical traffic policeman, root booster stalk strengthen, sugar and starch transporter, protein builder and as a disease retarder. Zinc is widely distributed element that occurs in small but adequate amount in most soil and plants. It is associated with iron and manganese for synthesis of chlorophyll. Normal plant leaves contain between 25 and 100 ppm boron. Most of available boron in soil, it associated with organic matter. Excess zinc may cause iron deficiency in some plants. Whereas, boron deficiency causes disintegration of softer tissues, browning of cauliflower, reduced transpiration due the defuncting of stomata. Leaf tips becomes yellow followed by necrosis. Leaves get a scrolled appearance and later fall off.

Keeping in view of the above the present investigation entitled, "Effect of Micro-nutrients on root development, water use, water use efficiency, yield and net return of linseed crop under limited water supply" an attempt was made with following objectives:

1. To study the effect of micronutrient on growth and yield of linseed under water source condition.
2. To study the water use and water use efficiency and root development under different treatments.
3. To study the economics of different treatments.

II. MATERIALS AND METHODS

A field experiment was carried out at Oil Seed Farm of Chandra Shekhar Azad University of Agriculture & Technology, Kanpur during rabi season of 2020-21. The soil of experimental field was typical gangetic alluvium (sandy loam) representing Kanpur. Type-1 with pH-7.7, organic carbon-0.34%, available nitrogen- 170.8 kg/ha, Available P₂O₅-16.9 kg/ha and Available K₂O- 156.5 kg/ha. The field capacity, wilting point and bulk density of soil were 18.5, 6.6 and 1.46 mg m³, respectively.

The treatments comprised 9 micronutrient combinations i.e., T₁: Control, T₂: Soil application of ZnSO₄ @ 25 kg ha⁻¹, T₃: Foliar application of ZnSO₄ @ 0.5% at 45 DAS, T₄: Soil application of ZnSO₄ @ 25 kg ha⁻¹ + Foliar application of ZnSO₄ @ 0.5% at 45 DAS, T₅: Soil application of Borax @ 1.5 kg ha⁻¹, T₆: Foliar application of Borax @ 0.3% at 45 DAS, T₇: Soil application of Borax @ 1.5 kg ha⁻¹ + Foliar application of Borax @ 0.3% at 45 DAS, T₈: Foliar application of ZnSO₄ @ 0.5% + Borax @ 0.3% at 45 DAS and T₉: Soil application of ZnSO₄ @ 25 kg ha⁻¹ + Borax @ 1.5 kg ha⁻¹, respectively. The experiment was laid out in randomized block design with three replication.

The crop was sown on 30th October 202 and harvested on 15th April 2021, whereas, the amount of rainfall received during the cropping period was 43.8mm, against the average rainfall of Kanpur is about 800mm.

III. RESULT & DISCUSSION

Seed yield, Biological yield and Harvest Index:

The pertaining of seed yield maximum values in this regards were recorded in T₈ treatment (20.47 q/ha) followed by T₉ treatment (15.24 q/ha) and lowest under T₃ treatment (13.34 q/ha). As regards, to biological yield maximum values were recorded in T₇ treatment (59.81 q/ha) followed by T₈ (59.80 q/ha) and lowest under T₂ treatment (39.62 q/ha). Similar findings were reported by **Patel et al. (2017)**.

The data relevant to harvest index maximum figures in this regards was recorded in T₂ treatment (38.69%) followed by T₁ treatment (35.06%) and lowest under T₇ treatment (28.02%). These observations were corroborate with **Bakry et al. (2012)**.

Root development:

As regards to root depth and no. of roots per plant (29.64cm and 31.62) was counted in T₉ treatment, followed by T₇ treatment (27.73cm and 29.76) and lowest T₄ treatment (19.41cm and 21.47).

Water use and water use efficiency (kg seed/ha mm/ha of water):

The data pertaining to water use & Water use efficiency presented in Table-1, revealed that maximum water used i.e. 306.23 mm was used by T₁ treatment followed by T₃ treatment (301.21mm) and lowest under T₉ treatment (286.07mm) during the test. While the highest WUE was recorded in T₈ treatment (7.02 kg seed/ha/ mm of water) followed by T₇ treatment (5.67 kg seed/ha/mm of water) and lowest under T₃ treatment (4.42 kg seed/ha/mm of water) during the investigation. These findings ware inaccordance with **Singh et al. (2017)**.

Net Return:

The data in this regards showed that the highest net return (Rs. 68643 /ha) was recorded under T₈ treatment followed by T₇ treatment (Rs. 50698 /ha) and lowest under T₄ treatment (Rs. 34913 /ha). These findings were inaccordance with those reported by **Husain et al. (2017)** and **Verma et al. (2017)**.

REFERENCES

1. Awasthi, Umesh Dutt (2020). Badi Jansankhya evam simatate bhoo sansadhan under publication, Kishan Bharti, G.B. Pant University of Agriculture & Technology, Pant Nagar, Udham Singh Nagar, Uttrakhand.
2. Awasthi, Umesh Dutt (2017). Aadhunik Mrida Sanrakshan Evam Jal Prabandh. Published by ICAR-New Delhi.
3. Awasthi, U.D., Chauhan, Aayushi, Malaya, Sameer and Tewari, Nalini (2022). Effect of micro-nutrient on growth and yield of linseed crop under limited irrigation. IJIRSET, Vol.-II, issue-8: 10552-10556.
4. Bakry, B.A. Tawfik, M.M., Mikki, B.B. and Zeidan, M.S. (2012). Yield and yield components of 3 flax cultivars in response of foliar application with Zn, Mn and Fe under newly reclaimed sandy soil conditions. American-Eurasian Journal of Agricultural & Environmental Sciences, 12(8): 1075-1080.
5. Husain, Karam, Dubey, S.D., Singh, Dhanjai and Srivastava, R.L. (2017). Phosphorus management through organic and inorganic sources in maize-linseed cropping system. Compendium of abstract on National Conference on Organic Farming (P2):-39.. Journal of Soil and Water Conservation, 14(4): 392-393.
6. Singh, S.P., Dixit, R.S. and Singh, G.R. (2017). Response of linseed to various moisture regimes and nitrogen levels on moisture depletion pattern, consumptive use, water use efficiency. Journal of Environment & Ecology, 18(8): 245-249.
7. Verma, Amar Kant, Yadav, P.N. and Awasthi, U.D. (2017). Studies on linseed based intercropping systems as influenced by integrated nutrient management on yield and economics under moisture stress condition. International Journal of Current Microbiology & Applied Sciences, 6(11): 2309-2314.



Table-1: Effect of micro-nutrients application on yield, root development water use & water use efficiency and net-return of linseed crop under limited water supply:

Treatment	Biological yield (q ha ⁻¹)	Seed yield (q ha ⁻¹)	Harvest Index (%)	Total water use (mm)	Water use efficiency kg seed/ha/mm of water	Root depth (cm)	No. of roots/plant	Net Return (Rs ha ⁻¹)
T ₁ : Control	42.09	14.76	35.06	306.23	4.81	20.50	24.03	42782
T ₂ : Soil application of ZnSO ₄ @ 25 kg ha ⁻¹	39.62	15.33	38.69	300.06	5.11	22.08	24.24	36423
T ₃ : Foliar application of ZnSO ₄ @ 0.5% at 45 DAS	41.72	13.34	31.98	301.21	4.42	21.49	24.05	36208
T ₄ : Soil application of ZnSO ₄ @ 25 kg ha ⁻¹ + Foliar application of ZnSO ₄ @ 0.5% at 45 DAS	48.20	15.00	31.25	298.97	5.01	19.41	21.47	34913
T ₅ : Soil application of Borax @ 1.5 kg ha ⁻¹	53.58	14.10	32.35	293.71	4.82	23.56	25.61	38708
T ₆ : Foliar application of Borax @ 0.3% at 45 DAS	44.96	14.10	31.36	296.34	4.95	23.50	25.50	39998
T ₇ : Soil application of Borax @ 1.5 kg ha ⁻¹ + Foliar application of Borax @ 0.3% at 45 DAS	59.81	16.76	28.02	295.14	5.67	27.73	29.76	50698
T ₈ : Foliar application of ZnSO ₄ @ 0.5% + Borax @ 0.3% at 45 DAS	59.80	20.47	34.23	291.56	7.02	23.38	25.42	68463
T ₉ : Soil application of ZnSO ₄ @ 25 kg ha ⁻¹ + Borax @ 1.5 kg ha ⁻¹	48.38	15.24	31.50	286.07	5.32	29.64	31.62	35103
SE (d)	0.024	0.002	0.018	-	-	-	-	-
CD (P= 0.05)	0.051	0.004	0.039	-	-	-	-	-



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