



ENHANCING GROWTH, YIELD AND QUALITY OF LENTIL THROUGH FOLIAR SPRAY OF ZINC, UREA AND THIOUREA UNDER RAIN FED CONDITION

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ABSTRACT

A field experiment was screen out the most foliar spray of water, zinc sulphate, urea and thiourea alone and in combination for lentil variety of KLB-303 and KL-320 under rain fed condition, during Rabi 2014-15 and 2015-16 at Department of Crop Physiology, C.S. Azad University of Agriculture and Technology, Kanpur-2. An experiment was conducted in micro plot with Randomized Block Design in three replications. Total treatment combinations were sixteen. Results indicated that the foliar application of zinc sulphate @ 0.5% + urea @ 2% + thiourea @ 500 ppm doses were found significantly higher with number of primary branches/ plant, number of secondary branches/ plant, chlorophyll content (mg/g of fresh wt), NR-activity in leaves/ ? mol NO₂/g of fresh wt), weight of seed/ plant, number of pods/ plant, test weight (g) and seed yield (q/ha) in comparison to other rest treatments respectively. The highest primary & secondary branches per plant, chlorophyll content, RWC(%), NR- activities leaves/? mol NO₂/g of fresh weight, pods/plant, test weight and yield (q/ha) were received by KL-320 variety of lentil which was significantly higher than KLB-303 variety of lentil, respectively. Therefore, on the basis of conclusions derived from two years study, a nutritional booster of zinc sulphate@ 0.5% + urea @ 2% + thiourea @ 500 ppm may be recommended for KL-320 variety of lentil in respect of growth attributes, physiological parameters and yields in rain fed conditioned.

Key words: Foliar spray, zinc sulphate, urea, thiourea, lentil.

India is the major pulse growing country of the world, accounting roughly for one third of the total world area under pulses and one fourth of the total world production. Pulse crop, also called grain legumes, have been valued as food, fodder and feed and have remained as a mainstay of Indian agriculture for centuries. Lentil is another popular *Rabi* pulse crop of U.P., M.P., Bihar and W.B. etc. Lentil is essentially a rain fed crop and is more or less grown under situation similar to that of chickpea. Zinc micronutrient is involved in auxin formation activation of carbonic anhydrate; dehydrogenate enzymes and stabilization of ribosomal tractions. Zinc is also known to play significant role in chlorophyll formation, carbohydrates metabolism synthesis of proteins and activation of oxidation

process and enzymes. Nitrogen deficiency is the most important which is almost of universal occurrence in Indian soils. Nitrogen is a primary element and to special importance in the formation of protein in plants. It is also present in chlorophyll green pigments that are receptors of high energy in photosynthesis. In present investigation, application of thiourea might have improved phloem loading of sucrose and enhance translocations of photo syntheses. Bio regulators plays important role in greater poisoning of photosynthesis towards reproductive sink thereby improve the harvest index to foliar application of thiourea. Keeping in view above facts the present investigation was carried with the objectives "to find out the suitable nutritional booster and selective the variety of lentil

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mol NO₂/g of fresh wt. (18.43%) higher the variety KLB-303 of lentil, respectively. The maximum chlorophyll content (mg/g of fresh wt.) was observed by the foliar application of zinc sulphate @ 0.5% + 2% urea + 500 ppm thiourea during a thesis stages our rest of treatments, respectively. Relative water content(%) was observed by different levels of treatments significantly maximum (RWC 80.6%) was recorded in treatment of zinc sulphate @ 0.5% + urea @ 2.0% + thiourea @ 500 ppm) in comparison to control water spray (78.0%). The nitrate reductase activity in leaves (? mole/g of fresh wt.) were also significantly higher value (608 ? mole/g of fresh wt.) in comparison to control water spray (508 ? mole/g of fresh wt) in present investigation. The results are conformity with the findings of Garg and Burman *et al.* (2007) reports that the treatment in combination with thiourea resulted in significantly higher net photosynthetic rate and concentration of chlorophyll, starch, soluble protein and total free amino acids as well as nitrate reductase activity in leaves compared to control plants and both vegetative and flowering stages and similar reported by Verma *et al.* (2004) and Sahu and Singh (1995).

Yield attributes

The effect of variety of lentil was not found response on seed weight/plant. The variety KL-320 was recorded significantly higher number of pods/plant (122) in comparison to other variety of KLB-303 (105). The significantly higher test weight was recorded with KL-320 (29.22g) in comparison to KLB-303 (28.94 g) in present investigation. Weight of seed per plant was also significantly increased in treatment of zinc sulphate (0.5%) + urea (2%) + thio urea (500 ppm) in comparison

to control, foliar spray of zinc sulphate (0.5%), urea (2%), thiourea (500 ppm) and zinc sulphate @ 0.5% + urea @ 2% treatment, respectively whereas, statistically at par weight of seed/plant was recorded with treatment of zinc sulphate @ 0.5% + thiourea 500 ppm and urea @ 2% + thiourea @ 500 ppm to each other treatment. The number of pods/ plant (137) was significantly higher with treatment of zinc sulphate + urea + thiourea @ 5.0% + 2% + 500 ppm) in comparison to control water spray (90). Test weight was significant improved in treatment zinc sulphate (0.5%) + urea (2%) + thiourea (500 ppm) the higher value recorded (30.66) in comparison to control water spray (27.27). It was also reported by Mehta *et al.* (2013) and Verma *et al.* (2015) that the zinc sulphate applied @ 30 kg/ha significantly increase the yield attributes. The similar results reported by Pandey *et al.* (2009).

Yields

The variety KLB-320 was recorded significantly superior seed yield (12.93 q/ha) in comparison to variety KL 303 (12.25 q/ha). The percentage increments of KL-320 variety of lentil over variety KLB-303 were 5.55 in pooled data under present study. The analysis of pooled data indicated that foliar spray of zinc sulphate 0.5% + 2 urea + 500 ppm thiourea had significantly higher grain yield of lentil than other treatments in present experiment but the differences between urea (2%) + thiourea 500 ppm foliar spray were not found significant. The significantly higher grain yield (14.37 q/ha) was recorded with treatment zinc sulphate 0.5% + 2% urea + 500 ppm thiourea in comparison to control (11.02 q/ha). These results are also conformity with Mehta *et al.* (2013), Verma *et al.* (2004), Verma *et al.* (2015).

Table: Influence of lentil varieties and nutritional booster (foliar spray) on branches/ plant, chlorophyll content (mg/g of fresh wt.) WEC (%) and NR-activity ? mol (NO₂/g fresh wt.) of pooled data under rainfed condition.

Treatments	Primary branches/ plant	Secondary branches/ plant	Chlorophyll content (mg/g of fresh wt.)	RWC (%)	NR-activity in leaves (µ mol NO ₂ /g of fresh wt.)	Seed wt./ plant	Pods/ plant	Test wt (g)	Seed yield (q/ha)
Varieties									
KLB-303	7.7	15.3	3.24	78.5	521	2-57	105	28.94	12.25
KL-320	8.8	16.5	3.75	80.2	617	2-66	122	29.22	13.93
SE mean ±	0.27	0.41	0.22	0.25	2.8	0.30	4.0	0.38	0.65
CD at 5% P	0.56	0.83	0.44	0.51	5.7	NS	8.3	0.77	1.33
Nutritional booster (Foliar spray)									
Control (Foliar spray of water)	7.5	12.7	2.55	78.0	508	2.41	90	27.27	11.02
ZnSO ₄ @ 0.5% (Foliar spray)	7.9	14.2	2.91	79.0	519	2.72	99	28.06	11.56
Urea @2% (Foliar spray)	7.9	15.3	3.12	80.6	557	2.77	108	28.60	12.21
Thiourea@ 500 ppm (Foliar spray)	8.0	15.7	3.22	79.4	567	2.81	112	29.11	12.92
ZnSO ₄ + urea (0.5% + 2%) (Foliar spray)	7.9	14.3	2.99	78.9	569	2.74	107	28.33	12.56
ZnSO ₄ + Thiourea (0.5% + 500 ppm (Foliar spray)	8.4	17.5	3.58	80.2	580	3.19	122	30.21	12.92
Urea + thiourea (2% + 500 ppm) (Foliar spray)	8.7	18.4	3.74	79.3	588	3.27	132	30.39	13.17
ZnSO ₄ + urea + thiourea (0.5% + 2% + 500 ppm) (Foliar spray)	9.5	19.1	3.91	80.6	608	3.42	137	30.66	14.37
SE mean ±	0.32	0.35	0.22	0.06	1.27	0.15	2-02	0.19	0.33
CD at 5%	0.81	0.84	0.60	0.16	3.0	0.47	4-13	0.59	0.67
Interaction effect									
Varieties × Nutritional booster	NS	NS	1.12	0.52	10.5	NS	NS	NS	NS

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