EFFECT OF ZINC ON SEEDLING GROWTH OF *VIGNA SINENSIS* LINN.

Manoj Kumar Sharma, A.K. Bhargava & Sonali Bhargava*, Sanjay Sharma

Department of Botany, M.S. College, Saharanpur-247001 (U.P.)

**Department f Botany, Govt. Girls Degree College, Lucknow (U.P.)*

Abstract: Observation shows that metal Zinc increases seedling growth of Vigna Sinensis Linn lower concentration and inhibits growth at higher concentrations. Thus 1 ppm zinc promotes seedling growth and beyond this all can contrition in habits growth.

Key words: Zinc Seeding growth, Vigna Sineness.

INTRODUCTION

Zinc is an essential micronutrient for the normal growth of green plants. It is essential element for humans and animals because it is associated with the synthesis of several enzyme zinc is also associated with alcoholic dehydrogenase enzyme activity.

Review of Literature: Leguminous family is the third largest family of flowering plants with 650 genera and 18000 species (Polhill, *et al*; 1981). Thus, legumes and their symbiotic bacteria contributes largely in Nitrogen fixation of our earth (Arora and Maheshwari, 1999). Large number of work done on mineral deficiency aspects in plants and also on critical concentration of certain mineral (Jain and Mehrotra, 1993; Mehrotra *et al*; 1990). Effects of metals on germination and seedling growth have been described in certain (Bhargava, 1983 and 1989; Mukherji and Das Gupta, 1972; Agarwal, 1989; Pundir, 1999; Divya Jain and Bhargava, 2003, Bhargava and Sonali, 2005; Anjana *et al*., 2006 and Reshu and Bhargava, 2007; Ritu *et al*., 2009.

MATERIALS AND METHODS

The seeds of *Cicer arietinum* were procured from Indian Council of Agricultural Research, New Delhi. For seedling growth, Properly sterilized seeds of above legume, were selected and soaked in solution of zinc chloride (Zncl-) containing 1, 10, 50 and 100 mg per litre for suitable hours. Simultaneously, a control soaked in distilled water was also maintained. Thereafter, seeds were kept in Petri plates on moist filter paper, 10 seeds in each petri plate, for germination and seedling growth in dark. Seedling samples were collected on 3rd, 5th, and 7th day of radicle emergence, dissected into radicle, epicotyls and cotyledons. Length and fresh weight of various parts was measured and dry weight recorded after proper drying of each part.

RESULT AND DISCUSSION

Results of the effect of zinc on seedling growth of *Vigna sineses* cv. PO 110 shown in Table 1 and 2. Results show that seedling growth promoted in lower concentrations. Thus, table 1 shows that in 1 Mg/I Zn concentration radicle length in 147.0%, 121.2%, and 125.0% of the control respectively on 3rd, 5th and 7th day of germination, while Epicotyl length is 128.5%, 136.0% and 125.0 % of control respectively on the same days in the same lower concentration.

Similarly, fresh weight increase observed in lmg/l Zn concentration in radical and epicotyls are 125.0 % and 114.8% of the control respectively at 7th day. However, at higher concentration of Zinc there is inhibition in seedling growth parts. Thus on the 5th day redicle lengths are 75.7%, 60.6%, 54.5% of the control respectively in 10, 50 and 100 mg/l Zn concentration. Likewise, inhibition in fresh weight was also observed in all the higher concentrations of Zinc studied, however, the extent of inhibition is more in the higher Zn concentration. Thus on 7th day radicle fresh weight is 75.6%, 62.5% and 51.8% of the control respectively in 10, 50 and 100 mg/l Zn concentration. Similarly, epicotyl fresh weight values on 7th day are 53.4%, 85.5% and 71.5% of the control respectively in the 10,50 and 100 mg/I concentration of Zinc.

Table 2 shows pattern of day matter transfer in *Vigna sinensis* seedling grown in dark. It shows that the increase in dry matter of radicle and epicotyl is nearly paralleled by decrease in the dry weight of coty ledons. Pattern of dry matter transfar from cotyledon and distribution in the seedling part is nearly similar to that of control. Results also show that at lower promontory concentration of Zinc dry matter increase in radicle and epicotyl are promoted with simultaneous increase in dry matter transfer from the cotyledon, whereas, at higher inhibitory concentrations of Zinc dry matter transfer from cotyledon to radicle and epicotyl are suppressed. In general, there is more retention of dry matter in presence of higher Zinc concentration in the cotyledon. Our these observations with seedling growth of *Vigna sinense* as affected by various concentrations of Zinc matches with the work done by Anjana *et al*., (2006); Bhargava and Sonali (2005); Bhargava (1983); Divya and Bhargava (2003); Dhiman and Bhargava (2008) and Ritu *et al*., (2009).

Table-1

EFFECTS OF 24 HRS PRETREAMENT OF SEEDS WITH DIFFERENT CONCENTRATIONS OF ZINC ON THE SEEDLING GROWTH OF *VIGNA SINENSIS* IN DARK.

Zinc Concentration mg/$^{-1}$	Length, cm SD			Fresh weight, mg-SD		
	DAYS AFTER RADICLE EMERGENCE					
	3	5	7	3	5	7
REDICLE						
0	3.40 ±0.08	6.60 ±0.80	8.50 ±0.80	26.00 ±2.00	60.60 ±6.40	80.00 ±8.40
1	5.00 ±0.10	8.00 ±0.80	10.60 ±1.00	34.00 ±4.00	70.40 ±6.80	100.00 ±8.00
10	3.00 ±0.08	5.00 ±0.80	8.00 ±1.60	16.00 ±1.60	50.00 ±3.80	60.50 ±6.60
50	2.80 ±0.60	4.00 ±0.80	6.00 ±0.26	12.60 ±1.16	40.00 ±2.80	50.00 ±5.00
100	2.00 ±0.08	3.60 ±0.20	5.00 ±0.16	10.00 ±1.40	30.10 ±1.80	41.50 ±3.80
EPICOTYL						
0	2.80 ±0.40	5.00 ±0.20	7.60 ±1.20	20.00 ±2.60	48.00 ±3.20	70.10 ±6.20
1	3.60 ±2.20	6.80 ±0.80	9.50 ±0.80	30.50 ±1.10	60.00 +5.12	80.50 ±6.10
10	2.06 ±0.318	3.60 ±0.40	6.00 ±0.40	15.00 ±1.30	35.40 ±3.80	65.50 ±2.00
50	1.48 ±0.10	2.08 ±0.20	5.00 ±0.40	10.40 ±0.26	30.40 ±0.24	60.00 ±5.40
100	1.10 ±0.60	1.50 ±0.60	4.00 ±0.30	8.10 ±0.18	26.00 ±0.18	50.18 ±4.00

Table-2

EFFECTS OF 24 HRS PRETREAMENT OF SEEDS WITH DIFFERENT CONCENTRATIONS OF ZINC ON DRY WEIGHT CHANGES (mg) IN DARK GROWN SEEDLING OF *VIGNA SINENSIS*.

Cobalt concentration $mg1^{-1}$	DAYS AFTER RADICLE EMERGENCE		
	3	5	7
Radicle			
0	3.00 ±0.88	6.80 ±0.90	10.50 ±1.60
1	4.60 ±0.60	8.50 ±0.80	12.50 ±1.80
10	2.40 ±0.40	6.00 ±0.80	9.00 ±0.80
50	2.00 ±0.18	5.10 ±0.46	7.60 ±0.40
100	2.00 ±0.16	3.80 ±0.30	6.10 ±0.80
Epicotyl			
0	2.20 ±0.10	5.00 ±0.60	9.10 ±1.00
1	3.60 ±0.16	6.18 ±0.16	10.50 ±1.20
10	3.00 ±0.18	5.50 ±0.40	8.90 ±1.00
50	2.20 ±0.10	4.40 ±0.80	7.60 ±0.80
100	1.80 ±0.10	3.16 ±0.30	6.10 ±0.80
Cotyledon			
0	160.10 ±4.00	145.0 ±4.00	130.40 ±2.00
1	160.00 ±8.18	140.0 ±4.00	125.50 ±4.10
10	172.50 ±4.00	160.10 ±4.80	140.00 ±3.80
50	180.80 ±4.80	168 ±3.30	145.50 ±4.60
100	188.00 ±4.50	170.60 ±6.40	148.00 ±3.60

REFERENCES

Kashyap, Anjanya; Kumar, A. and Bhargave, A.K., (2006). Effects of Copper on seed germination and feeding growth in *Cicer arietinum. Adv. Plant Sci.,* **19**(1): 319-321.

Agrawal, S.K. (1989). Studies on certain physiological effects of lead pollution. Ph.D. Thesis, Meerut University, Mereut, India.

Arora, N.K. and Maheshwari, D.K. (1999). Nodulation studies on a strain of root nodulating bacteria isolated from termite gut. *J. Indian Bot.* **78**: 391-392.

Bhargava, A.K. (1983). Effects of Zinc on seed germination, seedling growth and Phosphorous distribution in *Vicia faba, L. Geobios,* **10**: 254-256.

Dhiman, A.K. and Bhargava, A.K. (2008). Effect of Iron on dark grown seedlings of *Vigna radiata*, L cv K. 851, *Progressive Research*, **3**(2): 213-214.

Jain, Divya and Bhargava, A.K. (2003). Effect of Iron on seed germination and Seedling growth in *Vigna mumgo, Adv. Plant. Sci.,* **16**(2): 573-575.

Jain, P. & Mehrotra, S.C. (1983). Critical concentrations of Iron deficiency in some economically important plant species. *Acta botanica Indica*, **20**: 88-93.

Mehrotra, S.C.; Katiyal, R. and Jain, P. (1990). Critical limits of Iron deficiency of six plant species on the basis of active Fe determination. *New Bot*. **17**: 209-218.

Mukherji, S. and Gupta, Das (1972). Characterization of Copper toxicity in Lettuce seedling. *Physiol. Plant*. **27**: 126-129.

Pohil, R.M.; Raven, P.H. and Stirton, C.H. (1981). Evolution and systematics of the leguminosac. *In Advances in Legume systematics* Part I, 1-26.

Pundir, S. (1999). Physiological studies on effects of mn pollution. Ph.D. Thesis, C.C.S. University, Meerut, India.

Reshu and Bhargava, A.K. (2007). Effects of Cadmium toxicity on seed germination and seedling growth of Vigna radiata cv. K. 851. *Adv. Plant. Sci*. **20**(1): 122-126.

Agarwal, Ritu; Bhargava, A.K. & Bhargava, Sonali (2009). Effects of Cobalt on seedling growth of *Cicer arietinum*, Linn cv. PG110, *Biochem Cell Arch*. **9**(1):47-49.