

## Effect of cadmium on zinc uptake by chickpea (*Cicer rediantum*) and wheat (*Triticum aestivum* L.) in clay and loamy sand soils of Gujarat

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### ABSTRACT

A pot culture experiment was conducted during *kharif*, 1999 by growing Chickpea (*Cicer rediantum*) upto flowering and Wheat (*Triticum aestivum* L.) upto maturity stage in Clay and Loamy sand soils with five levels of Cd (0, 2.5, 5.0, 10.0 and 20.0 ppm) to asses the effect of Cd levels on content of Zn in different plant components of both crops as well as uptake of Zn by plant components and also by whole-plant. The result indicated that the graded doses of Cd significantly reduced the content and uptake of Zn by plant components. The C x S x Cd interaction showed antagonistic effect of Cd on content and uptake of Zn by chickpea and wheat plant components in both the soils.

**Key words :** Cadmium effect, Zinc content, Zinc uptake, Leaves, Stem, Roots, Grains, Chickpea, Wheat, Clay soil, Loamy sand soil.

Though cadmium occurs naturally in the soil, its addition as a pollutant has increased in recent times causing concern in the field of agriculture. Plants can tolerate Cd toxicity to a greater extent as compared to animals and human. They can absorb appreciable amount of it without showing any abnormal symptoms. Several workers reported the adverse effect of Cd on yield of different crops. The yield reduction may be due to the effect of Cd on uptake of essential plant nutrients (Ramchandra and D'souza, 1999). So the study was conducted to know the effect of cadmium on zinc uptake by chickpea (*Cicer rediantum*) and wheat (*Triticum aestivum* L.) in clay and loamy sand soils of Gujarat.

### MATERIALS AND METHODS

A pot experiment was conducted to study the effect of varying levels of Cd ( $Cd_0$ ,  $Cd_1$ ,  $Cd_2$ ,  $Cd_3$  and  $Cd_4$  i.e.0, 2.5, 5.0, 10.0 and 20.0 ppm Cd, respectively) on zinc uptake by chickpea cv. ICCV-4 ( $C_1$ ) and wheat cv. GW-2 ( $C_2$ ) in clay ( $S_1$ ) and loamy sand ( $S_2$ ) soils of Karvan village, and College Agronomy Farm of Anand, Gujarat, respectively. The physico-chemical properties of the soils are given in the Table 1. The experiment was conducted in Factorial CRD with three repetitions. Ten kg capacity polythene-lined earthen pots were filled with 8 kg soil. Before transferring the soil to pots, calculated recommended

**Table 1 : Physico-chemical properties of the experimental soils.**

Characteristics	Soil collected from Karvan ( $S_1$ )	Soil collected from Anand ( $S_2$ )
A. Mechanical Analysis		
1 Coarse sand (%)	7.8	0.4
2 Fine sand (%)	30.7	79.1
3 Silt (%)	22.0	10.0
4 Clay (%)	44.0	6.5
5 Texture	Clay	Loamy Sand
6 Water Holding Capacity (%)	53.0	36.0
B. Chemical Analysis		
1 $CaCO_3$ (%)	10.00	6.50
2 pH (1:2.5)	8.02	7.75
3 EC (1:2.5)	0.62	0.29
4 CEC [ $cmol(p^+)kg^{-1}$ ]	31.60	16.50
5 Organic Carbon ( $g\ kg^{-1}$ )	3.8	2.4
6 Total N (%)	0.03	0.02
7 Available N ( $kg\ ha^{-1}$ )	203	125
8 Available $P_2O_5$ ( $kg\ ha^{-1}$ )	217	164
9 Available $K_2O$ ( $kg\ ha^{-1}$ )	953	778
10 DTPA Zn (ppm)	18.6	10.5
11 DTPA Cd (ppm)	0.04	0.02

doses of fertilizers were added through solution form. The chickpea and wheat seeds were sown on 21-11-1999. Irrigation and plant protection measures were taken as per the need. Chickpea was allowed to grown up to flowering whereas wheat was grown up to maturity stage. The plants were uprooted carefully and after oven drying