An Asian Journal of Soil Science, Vol. 3 No. 1 : 76-78 (June, 2008)

Phosphorus uptake by chickpea (*Cicer rediantum*) and wheat (*Triticum aestivum* L.) under different cadmium levels in clay and loamy sand soils of Gujarat

AMRIT KUMAR JHA, K.K. JHA AND M.R. DALWARI

See end of the article for authors' affiliations

Correspondence to :
AMRIT KUMAR JHA
Department of Agricultural Chemistry and Soil Science, B. A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA

Accepted : *March, 2008*

ABSTRACT

A pot experiment was conducted during *kharif,* 1999 by growing chickpea (*Cicer rediantum*) and wheat (*Triticum aestivum* L.) in Clay and Loamy sand soils of Karvan and Anand with five levels of Cd (0, 2.5, 5.0, 10.0 and 20.0 ppm) to asses the effect of Cd levels on phosphorus content in plant components and total phosphorus uptake by the crops. The result indicated that phosphorus content in plant components reduced significantly when 20.0 ppm Cd was added. The total P removal was significantly reduced at each level of Cd addition. Wheat depleted significantly more P than chickpea in both the soils. The clay soil recorded significantly more P uptake by both crops as compared to loamy sand soil.

Key words : Phosphorus content, Phosphorus uptake, Cadmium.

Cadmium is a pollutant heavy metal encountered in soil and water pollution. It is added to the soil as a contaminant in fertilizer, manure, municipal wastes, sewage sludge and also from aerial deposition. The amount of Cd contributed from each source varies with location due to differences in soil formation, management practices and exposure to pollution sources (Jones *et al.*, 1992). Cadmium pollution in soil and its toxic effect are reported from the several parts of the world (Dahiya *et. al.*, 1987). The yield reduction may be due to the effect of Cd on uptake of essential plant nutrients (Ramchandra and D'souza, 1999). Present study was undertaken to assess the effect of cadmuim on phosphorus uptake by chickpea and wheat.

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 phosphorus uptake by chickpea cv. ICCC-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 replications. The chickpea and wheat seeds were sown on 21-11-1999. Irrigation and plant protection measures were taken as per the need. At maturity, the plants were uprooted carefully and after oven drying at 65^{0}C, the dry matter yield of plant components was recorded. The total phosphorus content in plant samples was analyzed following vanadomolybdophosphoric acid yellow colour method (Jackson, 1973). The P uptake was calculated by following formula.

$$\text{P uptake (mg pot}^{-1}) = \frac{\text{P content (\%) x Yield (mg pot}^{-1}) \text{ x } 1000}{100}$$

Table 1 : Physico-chemical properties of the experimental soil.

Characteristics	Soil collected from Karvan (S_1)	Soil collected from Anand (S_2)
A. Mechanical Analysis		
1. Sand (%)	38.5	79.5
2. Silt (%)	22.0	10.0
3. Clay (%)	44.0	6.5
4. Texture	Clay	Loamy Sand
5. 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 Cd (ppm)	0.04	0.02