

## **Response of *Brassica rapa* var. *parachinensis* grown on copper contaminated Oxisol, Inceptisol and Histosol**

### **ABSTRACT**

Copper (Cu) plays a key role in plant physiological and biochemical function but is harmful to plants when in excess. Copper availability is influenced by the mineralogical and chemical properties of soils. High Cu concentration is prominent in soils where vegetables are grown intensively with routine application of fertilizers and pesticides. A factorial pot experiment was carried out to determine Cu critical concentration and toxicity threshold for *Brassica rapa* as well as its soil phase association in Oxisol, Inceptisol and Histosol. Copper sulphate was applied at rates of 0, 5, 10, 15, 20, 30 and 60 mg Cu kg<sup>-1</sup> soil. The soil Cu critical level in Oxisol, Inceptisol and Histosol was 5.42, 4.67 and 7.79 mg kg<sup>-1</sup>, respectively; and threshold toxicity level was 12.69, 13.00 and 21.33 mg kg<sup>-1</sup>, respectively. Height of plants decreased by 50% at a rate of 15 mg Cu kg<sup>-1</sup> soil for Oxisol and Inceptisol, and at 30 mg kg<sup>-1</sup> for Histosol. The SPAD value of plant leaves also decreased as the Cu application rate increased starting at 15 mg kg<sup>-1</sup> in Oxisol and 20 mg kg<sup>-1</sup> in Inceptisol. The amount of Cu in different soil fractions for both Oxisol and Inceptisol applied with Cu at a rate of 60 mg kg<sup>-1</sup> was in the order of organic > residual > Fe/Mn oxides > carbonates > exchangeable > water soluble. This study indicated that at 60 mg Cu kg<sup>-1</sup>, Oxisol had a higher ability to retain Cu in the carbonate, Fe/Mn oxides and organic-bound fractions whereas in Inceptisol, the highest Cu amount was in the residual fraction.

**Keyword:** *Brassica rapa*; Copper; Critical level; Phase association; Toxicity level; Tropical soils