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Yield and zinc, copper, manganese and iron concentration in maize (Zea mays L.) grown on Vertisol as influenced by zinc application from various zinc fertilizers

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According to World Health Organization (WHO), zinc (Zn) and iron (Fe) deficiencies are major threats to the health and development of world population. Enhanced micronutrient concentration in agricultural produce will mitigate micronutrient malnutrition in human and animal. Moreover, Zn deficiency in soils as well as field crops is widespread across the world including India resulting in severe yield reduction. Therefore, soil application of Zn fertilizers is recommended for ameliorating Zn deficiency in soil and for obtaining higher crop yield and better crop quality. Zinc sulphate is commonly used Zn fertilizer in India because of its solubility and low cost. But good quality and adequate quantity of zinc sulphate is not available in the market round the year for farmers' use. Field experiments were therefore conducted during rainy season of 2010 and 2011 at research farm of Indian Institute of Soil Science, Bhopal, India to assess the influence of Zn application through zinc sulphate monohydrate, zinc polyphosphate and Zn EDTA(Ethylene diamine tetra acetic acid) on yield and micronutrient concentration and uptake by maize. In both the years, grain and stover yield of maize increased significantly with successive application of Zn up to 1 kg ha^{-1} added through zinc sulphate monohydrate and zinc polyphosphate. Addition of 2.5 kg Zn ha^{-1} did not increase yield further but resulted in highest stover Zn concentration. Zinc, Cu, Mn and Fe concentration in maize grain varied from 22.16 to 27.58, 1.63 to 2.53, 3.47 to 4.73 and 19.9 to 24.5 mg kg^{-1} respectively in both the years. Maize stover had 25.96 to 36.25, 7.87 to 9.83, 36.7 to 44.9 and 174 to 212 mg kg^{-1} Zn, Cu, Mn and Fe respectively. Zn application did not influence Cu, Mn and Fe concentration both in grain and stover of maize. Transfer coefficients (TCs) of micronutrients from stover to grain varied from 0.72 to 0.95, 0.18 to 0.30, 0.08 to 0.13 and 0.10 to 0.15 for Zn, Cu, Mn and Fe respectively. Total Zn uptake enhanced significantly with increased rate of Zn application from 0.5 to 2.5 kg ha^{-1} supplied through zinc sulphate monohydrate and zinc polyphosphate. Recovery efficiency of Zn declined with increased Zn rates.

Biography

Sanjib Kumar Behera has completed his Ph.D. from Indian Agricultural Research Institute, New Delhi.At present, he is working as Senior Scientist at Directorate of Oil Palm Research, Pedavegi – 534 450, West Godavari District, Andhra Pradesh, India . He has published more than 15 papers in reputed journals. Dr Arvind Kumar Shukla has compted his Ph. D. from Chandra Sekhar Azad Univeristy of Agriculture and Technology, Kanpur, India. At present he is working as Project Coordinator of All India Coordinated Research Project on Micro and Secondary Nutrients and Pollutant Elements in Soils and Plants at Indian Institute of Soil Science, Bhopal, India. He has published more than 30 papers in reputed journals.

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