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Zinc mobility and its distribution among different pools in soil

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In order to get insight into the complexities of nutrient interaction, particularly N, P and Zn and to find the fate of applied zinc in soil, its uptake by wheat and maize, its distribution among different fractions in soil, and also its movement and adsorption-desorption in soil, pot experiments as well as the laboratory experiments were conducted during 2000–2002. The pot experiment was a $3\times3\times3$ factorial in complete randomized design (CRD) with three replications in Zn deficient soils. Fertilizers were applied as three levels of zinc 0, 2.5, and 5 mg Zn kg^{-1} as zinc sulphate, three levels of phosphorus 0, 7.5, and 15 mg P kg^{-1} through KH_2PO_4 and three levels of nitrogen 30, 60, and 90 mg N kg^{-1} soil as urea using ^{65}Zn, ^{32}P, and ^{15}N. To study the distribution of zinc in various forms, sequential fractionation was used. In an incubation study, adsorption-desorption behavior of zinc in soil was studied by applying N, P and Zn according the treatments mentioned above. Apparent self-diffusion coefficient was determined following the half-cell technique. In terms of the relative abundance of different Zn fractions in soil, sequence was: Water soluble $<$ Exchangeable $<$ Specifically adsorbed $<$ Amorphous FeO $<$ Acid soluble $<$ MnO occluded $<$ Organic matter occluded $<$ Crystalline FeO $<$ Residual fraction. The availability of applied Zn reduced drastically after two crops and there were no build-up of Zn in available form. Apparent self-diffusion coefficient of Znincreased due to nitrogen and phosphorous application. The application of zinc also significantly increased the self-diffusion coefficient of Zn in soil. More than 90% of applied Zn activity got adsorbed on to soil. Nitrogen and zinc application increased the rate of adsorption of zinc, but with increasing the rate of P application, the percent Zn adsorption decreased significantly.