ABSTRACT

The present study was undertaken to delineate the extent of deficiency of S, B and Zn in red and laterite soils (Alfisols) of Mayurbhanj district, Odisha, find out their critical limits in soil and plants and their management for rice-groundnut and potato-rice cropping systems. The red and laterite soils of Mayurbhanj district of Odisha were acidic in reaction, medium in O.C., available P and K. Soils were deficient in hot water soluble B (66 %) and available S (83 %), but rich in DTPA extractable Zn. Three pot culture experiments were conducted in a completely randomized design with three replications each on rice (Kharif 2012), groundnut (Rabi 2012-13) and potato (Rabi 2012-13) with ten different soils. The treatments consists of seven levels of S (0, 10, 20, 30, 40, 50 and 60 kg/ha), Zn (0, 1.25, 2.5, 5.0, 7.5, 10 and 12.5 kg/ha) and B (0, 0.5, 1.0, 1.5, 2.0, 2.5 and 3.0 kg/ha). Critical limit of deficiency (CLD) of B of soils and 3rd leaf of rice, groundnut and potato crop were 0.56, 0.52 and 0.56 mg/kg and 23, 19 and 26 mg/kg, respectively. The CLD of Zn of soils and 3rd leaf of rice, groundnut and potato were 0.8, 0.7 and 0.7 mg/kg and 24.5, 23 and 27 mg/kg, respectively. Similarly, CLD of S of soils and 3rd leaf of rice, groundnut and potato was 10 mg/kg and 0.21, 0.34 and 0.8 %, respectively. Two field experiments were carried out with rice-groundnut and potato-rice cropping systems in two successive cropping seasons each, to study the effect of S, B and Zn on grain yield, nutrient uptake and their accumulation. The experimental design included ten treatments, T1: control, T2 : S @ 40 kg/ha, T3 : B @ 1 kg/ha, T4 : Zn @ 5 kg/ha, T5 : FYM @ 5 t/ha, T6 : S+B, T7 : S+Zn, T8 : B+Zn, T9 : S+B+Zn and T10 : S+B+Zn+FYM replicated thrice in randomized block design. Integrated use of S + B + Zn with FYM was the ideal combination for both rice-groundnut and potato-rice cropping systems as it was more sustainable, recorded the highest yield and SYI value along with higher accumulation and uptake of nutrients. The results revealed that red and lateritic soils are poor in S and B need integrated use of S, B and Zn along with recommended dose of NPK for getting synergistic and best effect in both rice-groundnut and potato-rice cropping systems.