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Micronutrient status of coconut growing soils of Sri Lanka

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Micronutrients play an important role in the nutrition of coconut. Application of only NPKMg fertilizers, soil erosion, exhaustion of soil organic matter and micronutrient removal by coconut palms, over the past centuries have lead to micronutrient depletion in coconut growing soils. Problems related to micronutrients rarely occurred in coconut plantations and micronutrient recommendations were considered only in specific situations. Therefore, the objective of this study was to determine the micronutrient status of soil and coconut leaf in relation to different fertilizer practices in coconut growing soils of Sri Lanka. The experimental sites were randomly selected from three types of fertilizer treatments: organic manures, inorganic fertilizers and no fertilizer for the past ten-years. Soil samples from 0-25 cm depth at both manure circle (MC) and the center of square (CS) and coconut leaf samples from 14th fronds were taken from the selected sites. The soil samples were analyzed for DTPA extractable Fe, Mn, Cu, Zn and leaf total Fe, Mn, Cu, Zn by wet digestion (HNO_3:$HClO_4$ at 1:4 mixture) and Atomic Adsorption Spectrophotometer. The critical soil levels for Fe, Mn, Cu and Zn are 4.5, 4.7, 0.4 and 0.5 mg kg^{-1} respectively. Based on this, 94% of the sites in all three treatments were sufficient in available Fe. For all the treatments in Mn, Cu and Zn, more than 40, 25 and 25% of the experimental sites had lower soil values than the critical levels. The critical leaf levels for Fe, Mn, Cu and Zn are 40, 60, 5 and 30 mg kg^{-1} respectively. Based on this, all the sites in all treatments were sufficient in leaf Fe. The leaf Mn in 11% of the non-fertilized sites, 18% of the organic fertilized sites and 23 % of the inorganic fertilized sites had lower leaf Mn values than the critical level. For all treatments, more than 66% of the experimental sites had lower leaf Cu levels than the critical level. It was found that more than 75% of the fertilized sites and 40% of the non-fertilized sites contained lower concentrations of Zn than critical level. There was a significant increase in Fe and Zn in the MC compared to the CS, irrespective of fertilizer practices used. There was no significant difference of micronutrient levels in the soil among different fertilizer practices. The poor correlation between soil and leaf data for these sites implies that the soil data do not account for the micronutrient status of the coconut palm. It can be concluded that the Mn, Cu and Zn status in both the soils and the coconut leaves were below the sufficient level irrespective of organic manure, inorganic fertilizer and no fertilizer application. Further investigation of the soil properties is necessary to determine the status of micronutrient availability to coconut.

Keywords: micronutrients, coconut, critical value, inorganic fertilizer, organic manure