

Boron Levels in Soils Cropped to Coffee and their Relationships to some Soil Properties in Ghana

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Abstract

Studies on boron levels in soils cropped to coffee were carried out in Ghana due to widespread reports on boron deficiency in soils of some coffee producing countries. Leaves and soils were sampled from Cocobod coffee plantations at Bogoso, Suhuma, Manso-Mim, Bunso and Bepong, which represent the main coffee growing areas in the Western, Ashanti and Eastern regions of Ghana. Also determined were percent OC and Ca, pH, texture and statistical relationships established for both leaf and soil boron contents and the soil properties. The results showed that available B in the 0-30 cm depth ranged from 0.77 to 1.54 mg B kg⁻¹ soil. Surface soil pH values ranged from 5.4 to 6.8 and the subsurface soil from 5.1 to 6.7. Leaf B was between 28.7 and 42.5 mg B kg⁻¹. The leaf Ca/B ratio used as index of B deficiency was between 331.4 and 398.8; values high enough to suggest that boron was low compared to Ca concentrations in the leaves, a condition which implies that available B in the soils was below the levels required to support coffee plants. All locations of sampling indicated that there was positive correlation between percent OC, calcium and available B in the surface soils. Similarly, the relationship between percent clay, calcium and available B in the subsurface soils was positively correlated. Soil available B at 0–30 cm depth was highly influenced by percent OC and pH. Coffee leaf B content and soil pH was negatively correlated at pH above 5.8, but was positive when the pH was below 5.8. Boron levels in the coffee leaves were within the critical range of 2–40 mg B kg⁻¹ although soil available B appeared low.