

Effects of Phosphorus Fertilizer Placement on the Growth of Arabica Coffee Seedlings

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SUMMARY

In Ethiopia coffee is grown to a large extent on Nitosol. This type of soil is deep and has no serious physical problems; it is however, poor in some major nutrients. Phosphorus is highly fixed in the soils, where dominated by kaolinitic clays. The ease of P uptake depends on fertilizer placement, rate and time of phosphorus application in the soil. Commonly P fertilizers are applied by broadcasting in ring around the coffee tree and may or may not be incorporated with the soil. Therefore, determination of the proper placement of fertilizer is useful. Field experiment was conducted to determine the effect of p placement on the growth of coffee seedlings (variety, F-59) at Jima Agricultural Research Center (Melko), on Eutric Nitosol. The effectiveness of localized spot applications at different horizontal and vertical distances was studied for three phases. Four horizontal distances (15, 30, 45, and 60 cm) and three vertical depths (7.5, 15, and 22.5 cm) were used for P placement and a conventional application method was also included for comparison to determine the effect of phosphorus (P). A recommended fertilizer rate of 77 kg P ha⁻¹ (13.7 gm per tree) and 170 kg N ha⁻¹ (50 gm per tree) was applied. The root biomass and distribution of roots at different depths were investigated. The status of P in the soil and in the plants were analysed for total and available (Bray I) P. The results of first and second phases of the experiment indicated that the effect of P placement on different growth parameters showed significant differences in root dry matter ($p < 0.05$). Horizontal placement at 45cm was the optimum placement. Covariance analysis of the last phase for the mean height, girth and leaf number between initial and final measurement showed significant responses with r value of 0.93, 0.47 and 0.86 respectively. The highest available P was recorded at 80 days when P was placed at 45cm away from tree trunk and at 15cm depth, whereas the check (ring application) has shown the maximum P - concentration in all applications time except 40 days.