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Full Length Research Paper

Soil moisture and its consequences under different management in a six year old hedged agroforestry demonstration plot in semi-arid Kenya, for two successive contrasting seasons

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Abstract

Hedged agroforestry (AF) demonstration plots with maize/bean intercrops were studied at Matanya in Laikipia district, Kenya, between 1991 and 1995 inclusive, to understand crop yield behaviour due to selected soil moisture conservation methods applicable in semi-arid areas. The treatments were: *Grevillea robusta* trees root pruned, compared to unpruned, both in combination with (1) minimum tillage and mulching with 3t/ha maize stalks harvested from the plots with additional stalks collected from the nearby farms, and (2) the locally applied method of deep tillage practiced by the immigrants from wetter regions, acting as the control. Results showed that: (i) plots with root pruned *Grevillea robusta* trees that were mulched and minimum tilled had most soil moisture available in the shallower layers, during the wettest and the driest season on which this paper is based; (ii) the variation of soil moisture with distance from the *Grevillea robusta* trees showed patterns that were quite similar for plots with root pruned trees in the dry and the wet season; (iii) beans had greater seed yields and maize had more (stover) biomass and (only in the wettest season) grain in plots with pruned trees, minimum tilled and mulched, than in other AF plots. In the wettest season this resulted in identical maize yields but lower bean seed yields compared to those in the mulched and sometimes also the local control plots without trees. In the driest season bean yields remained the same but maize biomass yields

improved above the control yields for the most successful agroforestry intervention applied; (iv) competition between the six year old Grevillea robusta trees and the crops was indirectly confirmed to be stronger than in earlier experiments in the same plots. This way the agroforestry demonstration plots were very successful in showing the consequences of the ageing agroforestry system, where the soil moisture conservation measures of pruning and mulching kept their effects. Statistical analysis only weakly confirmed the positive effect of root pruning on reducing competition for soil moisture between crops and trees that were very clearly shown to exist by the physical error analysis.

Key words: Agroforestry, demonstrations, hedges, intercropping, Kenya, semi-arid land, soil moisture management, wind problems

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