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SPECIES INTERFERENCE AND SOIL CHANGES IN CONTOUR HEDGEROWS PLANTED ON INCLINES IN ACIDIC SOILS IN SOUTHEAST ASIA

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Abstract: Contour hedgerow systems are widely viewed as an important element of conservation farming on the Oxisols and Ultisols that dominate the humid tropical uplands of Southeast Asia. However, little is known concerning the nature of hedgerow-crop interference planted on uplands on acidic soils. This paper discusses recent results on above- and below-ground interactions on Oxisols and Ultisols. Row-wise sampling of upland rice biomass and grain yield showed a characteristic dome-shaped response pattern, often modelled satisfactorily by a quadratic response function. The suppression effect of hedgerow on crop was not overcome by the application of more nutrient as green leaf manure or inorganic fertilizer. Forage grasses interfered more with the alley crop than leguminous forages and shrubs. Guinea grass (*Panicum maximum*) and Vetiver (*Vetiveria zizanoides*) both suppressed rice yields near the hedgerow.

In the areas adjacent to the hedgerows, rice growth tended to be suppressed more than maize. The installation of root barriers between hedgerow and crop did not significantly prevent yield suppression near the hedgerow, even when frequent pruning minimized shading. Major soil properties changed as natural terraces developed behind the perennial contour vegetation and strongly affected crop performance in the upper alley. These soil spatial changes influenced crop performance more than direct interference (either below- or above-ground) between the perennial hedgerow and the annual crop.

1. Introduction

Interference between perennial hedgerows and annual crops is a dominant issue in the debate about the productivity and sustainability of hedgerow intercropping systems. During the past decade, research has begun to explore these interactions [Ong et al. 1991].

Competition occurs when the available supply of a resource is below the joint requirements of two organisms and as a result the performance of one or both is impaired. Resource sharing in agroforestry systems has been reviewed by Buck (1986). Competition is inevitable in alley cropping systems, but the dominant resource competed for varies in each situation. Accurate identification of this dominant resource will improve the prospects of alleviating the negative effects of competition.

The perennial plants tends to exert a competitive advantage vis-a-vis the annual