

MANAGING SOIL FERTILITY ON TERRACES FORMING BEHIND VEGETATIVE FILTER STRIPS: AN ASSESSMENT OF FARMERS' STRATEGIES

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ABSTRACT

The indigenous use of natural vegetative strips (NVS) to control soil erosion on the slope has been viewed as a low-cost alternative to planted tree hedgerows. As in conventional hedgerow systems, however, natural terrace formation resulting from redistribution of sediment from upper to lower terrace zones leads to the development of a soil fertility gradient with significantly lower crop yield on the degraded upper portion of each terrace. Since NVS produce little biomass which could be used to maintain soil fertility, the sustainability of annual crop production in NVS systems may be questionable. Interview surveys conducted in two upland locations in the Philippines showed that most farmers had observed soil fertility scouring to adversely affect crop performance on the upper part of the terrace. However, scouring was not usually perceived as a serious constraint of the technology. Farmers claimed that the benefits of overall increased crop yield and rise in land value due to contouring outweighed the negative effects of upper terrace yield decline; besides, they generally believed scouring to be a transitory phenomenon. On-farm experiments were conducted to assess farmers' strategies to overcome the negative effects of soil fertility scouring in NVS systems by skewing the application of nutrient inputs towards degraded upper terrace zones. Further research is required to identify methods to fully rehabilitate the degraded upper terrace through raising soil organic matter levels.

1. INTRODUCTION

The indigenous practice of using natural vegetative strips (NVS) of 0.5 - 1 meter width as buffer or filter strips to reduce soil erosion on the slope can be viewed as an alternative technology to contour hedgerow intercropping with planted trees. It requires minimal labor for establishment and maintenance while reducing soil erosion at least as effectively as planted tree hedgerows (Garrity *et al.*, 1993). Local grasses and broad-leaf species compete less with adjacent alley crops (Ramaramanana, 1993). However, sediment redistribution during natural terrace formation leads to the development of a soil fertility gradient with significantly lower crop yield on degraded upper terrace (alley) zones as compared to the lower terrace portion where eroded sediment and nutrients accumulate (Turkelboom *et al.*, 1993; Anecksamphant and Sajjapongse, 1994). Natural vegetative contour strips provide substantially less biomass compared to tree hedgerows which could be used to maintain soil fertility levels on the upper terrace and reduce the effects of scouring. Sustained continuous crop production in NVS systems therefore depends largely on the import of external nutrients.

Research has focused on significantly reducing within-alley soil movement through ridge tillage cultivation, a minimum tillage technology (Thapa *et al.*, 1996), and on biasing the application of hedgerow cuttings and crop residues towards degraded upper alley (terrace) zones in tree hedgerow systems (Mercado *et al.*, 1996). The suggestion to improve fertilizer use efficiency by matching fertilizer rates to site specific nutrient requirements at varied landscape positions (Fiez *et al.*, 1994) may also be applied to small-scale variations of soil fertility in vegetative contour strip systems.

The present study is part of a participatory technology development (PTD) project conducted under ICRAF's research program in the Philippines. Objectives of the study were to identify farmers' indigenous strategies to improve the NVS system with a special focus on overcoming the negative effects of soil fertility scouring on crop yield. Subsequent on-farm research focused on assessing indigenous strategies to obtain uniform crop yield across the alley-way by biasing the application of nutrient inputs towards degraded upper alley zones.

A deeper understanding of the benefits and constraints of natural vegetative contour strips, together with identifying and developing options for the improved management of NVS systems, will allow more confident extrapolation of the technology to other locations in the humid tropics.

2. METHODOLOGY

Fifty-three interviews were conducted among contour farmers in Claveria (Northern Mindanao) and Matalom (Southern Leyte) in 1995 and 1997, respectively. Claveria municipality is one of ICRAF's research sites in the