SOIL FERTILITY GRADIENT IN A HEDGEROW INTERCROPPING SYSTEM: A SRI LANKAN EXPERIENCE

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Agricultural sustainability in Sri Lanka is currently facing many challenges due to increasing pressure on land resources. The Government has identified Sloping Agricultural Land Technology (SALT) as a solution to some land-related problems in watershed areas, where soil erosion control is of prime concern. Research has addressed various aspects in SALT systems in almost every agro-ecological zone of the region. Yet, factors like tree-crop interactions and field hydrology have received little attention. These tree-crop interactions on sloping lands can dramatically alter the slope by developing terraces behind contour vegetative barriers which could make the system more 'patchy' in terms of soil fertility and other micro-climatic parameters compared to mono-crop agricultural system. The present research was planned to address some of these issues by carrying out a detailed on-farm study using a 4-year old SALT-HI site in the wet zone, up-country of Sri Lanka.

To achieve this objective, a detailed on-farm study was carried out using a four-year old SALT plot at Doragalla (up-country /wet zone). The plot layout at Doragalla provided with the opportunity to sample soils along three transects down the entire slope covering four hedgerows and three alleyways. Soils were sampled from (i) the hedgerow itself, (ii) 1m and 3 m away from the hedgerow towards the alleys and (iii) four depths down the soil profile (0-10, 10-30, 30-50 and over 50 cm) and analyzed for important chemical parameters. Soil samples were also collected from a nearby farmer's vegetable plot with stone bunds as the only erosion control measure and from an abandoned tea land which has remained as a low-strata grassland, for comparison. In both these plots, three, 20 m transects, 2 m apart from each other, were sampled at 5 m intervals giving five sampling positions in each transect, down the slope.

After 4 years of hedgerow intercropping on the slopes at Doragalla, the organic C, and organic N, mineralizable N and organic P levels were higher under hedges compared to that in the open alleyways along the whole transect down the slope. These chemical parameters showed a distinct 'saw-tooth' pattern with the drops coinciding with the drops in soil levels between the alleys. In contrast, in both farmer's and abandoned-tea plot, soil organic C, total N, mineralizable N and organic P did not show any position effect down the slope. Other chemical parameters measured in the present study such as exchangeable cations, soil pH, 'available' P did not show any consistent pattern down the slope. This suggests that the presence of hedgerows enhanced within alley erosion, thereby re-distributing the soil nutrients. Even though the soil fertility status has increased after 4 years of HI, the high heterogeneity of soil nutrient distribution within alleyways may affect crop growth thus causing serious consequences to the success of HI on sloping lands. Studies for the possible amelioration of this problem have been suggested.

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