

MECHANISED LAND PREPARATION FOR RUBBER: EFFECT ON SOIL EROSION AND PHYSICO-MECHANICAL PROPERTIES

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The use of heavy machinery in farming activities offers numerous benefits. However, excessive and unnecessary reliance on these machines can adversely affect the soil's physical, chemical and biological properties. To assess the effect of different land preparation methods practiced for establishing rubber plantations on soil erosion and physico-mechanical properties of highly weathered lateritic type of soils under rubber cultivation in Kerala, a field experiment was initiated during 2010. The experiment was laid out in a randomised block design with four treatments and five replications. The land preparation methods evaluated were (a) pitting, terracing and tilling rubber inter rows for pineapple intercropping by earth mover (Hitachi); (b) pitting and terracing by earth mover (Hitachi) with zero tilled rubber inter rows; (c) pitting by tractor mounted hole digger and manual terracing with zero tilled rubber inter rows and (d) manual pitting and terracing (standard practice). Soil samples were collected from the inter row areas of rubber plantation at four depths *viz.* 0-15, 15-30, 30-45 and 45-60 cm and analyzed to determine physical properties such as bulk density and porosity, as well as the mechanical property aggregate stability, both before and after land preparation. Results of the study indicated that during the initial years of land preparation, significant decrease in bulk density, increase in porosity and hydraulic conductivity at all soil depths were observed in plots where pitting, terracing and tilling operations were carried out using earth movers. The aggregate stability of soil was not influenced by land preparation methods. Soil loss estimation revealed that the inter row tilled plots showed a higher rate of erosion up to sixth year of land preparation compared to zero tilled soil. In tilled soil, approximately 39 per cent more soil was lost during the first year after land preparation. A positive correlation between hydraulic conductivity and soil erosion was also observed up to the fifth year of land preparation. Comparative cost analysis indicated that pitting and terracing by earth mover saved about 50 per cent of cost of cultivation compared to standard method (manual). The paper also emphasized the need for reorientation of land management strategies, particularly when intercropping pineapple in rubber plantations.

Keywords: Mechanised land preparation, Rubber plantation, Soil erosion, Soil physico-mechanical properties, Zero tilled rubber inter rows

INTRODUCTION

The cultivation of rubber is a long-term investment that requires effective agro-management and soil conservation practices for sustainable production. In

Kerala, severe labour shortage hinders timely completion of agricultural operations in rubber plantations. Rising labour costs have further prompted the growers to seek alternative methods, such as substituting