THE ROLE OF ROOT BIOMASS ON SOIL STRUCTURE AND ITS EFFECT ON SOIL EROSION IN UPLAND INTERCROPPING SYSTEM

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Introduction

The root system is a significant factor in the formation of stable aggregates against the destructive action of raindrops and runoff water. The effectiveness of the root system for stabilising soil structure depends on the extent to which the movement of the particles or aggregates under the erosive influence of water can be restricted (Goss, 1991). The effectiveness of roots in reducing soil erosion also depends on the growth stages of the crop and the root density (Hashim and Wong, 1987). The objectives of this study were: (1) to measure the effect of root biomass on aggregate stability, bulk density, water retention capacity of upland intercropping system of banana, pineapple and immature rubber; (2) to compare and correlate soil loss and water runoff as affected by root biomass; and (3) to compare monocropping and intercropping systems in terms of soil erosion in upland areas.

Materials and Methods

In this study four erosion plots with an average slope of 9% were prepared on ultisol – one was planted with banana, a second with pineapple, and third with intercrop of banana and pineapple, whereas one plot was kept bare with regular cultivation every fortnight. Runoff water and sediment loss was measured after every erosive rainfall. Soil samples will be collected at 3-month interval for 24 months. These samples will be analysed for root density, organic matter content, aggregate stability, bulk density, and water retention capacity.

Results and Discussion

Preliminary results have shown that aggregate stability, bulk density, and organic matter content were influenced significantly by crop treatment, whereas soil loss was significantly reduced by cropping system compared to bare plot. The highest stability index was obtained from the banana plot and the lowest bulk density was obtained in the pineapple plot. The organic matter content was the same for all plots. Although banana plot had the highest stability index, its soil erosion value was still higher than the intercrop and the pineapple plots. This may have indicated that the effect of vegetative cover is more dominant than the soil physical conditions in reducing soil loss under different cropping systems. However, experiment is just starting and more samples will be taken and more analysis will be carried out.

Conclusions

The experiment is expected to show that different cropping systems will result in different root biomass influencing soil structural condition that will consequently affect the extent of soil erosion in sloping agricultural areas.

References

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