

## ABSTRACT

A preliminary survey was conducted at three integrated farming systems to determine the effect of long term (>25 years) crop-livestock integration on some soil and plant properties and composition. Herbage of grazed coconut land consisted of 90.6% grasses, 5.7% legumes and 3.7% other species where Carpet grass (*Axonopus compresses*) was the dominant species. The species diversity of the natural herbage of ungrazed coconut land was high representing 36.78% grasses, 29.86% legumes and 36.32% other species having more erect type plant species with Narrow Leaf Carpet grass (*A. affinis*) dominating. Long term grazing effect resulted to promote dominating prostrate type plant species such as Carpet grass (*Axonopus compresses*), Heen undupiyaliya (*Desmodium trifolium*) due to super imposed grazing pressure.

The effect of buffalo grazing the natural herbage growing in a coconut plantation was examined in an experiment of 6 months along with the survey. The Dry Weight Rank Method (DWRM) which gives an accurate estimate of the plant composition (PC) of grassland on dry weight basis, without the necessity of cutting and hand separating (HS) samples was used in estimating the PC. The DWRM was tested 5 times by comparing results with those of HS samples. With each of the five tests conducted, the  $r^2$  increased from 0.1348 to 0.8922 indicating greater ability to accurately predict HS data using the simple DWRM observations. For all observations  $r^2$  was 0.65 ( $p < 0.05$ ) giving a positive correlation and that regression was used to predict HS using DWRM data to study the PC of the herbage. PC of natural herbage under short term grazing indicated that as there was selective grazing and the ability to withstand grazing differed between species, with the time of grazing prostrate type plant species dominated. At any time of the grazing, Heen undupiyaliya (*Desmodium trifolium*) and Narrow-leaf carpet grass (*Axonopus affinis*) presented more than 10% of the herbage and significant ( $p < 0.05$ ) indicating that short term grazing enhances the growth of prostrate type plants.

Comparatively Dry matter (DM) and Organic matter (OM) yields of the herbage in each harvest were low in grazed herbage compared with the ungrazed herbage in both dry and wet seasons. Significantly ( $p < 0.05$ ) highest DM and OM yields were recorded in ungrazed

treatment during wet season. Due to selective grazing of more palatable herbage and over maturity of remaining plant species, Crude Protein (CP%) of grazed herbage was significantly low ( $p < 0.05$ ) than in ungrazed herbage.

Soils collected from long term integrated farming sites had a significantly higher ( $p < 0.05$ ) average pH of (5.58) as compared to that of non integrated sites (4.65). Reduction of acidity may be due to the improvement of soil nutrients via dung, urine and also due to accumulation of litter. Also it was visually observed that the soil in integrated sites were dark in colour as compared to non integrated soil due to the same reason. Bulk density of integrated soil ( $1.15 \text{ g/cm}^3$ ) was comparatively lower with that of non integrated soil ( $1.4 \text{ g/cm}^3$ ). Although not significantly ( $p < 0.05$ ), the moisture content improved in grazing coconut land due to improved ground cover as compared with ungrazed soil specially during wet season. Significant improvement was not observed because of the overriding effect of the shade of coconut trees facilitating the retention of moisture under both conditions. Similarly soil porosity also improved due to integration. Even though the effect of long term grazing improved physical properties of soil, short term grazing effect has not changed the same as such.

Overall results suggest that the waste materials such as excreta, beddings, dairy washings and residues of feeding materials thus produce various benefits with passage of time showing potential for the sustainability of a crop- livestock systems and also buffaloes can be introduced to weedy coconut plantations as environmentally friendly biological loan movers for better sustainability.