of soil diminishes and tea cultivation has caused many environmental problems. Thus, stabilization of a systematic Agro- forestry system in these areas would minimize the environmental problems and would conserve both '*Sinharaja*' and its peripheral villagers. Further, this kind of stabilization process should go parallel with the prevalent lifestyles and culture of the villagers. Additionally, that process should provide villagers with economical advantages. Moreover, plantation of crop verities in the tea lands should be encouraged as well as animal husbandry, apiculture and plantation of medicinal plant etc. Yet, the contribution and the sponsorship of the government and non-government organizations, plan and policy making of scientists and the active participation of the peripheral villagers are essential to bring these activities into success.

017

Behaviour of cattle in an agro-forestry system

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Objective of the present study was to understand the behaviour of dairy cattle tethered under agro-forestry systems. Three genetically uncharacterized, indigenous, non-lactating cows and two bulls (mean live weight 199±29) were tethered close to a water stream in an agro-forestry system. The vegetation of the agro-forestry system comprised of teak, coconut, mahogany and shrubs. Animals had enough foraging materials around the place they were tethered. One observer was assigned to each animal. The behaviour of the animals was observed for five hours from 1000 1500 hrs. The mean temperature and the relative humidity of day of the study were 28 ^{0}C and 79% respectively. Frequency and the duration of the time spent on nine behaviours were recorded. The behavioural activities studied were drinking, feeding (ground level and upper level), lying, standing, walking, urination, defecation, vocalization and interactions (cattle-cattle and cattle-other animals). Feeding was the most prominent behaviour of the animals. The time spent on feeding and the frequency of feeding during the 300 minutes study period were 252 min and 23, respectively and thus the feeding behaviour accounted for 84% of the total time budget. The frequency (15) and the time spent on ground level grazing (234 min) were significantly higher ($p<0.001$) than the frequencies and the time spent on upper level feeding. Though not statistically significant, animals spent more time on standing (18.9 min or 6.3% of the total time) than on Laying (14.6 min or 5% of the total time). The frequency of standing (5) was also significantly ($p<0.001$) higher than that of lying (1). May be due to tethering, cattle spent less time (8.3 minutes or 2.7% of the total time) on walking. The frequency of drinking (2) and the time spent on drinking were (3 min or 1% of the total time) unexpectedly low. Cattle defecated and urinated twice during the five- hour study period. Vocalization was the least prominent behavioural activity. It is concluded that cattle highly engage with feeding particularly, on ground level when they are tethered under agro-forestry systems. Further researches are needed to determine as to why the drinking behaviour is suppressed when tethered in agro-forestry systems.

018

Design and development of power tiller operated multipurpose whole stick harvester especially for sugarcane

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In Sri Lanka cane harvesting is done manually using various types of hand knives. This method of harvesting not only consumes much time but also requires much skilled labourers. But nowadays labourers are becoming scarce and costly, particularly in sugarcane cultivation areas. This is due to diversion of labour to other more remunerative work in industry, construction, business and diversion of labour to other crops.

It is difficult to employ heavy machines in Sri Lanka due to various reasons such as, fragmented and small holdings with small and irregular fields, diverse cropping patterns followed, the cultivation practices

which have been developed for manual harvest and poor farmers who cannot afford costly machines. Therefore Power tiller operated whole stick harvester prototype was designed and constructed. The designed machine consists of reversible cutting device, power transmission unit with clutch mechanism and Cane shifting device. The Maximum cutting width, Machine capacity and Traveling speed were considered as criteria for comparison of merits and demerits with existing manual method. The results showed that maximum cutting width, Machine capacity and Traveling speed were 1.2m, 0.8 ha/day and 0.75 km/hr respectively. The cost of production of the designed Sugarcane harvester was Rs.20,000.00

019

Multi-use two wheel tractor operated fertilizer applicator for Coconut cultivation

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Unfortunately, it is observed that application of comical fertilizers is low in the coconut sector partly due to high wages and scarcity of labour.

The purpose of mechanization in coconut cultivation is to produce more from existing land. Machinery is a complimentary input required to achieve higher land productivity. Additional benefits to the user may be associated with a reduction in drudgery of farm work greater leisure, or reduction of risk.

Use of manpower for the application of fertilizer is uneconomical due to high labor cost. Therefore power tiller operated fertilizer applicator for coconut cultivation was designed and constructed. This machine is not only useful to broadcast fertilizer on the soil but also to mix it with the soil close to the palm on the weeded surface.

The designed machine consists of fertilizer distribution unit and rotary unit. The Maximum spreading width in meter, Machine discharge rate in gr/min and Uniformity coefficient of spray distribution, were considered as criteria for comparison of merits and demerits. The results showed that the Maximum spreading width and Machine discharges rate were 0.7m, and 150 - 230 gr/min, respectively. The cost of production of the designed power tiller operated fertilizer applicator was Rs.10,000.00

020

Formulation of a fertilizer package for hybrid varieties of pumpkin (*Cucurbita maxima*)

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Pumpkin (*Cucurbita maxima*) is a popular low country vegetable in Sri Lanka and it has become a fundamental crop species in the farming systems of dry and intermediate zones. Introduced hybrid pumpkin varieties are becoming popular in Sri Lanka because of the higher yield. However, there is no fertilizer recommendation for hybrid pumpkin. Local farmers apply high dosages of Nitrogen(N), Phosphorus(P) and Potassium(K) levels which causes increased cost of production and reduced profit. Therefore, a field experiment was conducted to identify the effects of higher N, P and K levels on yield of hybrid pumpkin. The hybrid variety Arjuna was tested under eight different fertilizer levels where the Department of Agriculture (DOA) recommendation was taken as the control and one and half times of that was used as the higher levels of N, P and K. The experiment was arranged in a confounding design with three replicates with two blocks per each. Reproductive parameters and yield parameters *viz.* yield, number of fruits per vine, fruit width and diameter were recorded. The tested fertilizer levels did not show any significant effect on reproductive parameters and yield parameters of hybrid pumpkin, thus, indicating that the application of higher dosages of N, P and K is not economical. Hence, the DOA fertilizer recommendation is adequate for hybrid pumpkins though the yield is higher when compared to local pumpkin varieties.