PERFORMANCE OF S/2 d4 LOW INTENSITY HARVESTING SYSTEM OF RUBBER IN INTERMEDIATE ZONE OF SRI LANKA

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Introduction

Low intensity harvesting (LIH) systems in rubber plantations appeared to be a practical solution to address the issues related to labour, high rate of bark consumption and high cost of production. Rubber cultivation has been expanded to nontraditional areas, with the decline in land availability for further expansion in Wet zone. However, farmers faced with problems in time availability on engaging the activities with rubber and other seasonal crops they cultivated with commence of harvesting in the area. With more secured income with rubber, farmers tend to leave gradually from cultivation of other agricultural crops. Adoption of LIH systems in latex harvesting may reduce time allocation of farmers on rubber. With less rainfall, the initial establishment of rubber is quite difficult in intermediate zone (IZ); hence once established, it is important to keep the trees longer as much as possible. In this context, LIH may also be useful for farmers in IZ. Rubber tree is generally tapped along the half of the circumference of the trunk with the frequency of once in two days (S/2 d2) in harvesting. Recently S/2 d4 (tapped along the half of the circumference of the trunk with once in four-day frequency) system was recommended for harvesting rubber in Wet Zone of Sri Lanka. Among the LIH systems available, S/2 d4 was found to be more advantage; therefore, adaptability of S/2 d4 system may increase the sustainability of rubber growing whilst addressing the farmer issues in IZ.

Methodology

The experiment was conducted at Polgahawela and Padiyathalawa areas come under IL1a and IL2 agro ecological zones respectively. Mature rubber fields with RRIC121 genotype tapped on virgin bark (BO-1 panel) were selected for testing S/2 d4 system with monthly application of 2.5% ethaphon in IL2 agro ecological zone and 3.3% ethaphon in IL1a zone as the stimulation protocol. In IL2 zone with the given summer rest tapping was discontinued for one month. Simultaneously, S/2 d2 system was also performed as the control harvesting system in the same fields for comparison. Depending on the availability of plantations, three replicates blocks with 20 trees in IL1a and two replicate blocks with 50 trees in IL2 agro ecological zones were allocated for each harvesting system. Volume and percentage dry rubber content (%DRC) of latex were measured daily and with the knowledge of number trees and tapping days; yield per tree per tapping (GTT) and yield per tree per year (YPT) were calculated. As latex physiological parameters, sucrose, thiol and inorganic phosphorus contents were analyzed in both harvesting systems. Raw rubber properties such as initial plasticity (P_0), Plasticity retention index (PRI), Moony viscosity (V_R) and Ash content were analyzed in collected ribbed smoke sheet rubber in each harvesting system in IL1a and IL2 agro ecological zone

using the standard test methods. Data analyses were conducted mainly on rather descriptive manner and average values were compared using standard error.

Results and Discussion

Percentage dry rubber content (%DRC) was above 35% in both harvesting systems and did not show a significant variation among the harvesting systems in both agro ecological zones (Figure 1).

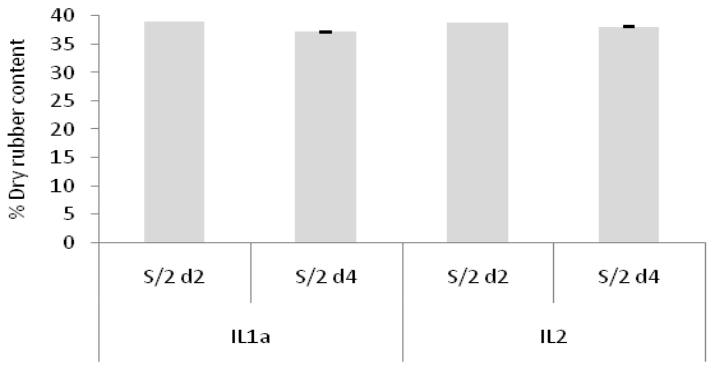

Figure 1. Percentage dry rubber content (%DRC) of S/2 d2 and S/2 d4 harvesting systems in IL1 and IL2 agro ecological zones

The yield per tree per harvesting (GTT) in S/2 d2 and S/2 d4 harvesting systems was 34.63 g and 63.62 g respectively in IL1a and in IL2 zone, it was 19.16 g and 41.87 g in S/2 d2 and S/2 d4 harvesting systems, respectively (Figure 2). The yield per tree per year (YPT) observed in S/2 d2 and S/2 d4 harvesting systems were comparable in both IL1a and IL2 agro ecological zone with averages of 5.54 kg and 5.25 kg, respectively in IL 1a zone and 3.07 kg and 3.35 kg, respectively in IL2 zone (Figure 3).

Comparatively higher sucrose and thiols contents in IL2 ecological zone justify the lower yield observed in IL2 zone. Comparatively higher inorganic phosphorus contents reflected high energy need for rubber conversion in latex vessels of trees in IL2. However, in both ecological zones, lower latex sucrose content was observed in LIH system than that in control harvesting system (S/2 d2) could be attributed to comparatively higher yields obtained per tapping (Table 1). Reduction in sucrose content with reduced harvesting frequency could partly be due to the dilution effect as the latex flow increase due to stimulation of trees in LIH system.

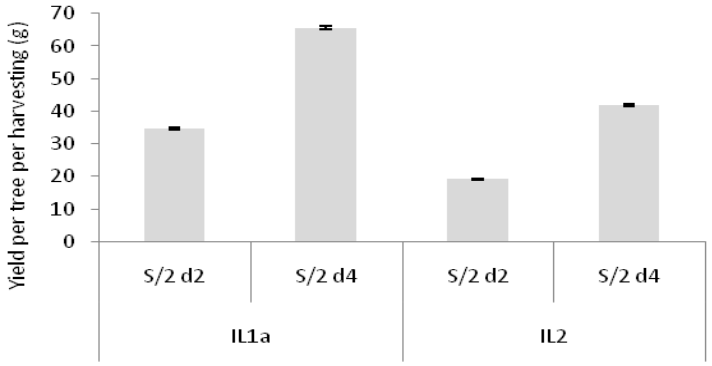

Figure 2. Yield per tree per harvesting (GTT) of S/2 d2 and S/2 d4 harvesting systems in IL1 and IL2 agro ecological zones

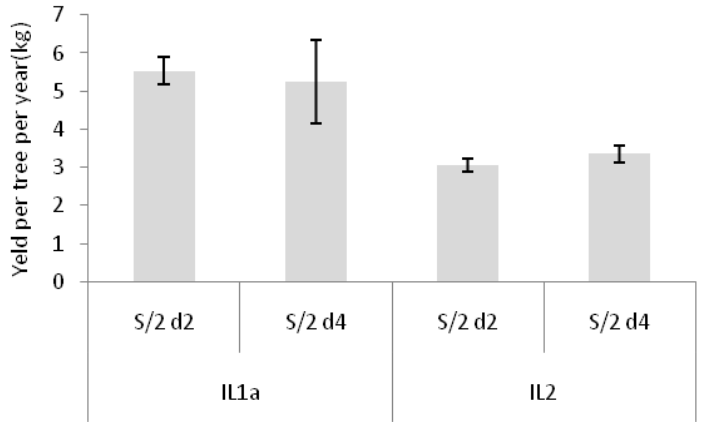

Figure 3. Yield per tree per year (YPT) of S/2 d2 and S/2 d4 harvesting systems in IL1 and IL2 agro ecological zones

Table 1. Sucrose, thiols and inorganic phosphorus (Pi) contents of S/2 d2 and S/2 d4 harvesting systems in IL1 and IL2 agro ecological zones

	IL1a			IL2		
Harvesting systems	Sucrose (mM)	Thiol (mM)	Pi (mM)	Sucrose (mM)	Thiol (mM)	Pi (mM)
S/2 d2	9.60	0.50	30.97	17.89	0.78	40.07
S/2 d4	5.77	0.58	42.16	6.58	0.83	54.03

In both agro ecological zones, raw rubber properties were not significantly different among the harvesting systems. However, in IL2 agro ecological zone initial plasticity and Moony viscosity were comparatively lower than that in IL1a ecological zone under both harvesting systems (Table2). Plasticity retention index and ash content of both harvesting systems did not show a considerable variation among the two agro ecological zones.

Table 2. Initial plasticity (P_0), Plasticity retention index (PRI), Moony viscosity (V_R) and Ash content of ribbed smoke sheet rubber of S/2 d2 and S/2 d4 harvesting systems in IL1 and IL2 agro ecological zones

Agro ecological zone	Harvesting systems	P_0 (Wallace units)	PRI	V_R (ML 1+4 @ 100 ^oC)	Ash (%)
IL1a	S/2 d2	48.60 (0.58)	84.04 (0.58)	70.71 (0.44)	0.23 (0.004)
	S/2 d4	53.01 (0.47)	82.45 (0.80)	77.02 (0.44)	0.24 (0.004)
IL2	S/2 d2	34.74 (0.25)	85.96 (0.50)	61.25 (0.24)	0.26 (0.003)
	S/2 d4	34.50 (0.27)	85.96 (0.43)	59.57 (0.26)	0.26 (0.004)

(Standard error of each value is given in the parenthesis)

Conclusions and Recommendations

Under both harvesting systems, overall latex yield observed was lower in IL2 agro ecological zone and this may due to comparatively dryer climatic condition in this area. However, S/2 d4 low intensity harvesting system performed well by giving expected yield levels in both IL1a and IL2 agro ecological zones. Comparatively higher % DRC revealed that stimulation protocols adopted do not affect the health of trees. Higher sucrose content in IL2 reflects the potential of trees to give higher yields but in the same time, higher inorganic phosphorous content revealed that trees are comparatively stressed in latex production. However, the yield decline observed in Padiyathalawa area (IL2) under both harvesting systems may be due to low rainfall than in Polgahawela area (IL1a).

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