စိုက်ပျိုးရေး၊ မွေးမြူရေးနှင့် ဆည်မြောင်းဝန်ကြီးဌာန
စိုက်ပျိုးရေးဦးစီးဌာန
နှစ်ရှည်သီးနှံဌာနခွဲ

Effect of Low Frequency Rubber Tapping Systems with Stimulation on Downward Tapping of Rubber Tree Clone PB 235

ကြိမ်နှုန်းနည်းအစေးခြစ်စနစ်နှင့်အစေးထွက်လှုံ့ဆော်ဆေးကိုပေါင်းစပ်အသုံးပြုခြင်း ဖြင့်အောက်ဖက်အစေးခြစ်စနစ်အပေါ်အကျိုးသက်ရောက်မှုကိုလေ့လာခြင်း

ဒေါ်သန္တာမိုး
ဦးစီးအရာရှိ
နှစ်ရှည်ပင်များသုတေသနနှင့်နည်းပညာဖွံ့ဖြိုးရေးဌာန
(မော်လမြိုင်)

Introduction

- Rubber provides advantages to the growers and to the society as a whole
- Latex gloves is a popular choice of disposable gloves since their protection against a range of bacterial and viral infections during COVID-19 crisis (https://www.medicalplasticsnews.com)
- Provides a permanent source of income

RUBBER REGENERATION

- Increase enzyme activity
- Increase sucrose availability
- Increase rubber biosynthesis

STIMULANT ETHEPHON

Increase yield

- LATEX FLOW
- Delays plugging
- Prolonged flow

(Kudaligama. K. V. V. S. et.al. 2019)

- In Myanmar, different tapping systems are used in each region
- Therefore, choosing an appropriate tapping system in combination of yield stimulant is an essential factor to determine the yield and profitability of rubber plantation

Problem Statement

❖ **high frequency tapping systems**

- high cost of production
- Low economic lifespan
- Scarcity of skillful tapper

LFT

Ethephon

will be a solution to solve these problems ????

❖ **excesses uses of stimulant**

- cause low dry rubber content
- increase incidence of tapping panel dryness
- low future yield potential

Objectives

- ✓ to evaluate the efficiency of low frequency tapping systems (LFT) with ethephon stimulation on yield and labor productivity
- ✓ to compare the profitability of different tapping system
- ✓ to identify the tapping systems showing the best efficiency

Materials and Methods

RI	RII	RIII	RIV
T 2 (S/2d2)	T5 (S/3d2)	T4 S/2 d4 ET 2.5 % Pal (1) 6/y	T1 (S/2d1)
T1 (S/2d1)	T 2(S/2d2)	T5 (S/3d2)	T4 S/2 d4 ET 2.5 % Pal (1) 6/y
T 4 S/2 d4 ET 2.5 % Pal (1) 6/y	T3 (S/2 d3 ET 2.5 % Pal (1) 5/y)	T1 (S/2d1)	T3 (S/2 d3 ET 2.5 % Pal (1) 5/y)
T3 S/2 d3 ET 2.5 % Pal (1) 5/y)	T1(S/2d1)	T2 (S/2d2)	T 5(S/3d2)
T5(S/3d2)	T 4 S/2 d4 ET 2.5 % Pal (1) 6/y	T3 S/2 d3 ET 2.5 % Pal (1) 5/y	T2 (S/2d2)

Treatments - 5

Replication - 4

Design - RCBD

Tapping Method- Downward

Tapping Panel - BII 2 (Second renewed bark of B0-1)

Experimental Site - PCRDC (Mawlamyine)

Rubber Clone - PB 235

Planted Year - 1994

Spacing - 20 ' x 9 '

Plot Size - 10 trees

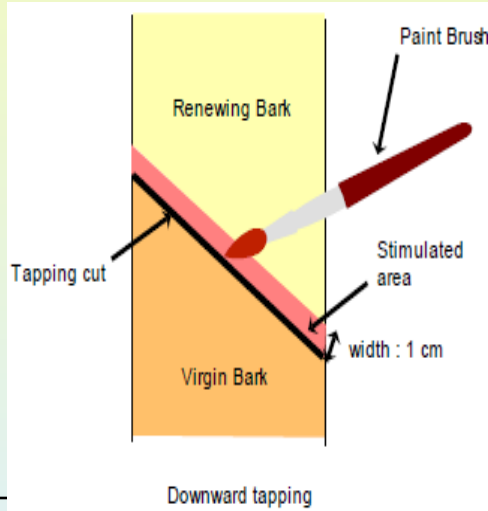
Total plants - 200 trees (1 ac)

Research Duration- 8 month (2021 Oct-May)

Materials and Methods (cont.)

Table 1. Details of experimental treatments

Treatment	Length of cut	Frequency of Tapping	Stimulation /year
T 1	S/2	d1	No stimulation
T 2 (Control)	S/2	d2	No stimulation
T 3	S/2	d3	ET 2.5 % Pal (1) 5/y
T 4	S/2	d4	ET 2.5 % Pal (1) 6/y
T 5	S/3	d2	No stimulation



Treatments	OCT	NOV	DEC	JAN	FEB	MAR	APRI	MAY	JUN	JULY	AUG	SEPT
T1	x	x	x	x	x	x	x	x	x	x	x	x
T2	x	x	x	x	x	x	x	x	x	x	x	x
T3	√	√	√	x	x	x	√	√	x	x	x	x
T4	√	√	√	x	x	√	√	√	x	x	x	x
T5	x	x	x	x	x	x	x	x	x	x	x	x

Materials and Methods (cont.)

Data collection

- **Latex yield**

  (gram/tree/tap , gram/tree/year and lb/ac/yr)

- **Dry rubber content (DRC) (%)**

- **Bark consumption**

- **Labour productivity**

- **Profit as % of revenue** $Profit\ as\ \%\ of\ revenue = \frac{Profit}{Revenue}\ x\ 100$

- **Tree Dryness(%) =** $\frac{\text{အစေးခမ်းခြောက်စရိယအလှည့်}}{\text{အစေလှီးခြင်းအလှည့်}} \times 100$

Results and Discussion

Table 2 . Dry rubber yield (g/t/t, g/t/yr and lb/ac/yr) among five treatments

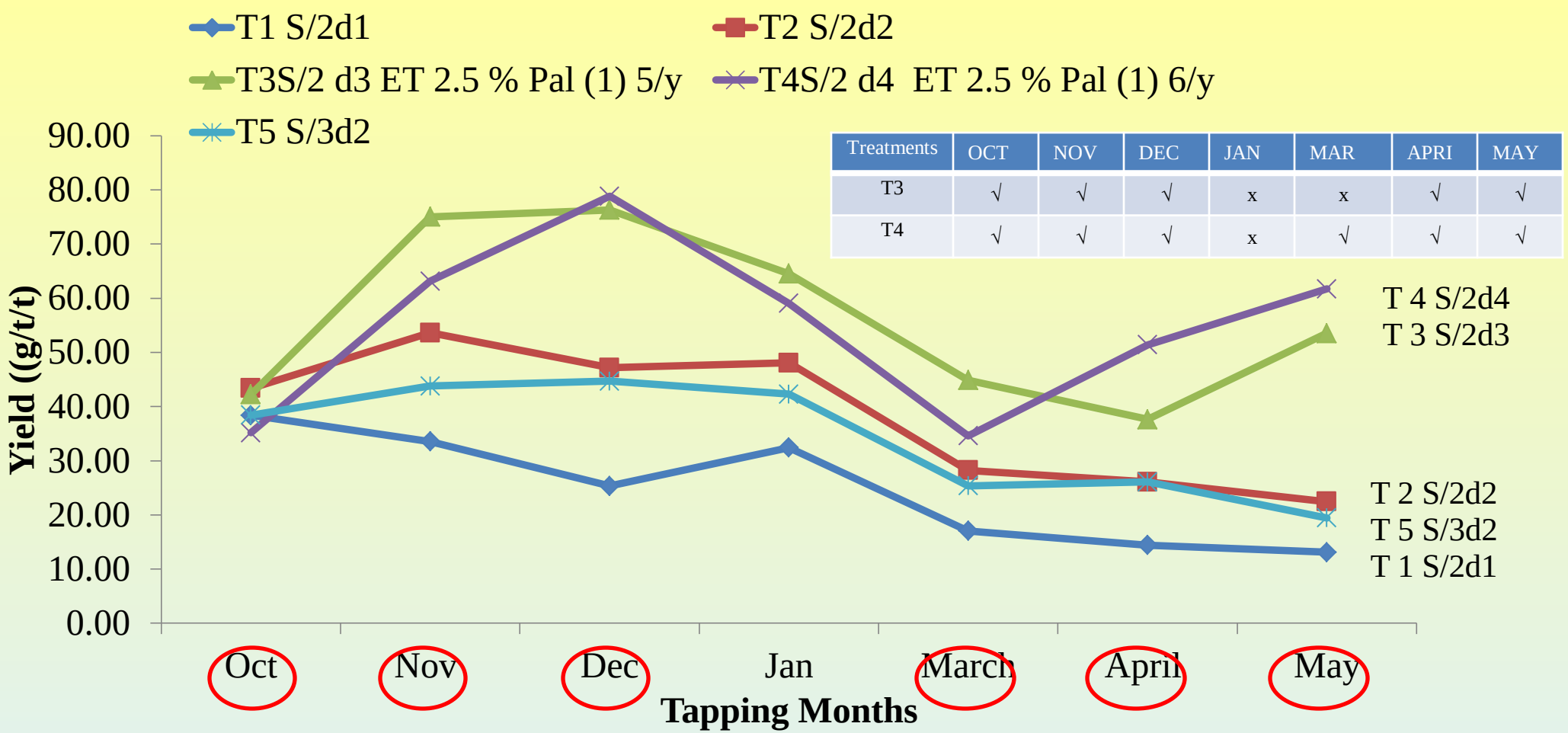
Treatments	Mean Yield (g/t/t)	increase (% C)	(g/t/yr)	increase (% C)	lb/ac/yr	increase (% C)	Tapping days
T1 (S/2 d1)	22.94 c	- 38.0	3945 a	+23.8	1564 a	+23.8	172
T2 (S/2d2) (Control)	37.05 b		3187 b		1263 b		86
T3 (S/2 d3) ET 2.5 % Pal (1) 5/y	58.28 a	+57.3	3380 ab	+6.1	1340 ab	+6.1	58
T4 (S/2 d4) ET 2.5 % Pal (1) 6/y	55.52 a	+ 49.9	2498 c	- 21.6	991 c	- 21.6	45
T5 (S/3 d2)	33.64 b	- 9.2	2893 bc	-9.2	1147 bc	-9.2	86

✓ T 3
✓ T 4

LFT must be combined with proper stimulant to increase potential yield (g/t/t) at each tapping. (Gohet *et al.*, 1991)

✓ T 1
✓ T 3

g/t/t = gram/tree/tapping
lb/ac/yr = no. of tapping days × g/t/t ×no. of plants per acres ÷ 454 g
Different letters in the same column indicates a significant difference at P ≤ 0.05 by LSD test



Treatments	OCT	NOV	DEC	JAN	MAR	APRI	MAY
T3	√	√	√	x	x	√	√
T4	√	√	√	x	√	√	√

Fig. 1. Average yield (g/t/t) by months in the five treatments during October 2020 to May 2021

LFT system combining with ethephon stimulation increase the duration of latex flow after tapping (Jacob *et al.*, 1989).

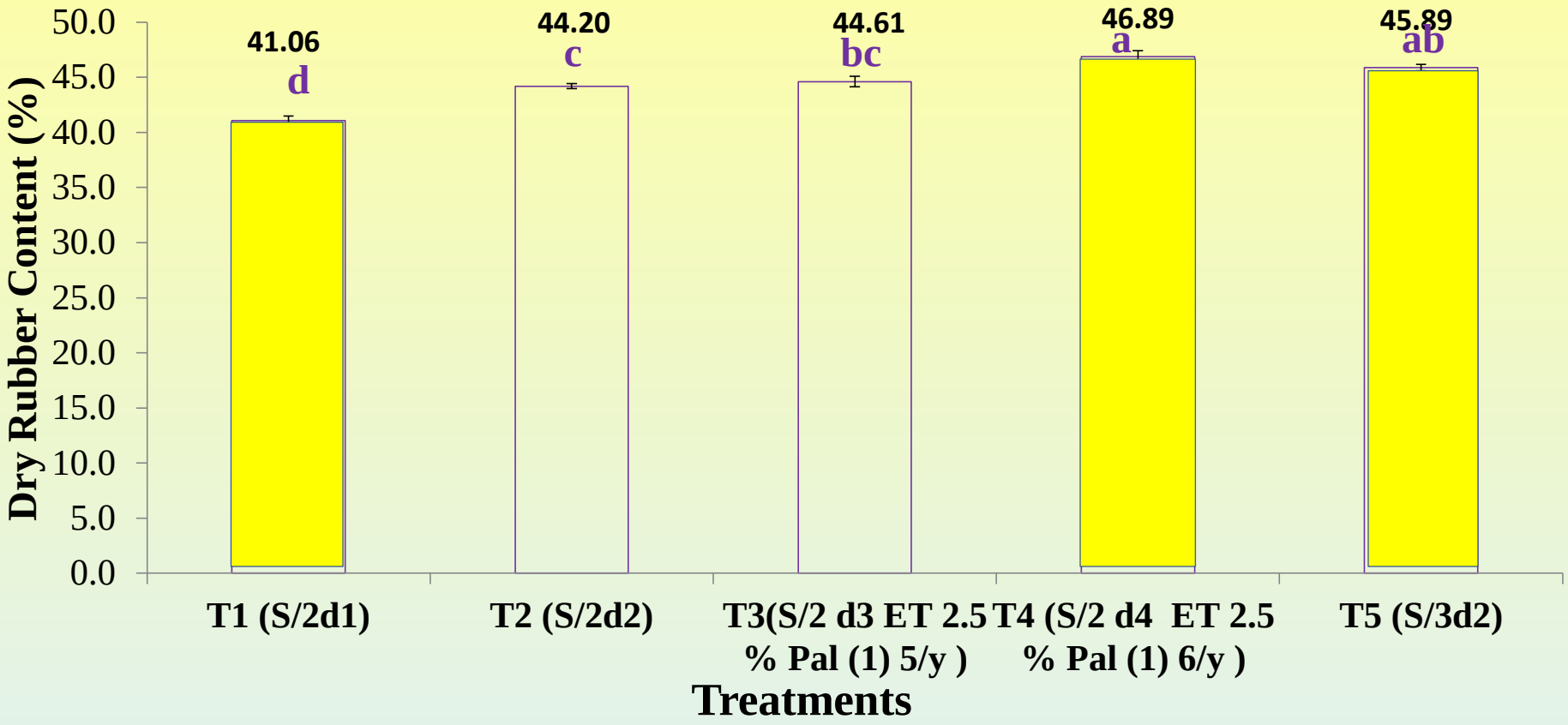


Fig. 2. Average dry rubber content (%) of the five treatments during October 2020 to May 2021: different letters above each bar indicate significant difference at P ≤0.05 by LSD test

Table 3. Labour Productivity of each tapping system

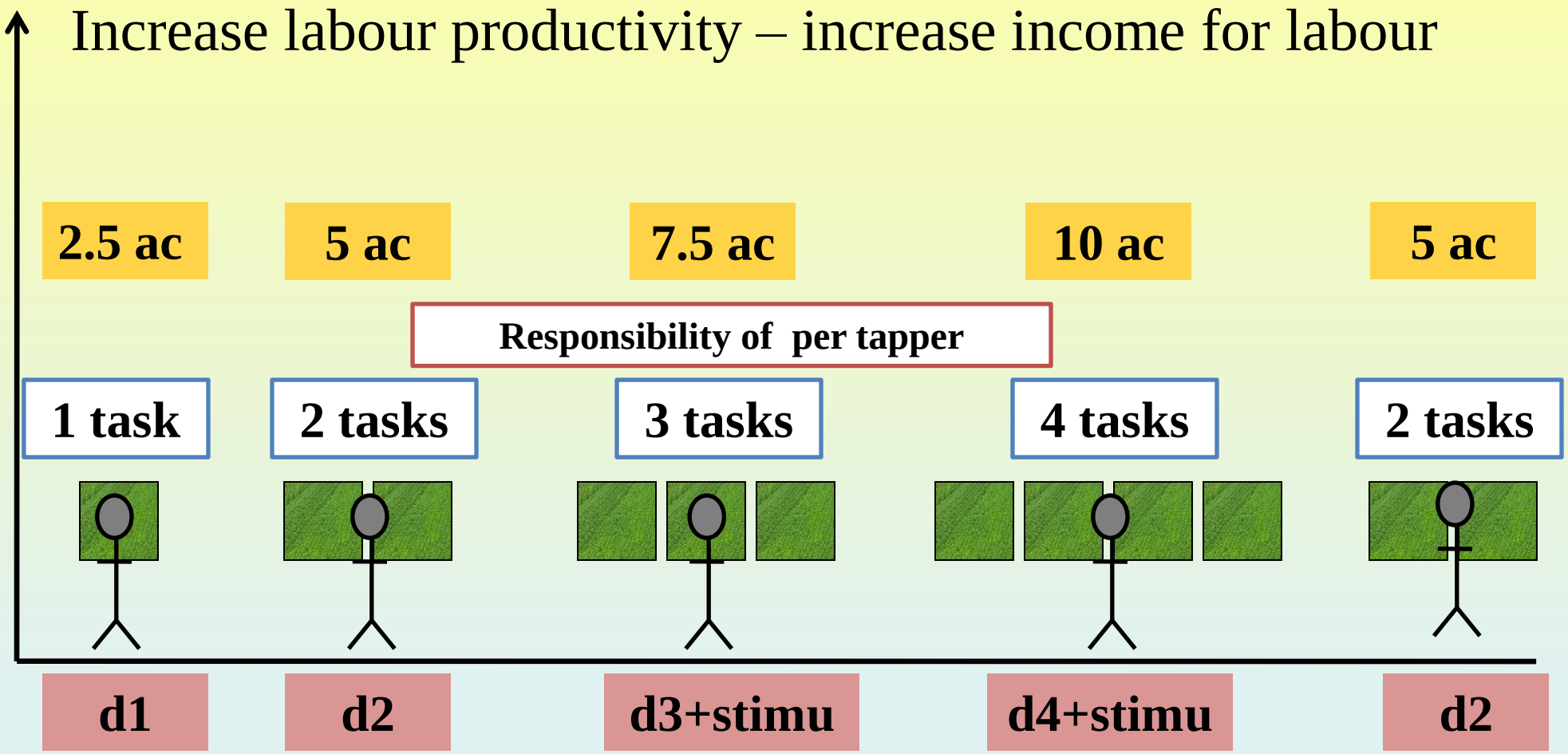


Table 4 . Tapper requirement and reduced tapper in five treatments

Treatments	Required Tapper (%) of d2 requirement	Reduced Tapper (%) of d 2 reduced
T1 (S/2 d1)	200	+100
T2 (S/2d2) (Control)	100	0
T3 (S/2 d3 ET 2.5 % Pal (1) 5/y)	67	33
T4 (S/2 d4 ET 2.5 % Pal (1) 6/y)	50	50
T5 (S/3 d2)	100	0

Table 5. Average Monthly Bark consumption and expected exploitation life as affected by different tapping system

Treatments	Actual Tapping Intensity (%)	Average Bark Consumption (cm)	Monthly Bark Consumption (cm)	Expected Exploitation Life (year)
T1 (S/2 d1)	94.24	46.13 a	6.6 a	12.0
T2 (S/2d2) (Control)	47.12	24.89 b	3.6 b	24.0
T3 (S/2 d3 ET 2.5 % Pal (1) 5/y)	31.78	15.51 c	2.5 c	38.2
T4 (S/2 d4 ET 2.5 % Pal (1) 6/y)	24.66	15.16 c	2.2 c	39.0
T5 (S/3 d2)	47.12	25.52 b	3.6 b	35.0
Pr > F		0.000	0.000	
LSD (0.05)		3.9496	0.4189	

Different letters above each bar indicate significant difference at P ≤ 0.05 by LSD test

Actual Tapping Intensity (%) = 4 x ½ x no. of tapping days / 365 x 100

Soumahin 2010 stated that Low frequency tapping systems reduce the annual consumption of bark and consequently increase the economic life time of rubber trees.

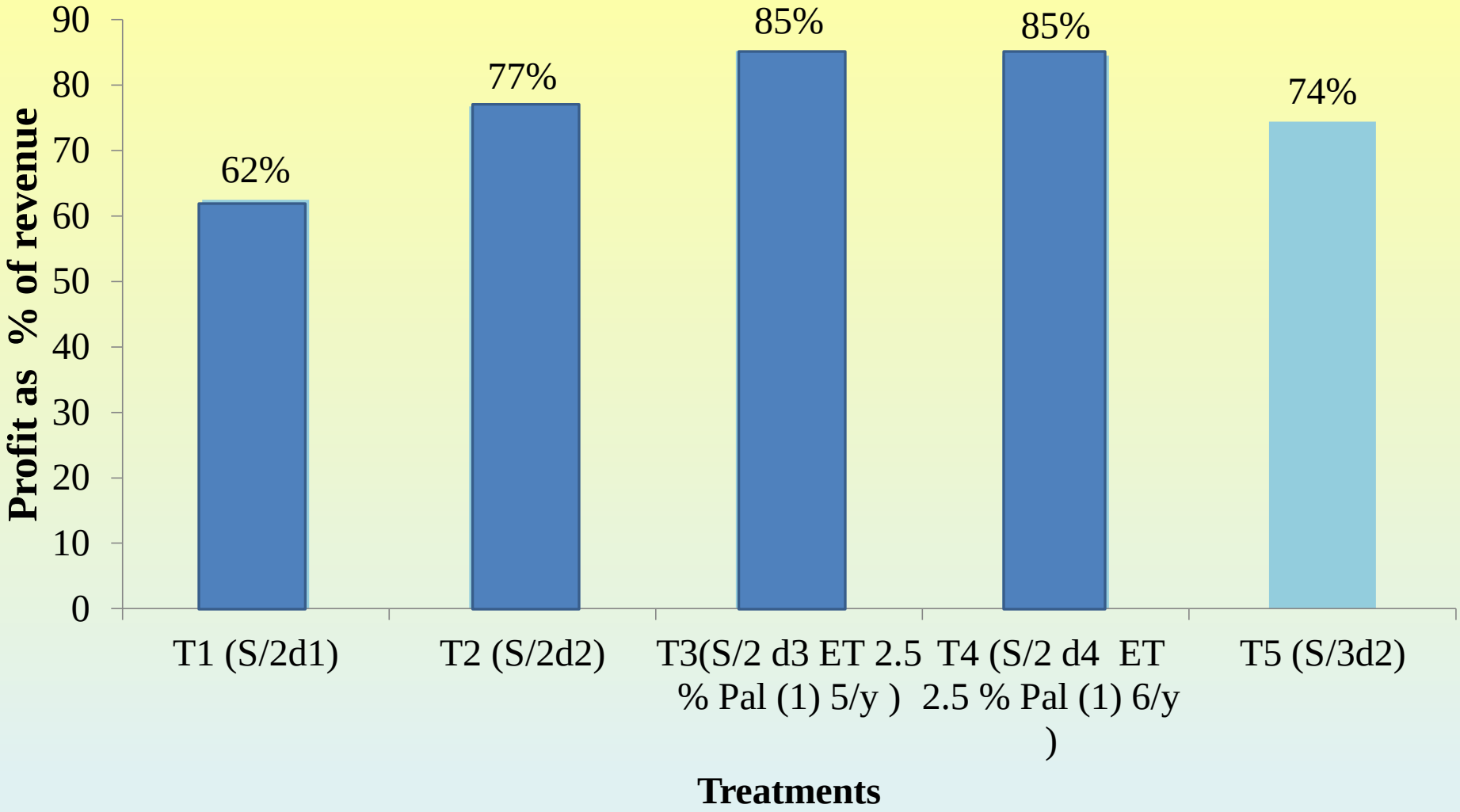


Fig. 3. Profit as percent revenue of the five treatments during October 2020 to May 2021

Table 6. Tapping Panel Dryness by five treatments

Treatments	Tapping Panel Dryness(%)	
T1 (S/2d1)	17.93	a
T2 (S/2d2)	3.73	b
T3 (S/2 d3 ET 2.5 % Pal (1) 5/y)	9.42	ab
T4 (S/2 d4 ET 2.5 % Pal (1) 6/y)	13.03	ab
T5 (S/3d2)	9.23	ab
Pr >F	0.2132	
LSD(0.05)	12.376	

Different letters in the same column indicates a significant difference at $P \leq 0.05$ by LSD test

Chrestin 1985 reported that the rate of Tapping Panel Dryness increase with the frequency of tapping.

Conclusion

- ❖ T 3 (S/2 d3 ET 2.5 % Pal (1) 5/y)
- ❖ T4 (S/2 d4 ET 2.5 % Pal (1) 6/y)

PB 235

- Highest dry rubber yield (g/t/t)
- Highest profit
- Best labour productivity
- Lowest tapper requirement
- Lowest bark consumption and high extend exploitation life

- ❖ T1 (S/2d1)

- Highest dry rubber yield (lb/ac/yr)
- Lowest profit
- high tapper requirement
- high bark consumption, high tree dryness and lowest extend exploitation life

S/2 d1 –should not be practiced

Recommendation

❖**The finding will provide smallholder to reduce increasing shortage of skilled tappers, to increase the tapping labor productivity on the sustainable of natural rubber production**

Future plan

- ✓ **Should be conducted in different locations**
- ✓ **Need to tested on different clones**
- ✓ **Should be tested with different ethephon application**

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(https://www.medicalplasticsnews.com)

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