MINISTRY OF AGRICULTURE, LIVESTOCK AND IRRIGATION

DEPARTMENT OF AGRICULTURE

PERENNIAL CROP DEPARTMENT

Effective Tapping System to Increase Rubber Yield of RRIT 251 Clone

RRIT 251 မျိုး၏ ရော်ဘာအထွက်နှုန်းတိုးတက်စေရန်ထိရောက်သောအစေးခြစ်နည်းစနစ်

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Staff Officer
PCRDE (Yedagon), Kawthaung

DATE 9.2.2024

Introduction

Natural rubber yield among rubber producing countries (2022)

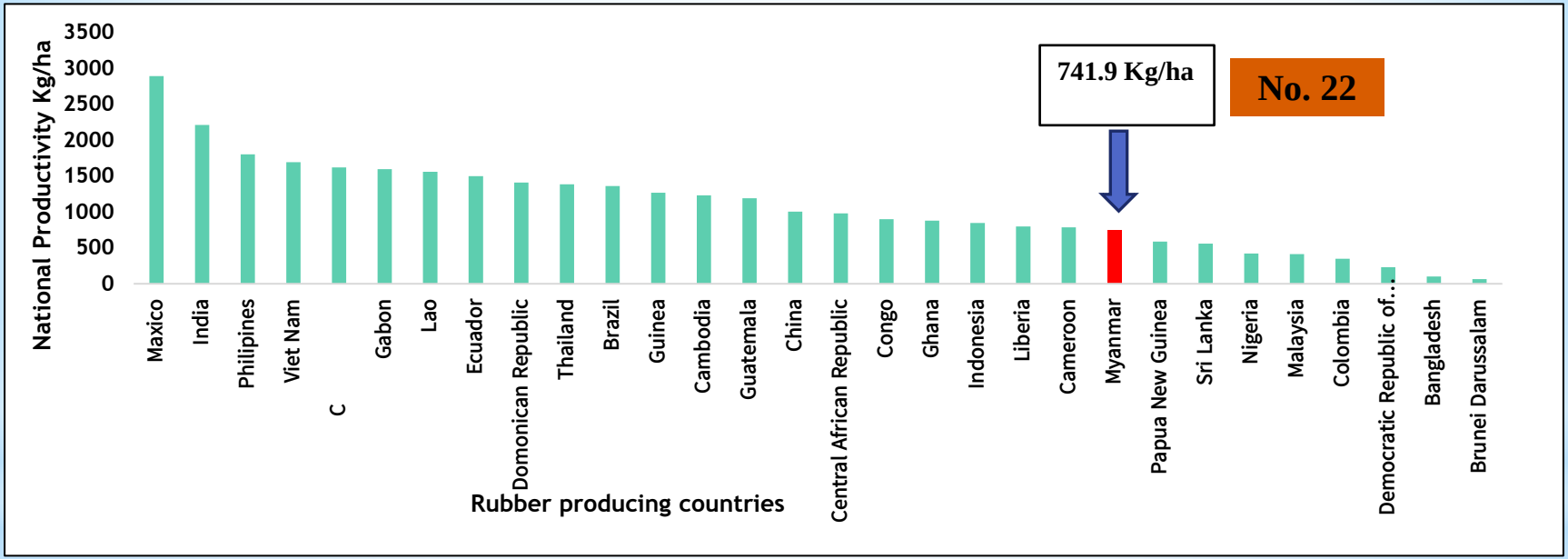


Fig. 1. Natural rubber yield (kg/ha) among rubber producing countries

Source: FAOSTAT-2022

Introduction (continued)

Table(1) Rubber cultivated and harvested area of Kawthaung Township,2022-2023 *source: MOALI (2023)*

No	Township	Growing Area (ac)	Tapping Area(ac)	Yield(lb)/ac	Total yield(lb)	Total yield(Mt)
1	Kawthaung	30485	15000	953.70	13555500	6148.67
2	Khamaukyi	8975	5000	900.07	4500350	2041.33
		39460	20000	902.79	18055850	8190

Table(2) Annual rainfall and raining days of Kawthaung Township

No	Year	Rainfall(mm)	Raining days	
1	2013	4897	171	
2	2014	4479	155	
3	2015	4008	159	
4	20 16	4627	181	
5	2017	4403	188	
6	2018	4082	179	
7	2019	3789	166	
8	2020	3637	147	
9	2021	5346	176	
10	2022	4490	186	
11	2023	3586	147	

Source; (Meteorology and Hydrology Department ,Kawthaung District)

Introduction (continued)

Important factors of latex exploitation

1. The size of tapping task

$$Number\ of\ tappers\ required = \frac{Planting\ density\ per\ hectare \times size\ of\ the\ area(ha)}{Frequency\ of\ tapping \times task\ size}$$

A very high task size gives higher yield to the tapper but a lower yield to the hectare basis.
A very low task size gives lower yield to the tappers but a higher yield to the hectare basis.

MRB, Malaysia,2006

Task size based on Tapping system

S/2 d2 - 500 plants /tapper
S/2 d3 - 500 plants /tapper
S/3 d2- 665 plants / tapper
S/3 d3- 665 plants / tapper

2. Tapping method

Rainguarding

- To overcome crop loss
- To reduce TPD to low level ncainity of stimulation
- recommendation with substantial reduction in

DR K R Vijayakumar, INRC 2012

Polythene skirt type

Introduction (continued)

Stimulation

Ethephon releases ethylene gas to enhance latex yield because it increases the duration of latex flow after tapping with the reduction of latex coagulation by activating latex cell metabolism (*Jacob et al., 1989*, *d'Auzac et al., 1997*)

Effective Tapping Technique should be:

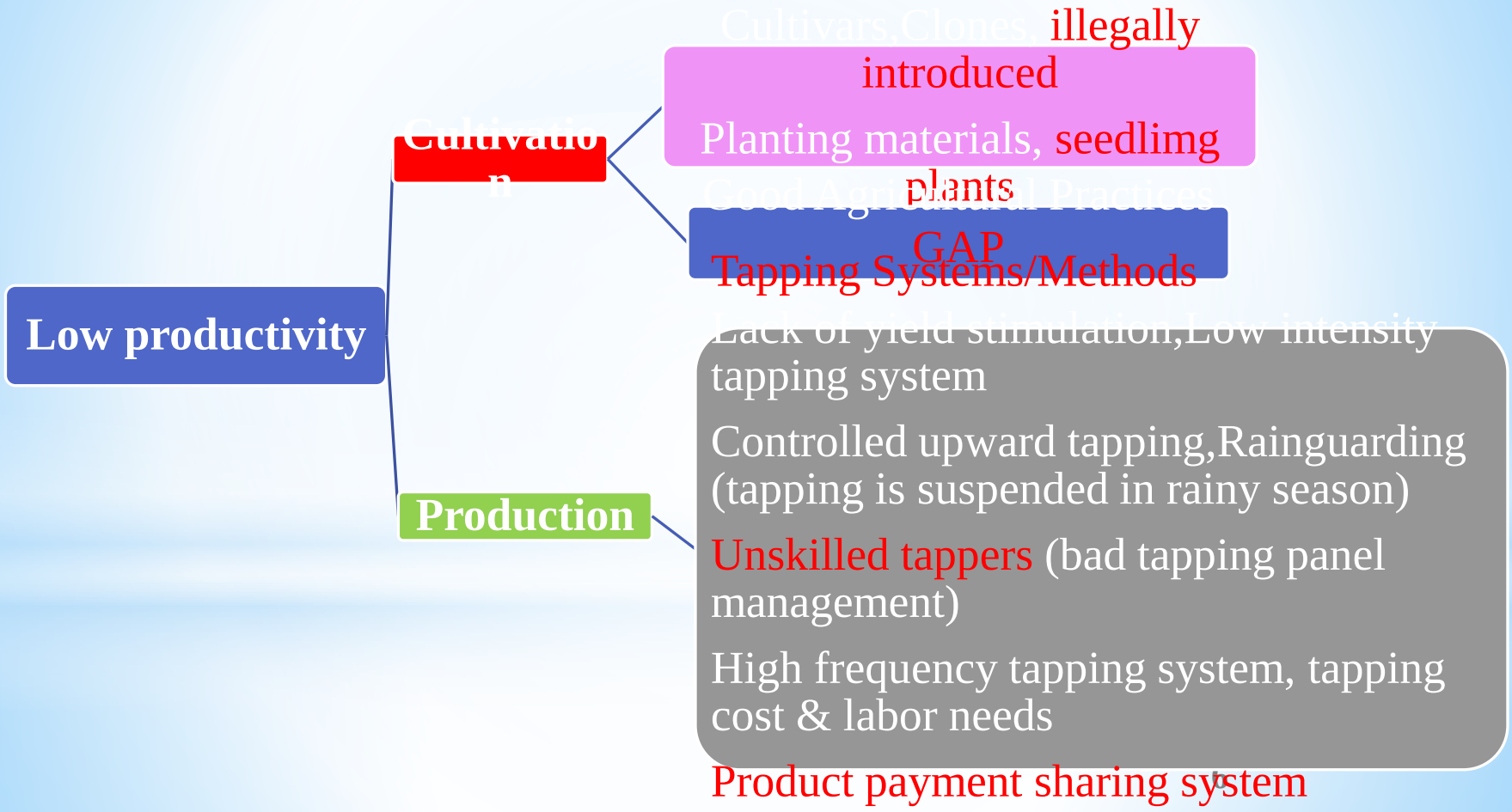
- High yield (g/t/t, Total g/t, yield /acre)
- High income,
- Low cost,
- Acceptable profits,
- Minimum labor requirement,
- Low bark consumption,
- Low tapping intensity and frequency

Popular clone - **RRIT 251**
Origin - Thailand
Parents - Illegitimate clonal seed
Recommended Group - Class I
Latex yield in (LSCT)

Year	1	2	3	4	5	mean
g/t/t	40.8	46.7	51.6	56.3	61.7	51.4

Source:Compendium of Morphological Descriptor of Clones Under the IRRDB Multilateral Clone Exchange Program

Problem Statement



Objective

- To evaluate the effectiveness of different tapping systems on rubber yield and profitability of RRIT 251, and
- To reveal the effective tapping system on natural rubber production of RRIT 251

Materials and methods

Study site : **PCRDE, Yedagon, Kawthaung District**, Myanmar

46 meters above sea level

pH- 4.5- 5.5

Treatments: **T1- S/2d2 (Control)**

T2- S/2 RG d2

T3- S/3 d1 2d3

T4- S/3RGd3ET2.5%La(0.5)6/y

T5-S/2RGd3ET2.5%La(1)6/y

Study duration 1st April 2023 to 31st December2023

Design: One Tree Plot Design (RCB) Replication: 10

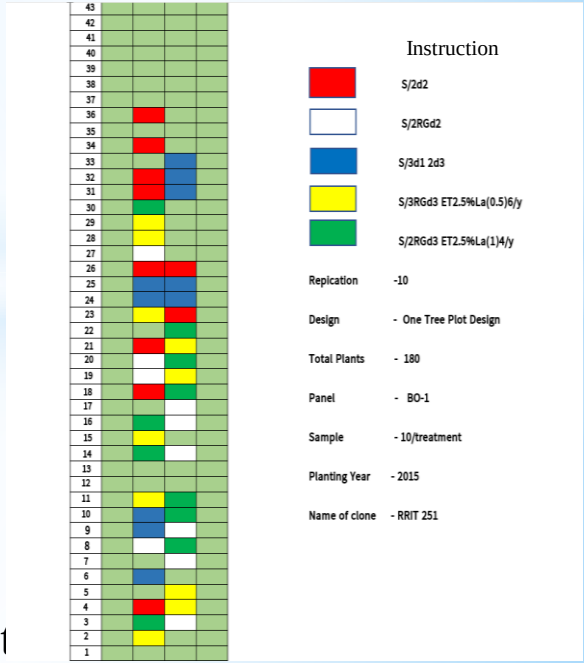
Rubber clone: **RRIT 251** Plant age: **9 years**

Plant spacing: 7m x 3m Total area: 1.0 acres

Planting Date: 2015 Data collection: 10 trees/treatment

Statistix 8.0

Layout Plan



Materials and methods (continued)

Weeding - twice a year

Fertilizer application - Pre moonson/ Late moonson 15:7:18:2 ratio of N:P:K:Mg 0.5kg/tree/time

Rainguard fitting - 1st week of April 2023

Tapping panel - BO-1

Plant girth range - 48.3- 56.0 cm

Length of Tapping cut - 30 cm

Tapping method - downward tapping , Rainguarding

Panel control - Mancozeb 0.375% (5g/ liter) Weekly spraying

Data collection - **Daily** recording

- **TSC (Frying Pan Method)**

Materials and methods (continued)

Table(3) Stimulation schedule for one year tapping

Treatment	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apri
S/2 d2												
S/2 RG d2												
S/3 d1 2d3												
S/2 RGd3.ET2.5%La(1)6/y		✓	✓	✓	✓	✓	✓					
S/3 RG d3.ET2.5%La(0.5)6/y		✓	✓	✓	✓	✓	✓					

Measurement parameters

- Rainfall and Temperature records
- Rubber yield (g/t/t , g/t, kg/ha, DRC%)
- Bark consumption
- Tapping Panel Dryness(TPD %)
- Tapper's Productivity, Income
- Cost and Benefit

Results and Discussion

Rainfall, Raining days and Temperature Records

Table(4) Rainfall and temperature collection from January to December 2023(Kawthaung)

No	Month	Raining days	Rainfall (mm)	Maximum Temperature°C	Minimum temperature°C
1	January	1	1.06	31.23	20.66
2	February	3	1.06	30.86	21.08
3	March	-	-	34.2	20.83
4	April	3	16.00	36.5	23.00
5	May	14	235.20	35.14	23.32
6	June	22	747.01	30.55	21.70
7	July	18	495.3	31.21	21.79
8	August	24	634.49	31.41	21.95
9	September	27	826.52	29.92	20.78
10	October	16	318.52	30.94	20.99
11	November	19	317.5	37.09	21.56
12	December	-	3.05	31.0	21.00

Source; (Meteorology and Hydrology Department ,Kawthaung District)

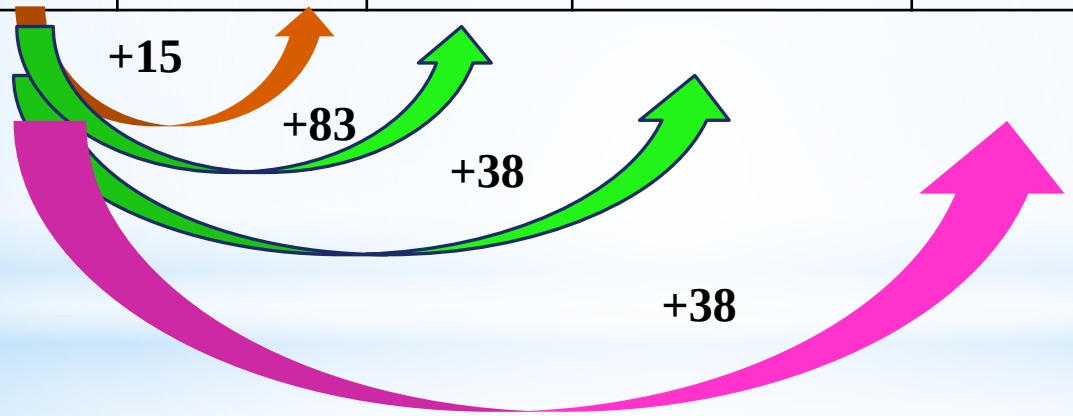
Good soil moisture in May-December favourable to prolonged latex flow time

Results and Discussion (continued)

Tapping days

Table(5) Total tapping days during 9 months from April to December 2023

S/2d2	S/3 d1 2d3	S/2RGd2	S/2RGd3.ET2.5% La(1)6/y	S/3RGd3ET. 2.5% La(0.5)6/y
49	64	132	87	87



More tapping days by Rainguarding

Results and Discussion(continued)

gram per tree per tapping(g/t/t)

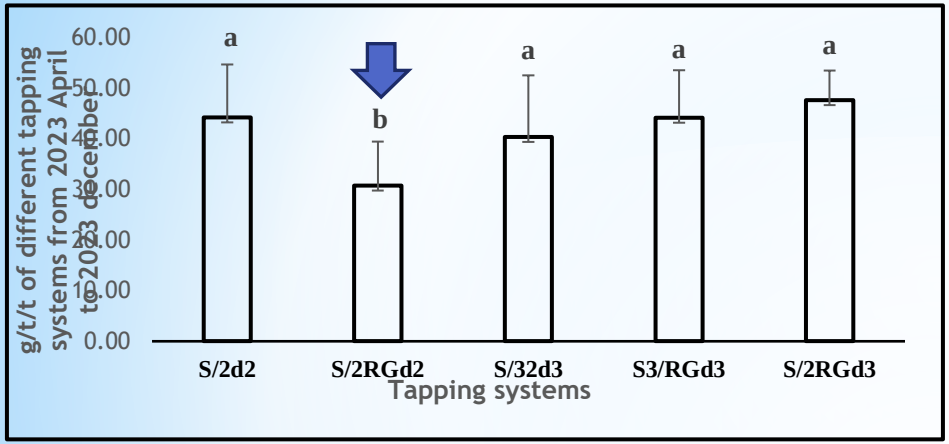


Fig.2 Comparing g/t/t of different tapping systems within 9 months

low frequency tapping recorded higher g/t/t levels and this true for all clones .More frequent tapping reduce DRC.

- High moisture & stimulant
- Increase metabolic activity
- Latex regeneration
- Prolonged latex flow
- Increased yield

Lacote et al 2004,

H. K. L. K. Gunasekera (hkgun@ou.ac.lk)

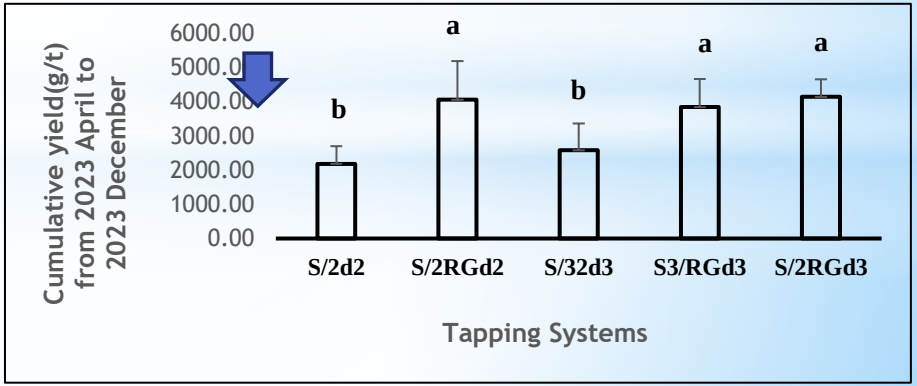
Dry Rubber Content (DRC %)

Table 6. Comparing monthly DRC of different tapping systems within 9 months

Months	S/2d2	S/2RGd2	S/32d3	S3/RGd3	S/2RGd3
April	42.1	39.46	42.23	41.7	37.79
May	36.85	36.52	33.46	39.86	39.86
June		32.95		38.89	36.68
July		31.53		35.25	33.62
August		30.41		34.76	33.46
September		28.6		32.74	31.38
October	39.1	29.95	38.1	34.95	32.17
November	34.8	29.89	35.92	37.8	32.54
December	32.96	31.59	31.16	37.26	30.47
Mean	42.11 ab	30.76 c	38.26 bc	44.16 ab	47.62 a

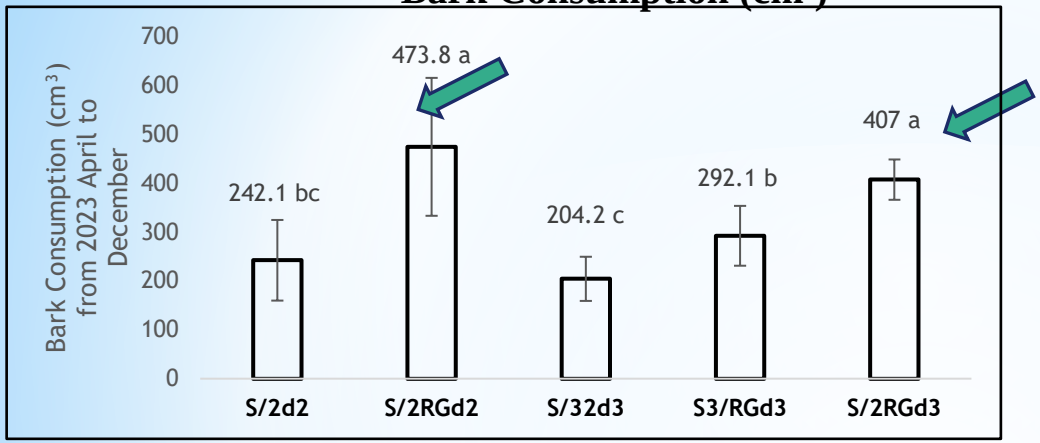
Cumulative yield (g/t)

Table 7. Comparing Cumulative yield g/t of different tapping systems within 9 months



Results and Discussion(continued)

Bark Consumption (cm^3)



Figure(3) Bark consumption(cm) within nine months from April to December

KK=PL ×KS×TS

KK= the bark consumption (in cm3),
PL= the length of track (in cm),
KS= the depth of tapping (in cm) and
TS= the tapping thickness (in cm)

H Susanto et al 2019

The more the tapping days , frequency & cut length increases , the more the bark consumption

Tapping Panel Dryness (TPD%)

Table(8) TPD severity stage of of different tapping systems within 9 months(April-Dec)2023

Tapping systems	S2 d2	S2 RG d2	S2 d1 2d3	S3RG d3 Et 2.5% 6/y	S2 RG d3(Et 2.5% 6/y)
TPD %	0	0	0	0	0
severity stage	Nil	Nil	Nil	Nil	Nil

The low tapping frequency applied consistently had potential impacts not only the labor-saving but also a longer economic lifespan.

Sainoi et al., (2017)

TPD%- 1-20% is Very low severity stage(VL) Okoma et al.2011

low frequency tapping system was more suitable to minimize the incidence of tapping panel dryness (TPD) *Senevirathna et al. (2007)*

Results and Discussion (continued)

Table (9) Summary of Experimental results from April-December

	T1 S/2d2	T2 S/2RGd2	T3 S/3d1 2d3	T4 S3/RGd3ET2.5%La(0.5)6/y	T5 S/2RGd3ET2.5%La(1)6/y
TSC%	41.51	35.43	39.53	39.71	37.34
DRC%	37.16	32.32	36.17	37.02	34.22
g/t/t	42.80 a	39.60 a	39.00 b	42.70 a	45.00 a
Total g/t	2183.24 b	4057.42 a	2582.85 b	3842.27 a	4142.85 a
Yield/acre (lb)	816.53 lbs	1517.48 lbs	965.99 lbs	1437.00	1549.43 lbs
cost/tree	1625	4603	1702	3031	3483
income/tree	6844	12720	8097	12045	12987
Profit /tree	5129	8117	6395	9014	9504
profit/ac (kyats)	88230	1379890	1087150	1532380 (+1444140)	1615680 (+1527450)
Cost per unit production(Kyats/lb)	338	515	300	359	382
daily Tapper's productivity	47.10 lb	43.56 lb	57.06 lb	62.47 lb	49.5 lb
daily tapper's income	12500 kyats	12500 kyats	13300 kyats	13300 kyats	12500 kyats
Bark consumption	242.1 bc	473.8 a	204.2 c	292.1 b	407.0 a
TPD %	0	0	0	0	0
Tapping days	49	132	64	87	87
Tapping Intensity	27%	72%	23%	32%	48%
Tapper needed for 1500 plants	1.5	1.5	2.25	0.75	1
Task size	500 plts	500 plts	665 plts	665 plts	500 plts

S/3RGd3ET2.5%La(0.5)6/y system is the most effective to overcome crop loss of RRIT 251 due to more raining days in Kawthaung.

Conclusion

- T4 : S/3RGd3ET2.5%La(0.5)6/y system might be effective on RRIT 251 by one third spiral cut practice.
- T5 : S/2RGd3ET2.5%La(1)6/y system might be effective on RRIT 251 by half spiral cut practice.

Future Plan

- It is necessary to do further study for at least 5 years in yield responses of each treatments on RRIT 251.
- It might be able to contribute the applied results to the rubber clients.

Photo Records for Research Activities

Rainguard fitting

Panel controlling

Photo Records for Research Activities (continued)

Sampling

Oven drying for TSC

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THANK YOU ALL