

USE OF RAINGUARD FOR RUBBER TREES

BY

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In 1947, the Perera, Whitclaw Commission on the rubber industry in Sri Lanka, observed as follows—"For many years attempts have been made to perfect some appliance which would protect the tapping panel of the rubber tree from rain and so allow tapping on wet days. In some districts, up to 50 days crop is lost each year owing to the impossibility of tapping a wet tree. In this way, immense quantities of rubber are lost to the producer and there is also a consequent loss of large sums of money to the wage earner."

The Commission recommended that the Government should continue to encourage the development of some appliance to protect the tapping panel from rain and also pointed out that the loss, which was considerable with old seedling rubber could be three or four times greater with high yielding cultivars. Today, the problem becomes even more important in the light of the present demand by plantation workers for a monthly wage.

During the monsoon seasons the tapping panel remains wet for long periods even after the rain has ceased mainly because of rain water seeping down the trunk, which prevents normal tapping. This could lead to either (1) loss of tapping days, when no tapping is possible during the day or (2) loss of normal tapping days when tapping is carried out late in the day which results in loss of crop by 20 to 25% of the normal days collection (Silva, 1960). A sudden, unexpected shower before latex collection could also result in partial or total washout. In Sri Lanka the major rubber growing areas Kalutara, Ratnapura and Kelani Valley fall within the wetzone. The extent to which adverse weather conditions hinder harvesting of crop in these areas is given in TABLE 1.

TABLE 1

ANALYSIS OF TAPPING ROUNDS PER YR. FOR FOUR ESTATES IN KALUTARA,
KELANI VALLEY AND RATNAPURA AVERAGE FOR FIVE YEARS
1968 TO 1972

Area	Estate	Possible tapping days*	Normal tapping	Late tapping	Washout	Double tapping	No Tapping due to Rain
Kalutara	Dartonfield	356	211	63	11	--	70
Kalutara	Vogan	356	160	79	6	36	76
Kelani Valley	Panawatte	353	217	41	21	55	73
Ratnapura	Kuruwita	359	170	57	20	—	115

*Excluding holidays

An analysis of tapping rounds for a few estates in these areas for five years from 1968 to 1972 is presented in TABLE 1. Average number of tapping days lost (given in the last column) ranges from 70 for Dartonfield Estate to 115 for Kuruwita in Ratnapura,

and late tapping from 41 days for Panawatte Estate, Kelani Valley to 79 days for Vogan Estate and rain interference or washout from 6 days for Vogan to 21 days for Panawatte. The trend remains more or less the same in all these estates. To make up at least partly for the loss in tapping days, many commercial estates resort to double tapping, which is 36 and 55 days respectively for Vogan and Panawatta Estates for these years.

While the loss in tapping days is considerable in wet districts, the crop lost due to late tapping and rain interference could also be quite substantial. A comparison of average crop per day for Eladuwa Estate (1) normal tapping (2) late tapping and rain interference, over a period of five years is given in TABLE 2. The crop lost, per day on late tapping days varies from 11.2% to 18.2% and due to rain interference from 25.5 to 53.5%. What this means for the estate in terms of crop lost is given in TABLE 3. Over the five year period, on an average, the estate lost 28,784 lb per yr owing to late tapping (39.6 days) and rain interference (12.8 days), that is 4% of the harvested crop/yr from 739 acres under tapping (calculated mean for 5 years.)

TABLE 2

ELADUWA ESTATE—KALUTARA

COMPARISON OF AVERAGE CROP PER DAY FOR (1) NORMAL TAPPING

(2) LATE TAPPING (3) RAIN INTERFERENCE AND CROP LOST

PER DAY DUE TO LATE TAPPING AND RAIN INTERFERENCE

RESULTS FOR FIVE YEARS 1968 TO 1972

Year	Normal tapping		Late tapping			Rain interference		
	Number of days	Average crop/day in lb	Number of days	Average crop/day in lb	Crop Lost per day in lb	Number of days	Average crop/day in lb	Crop Lost per day in lb
1968 (Jan-Dec)	227	2618	50	2224	394 (15.0%)	8	1755	863 (33.0%)
1969 (Apr-Dec)	145	2384	59	1983	401 (16.8%)	14	1453	931 (39.0%)
1970 (Apr-Dec)	176	2450	25	2074	376 (15.3%)	13	1139	1311 (53.5%)
1971 (May-Dec)	137	2336	36	1912	424 (18.2%)	17	1312	1024 (43.8%)
1972 (May-Dec)	146	2801	28	2487	314 (11.2%)	12	2086	715 (25.5%)

FIVE YEAR MEAN LATE TAPPING 39.6 DAYS

RAIN INTERFERENCE 12.8 DAYS

TABLE 3

ELADUWA ESTATE—KALUTARA

CROP LOST DUE TO LATE TAPPING AND RAIN INTERFERENCE
DATE FOR FIVE YEARS 1968 TO 1972

Year	Late tapping lb	Rain interference lb	Total in lb
1968	19,700	6,904	26,604
1969	23,659	13,034	36,693
1970	13,536	17,043	30,579
1971	15,264	17,408	32,672
1972	8,792	8,580	17,372

Rainguards

The pioneering work on rainguards for rubber trees was done by the rubber planters of Sri Lanka and many patents had been registered since 1916. More recently the work had been continued by the Ceylon Institute of Scientific and Industrial Research (CISIR) and the Rubber Research Institute of Sri Lanka.

The rainguards devised and tested fall into 3 categories, namely (a) the lamp shade type (b) the skirt type and (c) the gutter type.

Lampshade type

These were made from paper boards or jute stiffened with a water proof paste; or thin tin sheets and attached to the tree by a sealing compound and made water-tight. These were found to be ineffective after field trials for a short period.

Skirt type

Rainguards in the form of skirts made of light gauge 'polythene' sheets were tried out by the RRIC (Silva, 1960). The polythene sheet was tied round the tree above the tapping cut and extended below the cut. A sealing compound was used to make the skirt watertight at the point of attachment. A variation from the full circumference skirt type, was the half circumference apron-type. These rainguards gave very good protection to the tapping panel. However, there were some disadvantages as well; for example it had to be lifted up during tapping; got damaged easily and was attacked by insects (Heinisch, 1960) Fig. 2.

Gutter type

The CISIR developed a gutter type of rainguard from compounded rubber. It was fixed to the tree with a rubber belt and metal hook. This proved to be very effective in preventing trunk seepage, but failed to have any significant impact commercially on cost considerations Figs. 1a, b & c and Fig. 3.

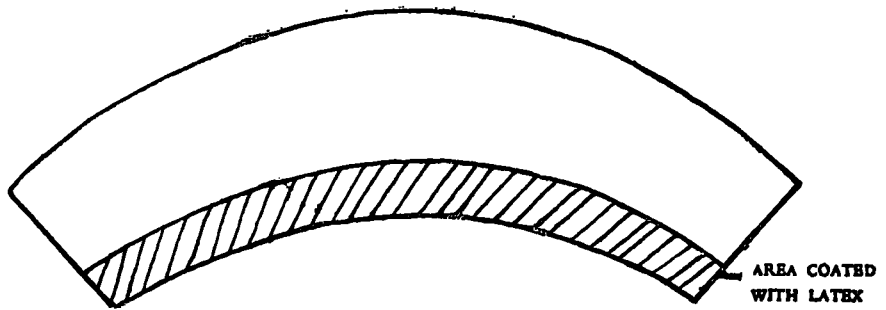


FIG. 1 (a) RUBBER GUARD STRIP

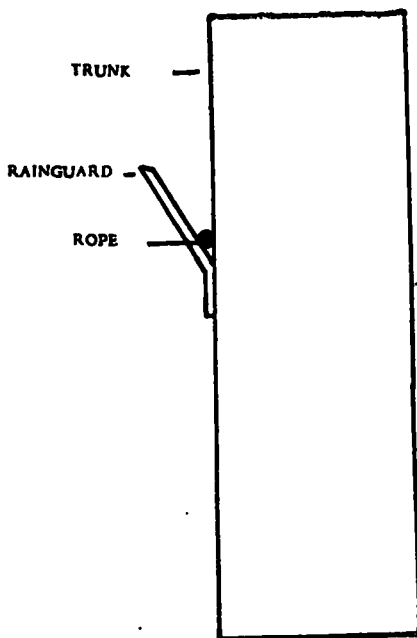


FIG. 1 (b) CROSS SECTION SHOWING ORIENTATION OF RAINGUARD

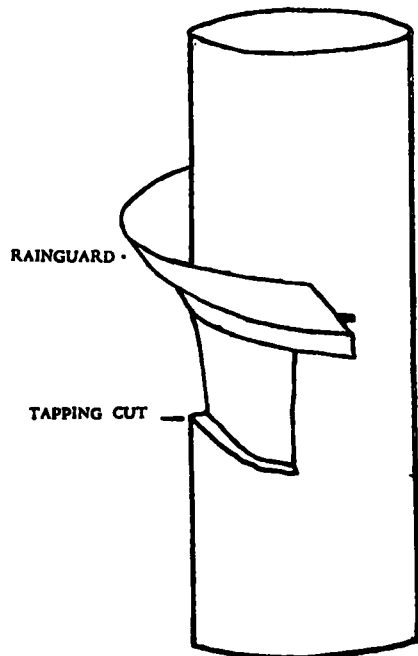


FIG. 1 (c) RAINGUARD ON TRUNK



Fig. 2 Rainguard-Skirt Type



Fig. 3 Rain-guard Type

The RRIM after attempts to produce a cheap, light weight rubber rainguard moved on to the idea of using light weight expanded polystyrene. The lightness of this material offered advantages in material cost and fixing could be done with simple adhesive sealing compounds like concentrated latex. Under field conditions these guards had a useful service life of only 4 to 6 months (Southern, 1969).

We have attempted to produce a cheap, gutter type of rainguard from highly filled compounded rubber. Since 1969, various designs had been tested and the one found most suitable will be described here. Large scale field trials have been carried out and in the oldest trial at Dartonfield, the rainguards still remain serviceable after two years, and it is hoped that these will last at least for another year.

EXPERIMENTAL

The main component of the rainguard is a thin rubber band about 6 cm in width made from extruded highly filled rubber. The second component is a piece of cheap coir rope about 1.0 cm thick. The guard is fixed effectively to the tree with ordinary field latex. The length of the rubber guard strip and coir rope required for each tree depends on the length of the tapping cut and should be about 4 in. longer so as to allow a slight overlap at each end of the tapping cut, when fixed.

Fixing of rainguards

The required length of rubber guard strip and coir rope for each tree were measured and cut in the field. The tree and the inner half of one face of the rubber strip were coated with field latex. The piece of coir rope was also dipped in field latex and all were allowed to dry. The coir rope was first fixed to the tree where the latex had been applied. The rubber guard strip was then placed on top of the coir rope and pressed firmly, so that the latex coated surfaces stuck together, to form a 'V' shaped, diversionary gutter above the tapping cut. A small quantity of a sealing compound, made of field latex and shellkote in the proportion of 5:1 was poured into the top end of the gutter and allowed to flow along the whole length. When dried, this made the gutter watertight. The sealing mixture had to be prepared in the field in small quantities sufficient to treat 10 to 12 trees at a time, as the mixture tended to coagulate in a short time. If the tapping panel was covered with moss or corky flakes on renewed bark, it was necessary to scrape the surface lightly before applying the latex.

RESULTS

Two large scale trials were carried out at Dartonfield and Eladuwa Estares. The trial at Dartonfield was on two tapping tasks of clones GT 1 (286 trees) and AV 385 (220 trees) planted in 1955. Rainguards were first fixed in May/June 1971. The same rainguards were dismantled and refixed close to the tapping cuts after 10 months tapping, in March 1972 and again after 8 months in October 1972. (This will be discussed later).

Observations were made from July 1971. The results for 12 months July 1971 to June 1972 are presented in TABLE 4. Out of 359 total possible tapping days (exclusive of holidays) for the 12 months, the control blocks (that is the estate) had 227 days normal tapping, 58 days late tapping and 74 days no tapping due to rain; while the blocks with rainguards had 278 days normal tapping, 45 days late tapping and 36 days no tapping. Thus the rainguard areas had 51 days extra normal tapping and 38 days additional tapping.

TABLE 4

RAINGUARD TRIAL—DARTONFIELD

RESULTS FOR 12 MONTHS FROM JULY 1971 TO JUNE 1972

Month	Total tapping days (possible)*	No Rainguard			Rainguard		
		Normal tapping days	Late tapping days		Normal tapping days	Late tapping days	
			After 8 a.m.	After 10 a.m.		After 8 a.m.	After 10 a.m.
July 1971	31	16	—	6	25	4	—
Aug ..	31	17	2	1	24	4	1
Sept ..	30	15	—	1	19	4	2
Oct ..	30	16	1	1	18	4	3
Nov ..	30	19	5	5	25	5	—
Dec ..	31	23	2	6	27	4	—
Jan 1972	30	27	1	2	30	—	—
Feb ..	29	27	—	2	29	—	—
March ..	31	25	1	5	29	2	—
April ..	28	18	1	9	21	7	—
May ..	28	12	—	—	12	4	—
June ..	30	12	4	3	19	1	—
Total for 12 Months	359	227	17	41	278	39	6

* Excluding holidays

NUMBER OF EXTRA TAPPING DAYS FOR 12 MONTHS = 38

NUMBER OF EXTRA NORMAL TAPPING DAYS FOR 12 MONTHS = 51

DAYS NO TAPPING DUE TO RAIN — CONTROL = 74

DAYS NO TAPPING DUE TO RAIN — RAINGUARD = 36

The results for a combined Ethrel/Rainguard experiment at Eladuwa Estate on six tapping tasks (Clone PB 86 planted in 1951, presently tapped on alternate system on panel C) are presented in TABLE 5.

TABLE 5

ETHREL/RAINGUARD TRIAL—ELADUWA ESTATE CLONE PB 86, 1951 CLEARING
ANALYSIS OF TAPPING ROUNDS FOR JULY 1972 TO MAY 1973
SIX TAPPING TASKS—THREE TASKS PER DAY TAPPED
ALTERNATELY ON S/2, D/2, 100% SYSTEM

Month	possible tapping days	CONTROL				RAINGUARD			
		Normal tapping	Late tapping	Rain interference and washout	NO Tapping due to rain	Normal tapping	Late tapping	Rain interference	NO Tapping due to rain
July 1972	30	20	6	1	2	24	2	2	2
Aug "	31	23	3	2	4	24	4	1	2
Sept "	30	16	2	3	9	17	4	2	7
*Oct "	31	18	4	—	9	20	5	—	6
Nov "	28	17	7	1	3	19	8	1	—
Dec "	31	23	3	1	4	25	6	—	—
Jan 1973	28	27	1	—	—	28	—	—	—
Feb "	19	17	2	—	—	19	—	—	—
March "	27	25	—	—	2	25	2	—	—
April "	29	15	8	—	6	22	7	—	—
May "	30	16	3	—	11	19	4	—	7
Total for 11 months	314	217	39	8	50	242	42	6	24

NUMBER OF ADDITIONAL TAPPING DAYS FOR RAINGUARD TASKS = 26

NUMBER OF ADDITIONAL NORMAL TAPPING DAYS FOR RAINGUARD TASKS = 25

*THREE TASKS WITHOUT RAINGUARDS

Rainguards were first fixed on 12/13th July 1972 for three blocks and on 23rd/24th October 1972 for the other three blocks. The same rainguards were removed and re-fixed close to the tapping cuts in March 1973. First Ethrel application was carried out in August and a second application in December. Of the 314 total possible tapping days (exclusive of holidays) for the eleven months July 1972 to May 1973 rainguard blocks had 242 normal tapping days as against 217 days for the control. Tapping days lost is only 24 for rainguard blocks as against 50 for control. The rainguard/stimulated blocks had 26 more tapping days and 25 additional normal tapping days. It should be noted that only for two months January and February there was no loss of tapping days for the control. During the rest of the months there was loss of tapping days due to rain. This was minimised with the use of rainguards.

How rainguards minimise the loss of tapping days and normalise late tapping days is presented in TABLE 6 and 7.

TABLE 6

RAINGUARD TRIAL—DARTONFIELD
 1955/56 CLEARING—GT 1 AND AV 385
 ANALYSIS OF TAPPING ROUNDS FEBRUARY TO MAY 1973
 TWO TAPPING TASKS TAPPED ALTERNATELY ON S/2, D/2, 100% SYSTEM

Month	Possible tapping days	CONTROL					RAINGUARD				
		Normal tapping	Late tapping (After 8 am)	Very late tapping (After 10 am)	Rain interference	No tapping due to rain	Normal tapping	Late tapping (After 8 am)	Very Late tapping (After 10 am)	Rain interference	No Tapping due to rain
February (9th-28th)	20	19	1	—	—	—	20	—	—	—	—
March	27	19	2	6	—	—	25	2	—	—	—
April	27	16	3	4	—	4	25	2	—	—	—
May	28	11	2	3	1	11	17	6	3	—	2
Total	102	65	8	13	1	15	87	10	3	—	2

NUMBER OF ADDITIONAL TAPPING DAYS FOR RAINGUARD TASKS = 13

NUMBER OF ADDITIONAL NORMAL TAPPING DAYS FOR RAINGUARD TASKS = 22

TABLE 7

RAINGUARD TRIAL—DARTONFIELD RAINFALL AND TAPPING DATA FOR APRIL 1973
(normal tapping days for estate not included)

Date	RAINFALL		TAPPING DATA	
	Duration	Amount in.	With Rainguard	Without Rainguard
March 31st	5.15 p.m.--- 1.45 a.m.*	1.26		
April 1st	—		Late tapping (8.30 a.m.)	No tapping
2nd	10.15 p.m.—12.20a.m.*	2.36		
3rd	8.30 p.m.— 1.45a.m.*	1.42	Normal tapping	Very late tapping(11.30 a.m.)
4th	—		Normal tapping	Very late tapping(11.00 a.m.)
7th	2.40 p.m.— 4.05 p.m.	0.32		
	6.10 p.m.— 6.15 p.m.	0.01		
	8.45 p.m.— 10.05 p.m.	0.15		
8th	2.45 p.m.— 3.15 p.m.	0.43	Normal tapping	Late tapping (10.00 a.m.)
9th	—		Normal tapping	Late tapping (9.45 a.m.)
16th	2.15 p.m.— 4.00 p.m.	1.60		
17th	—		Normal tapping	No tapping
18th	12.40 p.m.— 1.10 p.m.	0.44		
	2.15 p.m.— 4.15 p.m.	0.80		
19th	1.40 p.m.— 6.00 p.m.	1.67	Normal tapping	Very late tapping (10.30 a.m.)
20th	upto 5.15 p.m.	1.05	Normal tapping	Late tapping (10.00 a.m.)
21st	upto 6.00 p.m.	1.39	Normal tapping	No tapping
22nd	—		Normal tapping	Very late tapping (10.30 a.m.)
29th	7.00 a.m. — 7.20 a.m.	0.29	Late tapping	No tapping

*DENOTES TIME ON THE FOLLOWING DAY

In TABLE 6 is presented an analysis of tapping rounds for the rainguard trial at Dartonfield, for the months February to May 1973. It will be seen that out of 102 possible tapping days for the 4 months, 15 tapping days were lost by the estate due to rain; but in the rainguard blocks 13 out of these 15 days were saved for tapping, and only 2 days lost. Normal tapping was increased by 22 days. In April for example of the 27 possible tapping days the control blocks had only 16 days normal tapping, 3 days late tapping, 4 days very late tapping and 4 days no tapping. In rainguard blocks there were no loss of tapping days. Normal tapping was increased to 25 days. TABLE 7 explains how this was achieved.

This TABLE gives the daily rainfall figures, duration and amount and the details of tapping.

On 31st March from 5.15 p.m. to 1.45 a.m. on 1st April there was heavy rainfall of 1.26 in. and as a result tapping was affected on the 1st morning. No tapping was possible for the control blocks as the tapping panels remained wet, even though rain ceased. In the blocks with rainguards the tapping panels were dry, for tapping to commence at 8.30 a.m. Similarly on the 16th from 2.15 to 4.00 p.m. there was heavy rainfall of 1.60 in. no rain during the night, but the following morning, on the 17th, tapping could not be carried out by the estate, but with the use of rainguard normal tapping was achieved. A very similar situation occurred on 20th and affected tapping on the 21st. Again normal tapping was possible with rainguards. The data for the 29th indicates how short spells of rain in the early mornings can ruin tapping. This day there was rain from 7.00 to 7.20 a.m. amounting to 0.29 in. which resulted in loss of tapping for control blocks but not for the rainguard blocks. The rainguard prevented water seepage down the trunk. Similar short spells of rain before latex collection would result in washout which could be prevented with rainguards. On the 2nd night it had rained from 10.15 p.m. to 12.20 a.m. Although rain had ceased by 12.20 a.m. it had affected normal tapping on the 3rd. Similarly on the 7th there had been short spells of rain from 2.40 p.m. to 10.05 p.m. and normal tapping was delayed on the 8th. Rainguards normalised tapping on these two days.

OBSERVATIONS

If the rainguard is to be effective it should remain as close as possible to the tapping cut. The effective distance was observed to be 6 to 8 inches between the cut and the rainguard. If the distance was more, then the time taken for the panel to dry was also more. This means that the rainguard should be sufficiently cheap to be replaced every six to eight months or it should be re-usable.

When the rainguards were allowed to remain in one position for more than 8 months there was a tendency for them to crack below the position of the rope. This could be avoided to a great extent if the rainguards were stripped and refixed once in six or eight months.

In the trial at Dartonfield, the same rainguards had been re-used through three cycles. In the field cycle, when the guards were removed after 10 months 20% of them were found to have developed cracks below the rope. In the Eladuwa trial only 3% of the guards were damaged and could not be used a second time, when removed after 8 months.

CONCLUSIONS

Many tapping days are lost due to evening and early morning showers. The use of gutter type of rainguard which mainly prevents trunk seepage, will enable estates to be tapped on all such days except those of continuous rain. Rainguards could be devised to give complete protection from rain but these would be expensive and uneconomical. The benefits to be gained by the use of rainguards for normalising late tapping days and minimising loss of tapping days, especially in high yielding and Ethrel stimulated fields are evident. The use of coir rope helps to dismantle the rainguard without damage for re-use. The cracks appearing below the rope, mainly due to girthing of the trees, could be prevented by moving the rainguards down the trunks as the tapping cuts extend down which also maintain their efficiency through the years. The chief advantage of this rainguard is that it is re-usable. The expected service life of three years could be extended with improved compounding during manufacture which should help to keep costs down.

The economics of using rainguards is not discussed for the following reasons :

- (1) It is a separate exercise in itself.
- (2) It is connected with the cost of production.
- (3) It cannot be directly equated against the increased earnings derived by additional tapping day, alone.
- (4) On late tapping days an estate has to meet its full working expenses for getting less than normal crop and on no tapping days all other expenses except the wages of the daily paid tapper and at times the casual labour.

Perhaps the most important argument for rainguards other than profits is that it opens a way for maximising production and thereby increasing national wealth.

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