AERIAL/MICRON SPRAYING — SEASON 1966

CONTROL OF PHYTOPHTHORA PALMIVORA

Introduction

The year 1966 was another year of progress in the never ceasing battle for the control of *Phytophthora* on rubber, for whereas the total area sprayed by helicopters was similar to that of last year, something like 40,000 acres were sprayed by Micron sprayers as against about 4,000 acres in 1965.

The ultra low volume Micron sprayers, manufactured in India for the first time, were introduced by Shaw Wallace & Co., Ltd. towards the end of 1965 and received their baptism in the 1966 spraying season. It was only to be expected that there would be teething troubles during the first year of operation of these new machines, but we are convinced that where poor results were achieved with Micron sprayers the trouble was frequently due to the inexperience of the operators and mechanics, human error in spraying or under-dosage.

The spraying operations were bedevilled at the outset by doubts over the availability of copper oxychloride and the late arrival of the extender oil. This was due to the extremely difficult supply position that existed at the time. Since then conditions have improved and it is to be hoped that in future spraying materials will be readily available as and when they are required.

Each year we find abnormal features or characteristics about the *Phytophthora* attack and 1966 was no exception — indeed it was in many places the most peculiar yet experienced. This was due to the fact that the monsoon was unprecedentedly late and, although some districts experienced rain early in May and again early in June, the monsoon did not really break until 15th July — over six weeks after the conclusion of the rubber spraying. The first attack of *Phytophthora,* late in July, was abnormally heavy and caused alarmist reports about its severity but after this leaf-fall was comparatively light.

As there was a gap of between six and ten weeks from the time of spraying to the onset of the monsoon it is reasonable to assume that in areas where there was heavy leaf-fall the copper oxychloride lost some of its efficacy, which would not have been the case if the monsoon had followed its usual pattern. For this no one can be blamed.

Having received a large number of written reports from estates throughout the rubber growing areas, and having made as detailed a study on the ground as possible, we feel that the 1966 spraying — both helicopter and Micron — can be regarded as successful, despite the abnormal *Phytophthora* attack. There were instances where one particular estate had a very serious attack and the spraying results were unsatisfactory, but at the same time there were many estates which reported complete satisfaction over their results. Some aerial spraying customers have reported that this year's spraying results are the best they have ever seen since aerial spraying began, while some Micron sprayer customers using these machines for the first time, were delighted at the results.

In cases were poor results have been noticed it has been a tendency to place the blame on the Micron sprayer and copper oxychloride used. As we have already stated we feel that it is incorrect to blame the machines when inexperienced operation might have been the cause of poor results, just as it is incorrect to blame the copper oxychloride which had to withstand such a long period of drought after application and before the monsoon set in. The fact that results on the whole were satisfactory and in some cases were excellent indicates that given good conditions the machines and the copper can and will do the job.

Assessment

A detailed questionnairs was sent to all estates which were aerial sprayed and those who had purchased Micron sprayers, and the reports gave us very valuable information on the severity of this year's *Phytophthora* attack. We are most grateful to all those who so readily responded to our request for information.

At Appendices "A" and "B" we have summarised all the reports received from planters. These figures are of course the assessment of individual planters and in some cases our inspection indicated that leaf-fall was not as heavy as was indicated in these reports. These summaries indicate clearly enough that the spraying in the North Zone (i. e. from Trichur Northwards) was more successful than in the South Zone, particularly as far as Micron spraying was concerned, for whereas 37% of the area sprayed in the North by Microns was regarded by planters as "satisfactory" only 5% of the South Zone was so classified. Although aerial spraying in the North Zone was also better than in the South, the difference was not nearly so marked: this seems to indicate that the operation of Micron sprayers in the North was better than in the South.

After analysing these reports the programme for the Assessment Team was drafted, but it was difficult to carry out an inspection on the scale we would have liked in view of the labour strike which was in force at the time.

This year we invited representatives from commercial organisations directly or indirectly interested in the control of *Phytophthora* on rubber to join the Assessment Team, and we are grateful to them for their advice and comments. The Assessment Team comprised of :—

Capt. D. V. Dighe	....	Pilot, Helicopter Services
Messrs.		
P. Somasekhar	....	Entomologist, Tata Fison Industries Ltd.
C. T. Ittoop	....	I. C. I. (India) Private Ltd.
R. Ananthachari	....	Travancore Chemical & M'facturing Co., Ltd.
J. Jacob	....	Planter, The Cochin Malabar Estates Ltd.
A. W. Court	....	Shaw Wallace & Co., Ltd.
J. Varghese	....	do.
G. S. Gill	....	Peirce Leslie & Co., Ltd.

Mr. P. Somasekhar was only able to be with us for three days in the early part of the programme and Mr. A. W. Court was present for three days

in the latter part of the tour. The Assessment Team commenced their tour on 14th September in Coorg and concluded it on 23rd September in Punalur, Quilon District. The following estates, representative of the different rubber growing tracts of Coorg and Kerala, were visited :—

Coorg	....	Sampaji, Portland
Tamaracherry area	....	Kinalur, Poonoor, Manamel, Tamaracherry
Mokkam area	....	Thirumbadi
Nilambur area	....	Pullangode, Kerala, Nilambur
Perintalmanna	....	Fathimapuram
Trichur area	...	Chemoni and Pudukad
Thodupuzha	....	Malankara, Teekoy.
Kanjirapally area	....	Anathanam, Chenapadi, Kollamkulam
Mundakayam area	....	Nenmeny, Kutikul, T. R. & T.
Erumely area	....	Erumely
Vadasserikara area	....	Cavunal
Adoor area	....	Kodumon
Pathanapuram	....	Rajagiri
Punalur area	....	Shaliacary

It was unfortunate that we could not visit all the estates which were on our programme because of the strike, but the above visits did give us a useful cross-section of the industry, and our thanks are due to those who so readily allowed us to visit their estates and to discuss their problems with them.

Method of Assessment

Consistent with previous practice, results were assessed under the following categories :—

Satisfactory	....	Leaf retention of	75% and above
Reasonable	....	do.	50% to 75%
Unsatisfactory	....	do.	25% to 50%
Poor	....	do.	below 25%

While written information received from estates formed the main basis for assessment such information wherever possible was scrutinised by field inspection. Admittedly visual estimates are subject to human error but allowances were made for such error wherever necessary. Results are expressed in terms of percentages of the total area in each estate.

A summary of the results that we assessed on each estate visited and our comments on each are given in Appendix "C".

General Observations

(i) This year was a very unusual one; the rains were very late, some areas had comparatively less rainfall than others (well below the annual average) while other areas had very heavy rains. In spite of the variation in rains recorded, most planters stated that this year there were more tapping days during the monsoon than ever before. The rain was not evenly distributed over the monsoon period: heavy rains for a period were followed by sunshine and heavy rain again.

(ii) The seed crop was regarded as very heavy in all parts of Kerala. The seeds are breeding grounds for *Phytophthora* fungus, and heavier seed crops breed more fungus, resulting in a severe attack of *Phytophthora*.

(iii) As we noticed and recorded in our assessment report last year, some leaves which had a very good and evenly sprayed pattern of copper deposits had also fallen. It can only be assumed that in such cases the copper may have lost its efficacy due to the late arrival of the rains.

(iv) There seems to be no particular pattern of severity of the *Phytophthora* attack this year. Estates in the same vicinity have results varying in severity. In some estates part of the same area was bad, part was good, when no variation in clones, chemicals, mode of spraying or climatic condition prevailed at the time of spraying. No particular reason could be attributed for this particular phenomenon.

(v) This year there were very few cases of missed swathes in aerial spraying. Last year showed a considerable decline in missed swathes and we

are pleased to note that this year there were even less cases than last year. Planters as a whole were well pleased with the results of aerial spraying.

(vi) In some estates it was very prominently visible that the infected areas had lost the bulk of the leaves from the lower half of the tree while the crown still had a good canopy.

(vii) Among the various clones sprayed either by helicopter or by Microns it was noticed that PB86 suffered the most. Certain planters and the Rubber Research Institute of India are of the view that PB86, which suffers severely from *Phytophthora*, should be given a higher dosage of copper. BD10 is a very temperamental clone; in some estates it has given excellent results while on the other areas the results are bad. PB186 has given good results in Malabar while reports from Travancore indicate the contrary. The R.R.I.I. are of the opinion that GL1 stands up very well to *Phytophthora* and really needs very little protection, but some planters are of the opinion that it is no better or worse than other clones.

(viii) In some cases where poor results were achieved from Micron spraying it seems that the dosage recommended by the Rubber Board (1·8 litres copper per acre) was not always followed. We are convinced that it is very false economy to try and reduce costs by reducing the quantity of copper applied and we would strongly recommend planters not to use less than 1·8 litres per acre, preferably 2 litres.

SPRAYING RESULTS AS ASSESSED BY PLANTERS

APPENDIX "A"

(SUMMARY OF RESULTS RECEIVED IN ACRES)

AREAS	Satisfactory		Reasonable		Unsatisfactory		Poor		Total	
	Aerial	Micron	Aerial	Micron	Aerial	Micron	Aerial	Micron	Aerial	Micron
NORTH ZONE										
Coorg ...	499	—	105	—	—	—	—	—	604	—
Taliparamba ...	125	50	40	282	60	103	—	106	225	541
Tellicherry ...	—	331	—	92	—	—	—	—	—	423
Kuttiadi ...	—	185	—	—	—	170	—	—	—	355
Tamaracherry ...	1735	123	35	754	193	150	340	—	2303	1027
Mokkam ...	467	130	—	379	—	246	—	60	467	815
Nilambur ...	999	586	1038	175	—	25	—	40	2037	826
Trichur ...	1360	218	622	—	157	150	64	—	2203	368
	5185	1623	1840	1682	410	844	404	206	7839	4355
SOUTH ZONE										
Thodupuzha ...	187	28	823	705	—	34	—	500	1010	1267
Kanjirapally/Mundakayam	2396	110	631	698	1088	460	261	82	4376	1350
Konni/Punalur ...	1641	27	383	34	30	204	—	250	2054	516
	4224	165	1837	1437	1118	698	261	832	7440	3132
North and South Combined ...	9409	1788	3677	3119	1528	1542	665	1038	15279	7487

SPRAYING RESULTS AS ASSESSED BY PLANTERS

APPENDIX "B"

(SUMMARY OF RETURNS RECEIVED — AS PERCENTAGES)

AREAS	Satisfactory		Reasonable		Unsatisfactory		Poor	
	Aerial	Micron	Aerial	Micron	Aerial	Micron	Aerial	Micron
NORTH ZONE								
Coorg ...	83	—	17	—	—	—	—	—
Taliparamba ...	55	9	18	52	27	19	—	20
Tellicherry ...	—	78	—	22	—	—	—	—
Kuttiadi ...	—	52	—	—	—	48	—	—
Tamaracherry ...	75	12	2	73	8	15	15	—
Mokkam ...	100	16	—	47	—	30	—	7
Nilambur ...	49	71	51	21	—	3	—	5
Trichur ...	62	59	28	—	7	41	6	—
Average ...	66	37	24	39	5	19	5	5
SOUTH ZONE								
Thodupuzha ...	19	2	81	56	—	3	—	39
Kanjirapally/Mundakayam	55	8	14	52	25	34	6	6
Konni/Punalur ...	80	5	18	7	2	40	—	48
Average ...	57	5	25	46	15	22	3	27
North & South Combined Average ...	62	24	24	41	10	21	4	14

	North Zone		South Zone		Combined	
	Aerial	Micron	Aerial	Micron	Aerial	Micron
Satisfactory & Reasonable ...	90	76	82	51	86	63
Unsatisfactory & Poor ...	10	24	18	49	14	35
Total ...	100	100	100	100	100	100

SPRAYING RESULTS
AS ASSESSED BY ASSESSMENT TEAM

APPENDIX "C"

ESTATES	Satis-factory %	Reason-able %	Unsatis-factory %	Poor %	REMARKS
COORG AREA:					
SAMPAJI ...	95	5	—	—	Aerially sprayed in the evening on 18th May unlike in previous years when spraying was done in early April. Except for one boundary about 200 ft. long facing young replanting, the results are excellent. Manager prefers late spraying.
PORTLAND ...	30	60	5	5	Results reasonable. Micron sprayed areas of younger plants show satisfactory results (dosage 1½ litres of copper fungicide per acre). Micron sprayed area in older rubber (1938 clearing) is poor. Manager feels a finer spray in helicopter spraying would be more beneficial.
TAMARACHERRY AREA:					
KINALUR ...	80	—	10	10	Results are very patchy. Judged by the leaf-fall, Phytophthora attack has been more intense than in the previous 2 years. BD5 and TJ suffered badly. PB 186 fared very well.
POONOOR ...	95	5	—	—	Very good leaf retention, both in aerial and Micron sprayed areas.
MANAMEL PLANTATIONS ...	85	15	—	—	Results are generally satisfactory. Entire area was Micron sprayed—80% of area at 1½ litres fungicide per acre and the rest older rubber, 2 litres per acre. Manager is very happy over the results he achieved by using Mini Microns.
TAMARACHERRY ESTATE ...	70	15	15	—	Good results on visual inspection, but Manager feels otherwise. In his opinion spraying should be done before the leaves mature, i. e., in the month of March or early April.
MOKKAM AREA:					
THIRUMBADI ...	90	10	—	—	Good results on the whole. Rainfall much less compared to previous year. Micron spraying done in immature rubber with very satisfactory results. Aerial spraying in rubber under intensive system of tapping gave comparatively poorer results. In the other areas the results of Aerial spraying are very satisfactory.
NILAMBUR AREA:					
NILAMBUR ...	100	—	—	—	Results very good in aerial as well as Micron sprayed areas. The estate experienced breakdowns of Mini Micron machines during operation.
PULLANGODE ...	98	2	—	—	Very good leaf retention. Only 1 acre in two patches in an area of 898 acres missed. According to Manager, the attack was more severe this year, as unsprayed areas show very poor retention.

SPRAYING RESULTS
AS ASSESSED BY ASSESSMEMT TEAM

APPENDIX "C"

ESTATES	Satis-factory %	Reason-able %	Unsatis-factory %	Poor %	REMARKS
NILAMBUR AREA:					
KERALA ...	65	35	—	—	Some areas have shed 50% of the leaves while in other areas the results are satisfactory. In Micron spraying the results are satisfactory in both mature and immature areas.
FATHIMAPURAM ...	100	—	—	—	Very good leaf retention. Entire area aerially sprayed.
TRICHUR AREA:					
PUDUKAD ...	70	10	15	5	Results appear to be better than last year despite reduced dosage of copper (5·6 lbs. per acre against 6·4 lbs. last year). There are a few small missed patches. The attack was late due to late monsoon. Micron spraying with two litres copper has given far better results than spraying with 1·8 litres copper. The Manager is of the opinion that the results this year are far better than those of any previous year since the introduction of helicopter spraying.
CHEMONI ...	50	40	5	5	Manager feels that results are not as good as previous year's.
THODUPUZHA AREA:					
MALANKARA ...	65	10	25	—	Phytophthora attack was more severe than in previous years. Aerial spraying results are satisfactory. The Micron spraying results are disappointing in mature rubber. There are large patches of poor retention. However, Micron spraying done in immature rubber is very satisfactory. Rainfall and seed crop more than last year.
TEEKOY ...	50	20	30	—	There are patches of poor results ranging from 10—15 acres in aerial sprayed area. The patches do not form any particular pattern. Micron spraying on immature rubber, however, was very successful.
KANJIRAPALLY AREA:					
ANATHANAM ...	60	25	15	—	Several patches of leaf-fall—there was heavier rainfall compared with previous years. There are several missed swathes. Old seedlings have suffered badly. On immature rubbers, half-dosage aerial spraying, the results are unsatisfactory. The boundaries show poor retention.
KOLLAMKULAM ...	55	25	20	—	Boundaries and corners show severe leaf-fall. There are a few missed swathes. In other parts the retention is satisfactory.
CHENAPADY ...	55	20	25	—	There are a few missed swathes, very small in size, ranging from 50 to 100 trees in each patch. In these patches the results are poor while in the rest of the areas the results are satisfactory.

SPRAYING RESULTS
AS ASSESSED BY ASSESSMENT TEAM

APPENDIX "C"

ESTATES		Satis-factory %	Reason-able %	Unsatis-factory %	Poor %	REMARKS
MUNDAKAYAM AREA:						
T. R. & T.	...	65	10	15	10	There are large patches of very poor results. Phytophthora attack more severe than in previous years. BD 10 has fared very well on the estate. The lower and middle canopies had the higher leaf-fall. The epidemic is more confined to clonal characteristics than anything else. The older rubber seems to have had the worst damage. Micron spraying results on immature area very satisfactory.
KUTIKUL	...	85	15	—	—	Results very satisfactory with aerial syraying and Micron spraying in immature rubber.
NENMENY	...	85	10	5	—	Results patchy and boundaries affected. The overall results are satisfactory. Micron spraying has given very good results.
ERUMELY AREA:						
ERUMELY	...	85	—	15	—	There is heavy leaf-fall in a long stretch of area about 90 ft. As this runs along the spray flight runs, it is apparently a completely missed swathe. Otherwise very satisfactory.
VADASSERIKARA AREA:						
CAVUNAL	...	75	20	5	—	Results not as good as last year. Large patches with heavy leaf-fall.
ADOOR AREA:						
KODUMON	...	100	—	—	—	Very good leaf retention.
PATHANAPURAM AREA:						
RAJAGIRI	...	90	10	—	—	Small patches noticed in some areas; otherwise results are generally satisfactory. Micron spraying results are satisfactory except in a small patch in 1958 clearing with PB 86.
PUNALUR AREA:						
SHALIACARY	...	85	15	—	—	Leaf retention is less than 25% in scattered patches. There are about four patches with poor retention. DB 5 clone shows very bad results. In the remaining area the results are satisfactory.