STUDIES IN BLISTER BLIGHT CONTROL

VIII. TRIALS CONDUCTED WITH THE "MICRON" POWER SPRAYER IN CONNECTION WITH THE APPLICATION OF OIL-BASED COPPER FUNGICIDES

By

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Introduction

At the end of 1950, Mr. E. J. Bals, of Messrs. Clean Crops Limited, arrived in Ceylon bringing with him a prototype "Micron" power spraying machine, which he had developed for the low volume application of oil based formulations at rates of less than 1 gallon per acre. During his short stay in Ceylon, Mr. Bals carried out a number of preliminary trials with his machine and succeeded in obtaining fairly effective distribution of atomised light oils; the best results being obtained with the grade known as "spindle oil". Satisfactory results with emulsions were not obtained in these trials.

Mr. Bals also tried out on a few occasions a copper napthenate fungicide in an oil emulsion. This particular formulation caused undesirable tainting of the manufactured tea.

For the trials under review, which were carried out during the south west monsoon period of 1951, the prototype "Micron" sprayer, slightly modified in construction by our engineer on Mr. Bals's instructions, was used. The modifications were chiefly confined to the installation of Mr. Bal's new type atomiser and a flexible delivery tube.

Fungicides

Five proprietary formulations were available for trial. It was previously decided that the application rate should be fixed at 3/4 th. gallon per acre and that the final mixture should contain approximately 2 ounces of copper in the metallic form in each 3/4 th. gallon. This procedure was followed except where otherwise stated.

The mixtures were made up as follows :—

(i) **Copper napthenate.**— 80 ounces of formulation diluted with 40 ounces of water.

(ii) **Bulsol.**—(Messrs. Boots Pure Drugs, Ltd.)
60 ounces of formulation made up with 60 ounces of water.

(iii) **Ialine.**—(Messrs. Burt Boulton & Haywood, Ltd.)
At first used undiluted. After two applications diluted at the rate of 4 parts Ialine with 1 part water (on instructions received from the makers).

(iv) **Cuproil**—(Messrs. Universal Crop Protection, Ltd.)
Prepared for field application as follows :—
8 ounces Cuproil, 60 ounces Foliol, 52 ounces water.

(v) **Clean Crops fungicide.**—(Messrs. Clean Crops, Ltd.)

One pint was used undiluted over 1/6th of an acre, as supplies were limited. Clean Crops fungicide contains approximately 10 per cent. copper in an oil base.

Experimental Area

The field selected for the experiment was on a north-easterly facing hillside. Under normal south-west monsoon conditions it was expected that the prevailing wind would be due north-east. The upper boundary of the plots was a car road along which the "Micron" sprayer was worked. Each of the five plots was 50 yards wide and 100 yards deep (approximately one acre) and separated by guard plots also of the same size. The guard plots were set up to avoid spray drift and spray contamination between treatments.

In the line of anticipated wind direction in each plot, except in the case of copper napthenate, posts were set up 25, 50, 75 and 100 yards distant from the road Immediately prior to each spraying glass plates, of known surface area, were placed on these posts for estimation, in the laboratory, of copper deposits.

Table 1. *Copper deposits expressed as parts per million on glass plates* following spraying through the "Micron" Sprayer.*

Formulation	DATE							
	14/7	24/7	3/8	10/8	20/8	29/8	7/9	17/9
Buisol								
25 Yards	9	20	40	32	19	75	26	9
50 „	7	64	12	8	4	3	5	3
75 „	5	110	6	8	4	3	4	3
100 „	3	8	5	3	4	4	4	6
Ialine								
25 Yards	5	22	13	14	11	3	4	23
50 „	4	8	11	7	5	3	4	10
75 „	4	8	11	25	6	6	4	4
100 „	5	8	9	9	4	3	5	3
Cuproil								
25 Yards	57	158	65	55	192	5	6	180
50 „	18	21	7	8	120	3	5	40
75 „	5	6	5	5	19	3	4	10
100 „	10	5	4	5	10	5	4	4
Clean Crops								
25 Yards	5	20	4	43	22	5	8	6
50 „	4	7	5	9	10	3	4	4
75 „	5	7	5	4	8	3	4	3
100 „	5	13	7	4	5	2	4	7

**Copper deposits are expressed in terms of parts per million on leaf dry weight for comparison purposes. These values are obtained by multiplying the total copper per plate in micrograms by 1.5625. Plate size 4 inches x 4 inches.*

Table 1 shows the copper deposits on the plates collected after each spraying between 14th July and 17th September. In relation to these figures it should be borne in mind that figures below 5 p.p.m. may be ruled out as due to experimental error. Where deposits of copper are estimated from catches made at the time of application figures above 100 p.p.m. of copper are probably required for the effective control of blister blight when a period of 8—10 days intervenes between spray applications.

Spray Distribution and Wind Condition

During this year's south west monsoon, when large scale dusting has been in operation, it became increasingly evident that, in the up-country districts, the wind although arising from the south-west, can change direction considerably over even small areas. Accordingly, unless fields are very extensively roaded, in all directions, it becomes a physical impossibility to cover evenly any one particular field or area. In the case of power dusting this difficulty may be partially overcome by watching the carry of the dust and dusting the areas it has not been possible to cover with the aid of hand dusters. In the case of the "Micron" sprayer the carry of the fungicide mist could not be observed beyond 20 yards from the machine, even when the wind was favourable and blowing continuously in one direction. The distance to which the spray carried could only be observed from deposits on glass plates. It may be ruled out as unlikely that estates can find the time to lay out glass plates, in sufficient numbers, to observe just where and to what extent a field had been adequately sprayed. The ever-changing wind currents and the normal road system on upcountry tea estates would make spraying of a reasonably wide swathe improbable. The size and weight of the "Micron" sprayer are, also, disadvantages which cannot be lightly overlooked in large scale operations. On the trial plots it was evident that an even and effective cover with fungicides was not possible at any time during the south west monsoon months.

Results of Spraying

Of the fungicides tested through the "Micron" sprayer only Buisol and Cuproil can be considered to have given fair distribution up to 25 yards from the spraying position. Judging from the results of the copper analyses for August 20th, Cuproil, given perfect conditions of wind currents, gave good distribution up to 50 yards (see Table 1). In dry spells during the monsoon the ever-changing wind currents made cover impossible throughout the plots (cf. results on 29/8 and 7/9). Clean Crops fungicide and Ialine, though easy to handle and atomise, gave indifferent results even at 25 yards.

Copper napthenate.—This preparation gave rise to very severe tainting. Scorch appeared on both old and young leaves after 4 applications of fungicide. There was no apparent control of blister blight beyond 4—5 yards from the spraying point.

Buisol.—For the first 3 applications there was no evidence of scorch on the tea leaves. From the 4th application onwards scorching became more and more apparent, especially in the first few yards from the spraying point. There was fair control of blister blight from 0—20 yards. Beyond that no control was evident.

Ialine.—Severe scorching of both young and mature leaf was evident after the first application. The Ialine sprayed plots at the end of the experiment showed severely defoliated tea up to 5 yards. Beyond, scorching effects diminished rapidly. There was no apparent control of blister blight.

Cuproil.—This formulation showed no control of blister blight. There were no signs of scorch until after 6 applications when older leaves 0—5 yards from the spraying point showed scorch blotches. Scorching was most apparent on leaves which received spray on the under surface.

Clean Crops fungicide—At no time did leaves scorch. There was slight control of blister blight between 0—5 yards, beyond that no control at all.

Conclusions

None of the fungicides tested appear suitable for the control of blister blight. Except for Clean Crops fungicide all other formulations tested caused scorch and injury to leaves. The gradual building up of conditions conducive to scorch, as applications increase in number, should be considered before long term spraying programmes with oil-based fungicides are contemplated for tea. Furthermore the reaction of tea to repeated oil applications over a number of years should be known for a certainty, before oil-based formulations can be safely recommended. Judging from the condition of the tea which received the spray, of at least one of the formulations, the risks involved can be very serious.

As a practical proposition on Ceylon up-country tea estates it would appear that the " Micron " sprayer in its present form is unsuitable, even if a non-tainting, non-scorching oil-based fungicide can be developed.