CROP PROTECTION BY WET SPRAYING COMPARED WITH CROP PROTECTION BY DUSTING

J. LAMB.

DIRECTOR,

TEA RESEARCH INSTITUTE OF CEYLON.

Before I attempt to sum up the relative merits of spraying and dusting as methods of protecting tea against blister blight attack I must explain why it was considered necessary to raise this issue at the Conference.

At the Symposium held in November, 1949, expert opinion tended towards the conclusion that knapsack spraying was the only immediately practical method of blister blight control but necessity for the development of machines suited to our conditions and capable of treating large areas quickly and cheaply was strongly stressed.

Mr. Loos reported successful control with one proprietary make of dust but its cost prohibited its use for controlling blister blight.

Consequently the Tea Research Institute has concentrated on the immediate development of knapsack spraying and has also founded an Engineering Section for the purpose of studying the possibilities for developing machinery for crop protection.

Dr. Dike, Dr. Greenslade, and Mr. Bals have all borne our problems in mind, and have now all returned to Ceylon with what we hope will be solutions or substantial contributions to the solution of our problems. Dr. Dike left Ceylon after the Symposium with the idea that dusting offered one of the best chances of a solution to mechanised methods of protection. He returned in May with a prototype machine which could project either dust or spray and cause them to travel considerable distances with the aid of wind currents. He also brought five tons of dusts of improved formulation containing several different concentrations of copper. These dusts were of a type which could be produced at a reasonable cost, provided that the lower concentrations of copper proved to be sufficient to exercise control of blister blight.

With the very willing cooperation of Mr. V. C. Baker of Castlereagh Estate and Mr. James MacMahon of Mattakelle Estate and the kind permission of the Directors of the two companies concerned, we were able to arrange facilities for Dr. Dike's experiments. We were also able to give Dr. Dike laboratory facilities and assistance for a study of the distribution of copper fungicide in his experimental areas.

Dr. Dike made rapid and substantial progress with dusting and we organised a demonstration on Castlereagh Estate in August. Many planters and visiting agents were sufficiently impressed by this demonstration to place orders with Universal Crop Protection for Whirlwind Dusting Machines and 2

per cent Cuprosana Dust. Others have asked our advice about whether to dust or to spray and I am therefore obliged to give our complete impartial views on the two methods, at this stage of our proceedings.

I particularly stress the point that a Research Institute responsible to an industry can only advise on a basis of available facts. These facts are normally gathered by its own staff officers and carefully checked and cross checked before publication. Perhaps we are slow and cumbersome but at least we are sure of our ground. Individual estates may assess the possibilities of any method, machine, or material, and decide that chances are favourable for success. Such procedure is nevertheless a gamble. We are normally bound to base published advice on facts.

To individuals we may give an opinion as distinct from advice and suggest that they take chances. If things go wrong then any harm done is on a limited scale. To an industry where the consequences of bad advice are unlimited we can only advice on a basis of fully established facts. I therefore ask you to take my statements to follow as you would take the summing up of a case in a court of law. In this case, only established facts are accepted as admissible evidence. Circumstantial evidence and expert opinion are rejected. When I refer to a specific product it is because that product was actually used and does not mean that other proprietory fungicides would not have proved equally satisfactory. When I say that success is not proven it does not infer failure.

In other words, I shall not draw any inferences express any opinions, but simply state plain facts in unequivocal terms.

WET SPRAYING.

Wet spraying with Perenox has proved to be completely successful in protecting tea recovering from pruning under a wide range of terrain and climatic conditions. It has also proved completely successful in protecting first year tea in bearing for two successive years on the Tea Research Institute's own estate. Reports from other estates confirm our findings. There is no evidence to the contrary.

Wet spraying can be accurately controlled by reasonable supervision with good conductors provided the superintendent of the estate is well instructed and the labour and supervisors are properly trained. It does not interfere with plucking routine.

Wet spraying involves a relatively heavy demand on labour. One man has been required for every 7 acres protected.

The cost of spraying pruned tea or tea in bearing has been approximately the same. Mr. Portsmouth has already given you details and told you that the cost per acre per round on Kataboola Estate averaged Rs. 2.46 per acre per round.

Pruning on Kataboola Estate started in July and finished in August. The season was a bad one and recovery was relatively slow. An average of 16 spraying rounds was sufficient to afford protection from pruning to tipping and so the average working cost of spray protection from pruning to tipping approximated to **Rs. 40 per acre.** 16 spraying rounds gave satisfactory protection to first year fields on St. Coombs at the same cost.

At the present price of the Four Oaks Battery Knapsack Equipment, capital costs taking the life of the equipment at a conservative estimate of 4 years, amounts to **Rs. 20 per acre per annum.**

The total cost of spraying per acre per annum for protecting areas pruned from June onwards and for first year fields under S.W. monsoonal conditions in 1950 may therefore be taken as **Rs. 60**, and a very high degree of protection is attainable.

DUSTING.

Evidence is entirely restricted to results with the products of Universal Crop Protection Limited, namely The Whirlwind Dusting Machine and Cuprosana Dust. The first experiments on a limited scale commenced in June 1950.

From the preliminary experiments carried out on Castlereagh Estate in the Hatton district, between June and August 1950, it is possible to state that :—

> With a steady S.W. wind, overcast skies with or without rainfall of the lighter type experienced in the S.W. monsoon, it is possible to distribute the copper compounds contained in the fungicide over a wide radius downwind from the dusting machine. It is not possible to define the word "wide" except to say that it was favourably regarded from the practical point of view. Over the areas of tea in bearing, treated at weekly intervals, a marked degree of bud and stem protection was observed. The conditions of the experiments were so uncontrolled that it was not possible definitely to attribute any increase of yield to the treatment. The figures obtained by plucking the dusted and surrounding undusted areas separately, even when critically examined, supported the contention that the dust was exercising control. The quantity of dust available was not sufficient for a prolonged or large scale trial but for several weeks after dusting ceased, the superintendent and members of the Tea Research Institute staff could distinguish between the dusted and undusted areas.

2% Cuprosana Dust was selected for further trial by the Tea Research Institute and 12 tons were imported for further trials on 200 acres of Kataboola Estate from mid-October onwards. The weather improved from the time the experiment started and it is not possible to observe any effects of the treatment at the present moment.

Conditions for dusting during the N.E. monsoon season on Kataboola Estate are more difficult than they were on Castlereagh Estate during the S.W. monsoon. It has only been possible to work to our satisfaction between 7 a.m. and 10 a.m. and to cover certain areas remote from roads and paths has proved impossible on some occasions. The roads and paths on Kataboola are above average standards in all respects.

All the plucking programmes for the 200 acre area were altered to give a maximum interval between dusting and plucking. Dusting on Castlereagh was carried out at 7 day intervals and we do not know whether 10 day intervals will be satisfactory from the point of view of protection. If a shorter interval than 10 days is proved to be necessary then plucking rounds will have to be reduced accordingly as we cannot approve of dusting immediately before plucking as will occur if plucking rounds are at 10 days and dusting rounds at 7 days.

Over a period of 28 days large scale operation an average of 3 labourers per day have been employed.

The cost of application has worked out at approximately 40 cents per acre per round including all accountable costs except the costs of supervision which has so far been carried out by a member of the staff.

In this period the average rate of working including loading, unloading and path work has been 10 acres per hour.

The amount of dust used has worked out to be between 6 and 10 lbs. per acre. The aim has been to use 10 lbs. per acre and is based on results at Castlereagh Estate and the fact that we are working on a 10 day round. There is no evidence that this is the correct amount to use. The dust delivered at

the dusting machine has cost approximately 30 cents per lb. At the rate of 10 lbs. per acre we arrive at a total cost of Rs. 3-10 per acre.

Since the cost of application includes provision for depreciation of the dusting machine at 25 per cent per annum we can make a tentative comparison with the cost of wet spraying on a basis of 16 rounds per season and we arrive at a figure of Rs. 54/-. This figure must be taken as a bare minimum and does not include any provision for supervision.

If 10 lbs. per acre of dust applied at 10 day intervals proves sufficient to control blister blight on tea in plucking the cost of wet spraying and of dusting will be of the same order.

The present 200 acre experiment will be continued until the dry weather sets in. A further large scale experiment during the S.W. monsoon season of 1951 is essential before we can assess the efficiency of dusting as compared to spraying.

With regard to dust protection of tea recovering from pruning we have few facts to offer. Two acres of St. Coombs tea pruned at the end of July was successfully protected by dusting with 6 per cent dust, which was the only concentration available at that time, by application of 10 lbs. per acre every four days from two weeks, after pruning until November and at 7 day intervals after November.

Under typical S.W. monsoon conditions with a steady wind a good distribution of dust over the pruned area could be assured. Under N.E. monsoon conditions the dusting of even this small area, which was a long narrow strip between a road and a path, gave difficulty on some occasions. This experiment has demonstrated that complete protection of tea recovering from pruning by 6 per cent dust is possible.

Other experiments have shewn that, if one round of spraying is missed or is badly applied during the early stage of recovery from pruning, the effects are disastrous.

Before taking large scale risks with dusting pruned tea we must ascertain the extent of well defined areas over which dust may be evenly distributed during S.W. monsoon conditions, whether a concentration of 2 per cent copper in the dust is sufficient and whether longer intervals between application, or shorter intervals and lower rates of application will ensure complete protection.

I repeat that we cannot take large scale risks with dusting tea recovering from pruning until more evidence is available.

THE DISCUSSION ON THESE PAPERS WILL APPEAR IN VOLUME XXII, PART I, 1951.