STUDIES IN BLISTER BLIGHT CONTROL

XVI. CONCLUSION

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Prophylactic measures for the purposes of minimising attacks of the blister blight of tea are now an accepted part of tea estate routine in Ceylon. Of the success of these measures there is no doubt. Anxieties about the prognosis of the disease have gradually given way to concern about additions to cost of production and recent research work has been almost exclusively connected with the economics of control.

As pointed out at the last Conference, the Institute cannot pursue research to the point where it becomes concerned with the relative merits of proprietary fungicides and equipment. Once a reasonable technique for any particular agricultural operation recommended by the Institute has been evolved, the choice of materials and equipment must be left to commercial interests. Reputable dealers in fungicides and spraying or dusting equipment can be trusted to maintain the standard of their products and there is now sufficient competition to prevent any exploitation of the tea ndustry as a whole.

This particular series of articles will therefore be brought to a close, but this does not mean that all research on blister blight control will cease. It will be most disappointing if there is not any practical progress on methods of controlling fungus diseases of plants during, say the next decade, but at the present moment it is difficult to envisage any fundamental development which can effect routine spraying or dusting during the next three or four years. The most probable line of progress is in the development of fungicides which will increase the period of protection, for it will be readily appreciated that any fungicide, whose prophylactic effects lasted for twenty days, would straightaway tend to halve the cost of protection. In such a case, however, the mode of action would probably be fundamentally different to the present copper fungicides and prolonged tests would be advisable to ensure the absence of insidious effects upon the growth of the tea bush.

Apart from progress with fungicides there are always possibilities of improving the method of application but in view of the exhaustive investigation already carried out it is difficult to be optimistic about substantial progress until fundametal progress has been made in mechanisation of cultural operations in tea. The Wright Report[1] leaves no room for doubt that mechanisation is essentially linked with replanting, and in this case, the use of blister blight resistant clones offers a better solution to the problem of blister blight.

Looking back to 1949 it would not be unreasonable to claim that progress has been rapid. The tea industry in Ceylon has in fact made considerable contributions to the practice of plant protection. First, spraying and dusting during continuously wet monsoon weather was quite novel and up to the time of the Kataboola trials it is improbable that any other crop had been successfully protected against a serious fungus disease by weekly routine spraying irrespective of weather conditions. The successful protection of 200 acres of tea recovering from pruning through a severe south west monsoon was no mean feat, and it was indeed a fortunate circumstance that tea leaf retains sufficient fungicide to give effective protection under such conditions.

Secondly, low volume spraying was in its early infancy when the problem of blister blight arose. The first success with copper fungicides was attained by using

something of the order of 100 gallons per acre of spray suspension. A reduction to 15 gallons per acre with knapsack spraying was another major success. By the use of portable mist blowers, success has been obtained with one gallon per acre but the increased complexity of the spraying apparatus has tended to nullify the gain in ultra low volume application.

Thirdly, since the successful development of low volume technique, considerable gains have been made in coverage. At the time of the Kataboola experiment a coverage of one acre per labourer per day was considered satisfactory. In 1954 it is not unusual to find coverages of 4 acres per labourer per day and the average for St. Coombs estate in the present season, including all the steep and difficult terrain, is 3 acres per labourer per day.

Progress is seldom a steady and continuous process and tends to go by quanta. In 1954 it appears as though we have reached the end of a period of progress with which we must be satisfied for the time being. It is hoped that this present series of articles, which is now closing, will be followed by a further series under a general heading such as "Developments in Blister Blight Control", but it is not our intention to become involved in minor improvements concerned with sales promotion. Our attention in the future will be focussed on fundamental development with major practical possibilities. This will be a slow process for, as already explained, anything of the nature of "systemic" fungicides will require the most careful investigation. The blister blight fungus is to all intents and purposes a weed growing in the tea leaf instead of in the soil. All weed killers must be highly selective in action and it may be difficult to detect slight toxic effects on the tea bush which are cumulative over a considerable period.

At the same time it must be realised that the copper fungicides at present in use are very highly effective and that they will be extremely difficult to improve upon. Only six ounces per acre of the common fungicides containing 50% active material are sufficient to control the virulent blister blight disease and this quantity compares very favourably with all the most modern fungicides, insecticides and weed killers. In addition, copper fungicides are stable, easy to handle, and non-toxic; this combination of properties will not be easy to supplement.

The articles numbered XIII, XIV and XV in this series gave most of the technical detail needed to guide estate policy. It is quite clear that pressure retaining knapsacks with a suitable nozzle such as the American double swivel nozzle and two OC-O2 jets, spraying a suspension of 4 ozs of 50% copper fungicide in 10 gallons of water at the rate of approximately 15 gallons per acre are highly satisfactory. The efficiency of a battery of such equipment is greatly improved by a central power charging unit as described in the *Tea Quarterly*, Vol. XXV Part 1, page 15 (March 1954).

For shorter term protection, hand dusting, particularly with the more efficient dusts which give adequate protection when used at the rate of 5 lbs every 8 days, has certain advantages, and may also be regarded as a useful complement to wet spraying. The Institute does not, however, recommend dusting for protection of areas subject to prolonged attacks of blister blight.

Mist blowing is less certain as it is feared that the disadvantage of the complicated nature of the equipment, especially when used by estate labour, will tend to outweigh the advantages of ultra low volume coverage and comparatively high acreage per labourer. It may well, however, find a place in routine practice, especially where arrangements can be made for adequate supervision and upkeep.

Equipment and fungicides have been developed to a point where they will serve routine requirements for several years to come, but spraying organisation and supervision will require constant revision and attention. These are grave latent dangers in seasons unfavourable to blister blight for, under such conditions, what may in fact be indifferent work, may give apparently satisfactory protection and lead to a false sense of security. The monsoons of the past two or three years have, on the whole, been favourable to vigorous growth of tea and not wholly favourable to blister blight. A prolonged period of bad growing weather, sunless and misty for months on end,

such as may occasionally happen, will strain the present technique for protection to its limits. It is still a common experience to be "caught out" at the beginning of the monsoon by unexpectedly severe attacks when the weather is misjudged and spraying is commenced too late. It is also obvious that spraying gangs periodically slacken off and that a change in the weather reveals their shortcomings. Usually such attacks come under control when the technique is improved and the weather changes for the better. A heavy attack at the beginning of a very prolonged period of difficult weather will not visibly react, even to the most efficient spraying, for a considerable time, because even the best technique cannot be 100% effective and numerous sporing blisters will maintain a very high level of infection under misty, sunless conditions.

Constant vigilance is, unfortunately, indispensable and adds considerably to the responsibility of the Estate Superintendent apart from additional costs. When an attack is slow to come under control, the theory of mutation and resistance to copper fungicides is sometimes advanced. Blister Blight has been known for at least seventy years and there is no reason to suppose that any mutations have occurred in this time. All that can be said is that we sincerely hope that the emergence of a copper resistant strain will not occur in Ceylon, that it is improbable, and that we shall be extremely unfortunate if it occurs just as blister blight control is settling down to a routine.

The efficiency of fungicides is also sometimes questioned and it occasionally happens that there are grounds for suspicion of old stocks, especially when the containers have deteriorated. There is no reason to carry large stocks of fungicides on estates and no reason to suspect that reputable proprietary products vary in their effectiveness. The packages should always be inspected on arrival on the estate and damaged ones either used immediately or returned to the agents.

Although these final words may seem somewhat harsh, it is obviously sounder to accept probabilities rather than to advance obscure explanations when the control of blister blight is unsatisfactory. On the basis of established facts, the order of probability in seeking explanations of unsatisfactory results is as follows:—

1. Inefficient spraying
2. Inefficient supervision
3. Inefficient organisation, especially bad mixing and insufficient dispersion of fungicide before spraying.
4. Inefficient nozzles, especially worn orifices
5. Inefficient fungicides, especially due to deterioration through bad storage.

Reference

1. Wright, S. J.—*Tea Quarterly*, Vol. XXIV, Part III, 1953, page 57.