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WELLESBOURNE

FINAL CONTRACT REPORT

HDC FV 186a
Brassicas: use of copper sprays to control black rot during transplant production

by

S J Roberts* and *J Brough

Project title:	**Brassicas: use of copper sprays to control black rot during transplant production**
Report:	**Final**
Project Number:	**FV 186a**
Project Leader:	**Dr S J Roberts** **Horticulture Research International** **Wellesbourne** **Warwick** **CV35 9EF**
Key workers:	**Mrs J Brough (Research Assistant)**
Location:	**HRI Wellesbourne**
Project Coordinator:	**Mr David Simmons** **Trewellard Farm** **Scorrier** **Redruth** **Cornwall** **TR16 5DH**
Date Commenced:	**01-April-1999**
Date Completed:	**01-March-2000**
Keywords:	**Brassicas, black rot, *Xanthomonas*, copper oxychloride, disease spread**

PRACTICAL SECTION FOR GROWERS

Objectives and background

Black rot of brassicas, caused by the bacterium *Xanthomonas campestris* pv *campestris* (*Xcc*), has been causing considerable and increasing concern to growers and seedsmen in the UK in recent years, particularly in winter cabbage and cauliflower crops. Although originally thought to cause serious problems in the South West, problems have now been reported in all the major *Brassica* production areas of England.

Symptoms are most frequently seen in the field as wedge-shaped yellow necrotic lesions developing from the edges of leaves. The pathogen colonises the vascular system giving rise to characteristic blackened veins. Infection often leads to premature defoliation, plants may be stunted and crop quality reduced. The disease also results in increased susceptibility to *Alternaria* and to secondary bacterial soft-rots which may result in complete crop loss. There are no approved chemicals available for control of black rot.

The disease is considered to be primarily seed-borne, and although there may be other sources of infection (e.g. soil, weeds, crop debris), their relative importance has not been established. Plant to plant spread in the field is by water splash and machinery. The majority of commercially available seed is tested for the presence of *Xanthomonas campestris* pv. *campestris*. One possible reason for the recent increases in the disease may be that the currently applied quality standard of 0.01% infection (1 in 10,000 seeds) is inadequate for the current intensive and centralised transplant production systems, where opportunities for pathogen dissemination are rife.

Thus, it is possible that many of the disease outbreaks seen in the field result from low levels of seed infection combined with very high rates of plant to plant and tray to tray spread of disease during transplant raising. Preliminary results from the current MAFF-funded project have confirmed that these rates of spread during plant-raising can be considerable. There is very little individual growers can do about the low levels of seed infection other than demand that seed is tested to the highest possible standards. Even then there will always be the statistical possibility that some infected seed lots will get onto the market. Reducing the rate of disease spread and development during plant raising provides the next best target for control.

Currently the only registered pesticides with bactericidal activity are copper compounds. Although none are approved specifically for the control of black rot in brassicas, copper oxychloride has off-label approval for field application for control of bacterial spear rot in calabrese. The effectiveness of copper is limited to a protectant action and activity is likely to be highly dependant on being able to maintain sufficient concentration of copper on the leaves.

The objective of this project was to investigate the use of copper oxychloride in a spray program during plant raising as a means of eliminating or reducing the rate of spread of *Xcc* during plant raising. MAFF-funded work had already established the appropriate experimental procedures for monitoring the rate of spread of *Xcc* from single infected seedlings, thereby mimicking the most likely commercial scenario. It should be noted that it is not sufficient to rely on visual observation of symptoms as spread of the pathogen greatly precedes symptoms. This project builds on experience gained during MAFF-funded work and will compare the rate of spread of *Xcc* in module trays sprayed with copper with the rate of spread in un-treated trays.

If spread during plant raising is the most important phase in the development of black rot epidemics, the approach suggested here is likely to have a much greater chance of success than using bactericidal sprays in field crops. In addition, because of the protected environment it may be easier to maintain adequate copper concentrations and/or combine with other measures to reduce the rate of spread/infection. By using the pesticide at the early stages of plant production in a relatively controlled environment the risks of residues remaining on the crop at harvest are minimised, as are the amount of pesticide required (hence costs) and any adverse environmental effects.

Summary of results

- A single cell in one tray at the end of each of four blocks of 15 '308' module trays was sown with seed inoculated with *Xcc.*.
- Six sprays of copper oxychloride (Cuprokylt) were applied to half of the blocks of trays at the rate of 8.3 g of product/l with 0.25 ml/l of Agral wetter at weekly intervals.
- The development of disease symptoms was monitored visually and symptomless spread of the pathogen was monitored by carrying out leaf washings.
- Levels of black rot were significantly reduced in the copper-sprayed treatment.
- Reductions were seen in all of the measured disease parameters: apparent disease transmission, rate of symptom development, rate of disease and pathogen spread, pathogen numbers.

Action points for growers

- Copper compounds appear to have considerable potential as a tool for the management of black rot of Brassicas, but no recommendations can be made at present.
- It is not known whether the disease reductions achieved in this single experiment can be repeated or translated into disease reductions in the field.
- Growers should continue to implement other (non-chemical) disease management strategies for black rot.

Practical and financial benefits

The UK Brassica crop is worth over £200 million. Brassica growers are under constant pressure from the major retailers who are demanding ever greater standards of quality and uniformity. Foreign competition also contributes to the squeeze on grower returns. As a result, diseases which affect not only yield but also quality, growing and harvesting costs may have a major impact on the profitability of the crop. There is no doubt that *Xanthomonas* falls into this category and is perceived as one of the major disease problems by growers. Therefore information which may lead to elimination or improved control of the disease is of direct benefit to growers.

This experiment was intended as a first step to determine the *potential* of copper for use in the control of black rot of Brassicas. This potential has now been clearly demonstrated.

