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Combined Hormone-Fungicide Sprays for Control of *Botrytis* Fruit-Rot in Glasshouse Tomatoes

In recent years, losses in glasshouse tomato crops caused by *Botrytis cinerea* Pers. have become serious in New Zealand. This is particularly true of crops treated with fruit-setting hormones, where the dead petals are retained at the calyx end as the fruit expands. These dried petals provide entry points for infection of the fruits. Heavily sporulating centres of infection thus develop early in the life of the crops, increasing the likelihood of later epiphytotic development of all phases of the disease. This is a frequent occurrence in crops treated with hormones. Some form of protection for these petals is desirable, therefore, to reduce loss of fruit and prevent early build-up of infection.

In the process of fruit-set, different parts of the corolla of the tomato flower are for a period shielded from spray—at first, part of the under petal-surface by the calyx, and later, after wilting occurs, the inner petal-surface. Because a normal fungicidal programme is not related to truss development, it does not provide efficient cover for all petal surfaces. To give the necessary protection, sprays must be applied both before and after fruit-set. The correct time for the earlier of these protective sprays coincides approximately with that for the normal fruit-setting hormone spray, and it seemed likely that a combined hormone-fungicide spray at this stage could be used.

Experiments at this Station have shown that a high degree of protection is obtained by applying a suitable therapeutant with the hormone as a truss spray at full bloom, followed by a further spray of therapeutant alone 10–14 days later. A fungicide for this purpose must be compatible with the hormone and not affect fruit development. Various therapeutants have been submitted to laboratory screening tests and to small-scale and commercial glasshouse trials. In the laboratory screening tests, materials were applied at various rates with β-naphthoxyacetic acid at 50 p.p.m. to dry sterile tomato petals affixed to suitable holders for inoculations and incubation. The small-scale glasshouse trials involved inoculation, in humidity cabinets, of developing fruits with attached petals. Of the materials tested, copper fungicides were notably ineffective; but several other therapeutants proved effective, though usually at 1½–3 times the strengths recommended for other diseases. Included among those tested were certain organo-mercurials, thiocarbamates, tetramethyl thiuram disulphide, 2,3 dichloro 1,4 naphthoquinone, 8-hydroxyquinoline sulphate and 8-hydroxyquinoline benzoate. Compatibility tests of promising materials were made on emasculated trusses of potted tomatoes. Only four of these materials at the effective concentration proved to be compatible with the hormone and did not damage the trusses. These were 'Fermspray' (ferric dimethyl dithiocarbamate), 'Zirospray' (zinc dimethyl dithiocarbamate), 'Phygon XL' (2,3 dichloro 1,4 naphthoquinone), and 'Thirospray' (tetramethyl thiuram disulphide).

Commercial glasshouse trials of selected materials were made on spring crops in which the first three trusses were treated as outlined above. In two of these trials heavy natural infection developed, and results showed the method—that is, application of a combined hormone-fungicide spray—to be successful. In one of these trials the use of 'Fermspray' (0·5 per cent) and 'Phygon XL' (0·15 per cent) reduced *Botrytis* fruit-rot by 73 per cent and 53 per cent respectively on the treated trusses. Neither of the treatments adversely affected yield or quality of fruit. Spray residues on mature fruit were negligible. A measure of the severity of infection in the house can be judged by the fact that an average of almost seven fruits per plant (approximately 25 per cent) were lost from the three treated trusses in the check plots.

Apart from effecting a considerable saving of fruit at small cost, use of this new combined hormone-fungicide technique greatly delays build-up of infection, thus reducing the chance of later epiphytotic development of *Botrytis*. Trials are proceeding with the above and other materials. Detailed results will be published elsewhere.

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Bact. coli as a Food Supplement

The idea of using micro-organisms as food supplements is now commonplace, and a great deal is known about the use of yeast and *Chlorella*. Experimental work carried out recently at these laboratories suggests that equal, if not greater, possibilities exist in the use of *Bact. coli* cultures. These researches have been concerned solely with the effect of the addition of *Bact. coli* to basal diets, and no attempt has been made yet to ascertain the biochemical background of the results.

The material used consisted of heat-killed whole organisms, without removal of endotoxin. The strain was one selected at random from a collection of calf scour strains. The culture medium was a simple synthetic one, with ammonia as a nitrogen source and glucose as a carbon source. The aeration technique employed has been described[1]. Batches of 100 litres of this culture yielded about 400 gm. of bacterial protein, calculated as N × 6·25.

Uniform groups of young rats were fed *ad lib.* on a basal diet containing 11·5 per cent of protein and consisting of barley meal 2 parts, bran 1 part and 0·5 per cent cod liver oil. The effects of supplementing this diet with fishmeal and bacterial protein were observed by weekly weighings over periods of 3 or 4 weeks. It was shown by repeated experiments that 5 per cent of *Bact. coli*