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Project Report Summary For:

BOF 33

Sweet william, hybrid pinks and chrysanthemum: evaluation of fungicide treatments for control of rust diseases and crop phytoxicity

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BOF 33

Sweet william, hybrid pinks and chrysanthemum: evaluation of fungicide treatments for control of rust diseases and crop phytoxicity

Practical section for growers

Objectives and background

Rust diseases are important in many horticultural crops. Although the fungi responsible usually have a very narrow host range (e.g. the rust fungus found on sweet william does not affect hybrid pinks), their close taxonomic relationship means they are often susceptible to the same fungicides. With the recent appearance of several new rust fungicides, there is now opportunity to extend the armoury of products which can be used for rust control on horticultural crops. Many of these new fungicides have broad spectrum activity, offering the possibility of treating a crop for two or more diseases at the same time with one product. Optimum timing of spray application and the number of sprays required for effective rust control will differ markedly between crops; also, safe rates of use need to be established for each crop.

Outdoor crops of sweet william, hybrid pinks and chrysanthemum are all particularly susceptible to rust. The diseases, caused by *Puccinia arenariae, Uromyces dianthi* and *Puccinia horiana* respectively, can develop to epidemic proportions very rapidly when environmental conditions are favourable. Once established in a crop, they can be notoriously difficult to control.

The objectives of this project were:

1. To identify fungicides capable of giving effective rust control in three economically important flower crops (sweet william, hybrid pinks and chrysanthemum)

2. To devise spray programmes which are reliable and effective

3. To identify fungicides which may reduce stem length or otherwise adversely affect crop growth

Sweet william rust (1994/95)

Summary of results

An experiment was established in August 1994 in a transplanted crop of sweet william *cv*. Messenger in Lincolnshire. Rust infection occurred naturally in October, three weeks after application of the first fungicide treatments. Nine fungicide products (Alto 100, Corbel, Folicur, Plantvax 75, Systhane 6W, Tilt 250 EC, Plover 250, Dorado and an experimental product) were each applied at 500 litres/ha eight times between September and April; all gave good control of rust. A reduced spraying programme, with no fungicides applied until February, gave moderate control of stem infection and poor control of rust on lower leaves. Treatment with Tilt was as effective at 0.5 ml/litre as at 1.0 ml/litre. Some products applied eight times to the crop reduced stem length. In a second experiment, the degree of rust

control was improved and stem length was reduced as the number of sprays of propiconazole (Tilt) was increased from four to eight.

Action points for growers

1. For good rust control in sweet william, apply a first fungicide treatment in the autumn, before or immediately the disease occurs in a crop. The frequency and interval for subsequent sprays will depend on temperature and disease pressure. More treatments are likely to be required in mild, wet weather (eg in the south west) than in very cold or dry weather (eg in eastern England).

2. Fungicide products from four different groups all provide effective control:

Fungicide group	Products used in this work
DMIs	-Alto 100, Dorado, Folicur, Systhane 6W, Tilt 250 EC, Plover
Morpholine	-Corbel
Carboxin	-Plantvax 75
Strobilurin	-Experimental

   Rotate product choice from different groups to reduce the risk of fungicide resistance developing.

3. Multiple applications of some DMI fungicides (e.g. Tilt) may result in a shortening of flower stem length.

4. Consider using Plover for rust control in areas where there is a history of ring spot affecting sweet william; this fungicide will provide effective control of both diseases. Results of an HDC project on fungicide treatments for control of ring spot are available in Project Report PC 87.

Practical and anticipated financial benefits

This work has clearly identified eight fungicide products and one experimental fungicide which, applied as programmes of sprays before rust occurred in the autumn, all gave good control of sweet william rust through to flower harvest. Repeated application of some triazole fungicides significantly reduced flower stem length. Production of disease-free stems of the minimum stem length is critical when supplying cut flowers to supermarkets and other multiples. This work will help growers to develop spray programmes which achieve effective control of rust without reducing stem length. Two off-label approvals (2268/96 and 2269/96) have been obtained as a result of this work and project PC 87 (Control of ring spot on hybrid pinks) permitting the use of Plover on protected hybrid pinks and sweet william. Plover is effective against both rust and ring spot diseases.

Hybrid pinks rust (1995/1997)

Summary of results

An experiment was established in September 1995 in an outdoor crop of hybrid pinks *cv*. Haytor White in Lincolnshire. Rust was established in the guard rows in September 1996 following inoculation with a suspension of rust spores. There was a latent period of 7 weeks between inoculation and symptom development. The disease failed to spread through the crop during the following autumn and winter, probably because of the cold and generally dry weather. The crop was re-inoculated in April 1997 and rust was widespread

in the crop by October, when fungicide treatments were applied. Programmes consisting of two fungicide sprays, applied within 8 days of each other, reduced the number of rust pustules developing on previously unaffected leaves. Treatments reduced the increase in rust by approximately 58-84%; Plantvax and Opus were slightly more effective than other treatments. None of the 2-spray programmes gave control equal to that of a protectant programme (97% control). Carnation necrotic fleck virus was confirmed in plants, causing leaf tip spotting and necrosis, after an infestation of aphids.

Action points for growers

1. Rust in pinks can have a long latent period (over 4 weeks) between infection and symptom development. There is opportunity to use fungicides with curative activity (eg Plantvax, DMI products) soon after rust is first seen in a crop, to prevent latent infections developing into visible sporing pustules. Examples of DMI products are Alto 100, Dorado, Plover and Tilt 250 EC.

2. Although a protectant programme is likely to be more effective than a curative treatment, especially when conditions favour rapid disease development, application of two fungicide sprays at a short interval soon after rust becomes established in a crop can markedly reduce rust development.

3. It is recommended that no more than two sprays of products in the same fungicide group are used in sequence. Plantvax and DMI products (e.g. Plover) should be alternated with broad-spectrum protectant fungicides (e.g. a chlorothalonil product such as Bravo 500 or a mancozeb product such as Karamate) to reduce the risk of selcting rust pathotypes resistant to the site-specific fungicides.

4. Control aphids in order to prevent carnation necrotic fleck virus becoming widespread in a crop.

Practical and anticipated financial benefits

This experiment has identified 10 fungicides which can provide some control of rust when treatment is not started until after the disease is present in a crop. It also demonstrated that a protectant programme can provide more effective control. These results will assist growers in achieving control of rust in hybrid pinks.

Chrysanthemum white rust (1996)

Summary of results

An experiment was established in July 1996 in an outdoor crop of chrysanthemum *cv.* Margaret in Lincolnshire. All cuttings were dipped in Tilt before planting. Spray treatments commenced four weeks after planting. White rust infection occurred naturally and was first found on untreated plants on 10 September. Eight preventative spray programmes, with sprays applied at 14 day intervals before rust occurred and at 7 day intervals shortly after its first occurrence, all reduced disease development, although none gave complete control. The four most effective programmes were Karamate/Glint, Karamate/Plantvax, Karamate/Systhane and Karamate/Experimental. Karamate alone, Karamate/Bravo, Karamate/Corbel and Karamate/Dorado all gave good reductions in white rust. Treatment with Corbel (4 sprays) from 26 July resulted in marked leaf yellowing and reduced stem length by *c*. 8 cm. The same number of sprays applied from 10 September was not phytotoxic. Application of four sprays of Tilt, Corbel or Glint immediately after the first appearance of white rust in the experimental area reduced disease development and at

harvest these treatments were not significantly inferior to the best preventative spray programmes.

At harvest (18 October), the mean number of pustules on untreated plants was 22.8 per stem. This was reduced to 0.7 pustules per stem by Karamate/Experimental (the best preventative programme) and to 0.9 pustules per stem by Glint (the best eradicant programme). Fungicides in six different groups gave control of white rust.

Action points from growers

1. The following fungicides all provided control of chrysanthemum white rust:

Fungicide group	Products used in this work
DMIs	Dorado, Systhane, Tilt
Morpholines	Corbel
Carboxin	Plantvax 75
Strobilurin	Experimental
Dithiocarbamates	Karamate
Phthalonitriles	Bravo
DMI/Morpholine mixture	Glint

   Rotation of products from different fungicide groups should reduce the risk of fungicide resistance developing.

2. Multiple applications of Corbel at 2 ml/litre from seven weeks after planting resulted in stem shortening and leaf yellowing; most stems in this treatment were unmarketable.

3. For good control of white rust, start a spray programme before the disease occurs in a crop; consider reducing the spray interval to 7 days immediately the disease occurs.

Practical and anticipated financial benefits

The experiment on chrysanthemum white rust identified four programmes of alternating sprays which resulted in 93% control of the disease, or greater. Importantly, it also demonstrated that some less expensive, older fungicides, applied as protectant sprays, can provide 50-80% control. Use of such products in white rust spray programmes, before the disease becomes established in a crop, will help to preserve the efficacy of systemic, rust-specific fungicides (eg Tilt).