FUNGICIDE EVALUATION FOR CONTROL OF BLOSSOM BLIGHT OF NECTARINES

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SUMMARY

Several triazole fungicides were evaluated on Fantasia nectarines for control of blossom blight caused by *Monilinia fructicola* (Wint.) Honey. Blossom blight did not occur on field plot trees but was induced in controlled environment cabinets. Blossoming laterals were cut from plot trees, inoculated and incubated. Under these severe test conditions all the fungicides tested were as effective as the standard triforine and some were significantly better.

INTRODUCTION

Blossom blight is the blossom phase of the disease brown rot of summerfruit caused by the fungus *Monilinia fructicola* (Wint.) Honey. The presence of blighted blossoms causes a build up of inoculum for subsequent brown rot infection of the fruit. In wet seasons brown rot causes considerable pre-harvest and post-harvest fruit loss in Hawke's Bay.

Control strategies are based on preventing the blossom blight phase of disease. Chlorothalonil, triforine and the dicarboximides have been in widespread use since the early 1980's for blossom blight prevention. However, the development of fungal strains resistant to dicarboximide fungicides (Elmer and Gaunt 1986) has given impetus to the development of new products. Currently a range of demethylation inhibitors (DMIs) are being developed for registration on summerfruit in New Zealand.

In this trial a number of DMI fungicides were compared with the standard piperazine (DMI) fungicide, triforine, for their effectiveness in preventing blossom blight on Fantasia nectarines.

METHOD

The trial was conducted at Hawke's Bay Agricultural Research Centre during spring 1988. The experimental design was a randomised block with five replications of 3 year old Fantasia nectarines. Plots were single trees planted at 3 x 2.8 m spacings.

Fungicides (Table 1) were applied three times to each plot tree (2 September, 5 September and 9 September), to cover the blossom period (Fig. 1). Rain fell 2 h after the first spray application and 7 h after the second. Application was to run-off by hand-operated knapsack sprayers with solid cone nozzles operated at low pressure to reduce drift. In addition polythene screens were used when necessary to isolate treated trees.

To identify the occurrence of infection periods a mechanical temperature/leaf wetness recorder was sited in the block, 1 m above the ground in a Stevenson weather screen. Daily rainfall data were also collected from the Whataku weather station, 230 m to the south east of the trial site.

All trees were inoculated with *M. fructicola* on September 5 (Fig. 1). A pure culture conidial suspension (2×10^5 per ml) was applied by De Vilbis atomiser to the blossoms during light wetting rain. Conditions did not remain suitable for infection however, so a second inoculation of trees was carried out on September 14 during rainfall.

To ensure diseased blossoms for treatment assessment, blossom blight was induced on detached blossoming laterals in controlled environment conditions using a method adapted from Tate and Seelye (1977). Three to six blossoming laterals were cut from each plot tree and placed in vials of water. All blossoms were inoculated with *M. fructicola* pure culture suspension (3×10^5 conidia/ml) and placed in refrigerated, high humidity incubators. Two such tests were run.

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TABLE 1: Percentage of blighted blossoms on detached Fantasia nectarine laterals from trees to which different fungicides had been applied during bloom.

Fungicide	Product	Formulation	Rate (g ai/100 litres)	% Blighted blossoms Incubator Test	
				1	2
chlorothalonil + cyproconazole	Bravo + San 619	50% EC 30% EC	115 2	0.0	1.2
chlorothalonil + cyproconazole	Bravo + San 619	50% EC 30% EC	60 2	0.0	1.9
chlorothalonil + cyproconazole	Bravo + San 619	50% EC 30% EC	115 1	0.0	6.2
myclobutanil	Systhane	12.5% EC	28	0.0	7.8
myclobutanil	Systhane	12.5% EC	14	1.5	15.3
myclobutanil	Systhane	12.5% EC	7	4.2	36.3
propiconazole	Tilt	25% EC	6.25	0.0	15.1
flusilazol	Nustar	20% DF	4	1.4	20.0
flusilazol	Nustar	20% DF	3	4.4	17.1
triforine	Saprol	19% EC	19	4.2	21.2
	CGA 169374	10% WP	20	0.0	31.5
	CGA 169374	10% WP	10	3.0	17.1
			LSD (5%)	3.0	17.1
bitertanol ¹	Baycor	50% WP	25	4.0	27.7
untreated ²	-	-	-	65.7	77.9

¹ Non-randomised plots (within trial) - not included in analysis² Untreated check not included in analysis.

Test 1 (Pilot Test): Laterals were taken on September 6, 1 day after fungicide application, following 6 mm of overnight rain (Fig. 1). The trees were at 20% bloom, and approximately 20 blossoms per plot tree were taken. Incubation was for 6 days at 18 - 20 °C.

Test 2: Laterals were taken on September 12, after 3 days of warm, dry conditions following the second fungicide application. The trees were at full bloom and approximately 30 blossoms per plot tree were taken. This time the blossoming laterals from each plot were enclosed in a moistened plastic bag secured to the vial by a rubber band to ensure constant high humidity. Incubation was for 7 days at 16-18 °C.

Although blossoms on plot trees were inspected following each wet period, blossom blight was not seen and no disease assessment was carried out.

Assessments of induced blossom blight in the incubator tests were made following each incubation period. The total number of blossoms in each vial plot was counted, and each blossom classified as either blighted or not. Any sporulation on the calyx was deemed to constitute 'blight'. Sporulation on the blossom filaments or petals only was disregarded, as the fungus has to grow down into the calyx to destroy the whole blossom (blossom blight). From these data the percentage of blighted blossoms for each plot was calculated, then subjected to a generalised linear model analysis.

RESULTS AND DISCUSSION

Field conditions for disease

There was no evidence of natural inoculum in the trial area and blossom blight did not occur despite inoculation.

Fig. 1: Timing of fungicide sprays in relation to flowering, weather conditions and detachment of blossoming laterals for incubator Tests 1 and 2.

Weather conditions at the beginning of September (10% bloom) provided conditions conducive to blossom blight development. The lack of disease development was probably due to the absence of inoculum. Two further wet periods occurred during bloom (September 5 and 14), and inoculum was applied to the trees at the beginning of each wet period. Again there was no disease development. The rainfall on September 5 was too brief to allow blight development. The September 14 wet period lasted for 11 hours with an average screen temperature of 14°C, although the temperature dropped steadily to 4°C. The flower temperature was likely to be well below the screen temperature, and conditions were probably too cold for disease development.

Incubator tests

Both incubator tests produced high levels of blossom blight (66% and 78% respectively) in untreated blossoms (Table 1). However the incubation conditions were artificial and the 'blight' produced was not typical of field blight, with some petal and blossom drop during the test.

All fungicide treatments reduced disease levels. The fungicides appeared more effective in Test 1 than in Test 2. This difference was thought to be due to the different incubation conditions. Test 2 was probably more rigorous because a more constant high humidity was achieved (by enclosing blossoms in plastic bags) and the test was run a day longer. The triforine standard reduced disease levels from 66% to 4% in Test 1 and from 78% to 21% in Test 2. This was considered to be a satisfactory result under the severe conditions of these tests, particularly Test 2. Better results could be expected in field infection conditions. None of the fungicide treatments were significantly less effective than triforine, but some were significantly more effective. In Test 1 all chlorothalonil + cyproconazole combinations, propiconazole and the higher rates of CGA 169374 and myclobutanil gave significantly greater disease reduction than triforine. Under the more severe conditions of Test 2 only two combinations of chlorothalonil + cyproconazole gave significantly greater disease reduction than triforine.

These results generally agree with those of many separate field trials reported in the USA (e.g. Hickey *et al* 1987) in which triazole fungicides compare well with current standards such as triforine.

CONCLUSIONS

The technique used in this trial (in which detached laterals were inoculated, then incubated under controlled conditions) is useful to derive disease data from field spray trials when weather conditions are not conducive to disease development in the field.

Based on the results of this trial, triazole fungicides are effective alternatives to current standard fungicides for preventing blossom blight in nectarines and peaches.

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