



Mana Kai Rangahau

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***Evaluation of natural products for control of
Phytophthora rot of asparagus***

L-H Cheah

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*New Zealand Institute for Crop & Food Research Limited
Private Bag 11 600, Palmerston North, New Zealand*

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1 *Executive summary*

A field trial to evaluate the efficacy of five natural products for the control of Phytophthora rot of asparagus was established at the property of a commercial grower, on land known to be infested with *Phytophthora megasperma*. Incidence of the disease was low and there were no statistically significant differences in disease control observed between treatments. There was also little evidence that the treatments gave different yields. However, chitosan, meadowfoam meal and Trichoderma gave slightly higher (5-15%) average yields than the untreated experimental control, with correspondingly higher spear weights from these treatments. There was no indication that phosphorous acid reduced the incidence of disease or increased spear yield.

In this trial all of the tested treatments, except phosphorous acid, were biological products that may take some time to influence disease and yield. Since disease incidence was low and there was an indication that some treatments slightly increased yield, we recommend repeating the trial in order to determine the accumulative effect of these biological products on disease control and crop yield.

2 *Introduction*

Phytophthora spear rot, caused by the fungus *Phytophthora megasperma*, is a major problem in many asparagus growing areas in the southern North Island. The disease can cause losses up to 50% of spears to be lost during long wet periods in early spring. Losses in total production are often underestimated by the growers as the disease occurs below ground. The fungicide metalaxyl has been shown to effectively control the disease in California (Falloon et al. 1983) and in New Zealand (Nikoloff 1984; Cheah 1987). Recently, however, growers have complained that the chemical is losing effectiveness, despite greater than recommended rates being applied.

Market trends in New Zealand and worldwide are moving towards healthy food and sustainable production methods. Consumers are demanding little or no pesticide residues on their food. For this reason there is a need for new and effective means of disease control that pose less risk (perceived or real) to human health and to the environment.

In order to meet this need, some asparagus growers are using biological control methods. However, the efficacy of these products is yet to be proven in New Zealand conditions. Also there are no efficacy data to substantiate label claims.

The objective of the present study was to evaluate natural products and biocontrol agents for the control of Phytophthora rot on asparagus.

3 *Materials and methods*

A field trial to evaluate the efficacy of five natural products (Table 1) for the control of *Phytophthora* rot asparagus was established at the property of a commercial grower on land (pH 6.5) known to be infested with *Phytophthora megasperma*. Forgreen-BS at 10 kg/1000 m² was mixed with the standard fertiliser that is usually applied. After the fertiliser plus Forgreen-BS had been applied and worked in to the soil, a 2 litre Chitosan AA only treatment, diluted in 300 litres of water, was applied to the soil. The second Chitosan application of 2 litres per 300 litres of water was applied one month after the first application, the third application one month after the second application and the fourth application one month after the third application. A total of four Chitosan AA applications were made.

Guard Pk (phosphorous acid) was sprayed twice on the plants (at fortnightly intervals) during summer and applied at monthly intervals on the soil during the season. A total of four applications were made. Meadow foam was applied four times in a season: once before picking, and then at monthly intervals during the season. Metalaxyl was applied once in early spring before spear emergence. Trichoflow was applied four times during the season – once before picking, and then at monthly intervals during cropping.

Treatments were applied to 6m long plots (18-20 plants), which were comprised of one row of plants. The planted rows were 1.5 m apart and there was a guard row in between treated plots. Treatments were laid out in five randomised blocks, each of which was comprised of a complete set of the six treatments. Soil samples were taken before and after application of these treatments to measure the changes in soil pH. The crop was harvested according to grower practice, and spears were graded for quality and then weighed. The numbers of diseased spears were recorded.

Table 1: Products tested for control of *Phytophthora* rot of asparagus.

Treatment	Rate
1. Forgreen-BS and Chitosan AA	10 g/m ² , 2 ml/m ²
2. Guard Pk (phosphorous acid)	5 ml/l
3. Meadow foam	1 g/m ² (= 10 kg/ha)
4. Metalaxyl (Ridomil EC)	0.13 ml/m ² (= 1.3 l/ha)
5. Trichoflow	0.1 g/m ² (= 1 kg/ha)
6. Untreated control	-

4 *Results*

Twenty harvests were made from the trial plots during the 2001 season. The incidence of *Phytophthora* rot was low, with all treatments giving less than 1% of spears infected (Table 2). There was also little evidence that the treatments gave different yields. However, treatments 1 (Chitosan), 3 (Meadow foam) and 5 (*Trichoderma*) had a slightly higher (5-15%) average yield than the untreated

control, and spear weight was also similarly increased by these treatments. There was no indication that phosphorous acid reduced the disease incidence or increased the yield. There were no changes in soil pH after the application of these products.

Table 2: Mean yields of asparagus after treatments with products for control of *Phytophthora* rot.

Treatment	Rotted spears (%)	Mean Yield per plot		
		Total spears ¹	Total wt (g) ²	Wt/spear (g) ³
1. Forgreen-BS and Chitosan AA	0.8	165.5	196	15.9
2. Guard Pk (phosphorous acid)	0.1	145.2	132	13.3
3. Meadowfoam	1.0	165.8	180	14.6
4. Metalaxyl (Ridomil EC)	0.5	187.2	147	12.9
5. Trichoflow	0.6	168.2	188	15.0
6. Untreated control	0.2	160.0	169	13.3
7. SEM	-	19.6	32	1.5

¹Cumulative count of spears for 20 picks.

²Sum of the weights of the 10th and 20th picks.

³Average weight per spear from the two weighed picks.

⁴Standard Error of the means (pooled)

5 Discussion

The reason for low *Phytophthora* rot incidence on spears was unclear because, according to the owner of the property, the crop had a history of severe infection by *Phytophthora*. During harvesting it frequently rained, temperatures were mild, creating conditions conducive to infection. However, the winter was very dry, and this may have contributed to low disease incidence.

It is generally agreed that biological products may take some time to take effect and for their impact on disease control and yield to become evident. This trial provides some evidence that these products slightly increased in yield in the first season of application. For this reason we would like to repeat the treatments to study their cumulative effects on disease control and yields.

6 Recommendations

1. Repeat tests of the above treatments to confirm the cumulative effect of the biological products.
2. Artificial inoculation of the pathogen may be needed to increase disease incidence.

7 *Acknowledgements*

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8 *References*

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