SCREENING NATURAL PRODUCTS FOR THE CONTROL OF POWDERY MILDEW IN SQUASH

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INTRODUCTION

Powdery mildew of squash, caused by *Sphaerotheca fuliginea*, is a common and serious disease throughout New Zealand. The disease can reduce the photosynthetic area of leaves and, in severe cases, defoliate plants-effects that are likely to reduce yield and quality of plants.

Methods for disease control currently available to commercial growers include repeated applications of elemental sulphur or demethylation inhibitor (DMI) fungicides, but these do not always provide adequate disease suppression. It is possible that the lack of control may be due to fungicide resistant strains of powdery mildew fungi in squash crops. Cucurbit fungicide resistance has been reported in crops in Australia (1). Furthermore, the increasing concerns for public health, the environment and the expanding competition in the agriculture market motivates growers to seek disease control strategies that use reduced amounts of synthetic fungicides. For these reasons there is a need for new and effective means of disease control that poses less risk to human health and the environment. A screening trial was carried out in a glasshouse to evaluate some natural products for the control of powdery mildew in squash.

MATERIALS AND METHODS

Squash (*Cucurbita maxima*) plants were raised in the glasshouse until 6-8 weeks old. Powdery mildew spores were washed from infected leaves to make into a spore suspension. Treatments were applied by brushing the extract filtrates, oil suspensions or cell suspensions of biological control agents onto leaves with a paint brush. After the treated leaves had dried, they were inoculated with *S. fuliginea* by spraying a spore suspension onto the leaves. Treated leaves were then bagged to maintain high relative humidity for two days before disease assessments were made.

RESULTS

In the first test, eight natural products (*Reynoutria* extract, olive oil, rapeseed oil, mineral oil, neem oil, chitosan (crab shell extract), baking soda and *Acremonium* sp) were screened. *Reynoutria*, olive oil and rapeseed oil gave a significant reduction of powdery mildew (Table 1)

Table 1. Effect of plant extracts, water and *Acremonium* sp. on incidence of powdery mildew in squash.

Treatment	Rate (per litre)	Infection (%)
Reynoutria extract	20.0 mg	1.3d[1]
Olive oil	20.0 ml	1.8d
Rapeseed oil	20.0 ml	3.0c
Water	-	23.2a
Acremonium sp.	$1x10^7$ spores/ml	23.7a
Untreated control	-	29.8a

[1]Any two means followed by the same letter are not significant at P<0.05

In the second test, all natural products gave significant reduction of the disease level up to 14 days after inoculation. However, sulphur and chitosan continued to suppress disease up to 28 days, while other products had lost their efficacy of control (Fig 1).

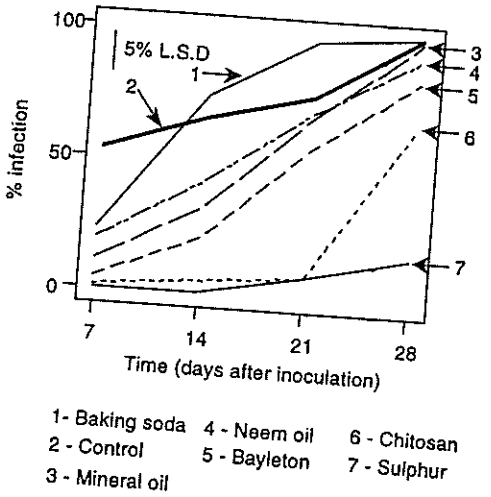

Figure 1. Effect of natural products on the progression of powdery mildew on squash in the glasshouse.

DISCUSSION

Our results agree with the results obtained by Herger *et al* (2). Our results also showed that olive oil and chitosan are effective treatments. This appears to be the first report of control with olive oil and chitosan. If these natural products perform as well on field crops as in the glasshouse, they would be good substitutes for fungicides to avoid the problem of resistance to fungicides in *S. fuliginea*. The use of natural products for control of powdery mildew by vegetable growers would be seen as a positive response to public concern about the adverse effect of fungicides on human health and the environment.

ACKNOWLEDGMENTS

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