

# Downy Mildew of Brassicas

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Fig 1. *Brassica* seedling showing cotyledons infected with downy mildew.

## Introduction

This project funded by the MAA, HRDC and Agriculture Victoria is developing an integrated management strategy for the control of downy mildew on *Brassica* and stock seedlings, which is caused by the fungus *Peronospora parasitica*. The disease which discolours foliage and causes premature defoliation is responsible for substantial losses to seedling growers.

## Symptoms of downy mildew

The downy mildew disease on brassicas first fluffly appears as a mass of white spores on the under surface of leaves. This is followed by black speckling on upper leaf surfaces, especially of the cotyledons. Leaves prematurely yellow and defoliate. The disease is usually not fatal but severely slows plant development

## Host range

Strains of the fungus *P. parasitica* are specific to particular groups of plants. One strain only infects Cruciferaea (e.g. broccoli, Brussels sprouts, cabbage, cauliflower and Chinese cabbage) whilst another is specific to stocks.

## Seed

Extensive seed germination and grow-on tests on broccoli, Brussels sprouts, cabbages and cauliflowers failed to detect downy mildew on emerging seedlings up to 2 months after planting. Seed does not appear to be a source of infection for the spread of the disease.

## Infection

Spores are produced overnight on the under surface of leaves and released in the morning. Spores need wet leaf surfaces to germinate. The process of infection takes up to 3 hours. The fungus then grows within the leaf. It takes 5-7 days for symptoms to become visible on leaves after infection.

## Spread of the disease

Old infected seedlings in a nursery, or weedy crucifer plants in the vicinity of nurseries are probably responsible for the spread of the disease. Spores are carried on the wind from these plants to healthy seedlings. The disease is favoured by cool temperatures in the range of 10-16 °C, consequently it is prevalent in winter.

## Control Strategies

Strategies to control the disease must consist of both management practices and fungicides spray programs.

## Management Practices

Management strategies to reduce the disease are:

### 1. Controlled Watering

Where possible avoid watering plants in the morning because this is the time when spores are released and available for infection. Spores need water to germinate on leaf surfaces and to infect plants. One heavy watering is preferable to a long light watering. The disease can be severe when rainfall exceeds 750-1000mm/yr.

### 2. Ventilation

Always maintain a well ventilated environment to lower humidity and reduce spore production. This may mean fewer plants and trays per square metre.

### 3. Nutrition

Maintain a balance program of nutrition because a potash deficiency will increase the susceptibility of seedlings to downy mildew.

## Evaluation of Fungicides

For downy mildew of stocks, either the combination of 'Foli-R-Fos'+ 'Euparen' or 'Foli-R-Fos' + 'Zineb' controlled the disease on plants grown for 8 weeks under glass.

Growing cauliflower seedlings under cover (2 weeks under glass, 2 weeks under cloth and 4 weeks outside) slows down the initial development of downy mildew, compared with growing them without cover (2 weeks under glass, 6 weeks outside), Fig 2.

A combination of the contact fungicide 'Euparen' + the systemic fungicide 'Foli-R-Fos' controlled downy mildew on seedlings grown with or without cover (Fig 3 & 4). 'Euparen' which was applied with 'Agral 60', was not phytotoxic but produced greening of foliage on seedlings.

Neither 'Foli-R-Fos' nor 'Euparen' are registered for control of downy mildew.

Fungicides registered for the control of downy mildew on brassicas are copper, copper oxychloride, cupric hydroxide, Mancozeb, Metiram and Zineb. Furalaxyl is registered for ornamental seedlings. All are contact fungicides except Furalaxyl, which is a systemic.

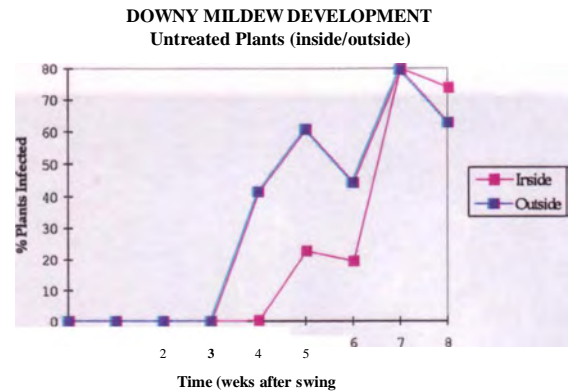


Fig 2. Untreated cauliflower seedlings grown outside (without cover) and inside (with cover).

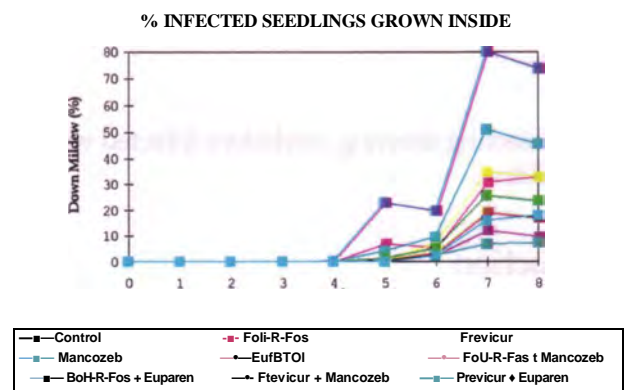


Fig 3. Fungicide trial. Infected seedlings grown inside (under cover).

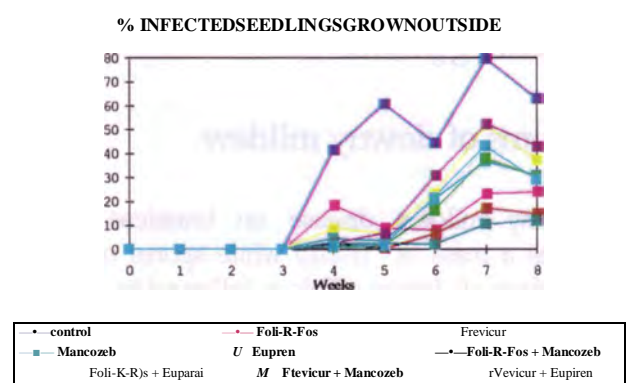


Fig 4. Fungicide trial. Infected seedlings grown outside (without cover)

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