DEPARTMENT OF
PRIMARY INDUSTRIES

Primary Industries Research Victoria
Plant Health Sciences

Managing Clubroot

Key Elements of Integrated Control

Clubroot spores can persist in the soil for many years and are spread in water or soil adhering to equipment, machinery, etc.

Symptoms on brassicas include wilting, stunted growth, colour change in foliage and root galling. Infected roots prevent water and nutrient assimilation.

Clubroot disease is favoured by a contamination source, and warm, wet, acidic soils.

Once a plant has been infected there is no effective treatment.

Wilting due to clubroot

Healthy roots Infected roots

PREVENTION

Good sanitation and implementation of a hygiene protocol in the nursery and farm are your responsibility and your right to protect against clubroot disease.

Hygiene

Control traffic movement with signage and foot baths. High pressure wash equipment is needed to remove dirt. Clean first then disinfect equipment. Use an uncontaminated water source. After cleaning, reusable nursery trays should be soaked in disinfectant solution or steam sterilised.

Planting Material

Simple changes to the nursery design can reduce contamination at entry points. Include concrete or gravel floors, foot baths, raised benches, screening and signage.
Store seed and potting media away from dirty washing areas.
Irrigate with a clean source of water.
Source seedlings from a refutable supplier and use tolerant or resistant varieties.

Cultural Control

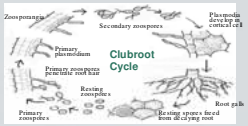
Avoid over watering to prevent a water logged environment and improve drainage by increasing bed heights and/or laser grading.
Refrain from cropping crucifers more than once every two years. Rotate with non brassica crops.
Try to avoid double cropping and summer crops.
Control brassica weeds (eg. mustards, white radish, shepherds purse) to prevent a contamination build up.

Amendments

Monitor soil pH and use lime to maintain a pH of 7-7.5 in responsive soils.
An increase in soil concentrations of calcium and boron within the first 3 weeks of planting inhibits clubroot.

MANAGEMENT

Determine the disease risk using farm records or diagnostic tests to be able to select an appropriate disease management strategy.



Rate the disease risk

		LOW	MEDIUM	HIGH
1	Severity of last observed clubroot infection	Mild	Moderate	Severe
2	Time since last observed clubroot infection.	More than 5 years	2-5 years	0-2 years
3	Intended sowing time for brassicas.	May-Aug	March/April and Sept/Oct	Nov-Feb
4	Have brassica weeds been seen on the site since last infection?	Never	Infrequently	Often
5	Intended crop	Non-brassica	Broccoli, Brussel sprouts, cabbage, Asian veg brassica	Cauliflower, Chinese cabbage
6	Soil pH	7-8	6-7	Less than 6
7	Source of planting material	Cell grown transplants -reputable nursery	Seed bed on farm	Direct seeded onto site
8	Variety	Tolerant/resistant	Susceptible	Highly susceptible
9	Drainage	Excellent	Fair	Poor
10	Soil type	Sand	Loam	Clay

Identify then eliminate the likely sources of contamination.

Consider the following top 3 risks:

Nurseries
1. Reusable plastic seedling trays returning from farms.
2. Water stored in dams.
3. Soil and dust carried onto the nursery.

Farms
1. Dirty machinery moving from site to site.
2. Dirt exchanged with shared equipment and labour.
3. Irrigation with water from contaminated dams.

New outbreaks.

Quarantine an outbreak and remove affected plants. Dispose of diseased material and attached dirt.
Isolate the area.

Application.

Apply treatments to the plant root zone. Strategic application effectively incorporates products into the transplant row. This can save time, cost and labour.
Fungicides and fumigants are available for disease control.
Appropriate use relies on timing, rates and method of application.

Use the techniques listed once disease risk has been estimated.

Low Risk

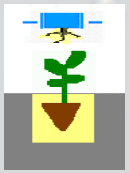
Be rigorous about farm hygiene. See factsheet 3.
Adjust soil pH to 7.0-7.5 with lime. See factsheet 5.
Improve drainage and irrigation practices. See factsheet 3.
Monitor for symptom development eg.stunted or wilting plants.
Remove plants and check for galls. See factsheet 1.
Treat any spot infection immediately. See factsheet 4.

Medium Risk

Practise a minimum 2 yr crop rotation.
Keep crops free of brassica weeds.
Adjust soil pH to 7.0-7.5 with lime. See factsheet 5.
Maintain high soil calcium in first 3 weeks after planting. See factsheet 6.
Improve drainage and irrigation practices to minimise water logging. See factsheet 3.
Use tolerant / resistant plant varieties.

High Risk

Avoid summer plantings.
Do not crop Chinese cabbage.
Practise a minimum 3 yr crop rotation.
Keep crops free of brassica weeds.
Adjust soil pH to 7.0-7.5 with lime. See factsheet 5.
Incorporate fungicides into the transplant row immediately before planting. See factsheet 8.
If severely affected fumigate the disease site. See factsheet 7.
Maintain high soil calcium in the first 3 weeks after planting. See factsheet 6.



To confirm a clubroot diagnosis Contact: Crop Health Services (03) 9210 9356

A SERIES OF 10 FACTSHEETS ACCOMPANY THIS POSTER. PLEASE CONSULT THE RELEVANT FACTSHEET FOR MORE DETAILED INFORMATION.

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