

Integrated Clubroot Management in Vegetable Brassica Crops



Clubroot (*Plasmodiophora brassicae*) is a serious soilborne disease of brassica (cabbage family) crops that can cause significant economic crop losses if not managed effectively.

The symptoms from which the disease gets its name are easily identifiable by the swelling on the roots, or “clubs”, on roots. Clubroot infections reduce the ability of the infected plant to access water and nutrients. Low to moderate clubroot infections can cause stunting and even wilting of the plant during the day, even when soil moisture levels are considered adequate. If the clubroot infection is severe, it can kill the crop resulting in significant crop loss.

As a disease the clubroot pathogen produces thick-walled, long-lived resting spores (some reports suggest that clubroot spores can live for as long as 20 years), with the majority of spores likely die within 5 to 7 years (Wallenhammar, 1996). It is these two key features that makes clubroot difficult to manage and unlikely to be eradicated once established in a field.

The incidence and severity of clubroot in some vegetable production areas is on the rise, due to an

- Increasing demand for brassica products to be grown year round and
- Limited availability of fresh ground due to urban encroachment where to grow brassicas crops, reducing rotational cropping options, has resulted in more extensive cropping on the same soil

Clubroot is endemic in most of the major production regions of Victoria, New South Wales and Tasmania. Outbreaks have occurred in Stanthorpe (Queensland in 1997), Gatton, (Queensland in 2001) and Manjimup (Western Australia in 1993). Clubroot is now a significant problem in every state of Australia. (Horticulture Australia project number VG 00044, Clubroot – Total Crop Management (Final report). Managing clubroot successfully requires the use of a sound integrated disease management strategy that uses a range of management techniques

A successful control strategy should include the following steps:

1. Correctly identifying the disease by regularly monitoring your crops and using soil pathogen testing services like SARDI.
2. Containing the disease to the area of the paddock infected by establishing effective quarantine measures
 - a. The best way to manage clubroot is to prevent disease from becoming established on your property
 - b. To reduce the risk of introducing clubroot to your farm, identify all possible sources of pathogen transport (equipment, transplants, animals, and people), and then manage your farming system to avoid bringing the pathogen onto your farm.

- c. Clubroot spores can be transported short distances with surface runoff caused by rain or irrigation water so try and minimize surface water entering your property by utilizing adequate drains
- 3. Implementing good agricultural practices that reduce disease pressure. These practices include:
 - a. Rotating out of brassica crops for at least 5 years or more
 - i. Rotations of fewer than 8 years can be used effectively in an integrated disease management system (e.g. lime application) to keep disease pressure low enough to prevent crop loss.
 - b. Effectively managing brassica weeds that may host the clubroot pathogen
 - i. E.g. Canola (*Brassica napus* and *B. rapa*) Wild Mustards (*Brassica* species) Shepherd's purse (*Capsella bursa-pastoris*) Wild radish (*Raphanus raphanistrum*)
 - c. Irrigation and soil management avoiding soil waterlogging and runoff will reduce the risk of infection
 - d. Improve soil drainage in poorly drained soils and low lying areas. Avoid over-watering.
- e. Planting clubroot-resistant cultivars when available
 - i. However the repeated planting of resistant cultivars in the same location may lead to development of a pathogen population that overcomes the main resistance genes in those cultivars.
 - ii. It has been identified that in some localities there are strains against which the resistance is not effective. For that reason clubroot resistance must always be used as part of an integrated approach to disease management – not as the only solution.
- f. The use of Shirlan (fluazinam) applied as a seedling drench at 25-50mL per 1000 plants has been shown to effectively control clubroot but must be evenly distributed around the transplant root zone at planting.
- g. Liming soil to a minimum pH of 7.0 prior to planting, which prevents the clubroot spores from germinating (remember the quality of lime will play an important role in the treatment of clubroot)
 - i. Please note that liming will not completely suppress clubroot in the field, but rather it can greatly reduce the infection rate and disease severity of the disease if done effectively.



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