

Asparagus

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Phytophthora rot – an emerging problem on UK asparagus

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Symptoms of *Phytophthora* on asparagus were widespread in the UK for the first time in 2002. The disease is known to be a major production constraint in New Zealand and California, USA, where yield losses of 50% have been reported. This factsheet alerts growers to the problem, and summarises available knowledge of the disease and potential management strategies.

Background

Before 2002, reports of *Phytophthora* rot on asparagus in the UK were rare. In 2002, however, disease symptoms were widespread, with results from a grower questionnaire indicating that at least 50% of the asparagus production area in the UK may be affected or at risk from the disease. There are currently no fungicides approved for the control of *Phytophthora* on asparagus either in the UK or the rest of Europe. Given the perennial nature of the crop and that *Phytophthora* is

soil-borne, there are concerns that without the option for chemical control, the disease could become a major production constraint.

Phytophthora rot is an important disease of asparagus in New Zealand, USA, Mexico, Chile and Australia. In Europe, *Phytophthora* is an occasional problem on green asparagus in France, Spain and Italy. The disease is endemic in the Netherlands and Germany but does not pose a major threat in these countries because of different cultivation practices used to produce white asparagus.

The majority of research on the biology and control of the disease has been carried out in New Zealand and USA (California) where yield losses in excess of 50% have been attributed to *Phytophthora*. Losses are due to failure of newly planted crops to become established and from reduced yields or plant death in mature crops. Infected spears, if hydro-cooled during packing for market, may contaminate the water and spread the pathogen to other spears, causing extensive rotting during transit.

Symptoms

The disease is characterised by slightly sunken, water-soaked lesions

on shoots at, slightly above, or below the soil level (spear rot) (Fig 1). Under wet conditions, the lesions become slimy because of secondary invasion

by bacteria, and may have a disagreeable odour. Spears usually have a crooked appearance with lesions on the inside of the crook



1 Watersoaked lesion due to *Phytophthora* on harvested asparagus spear



Photo appears courtesy of Dr. P. Falloon, Aspara Pacific Ltd, New Zealand

2 'Crooked' spear (right) resulting from *Phytophthora* infection



Photo appears courtesy of Dr. P. Falloon, Aspara Pacific Ltd, New Zealand

3 Field view of 'crooked' spear (centre) due to *Phytophthora*

(Figs 2 and 3). This symptom is not, however, diagnostic because insect, slug and mechanical injury can also result in crooked spears. Asparagus samples with suspected symptoms of *Phytophthora* can be sent to a diagnostic laboratory for testing. Under dry conditions, the whole lesion may become light brown and the spear may finally shrivel up (Fig 4).

Newly formed storage roots infected with *Phytophthora* appear white but slightly transparent. Fleshy storage roots of infected plants may be reddish-brown and occasionally hollow. Infected crowns have yellow-brown coloured tissue, which may appear water-soaked and fibrous.



4 Dried shrivelled spears resulting from *Phytophthora* infection

Biology of the disease

The *Phytophthora* species of greatest importance on asparagus in New Zealand and California is *P. megasperma* var. *sojæ*. A number of other *Phytophthora* species are reported to infect asparagus and all of them have a wide host range. However, some of these species may include specialised 'biotypes' that are pathogenic only to asparagus. The species of *Phytophthora* infecting UK asparagus has not been diagnosed as yet.

Phytophthora species are soil-borne fungi and can survive in the soil for long

periods of time as thick-walled spores. When environmental conditions are favourable, particularly in the presence of free water, mobile spores are released which can infect plant tissues.

As with *Phytophthora* diseases on other crops, disease development is most severe following heavy rains and in poorly drained soil. However, infection occurring during the winter when the plant tissue is dormant is thought to have relatively little effect on production compared with infection in spring, which can lead to the development of substantial spear and crown rot.

From UK observations in 2002, diseased plants were not confined to a specific area of the field but were

distributed throughout the crop. Rate of disease spread within an individual field is likely to depend on drainage and water movement.

Sources of inoculum for the disease include planting material (crowns, transplants) and infested soil. At present, planting material is not tested specifically for *Phytophthora* infection. However, asparagus planting material that is certified to be of high quality, originating from the Netherlands and France is inspected in the field during plant production to ensure that there are no disease symptoms (see details in 'Cultural practices' section below).

Disease management

Cultural practices

Due to the ability of the pathogen to survive in soil and the perennial nature of asparagus, it is difficult to eliminate the disease once it is present in a crop. Avoidance is the best management strategy:

- Avoid planting new fields where there have been severe problems with *Phytophthora* on a previous crop. Even if symptoms were not due to a *Phytophthora* species pathogenic on asparagus, presence of the disease on a previous crop indicates that soil conditions may be conducive for development of *Phytophthora* in that field.
- Ensure that soil is well-drained and not prone to water-logging. If there is poor drainage in a mature crop, take action to remedy the problem.
- Obtain planting material from reliable suppliers. In the Netherlands, asparagus planting material with the Select Plant[®] label is certified by the Netherlands Inspection Service for Horticulture (Naktuinbouw). A list of Select Plant suppliers[®] can be obtained from the following website: www.naktuinbouw.com. A similar scheme is available in France.

- Transplanting or planting of crowns should be carried out under dry, warm conditions, to minimise the risk of *Phytophthora* infection.

- If *Phytophthora* rot has been observed in one asparagus field, wash down machinery between operations in different fields, to minimise soil spread.

- Spears found with *Phytophthora* rot in the packhouse should be discarded, ensuring that waste is not returned to cropped areas.

Chemical control

There are currently no fungicides approved in the UK for control of *Phytophthora* on asparagus. This factsheet will be updated if the situation changes. In California and New Zealand, metalaxyl-M is used for the control of asparagus *Phytophthora*. To date, an application to the Pesticides Safety Directorate for off-label approval to use metalaxyl-M as SL 567A (Syngenta) on asparagus in the UK, has been unsuccessful.

Alternative management strategies

After 10–15 years repeated use of metalaxyl on asparagus in New Zealand and California, and associated problems of pathogen resistance and/or microbial degradation, alternative management strategies for the future have received attention:

- No cultivars of asparagus are resistant to *Phytophthora*. However, a breeding programme in New Zealand has produced several hybrids that have multi-gene resistance to *Phytophthora*. This type of resistance is less likely to be overcome by changes in the pathogen population than single gene resistance. In New Zealand, the hybrids show yield and quality traits equal to, or better than the standard cultivars UC157 and JWC1.

- Results from preliminary field trials in New Zealand show that inoculation of asparagus crowns with a biological control agent, *Pseudomonas aureofaciens*, led to a significant increase in the yield of fern dry weight in comparison to untreated plants.

- In California, Aliette (fosetyl-aluminium) is approved for the control of *Phytophthora* on asparagus. The fungicide is applied to the previous years' fern crop. Phosphite is also approved as a fungicide (Phostrol) in some states of USA for *Phytophthora* control and may be trialled in California for use on asparagus.

- In New Zealand, drenching of crowns with metalaxyl prior to planting can improve establishment rate.

Action points

- Ensure that there is good drainage at new sites and in mature stands.
- Use certified planting material.
- Infected spears seen in the packhouse should be removed prior to packing.

Further information: A full copy of the final report (FV 246), written by Kim Green, is available from the HDC office (01732 848383).

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