

Impact and Control of Fusarium Root Rot in Faba Bean Agriculture and Agri-Food Canada

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For the past three years, a joint research study on Fusarium root rot of faba bean has been underway at field locations near Morden, Manitoba and Edmonton, Alberta. Financial support for this study from the Manitoba Pulse Growers Association (MPGA) was matched with a grant from the Agri-Food Research and Development Initiative (ARDI) to conduct research on other root diseases of this crop. The same study was also carried out at field sites near Brandon, Manitoba and Saskatoon, Saskatchewan with funding received from the Saskatchewan Pulse Growers (SPG).

Faba beans are currently grown on only a small acreage in western Canada. Although they are a good source of energy and protein in livestock feed rations, and an excellent forage crop that can produce high quantities of silage, one of the primary impediments to their greater utilization has been caused by tannins in the seed coat which adversely affect their consumption and digestibility in livestock feed rations. However, recent improvements in cultivar development, particularly the release of zero-tannin cultivars, are expected to lead to increases in the demand for faba beans and an expansion in their area of production.

Faba beans have developed a symbiotic relationship with a species of *Rhizobia* bacteria that leads to the formation of root nodules, which are the sites for the fixation of atmospheric nitrogen. The ability of faba beans to fix nitrogen eliminates the need to apply nitrogen fertilizers at seeding, which reduces input costs. Faba beans are generally regarded as a good rotation crop because they enrich the soil with nitrogen for subsequent crops.

A number of root rot pathogens can infect faba beans and they can be an important constraint on yield and the efficiency of nitrogen fixation. In 2009, a survey of root diseases was conducted in commercial fields of faba beans in Manitoba and Alberta. In both provinces, Fusarium root rot, caused by *Fusarium avenaceum*, was shown to be the most common root disease of faba bean. No crops appeared to be severely affected by root disease, but root diseases usually become more important after a crop has been grown in an area for a prolonged period of time. Root rot pathogens like *F. avenaceum* produce thick-walled spores in the crop debris that can persist in the soil for several years, so a five-year rotation with nonhost crops is recommended as one method of disease control. Some of these root rot pathogens can also infect field peas, so these pathogens could be well established in areas where field peas are frequently grown.

Fusarium root rot adversely affects crop production in several ways. Infection of seedlings prior to or shortly after emergence can result in damping-off and death of the seedlings resulting in uneven plant stands. The root systems of adult plants may become severely diseased, resulting in yellowing of the basal leaves, stunting of the plants and lower yields. Sometimes there are no above-ground symptoms, but a red discoloration

can be seen on the root exterior and in the vascular system. The influence of *Fusarium* root rot on the growth of adult plants is usually most obvious in fields where soil conditions, such as soil compaction, drought or excess moisture, adversely affect root growth.

This study was established in 2009 to determine the impact of inoculum concentrations of the pathogen *F. avenaceum* on the effectiveness of different seed-treatment fungicides on root rot control in the tannin-free faba bean cultivar Snowbird. At each field site, data was collected on seedling emergence, root rot severity, root nodulation and yield. The results varied somewhat depending on year and location. However, the results from all four field sites indicated seedling emergence and yield generally declined with increases in *F. avenaceum* inoculum concentration, but its effect on root rot severity and nodulation were less consistent. Similarly, certain seed-treatment fungicides were effective in improving seedling emergence and yield, but their influence on root rot severity and nodulation was more variable. Seed-treatment studies in other crops have indicated that seed-treatment fungicides often provide only a zone of protection close to the seed that does not extend to the whole root system. The compiled results from this three-year study will be used to update recommendations on the control of *Fusarium* root rot in faba beans.

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