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In-field and post-harvest management of Sclerotinia rot in carrots

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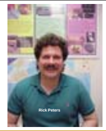

Introduction

Sclerotinia rot of carrots (SRC), caused by *Sclerotinia sclerotiorum*, is a devastating disease of carrot foliage (Fig.1) and roots (Fig.2) and can lead to serious losses in storage (Fig.3). Recent research in Prince Edward Island (PEI), Canada has indicated that factors that increase canopy density, including high nitrogen inputs, seeding rates, and cultivar choice can promote conditions conducive to the development of SRC.

Figure 1. SRC on foliage

Figure 2. SRC on roots

Figure 3. SRC in storage

Nitrogen rates and seeding density

Field trials in PEI have shown that increasing nitrogen inputs (Fig.4) and seeding rates (Fig.5) increase canopy density and disease pressure.

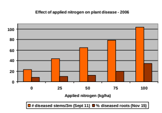

Figure 4. Impact of applied nitrogen on SRC in stems and roots.

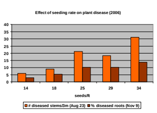

Figure 5. Impact of seeding rate on SRC in stems and roots.

Carrot foliage trimmer (CFT)

A prototype carrot foliage trimmer (CFT) was designed and manufactured in 2006 at the Harrington Research Farm in PEI (Fig. 6,7). The CFT mows the lateral foliage of adjacent carrot rows which opens the carrot canopy to allow sunlight to penetrate, foliage to dry and also removes older senescing foliage, thus eliminating conditions conducive to SRC development (Fig.8,9). Field evaluation has shown that trimming has no effect on carrot yield.

Figure 6. PEI prototype CFT - 2006

Figure 7. PEI prototype CFT in action

Figure 8. Carrot canopy at time of row closure

Figure 9. Carrot canopy after trimming

Commercialization of the CFT

In 2007, two nine-row commercial units were built by the carrot industry in North America, one in Nova Scotia, Canada (Fig. 10) and one in Wisconsin, USA. (Fig. 11). Additional commercial units are now being constructed in PEI, Quebec, France and Scotland.

Figure 10. Nova Scotia CFT - 2007

Figure 11. Wisconsin CFT - 2007

Validating the effectiveness of the CFT

In 2006 trimming at row closure significantly reduced the incidence of SRC on foliage by 82% (Fig.12) and on carrot roots in storage by 75% (Fig.13), compared to the untrimmed control plots.

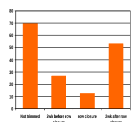

Figure 12. Mean number of diseased petioles/3m - August 2006

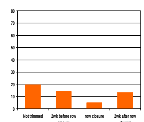

Figure 13. Percent roots with Sclerotinia rot following storage - October 2006

Cultivar response to SRC

When carrots were not trimmed, cultivar response to disease varied in 2007 (Fig.14). Trimming significantly reduced the number of diseased petioles for all cultivars evaluated.

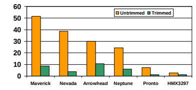

Figure 14. 2007 PEI - # of diseased petioles/3 m

Post-harvest management of SRC

In vitro assays showed isolates of *S. sclerotiorum* to be highly sensitive to fludioxonil (EC_{50}<0.001 ppm). Storage trials provided data indicating that dipping carrots in fludioxonil (Scholar 230SC) prevented spread of SRC in storage (Fig.15).

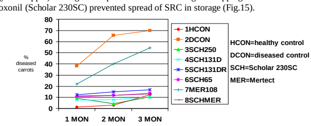

Figure 15. SRC development in carrots following 3 months storage in a commercial facility.

Summary

Manipulation of cultural practices including nitrogen inputs, seeding rate and cultivar choice combined with canopy trimming and post-harvest application of fludioxonil prior to storage can provide an effective management package for SRC that has minimal environmental impacts.

Acknowledgements

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