Regional ascospore detection correlates to disease incidence providing accurate timing for disease management applications

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Introduction

Sclerotinia rot of carrot (SRC), caused by *Sclerotinia sclerotiorum* (Lib.) de Bary, is an important disease of carrot (*Daucus carota* L., subsp. *sativus*); epidemics are sporadic but infection can be severe, particularly in postharvest storage. A SRC forecasting model incorporating an ascospore detection variable has been developed (Kora, 2005). The objective of this study was to determine the relationship between ascospore counts and disease incidence to improve the timing of disease management practices against SRC.

Figure 1. Sclerotinia rot of carrot on infected foliage (A) and stored roots (B)

Materials and Methods

Inoculum detection was based on passive deposition of bioaerosols using the Blue Plate Test (Steadman et al., 1994) at three and four sites in 2008 and 2009, respectively. Site 1 was the same and Sites 2 and 3 differed for both years; all sites were in the Bradford Marsh, ON. Refer to Table 1 for a list of treatments and application schedules applied against SRC at Site 1 in 2009. Correlations were calculated considering a 1 week delay between ascospore counts and disease incidence.

Table 1. Treatments applied against sclerotinia rot of carrot

	Application schedule
Elexa-4 (a.i. chitosan at 0.2%)	Biweekly calendar
Lance (a.i. boscalid at 441 g ha-[1])	Forecast
Trimming and Elexa-4	Forecast and biweekly calendar, respectively
Trimming and Lance	Forecast, both
Untreated /untrimmed control	

[a] Forecasted managements applications were applied when detected inoculum surpassed the sclerotinia rot of carrot forecast model threshold. of a mean of 5 ascospores.

Results

Figure 2. Mean (n=6) number of detected ascospores of *Sclerotinia sclerotiorum* and incidence of Sclerotinia rot of carrot at three sites in the Bradford Marsh, ON, in 2008.

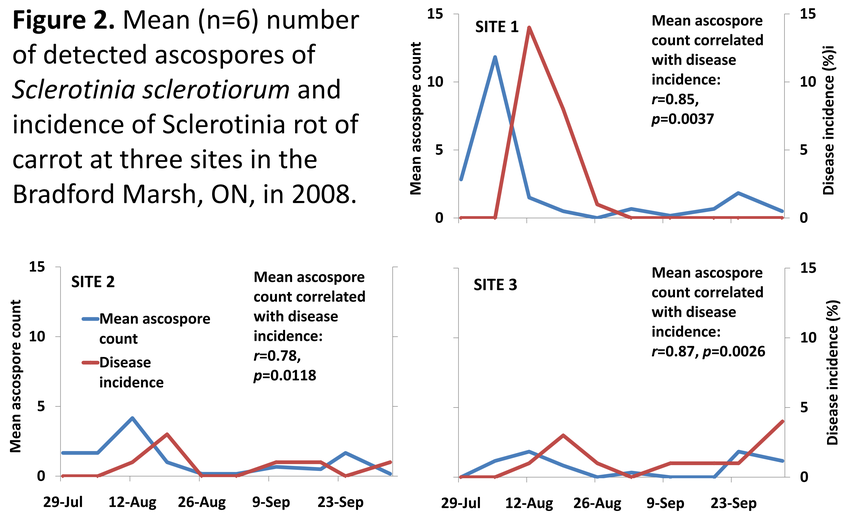
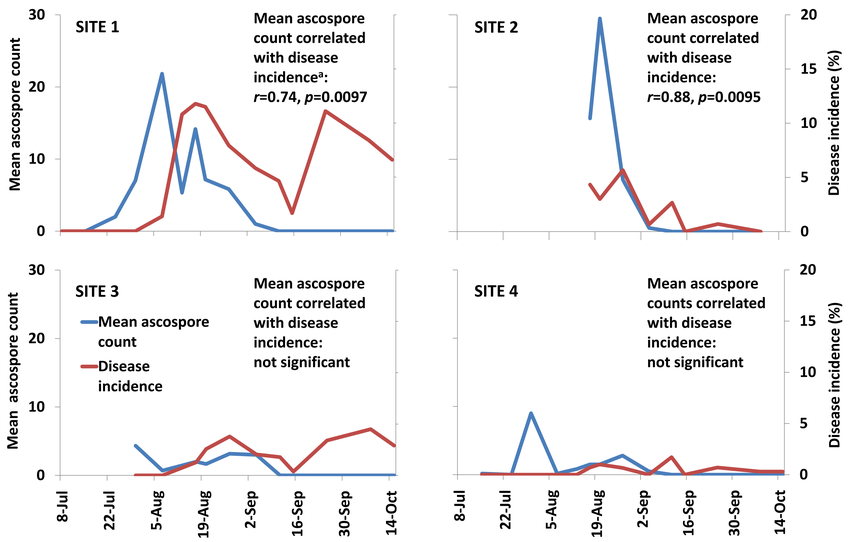


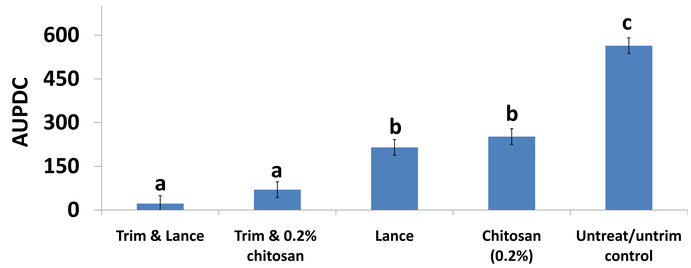
Figure 3. Mean (n=6) number of detected ascospores of *Sclerotinia sclerotiorum* and incidence of Sclerotinia rot of carrot at four sites in the Bradford Marsh, ON, in 2009.



[a]Reported correlation and significance values for Site 1 are significant between ascospore counts and disease incidence until 11 September.

Calendar sprays were applied July 31, Aug. 12 and 26 and Sept. 9 and 23; trimming the carrot canopy occurred Aug. 12 and forecast sprays were applied Aug 5, 12 and 26, both timed according to ascospore counts.

Figure 4. Area under the disease progress curve (AUPDC) for Sclerotinia rot of carrot in response to canopy trimming, chitosan and fungicide treatments. Bars are means (n=4) and error bars are SEs. Bars with different letters are significantly different (p=0.05).



Discussion

- Disease incidence increasing after Sept. 15 at Site 1 in 2009 despite zero ascospore counts was due to conducive environmental conditions stimulating primary infection.
- Despite insignificant correlations between ascospore counts and disease incidence at Sites 3 and 4 in 2009, both were consistently low throughout the growing season.
- The results provide good evidence that disease prediction is accurate, particularly when the number of detected ascospores is low.
- The results also demonstrate that disease management is effective when accurately-timed according to the number of detected ascospores within the crop.

References

Kora, C. 2003. Etiology, Epidemiology and Management of Sclerotinia Rot of Carrot Caused by *Sclerotinia sclerotiorum* (Lib.) be Bary. Ph.D. Thesis, University of Guelph, Guelph, Ontario.

Steadman, J.R., J. Marcinkowska, and S. Rutledge. 1994. A semi-selective medium for isolation of *Sclerotinia sclerotiorum.* Can. J. of Plant Pathol. 16:68-70.

Acknowledgements

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