Title of Project: EPIDEMIOLOGY, CONTROL MEASURES AND CHARACTERIZATION OF ISOLATES OF *LEVEILLULA TAURICA* FROM FIELD, PEPPER IN SOUTHERN ONTARIO

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Objective

Determine the extent of occurrence of L. taurica in pepper fields in southern Ontario, determine the pathogenicity of isolates of the fungus to other vegetable crops, determine the over-wintering potential of the fungus in Ontario, initiate field trials for chemical and non-chemical control of pepper powdery mildew, and investigate the genetic variation among field and greenhouse isolates of the fungus to determine if the fungus originates from greenhouse transplants or if the spores are blown in from elsewhere.

Results

Field plots: There was no significant difference among fungicide treatments for control of L. taurica in field pepper at GPCRC in 2006 whether measured as area under the disease curve or the final disease reading (Table 4). All treatments significantly reduced pepper powdery mildew development as measured using area under the disease curve in comparison to the inoculated water check treatment. Area under the disease curve was in plots receiving Nova while the final disease reading was least in plants sprayed with Lactosan + Agral 90.

Table 4. Effect of fungicide spray treatments on development of Leveillula taurica in field pepper at GPCRC, Harrow, Ontario in 2006

Spray Treatment	Area Under Disease Curve [a]	Final Disease Reading [b]
Inoculated - Water check	10.969 [a]	0.2750
Un-inoculated check	3.578 [b]	0.1625
Nova	0.122 [b]	0.0188
Lactosan + Agral 90	0.163 [b]	0.0063
Pristine	0.547 [b]	0.0500
Prev-Am	1.263 [b]	0.0625
Procure	1.834 [b]	0.0500
Milstop	2.688 [b]	0.1625

[a] Means within the column followed by the same letter are not significantly different (P - 0.05) according to Fisher's protected LSD test.
[b] Means within the column are not significantly different (P = 0.05) according to Fisher's protected LSD test.

There was limited disease development 20 days after inoculation with the fungus in the water check plots with 22 of 160 leaves sampled showing some signs of fungus growth on the under-surface. In comparison, in the least effective fungicide treatment, Milstop, there were only 9 of 160 leaves showing some visible growth by L. taurica (data not shown)

Table 5. Effect of fungicide spray applications on number of pepper leaves out of a maximum of 160 leaves, and % with visible L. taurica on the lower leaf surface, 20, 39, and 52 days after inoculation with the fungus.

Spray Treatment	20 days	39 days	52 days
Inoculated - Water Check	22, 13.75% [1]	64, 40.0%	44, 27.5%
Un-inoculated check	1, 0.6%	4, 2.5%	26, 16.25%
Nova	0, 0%	0, 0%	3, 1.88%
Lactosan + Agral 90	1, 0.6%	0, 0%	1, 0.6%
Pristine	1, 0.6%	7, 4.38%	8, 5.0%
Prev-Am	0, 0%	5, 3.12%	10, 6.25%
Procure	5, 3.12%	9, 5.62%	8, 5.0%
Milstop	6, 3.75%	9, 5.62%	26, 16.25%

1. First number denotes number of pepper leaves out of a maximum of 160 leaves with visible L. Taurica on the lower leaf surface. Second number denotes % of leaves with visible L. taurica.

Discussion

The shapes and the dimensions of the dimorphic spores of the various isolates obtained from pepper fields in Essex/Kent were similar. The isolates also showed a similar host range. This includes pepper (Capsicum annuum), potato (Solanum tuberosum) and carrot (Daucus carota). The other plants showed not symptoms. The greenhouse isolate was able to infect several commonly-occurring weeds of Ontario. It is likely that the field isolates can also infect these weeds since there were no substantial differences in host range among the isolates.

Development of mildew on potatoes concurs with previous observations in the Pacific Northwest. However, results regarding the onion, carrot and tomato do not show similarities with previous reports in the Pacific Northwest region. In our experiment, we did not have any mildew development on any onions or tomatoes whereas in other areas of the Pacific Northwest, L. taurica does affect these hosts. On the other hand, there are no reports so far that show carrot as a possible host. However, our results do indicate that carrot and wild carrot are possible hosts for L. taurica, although disease development is minor.

Pepper powdery mildew developed slowly under the warm, wet conditions that existed at GPCRC and elsewhere in southern Ontario in 2006. Only 14% of inoculated pepper leaves

showed powdery mildew symptoms after 20 days at GPCRC. Limited peppery powdery mildew development was observed in Ontario fields in 2006; however, pepper powdery mildew can develop more quickly under hot, dry conditions as evident in 2005. These are the type of conditions that may arise in this region of Ontario as a consequence of regional or global warming.

Control of the fungus is possible under greenhouse conditions with weekly applications of Milstop and Stylet Oil, or with greater spray intervals using Nova (personal observation). Milstop and Nova as well as Lactosan + Agral 90, Pristine, and Procure were effective under field application.

The fungus is able to over-winter at low temperatures for a period of time. This is likely due to the endophytic nature of infection in contrast to the majority of powdery mildews which are more superficial in nature. Control measures such as burial of plant debris will allow for rapid breakdown of foliar tissue and inoculum levels. Further over-wintering studies are required to confirm the above observations and to obtain a more complete profile of survival at varying low temperatures.