PM-201

The occurrence of psyllids on carrot and presence of *Candidatus* Liberibacter solanacearum in France

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The presence of psyllids has been known a long time ago in French carrot fields, but until recently, they don't make real damage in crops and are not well studied. It's not the same for Northern Europe, where *Trioza apicalis* is an important pest for carrot production and reduces both yield and quality of the carrots. Recently, the report of *Candidatus* Liberibacter solanacearum (Loiseau et *al.*, 2014) and the presence of psyllid species in carrot fields are not well kwon, *Bactericera trigonica* (F. Villeneuve, unpublished results) in French carrot fields, leads us to make an inventory in order to know the species of psyllids present in French carrots fields. The transmission of proliferation symptoms to carrot by psyllids is not really new; Leclant et *al.* demonstrated the involvement of psyllids in the transmission of proliferation in carrot in 1974.
A survey was conducted during 2016 in carrot fields. Psyllid insects were collected in yellow traps and identified. The level of *B. trigonica* carrying the bacterium is also evaluated. Also, monitoring was set up from 2014 to 2016.
Different psyllid species are present and identified, the most frequent is *Bactericera trigonica*. This species seems to be present in carrot fields throughout the year. Detection tests to evaluate the presence of *Ca*. L. solanacearum in psyllid samples are in progress as of the end of 2016. Results of the survey carried out in carrot crops in France will be presented. The haplotype detected seems to be subservient to Apiaceae crops (carrot principally).
Acknowledgements:CaLiso project is conducted with a grant from the French Ministry of Agriculture (CasDAR project) and Marianne Loiseau, ANSES-Angers, is the project leader.

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Loiseau M., Garnier S., Boirin V., Merieau M., Leguay A., Renaudin I., Renvoisé J.-P., Gentit P., 2014. First Report of '*Candidatus* Liberibacter solanacearum' in Carrot in France. Plant disease, 98: 839

PM-202

Assessing new chemical control options for carrot weevil in the Holland Marsh, Canada

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The carrot weevil (CW), *Listronotus oregonensis* (LeConte), is a primary insect pest of carrot production in Ontario. Yield loss due to CW larval feeding can exceed 40% but is highly variable. In Canada, the CW has historically been univoltine and IPM recommendations consist of insecticide applications at the 2nd and 3rd true leaf stage, based on action thresholds. Imidan 70 WP (phosmet) was the only registered product for CW control in Canada until recently and is still the primary product used despite concerns of resistance. This study examined the efficacy of seed treatment and foliar applications to mitigate CW damage in the Holland Marsh, a region of intense carrot production in Ontario, Canada. Phosmet failed to reduce CW damage compared to untreated plots, while two insecticides (novaluron as a foliar, cypermethrin as a foliar and seed treatment) showed some efficacy in 2016. Another trial examined the impact of an insecticide synergist, piperonyl butoxide, on the

efficacy of phosmet and cypermethrin, another prevalent insecticide in Canadian carrot production. Phosmet alone slightly reduced CW damage, though both insecticides performed significantly better with the addition of piperonyl butoxide. Overall, CW mitigation appears to be challenging with the insecticides available currently. However, future research using novaluron, cypermethrin, and piperonyl butoxide appears promising. In all trials presented here, increases in CW damage was found late in the growing season. This likely indicates that some second generation CW activity is occurring.

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Carrot cyst nematode survey in the Holland Marsh, Ontario, Canada 2016

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Carrots are grown in all regions of Canada, and the province of Ontario is the largest producer. *Heterodera carotae* Jones, is commonly known as the carrot cyst nematode. It is found in several countries in Europe, and Michigan, USA. It is considered an exotic plant pest to Canada and can cause serious damage to carrot crops. Carrots (*Daucus carota* L.) and wild carrots are the lone hosts. In recent years, carrots in commercial fields were found to have patches with poor growth, stunting, smaller and forked carrots with a proliferation of secondary roots, and cysts associated with the damaged roots. Thirty carrot fields in Holland Marsh region of Ontario, Canada were sampled in November 2016 following carrot harvest. Field size varied from 5 - 25 acres. Soil samples from the top 20 cm of soil were sampled in an X pattern in each field. Samples were analyzed for the presence of carrot cyst nematode. Veriform nematodes were extracted using a Baermann funnel and the Fenwick method for cysts. Second stage juveniles, males, and cysts were recovered. The species was confirmed as *H. carotae* using morphological and molecular methods. Carrot cyst nematodes were found in 90% of the samples and were widespread throughout the sampled area. Population densities of the carrot cyst nematode ranged from 0 to 16,100 juveniles/kg of soil. This confirms the presence of carrot cyst nematode in the Holland Marsh. Further studies are needed to assess the impact of this pest to carrot producers.

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Assessing new chemical control options for carrot weevil

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cyantraniliprole as a foliar and seed treatment. Another trial examined the impact of an insecticide synergist, piperonyl butoxide, on the efficacy of phosmet and cypermethrin, another prevalent insecticide in Canadian carrot production. Phosmet alone slightly reduced CW damage, though both insecticides performed significantly better with the addition of piperonyl butoxide. Overall, CW mitigation is challenging with the insecticides available currently. However, insecticides novaluron, cyantraniliprole and cypermethrin with piperonyl butoxide appear promising as replacements for phosmet. There were increases in CW damage, late in the growing season, in all of these trials. This suggests that some second generation CW activity is occurring.