



Tracking vectors of bacteria and phytoplasmas threatening Europe's major crops

Several harmful phytoplasmas and bacteria such as *Xylella fastidiosa*, '*Candidatus Liberibacter solanacearum*' or fruit crop phytoplasmas are threatening important European crops such as potatoes, olives and fruit crops, with major economic impact. For these pathogens, some phloem and xylem feeding insects are already identified as vectors or candidate vectors, but knowledge on vectors involved, their phytosanitary status in specific areas, their host range, alternative hosts, and influence of abiotic factors on the vector occurrence and disease transmission capacity is fragmented or lacking.

A comprehensive scientific insight is indispensable in order to improve risk evaluation and define effective regulation and phytosanitary management strategies adapted to local conditions for this type of vectored plant diseases.



The main goal of the project is to generate more information on insect vectors (*Auchenorrhyncha*) of bacteria and phytoplasmas of phytosanitary concern, more specifically:

- on phloem and xylem feeding insects that should be tested as possible vectors for bacteria and phytoplasmas;
- on the fruit and field crop range that the vectored bacteria and phytoplasmas cause damage to;
- on the capability of the insects to vector specific bacteria and phytoplasmas of phytosanitary concern;
- on the specific association between vector and plant pathogen.

The research scientists in the project are focusing on different case studies, yet all with the same goal, as described above. During the first year, various monitoring and trapping techniques (light interception traps, sweep-netting, beating, and adhesive techniques, pan traps and a portable air suction machine) to collect phloem and xylem-feeding insects (*Auchenorrhyncha*) which could potentially act as vectors of '*Candidatus Liberibacter* spp.' and '*Candidatus Phytoplasma*' were evaluated.



One specific aspect of the project involves a detailed vector monitoring in apple proliferation phytoplasma infected *Malus* orchards, pear decline phytoplasma infected *Pyrus* orchards and aster yellows phytoplasma infected carrot fields. For this survey, adhesive sticky traps, which revealed to be the most reliable and most practical monitoring method, were used. In the *Malus* and *Pyrus* orchards, *Empoasca decipiens*, and *Ribautiana debilis* (mainly in apple), *Eupteryx atropunctata* and *Edwardsiana rosae* were the most prevailing insects, whereas in carrot, besides *E. decipiens* and *E. atropunctata*, also *Macrosteles sexnotatus* and *Zyginidia scutellaris* were the most captured *Auchenorrhyncha* species. A selection of those insects were tested for phytoplasmas presence (nested PCR: P1/P7⁽¹⁾ & R16F2/R2⁽²⁾ primer sets). In carrot, several *M. sexnotatus* and one *Javesella pellucida* and *E. decipiens* specimen tested positive for phytoplasmas presence. In *Malus*, a *Typhlocyba quercus* and *Graphocephala fennahi* specimen tested positive, and finally, in *Pyrus*, one specimen of each *M. sexnotatus*, *Philaneus spumarius* and *Cicadella viridis* revealed positive in the phytoplasma test. After rearing individual populations of the insects, transmission experiments are being set up for the confirmed phytoplasma carrying *Auchenorrhyncha* species as a next step in identifying them as potential vectors.

References:

- (1) Deng and Hiruki. 1991. *J. Microbiol. Methods* 14, 53-61.
- (2) Lee et al. 1994. *Phytopathology* 84, 559-566.

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