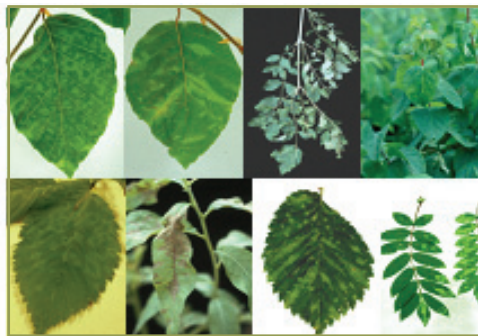


Urgent Need for Reliable Methods of Virus Detection and Identification in Forest Trees

Report from the research workshop of IUFRO Working Party 7.02.04 on "Viruses and Phytoplasma of Forest and Urban Trees" in Berlin, Germany, on 29 May 2013, by Carmen Büttner, Coordinator of IUFRO WP 7.02.04, and Risto Jalkanen, Deputy Coordinator of IUFRO WP 7.02.04. <http://www.iufro.org/science/divisions/division-7/70000/70200/70204/>

The lack of knowledge about the presence and frequency of occurrence of viral diseases in forest trees leads to the impression that they are rare and therefore not important. However, the opposite is the case. Viruses are responsible for far greater economic losses than generally recognized. Plant viruses play a central role in the plant health status of forest trees and may lead to extensive tissue damage. Virus and phytoplasma diseased plants may increase production costs because of the possibly decreased growth of infected stock plants and undesired subsequent field performance.



To date, viruses from 17 different plant genera have been identified. The latest European mountain ash ringspot associated virus (EMARaV) has recently been classified by the ICTV (International Committee on Taxonomy of Viruses). Interestingly, some plant genera such as *Carpinus* and *Robinia* are susceptible to only one or two virus species while others such as *Betula* and *Fraxinus* are a host for multiple virus species. At least 18 genera of broad-leaved trees and shrubs as well as a variety of herbaceous plants have been recorded to be affected by cherry leaf roll virus (CLRv), for example.

Against this background, a research workshop (<http://dpg.phytomedizin.org/de/virus2013/>) was organized and hosted by the Humboldt University Berlin (HU), the German Phytopathological Society (DPG), the Julius Kühn Institute - the German Federal Research Institute for Cultivated Plants (JKI), and the Austrian Alliance for Life Sciences, Food, Veterinary Expertise and Agriculture (ALVA). It was attended by 42 researchers from Finland, USA, Greece, Columbia and Germany. They mainly discussed the following topics:

a) Viruses affecting broad leaved urban and forest trees

Presentations focused on the characterization of the European mountain ash ringspot-associated virus as the type-species of the newly described virus genus *Emaravirus*, including the description of the genus and members of the genus. Tools to investigate and characterize unknown viruses in diseased *Ulmus* and other woody plants were also discussed.

b) Nepoviruses

Papers dealt with the situation of the birch leaf roll disease in Finland, which is associated with an infection of cherry leaf roll nepovirus (CLRv); the genome organization of CLRv and the functional characterization of virus encoded products; and epidemiological studies and investigation of vector

transmission of CLRv. Another topic was the characterization of symptom determinants on the Arabis mosaic nepovirus (ArMV) genomic RNA2.

c) Phytoplasma diseases

Here, the impact of genome analyses on phytoplasma research and comparative studies regarding the Sec-dependent protein export in phytoplasma and acholeplasma were presented. There are also promising approaches to control apple proliferation disease by cross-protection and plant resistance.

d) Poster presentations

focused on the description of symptoms and investigation into the distribution and dissemination of viruses infecting forest trees, on molecular analyses and genetic diversity of viruses affecting woody hosts, and diagnostic tools for viruses of forest trees. Investigation addressing the alteration of allergen potential by the Cherry leaf roll virus (CLRv) in infected birch pollen was also a relevant topic.

Participants agreed that there is an urgent need for reliable methods of virus detection and identification in forest trees, as well as a need for tools for disease management. Knowledge of virus characteristics and their epidemiology are the first steps in developing appropriate phytosanitary strategies to produce virus-free plants and to keep tree seedlings free of plant viruses. The mode of transmission has to be considered as an important factor affecting the spread and impact of a virus infection within a forest.

However, investigation into virus and phytoplasma diseases in the forest ecosystem is extremely rare in comparison with the agricultural environment. Traditional virus detection methods target specific known pathogens. Thus, it can be difficult to identify novel or unsuspected viruses and phytoplasma that cause infections in forest and urban trees. Therefore, more detailed diagnostic trails for the determination of individual known and unknown viruses and the recognition of visible symptoms have to be established. In this respect, the successful application of viral and phytoplasma metagenomics should be one of the future concerns.

Abstracts of the oral and poster presentations are available in the proceedings of the 5th International Symposium on Plant Protection and Plant Health in Europe (Section 9: page 295-333; ISBN 978-3-941261-11-2 or for free download: http://dpg.phytomedizin.org/fileadmin/daten/04_Verlag/02_SP/11_PPPHE_2013/0294-sp-2013-ppphe-2.pdf)