Verticillium Wilt in Tree Species; Elements for Integrated and Innovative Management Strategies (EU-Project QLRT-CT99-1523)

J. A. HIEMSTRA (CO-ORDINATOR)

Plant Research International, 6700 AA Wageningen, The Netherlands
E-mail: jelle.hiemstra@wur.nl

Abstract
Verticillium wilt is of increasing significance in European agriculture, especially in tree hosts such as olive and stone fruits, and in shade tree nurseries. In the period 1997–1998 eight European research groups participated in an EU-funded Concerted Action on this disease. Main results were the publication of “A Compendium on Verticillium wilts in tree species” (HIEMSTRA & HARRIS 1998) and an RTD-proposal submitted for financing to the 5th EU Framework Programme. This proposal was approved by the European Commission and the research started in March 2000. Ten research groups participate in a project that aims to provide essential elements for an efficient and environmentally sound management of Verticillium wilt in trees. The research concentrates on tree key areas: (1) pathogen variability, (2) host resistance, and (3) detection and risk assessment. In addition the project aims at harmonising methods, exchange of experience and continuation of the successful co-operation developed during the previous Concerted Action. The specific achievements of the project include information on genetic variation within the pathogen and on distribution and virulence of its subspecific groups; standardised methods to select for host resistance; resistant selections of olive and maple; molecular methods to detect the pathogen in soil and plants; and improved risk assessment procedures. Details on aims, methods and participating groups will be presented.

Keywords: Verticillium dahliae; pathogen variability; host resistance; detection; quantification; soil inoculum levels; Acer platanoides; Olea europaea; selection; methods

Verticillium wilts, caused by the soil-borne fungus Verticillium dahliae, are of increasing significance in European agriculture, horticulture and forestry. These diseases not only affect common and important crops such as potato, tomato, cotton and oilseed rape but also many woody species may seriously be affected. Among the tree species that are susceptible to Verticillium wilt are important fruit trees such as olive and stone fruits and many shade trees including maple (Acer) and ash (Fraxinus) species. In the latter group especially in tree nurseries serious losses may occur. In fruit trees, young as well as adult trees may be affected resulting in loss of trees in young plantations and serious loss of production in older plantations. Except for fumigation with methyl bromide, which is, or will in the near future, be banned world-wide, there is no single effective method of control. Therefore, dealing with Verticillium wilts requires integration of different approaches.

In the period 1997–1998 eight European research groups joined forces in an EU-funded Concerted Action on this disease (project ref. no. FAIR3 PL96-2015). Main results were the publication in 1998 of “A Compendium on Verticillium wilts in tree species” (HIEMSTRA & HARRIS 1998) and an RTD-proposal submitted for financing to the fifth EU Framework Programme in 1999. After approval by the European Commission the project started in March 2000 (Project ref. No. QLRT-CT99-1523). Ten research groups from Greece, Italy, Spain, United Kingdom, Sweden, Poland and the Netherlands participate in the project that aims to provide essential elements for an efficient and environmentally sound management of Verticillium wilt in trees.

The research concentrates on tree key areas: (1) pathogen variability, (2) host resistance, and (3) detection and risk assessment (Table 1). The scientific/technological objectives for these areas are:
Table 1. Main research tasks in EU-project on Verticillium wilts in trees

<table>
<thead>
<tr>
<th>Research area</th>
<th>Research tasks (Work packages)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pathogen variability</td>
<td>WP 1.1 Collection and verification of isolates</td>
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<tr>
<td></td>
<td>WP 1.2 Molecular characterisation of isolates</td>
</tr>
<tr>
<td></td>
<td>WP 1.3 Biological characterisation of isolates</td>
</tr>
<tr>
<td>2. Host resistance</td>
<td>WP 2.1 Evaluation, validation and standardisation of methods</td>
</tr>
<tr>
<td></td>
<td>WP 2.2 Selection for resistance</td>
</tr>
<tr>
<td>3. Detection, quantification &amp; risk assessment</td>
<td>WP 3.1 Quantification of V. dahliae in soil</td>
</tr>
<tr>
<td></td>
<td>WP 3.2 Effect of inoculum density</td>
</tr>
<tr>
<td></td>
<td>WP 3.3 Molecular detection of V. dahliae in soil and plant materials, and of quantitative estimation of the importance of inoculum density level.</td>
</tr>
</tbody>
</table>

To understand the genetic variability of *V. dahliae* in relation to its virulence and host range and to chart the distribution of that variability within Europe.

To standardise and to generalise methods to select and screen for resistance in woody species, and to identify resistant germplasm of important species.

To improve risk assessment procedures by developing reliable methods of quantitative detection of *V. dahliae* in soil and plant materials, and of quantitative estimation of the importance of inoculum density level.

Important additional aims of the project are to harmonise methods in general, to exchange experience between the participating groups and to stimulate European cooperation in research on Verticillium wilts.

Within each research area different research tasks (work packages) were identified. Figure 1 illustrates

![Diagram](image-url)
Table 2. Participants in EU-project on Verticillium wilts in trees (QLRT-CT99-1523)

1. **Plant Research International**, P.O. Box 16, 6700 AA Wageningen, The Netherlands  
   Dr. J.A. Hiemstra (co-ordinator), e-mail: jelle.hiemstra@wur.nl
2. **Institute of Sustainable Agriculture (CSIC)**, Department of Crop Protection, Av. Menendez Pidal s/n, 14080 Córdoba, Spain  
   Prof. Dr. R.M. Jiménez Díaz, e-mail: ag1jidir@lucano.uco.es
3. **University of Bari**, Department of Plant Pathology, Via Amendola 165/A, 70126 Bari, Italy  
   Prof. M. Cirulli, e-mail: cirullim@agr.uniba.it
4. **Agricultural University of Athens**, Department of Plant Pathology, Iera Odos 75, Votanikos, 118 55 Athens, Greece  
   Prof. Dr. E.C. Tjamos, e-mail: ect@auadec.aua.gr
5. **Horticulture Research International**, Department of Plant Pathology & Microbiology, Wellesbourne, Warwickshire CV35 9EF, Great Britain  
   Dr. D.J. Barbara, e-mail: dez.barbara@hri.ac.uk
6. **University of Córdoba**, Department of Agronomy, Av. Menendez Pidal s/n, 14080 Córdoba, Spain  
   Prof. M.A. Blanco-López, e-mail: ag1blloom@lucano.uco.es
7. **Wageningen Agricultural University**, Biological Farming Systems, Marijkeweg 22, 6709 PG Wageningen, the Netherlands  
   Dr. A.J. Termorshuizen, e-mail: aad.termorshuizen@wur.nl
8. **Benaki Phytopathological Institute**, Department of Plant Pathology, Laboratory of Mycology, 8 S. Delta Str., 145 61 Kifissia-Athens, Greece  
   Dr. E.J. Paplomatas, e-mail: ctp2pae@auadec.aua.gr
9. **Uppsala Genetic Centre**, Department of Plant Biology, Swedish University of Agricultural Sciences (SLU), Box 7080, 750 07 Uppsala, Sweden  
   Dr. C. Dixelius, e-mail: christina.dixelius@vbiol.slu.se
10. **Plant Protection Institute (IOR)**, ul. Miczurina 20, 60-318 Poznan, Poland  
    Dr. M. Rataj-Guranowska, e-mail: m.guranowska@ior.poznan.pl

References

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