

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

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### 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 5<sup>th</sup> 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 sub-specific 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

Research area	Research tasks (Work packages)
1. Pathogen variability	WP 1.1 Collection and verification of isolates
	WP 1.2 Molecular characterisation of isolates
	WP 1.3 Biological characterisation of isolates
2. Host resistance	WP 2.1 Evaluation, validation and standardisation of methods
	WP 2.2 Selection for resistance
3. Detection, quantification & risk assessment	WP 3.1 Quantification of <i>V. dahliae</i> in soil
	WP 3.2 Effect of inoculum density
	WP 3.3 Molecular detection of <i>V. dahliae</i>

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.

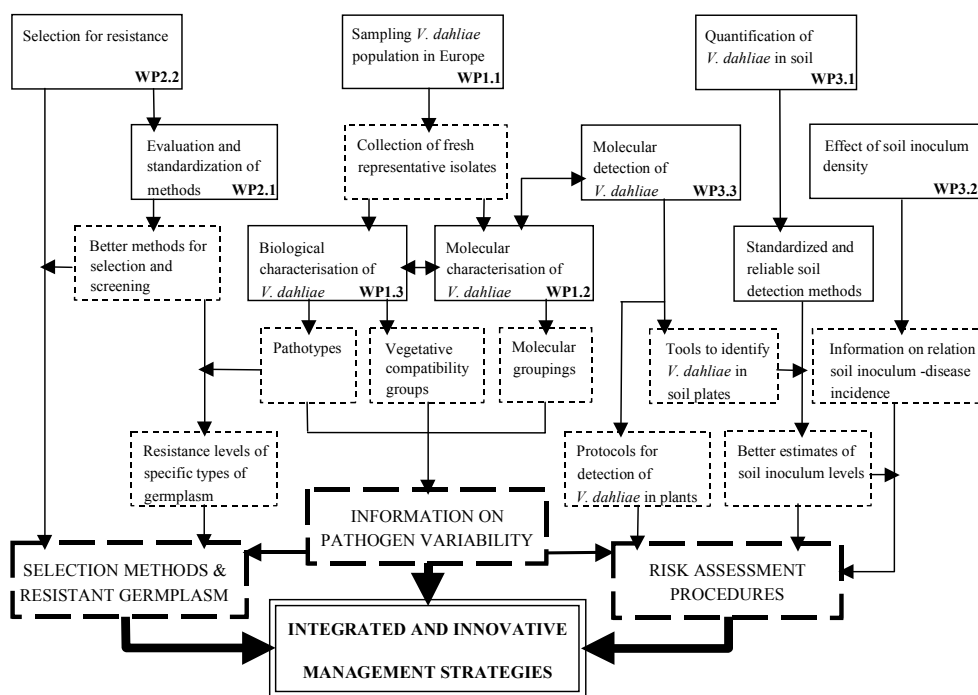
To standardise and to generalise methods to select and screen for resistance in woody species, and to identify resistant germplasm of important species.

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 co-operation in research on Verticillium wilts.

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



LEGEND

- Workpackages
- Information/intermediate result
- Flow of information
- Main research aims
- General objective of proposal

Figure 1. Relations between work packages and aims of the project

Table 2. Participants in EU-project on *Verticillium* wilts in trees (QLRT-CT99-1523)

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the relations between these workpackages and shows how they contribute to the aims of the project. Table 2 provides some details on the participants in the project. More information on the project can be found on its internet homepage ([www.eu-verticilliumintrees.org](http://www.eu-verticilliumintrees.org)).

## References

- HIEMSTRA J.A., HARRIS D.C. (1998): A compendium of *Verticillium* wilts in tree species. Wageningen/West Malling. (Free copies available through the co-ordinator and the above participants 1 to 8 in EU-Project QLRT-CT99-1523.)