Implementation of epidemiological models for downy and powdery mildew in a DSS for integrated vineyard management

F. Salinari[1], T. Caffi[2], S.E. Legler[2], and V. Rossi[2]

[1] HortaSrl. Via Gorra, 55. 29122 Piacenza. Italy.
[2] Istituto di Entomologia e Patologia vegetale (Università Cattolica del Sacro Cuore). Via Emilia Parmense, 84. 29122 Piacenza. Italy.

Abstract

The European project MoDeM_IVM (A web-based system for real-time Monitoring and Decision Making for Integrated Vineyard Management), funded under the FP7's programme Capacities, aims to develop an interactive, web-based Decision Support System (DSS) for integrated vineyard management. The project produced a prototype DSS that includes a series of functionalities such as decision supports for canopy management, disease and pest control, and alert systems on potential abiotic stresses (such as low temperature injury and water stress).

Concerning disease control, the DSS includes weather-driven, mechanistic models that simulate downy and powdery mildew (both primary and secondary infections) and that were previously developed and validated by the authors. A prototype model for grey mould was also developed. These models receive weather data in real-time from weather stations and a Wireless Sensor Network installed in the vineyard. The vineyard manager, whom the DSS is designed for, can consult the DSS and access information through the Internet with a user-friendly interface at two levels of detail: i) a synthetic overview of the disease risks, provided in the form of a dashboard; and ii) detailed outputs on all key infection processes, provided in the form of graphs. On the basis of these outputs, the DSS provides decision supports for managing the vineyard according to IPM principles. In this sense, the DSS provides evidence that the vineyard manager has complied with the Directive on the Sustainable Use of Pesticides (2009/128/EC). According to this Directive, all Member States must create the necessary conditions for implementing Integrated Pest Management (IPM) by 2014. In the draft of the Italian National Action Plan, which acknowledges this Directive, monitoring activities and alert systems based on epidemiological models are listed among the technical solutions for applying IPM principles and reducing pesticide applications.