

Calibration and in-Field Validation Tests of a Web-based Adaptive Management System for Monitoring - *Scaphoideus titanus*

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Abstract:

We developed a Web-based Adaptive Management System (WAMS) within a research project, called “SMART VINEYARD”, which was funded by the Swiss Federal Commission for Technology and Innovation (Project 11307.1 PFES-ES). Goal of the project was to address the challenge of proposing a decision support system to provide real-time forecast of the life stages of - *Scaphoideus titanus*, vector of flavescence dorée. The benefit of using the WAMS is to decide the timing of insecticide application and the planning of in-field monitoring tasks.

After some laboratory tests done in 2010 and based on historical data, we performed some preliminary in-field tests of the system in the Canton of Ticino, Switzerland, between April-July 2011 (Prevostini et al., 2011). The obtained results allowed us to develop a calibration algorithm aiming at setting up the initialization of - *S. titanus* monitoring in new vineyards of regions with different micro-climate conditions.

A first in-field validation of this calibration techniques was performed in Romandie, the french speaking part of Switzerland, in particular in two vineyards, in Changins and Satigny, in the Canton Vaud respectively Geneva.

The obtained results were very promising. Even if the region was not “known”, our system was able to generate prediction windows about three weeks in advance and with an error rate of +/- 2 days.

We strongly believe that end-users of our WAMS (i.e. wine growers, phytosanitary services, scouts) can benefit by operating in a cycle of system monitoring, data processing and adapting their activities to the current situation in their vineyards. End-users are given the possibility to interact with the monitoring system by means of a customizable web-based application able to provide real-time prediction windows, visualization of real-time temperature, as well as aggregated data like minimum, maximum and average temperature. Moreover, an alert feature regularly notifies the end-user about prediction windows via email or sms. The monitoring system can be easily interfaced with both weather station and wireless sensor networks.

The engine of the monitoring system is a set of proprietary software implementing: (i) phenology models for predicting the life cycles of the vector and (ii) the auto-adaptiveness of the system based on machine-learning techniques.

Key words: integrated control, auto-adaptiveness, decision support system, prediction algorithms, *Scaphoideus titanus*, flavescence dorée.

Prevostini M., Taddeo A. V., Balac K., Rigamonti I., Baumgärtner J., Jermini M., 2011.

“WAMS - an adaptive system for knowledge acquisition and decision support: the case of *Scaphoideus titanus*.”, IOBC Bulletin 2011