

Three years experience in France using PreDiVine DSS analysing 25 vineyards for *S. titanus* monitoring

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Abstract: This work presents a three-year project where 25 vineyards have been monitored in France, by means of the Decision Support System (DSS) called PreDiVine, and discusses the criteria used to evaluate the monitoring, the results and the benefits of its usage. PreDiVine (Predicting Diseases of Vine) is a web-based and selfadaptive DSS able to predict the evolution of vineyard's pests and diseases and suggests just in time targeted treatments. In particular PreDiVine provides real-time forecast of the life stages of *Scaphoideus titanus*, vector of flavescente dorée (FD). The benefit of using PreDiVine is to decide the timing of insecticide application and the planning of in-field monitoring tasks. Phytosanitary services are able to decide, with about 2-3 weeks in advance, when wine growers have to perform the chemical treatments. During the three-year project (2014-2016) we analyzed the field observations of 25 vineyards associated with 17 reference meteorological stations. We conducted a preliminary site analysis to understand whether the optimal conditions to perform computations with PreDiVine were met. PreDiVine performed the computations with a calibration based on previous years where observations of *S. titanus* and meteorological data were given. The goal was to understand whether between the three seasons there have been improvements in Predivine forecast. In particular, we identified some criteria in order to evaluate the vineyards (by means of distance from the weather station, historical *S. titanus* observation and whether the vineyard was under treatment or not), the weather stations (by means of historical data and quality of the data), and the feedback reported by the users/scouts. Finally, we assessed the PreDiVine performances by analyzing the results in order to identify those factors that had an impact in the life stages forecast in comparison with the observed samples. Some of these factors include the distance of the weather station from the site, the sample protocol frequency, the *S. titanus* population and the vineyard was already under treatment. We observed that, during those three years, we had a continuous increase in the accuracy of PreDiVine predictions with some minor exceptions in some sites between 2015 and 2016. PreDiVine proved to be a robust DSS able to provide accurate predictions already starting from a zero knowledge condition of the site and, at the same time, being flexible by re-using the data collected every year to self-improve the system calibration for future real-time predictions. PreDiVine has been originally developed within a research project at the ALaRI Institute of the Faculty of Informatics of the University of Lugano in collaboration with Agroscope Research Centre of Cadenazzo, the University of Milan and co-funded by Dolphin Engineering Sagl, a startup company hosted at the accelerator of the University of Lugano, and by the Swiss Federal Commission for Technology and Innovation (Project 11307.1 PFES-ES).

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

Prevostini M., Taddeo A. V., Jermini M., Linder C., Petit A. "Monitoring *Scaphoideus titanus* and related in-Field Activities: the experience in Switzerland and France using PreDiVine DSS", IOBC-WPRS meeting of the Working Group on Integrated Protection and Production in Viticulture, Vienna, Austria, October 19-24, 2015

Prevostini M., Taddeo A. V., Balac K., Jermini M., Linder C., 2013. "Calibration and in-Field Validation Tests of a Web-based Adaptive Management System for Monitoring - *Scaphoideus titanus*.", Future Integrated Pest Management in Europe., Riva del Garda, Italy, March 19-21, 2013

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