



**EUPHRESCO Final Report (NC)**  
for Non-Competitive research projects

<b>Project Title and Acronym</b>	
Damage potential of <i>Drosophila suzukii</i> and development of risk management and control measures (DROSKII)	

**Project Duration:**

<b>Start date:</b>	01/06/12
<b>End date:</b>	30/05/14

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## 2. Executive Summary

Project Summary
<p><b>Title</b> Damage potential of <i>Drosophila suzukii</i> and development of risk management and control measures (DROSKII)</p> <p><b>Introduction</b> <i>Drosophila suzukii</i>, the Spotted Wing Drosophila (SWD), is a vinegar fly native to Asia, which recently has been introduced to Europe (Calabria <i>et al.</i>, 2012). <i>Drosophila suzukii</i> infests thin-skinned fruits and poses a significant risk to soft fruits, stone fruits as well as grapes (Cini <i>et al.</i>, 2012). Although this pest is present in Europe since only a few years, severe damages were observed on sweet cherries, strawberries, raspberries, black and blueberries. New findings in EU countries account for infestation on some grape varieties. The economic damage potential of <i>D. suzukii</i> is therefore enormous due to its high biotic potential. Experiences with insecticide applications show that efficient crop protection is difficult to attain. Furthermore, the range of registered products against <i>D. suzukii</i> is quite limited (Boselli <i>et al.</i>, 2012). Thus, the elaborated pest risk assessment of the EPPO (European and Mediterranean Plant Protection Organization) concluded that <i>D. suzukii</i> is an important pest of soft fruits, stone fruits and grapes in most parts of the EPPO region.</p> <p><b>Main objectives</b> To characterize/identify:</p> <ul style="list-style-type: none"><li>- the potential dispersal of <i>D. suzukii</i> in Europe by large scale monitoring;</li><li>- the most behaviourally-active volatiles emitted by fruits host of <i>D. suzukii</i> in order to develop more selective and powerful attractant lures;</li><li>- the applicability and efficacy of environmentally sound methods such as physical barriers, mass-trapping and mating disruption;</li><li>- the occurrence and level of incidence of natural enemies, in particular parasitoids, and their even management to control.</li></ul> <p><b>Methods</b> <b>Monitoring - activities, assessment, refinement and forecasting</b>, at local-regional-transnational scale. <b>Susceptibility testing of different fruit varieties</b> Field survey in different susceptible agro ecosystem in order to verify occurrence and incidence of <i>D. suzukii</i> on different hosts. Extraction and identification of volatile compounds emitted by its main host fruits. <b>Survey on the infestation of grapes and grape varieties in Europe</b> Monitoring of infestation on grapes and screening the susceptibility of grape vars. <b>Actions for containment and control of <i>D. suzukii</i> by environmentally-friendly measures.</b> Assessment of appropriate approved chemicals for fruit against adults and/or larvae. Screening and assessment of new control measures and management approaches. Field survey to verify occurrence and incidence of natural enemies on SWD.</p> <p><b>Results and Conclusion</b> <b>WP2:</b> <i>D. suzukii</i> is very rapidly spreading in Europe. In 2012-2013, SWD was recorded over the winter as well as in spring. The peak of population was in late October/early November. In 2013-2014, the mild winter allowed the <i>D. suzukii</i></p>

population to build up very early in the spring.

Different traps and lures were tested: the ideal trap is put on a shady place and has a high number of small openings (2 to 3 mm), which are rain-proofed; yeast baits or e.g. the mixture of apple cider vinegar and wine as trapping lures delivered the best results but development is required to improve the efficiency of traps - e.g. the number and position of traps per site and/or the timing of control measures. Mass-trapping is implemented on a broad scale in berry production and producers were satisfied with the achieved protection.

**WP3:** Different volatiles from host plants influence the olfactory behaviour of *D. suzukii*. Mated females were attracted to rubber septa loaded with synthetic isoamyl acetate. The release rate of isoamyl acetate from attractive rubber septa was comparable to that by fresh fruits. The almost complete putative full repertoire of genes encoding odorant receptors normally activated by isoamyl acetate in *D. melanogaster* are present in *D. suzukii*. The results indicate that *D. suzukii* uses olfactory cues to select oviposition sites.

Preliminary lab trials using Y-olfactometer to evaluate the response of *D. suzukii* to the yeast *Hanseniaspora uvarum*, frequently present on healthy fruits, were carried out. The comparison among three yeast strains artificially reared, highlighted that only one of them is attractive in comparison to the control represented by the growing media.

**WP4:** An online survey on the threat that *D. suzukii* poses to European table and wine grape production was developed and emailed to phytosanitary services, industry partners, policy makers and scientists all over Europe in the winter 2013 and 2014. It results that *D. suzukii* is present in most European vineyards, but it did not cause any major damages on table or wine grapes in 2012 as well as 2013. The obtained responses cover more than 10% of the viticultural area of Europe. It was confirmed that grapes can be damaged by SWD even if they are not very suitable for larval development and the buildup of large populations. The interaction of *D. suzukii* with native vinegar flies and fungal pathogens is partly understood. There are no clear evidences that SWD presence favors the development of other drosophilids or sour rot even if such interactions cannot definitely be excluded.

**WP5:** The application of sanitation measures and mass-trapping proves to be very effective against *D. suzukii*.

Spinosad, chlorantraniliprole and the experimental product, TA2674, showed excellent potential as control agents for blueberries with mortalities of 100%, 93% and 98%, respectively. Entomopathogenic agents (fungi: *Lecanicillium muscarium* as Mycotal as well as *Beauveria bassiana* as Naturalis and Botanigard; nematodes: *Steinernema carpocapsae*, *S. feltiae*, *S. krausse*) were tested and appeared to reduce *D. suzukii* population development. However, they are probably unable to prevent outbreaks. *Pachycrepoideus vindemiae* (Hym.: Pteromalidae), a generalistic parasitoid was collected from both *D. suzukii* and *D. melanogaster* pupae in traps deployed in different sites in Northern Italy (Trento province). The record of *P. vindemiae* represents the first identification of a *D. suzukii* parasitoid in Europe.