Euphresco

Success story

March 2017

Detection and management strategies for invasive non-European and other selected fruit fly species of economic importance

Fruit flies of the family Tephritidae exert a huge economic impact on fruit and vegetable production worldwide because of direct damage on fruit and vegetable commodities and as a result of the strict quarantine regulations that have been established by many countries. The FLYDETECT project focusses on species of tephritid fruit flies that are key pests to a large number of crops in the Mediterranean region, such as *Ceratitis capitata* (Mediterranean fruit fly, Medfly), or are considered as important invasive species, such as *Bactrocera zonata* (Peach Fruit Fly, PFF), *Bactrocera dorsalis* complex (Oriental Fruit Fly, OFF), and *Myiopardalis pardalina* (Melon Fruit Fly, MFF). These species, which are already present in some parts of Europe (e.g. MFF), are a threat as they may become established (e.g. PFF) in the Mediterranean basin, posing a risk to the horticultural crops and agriculture of Central and Southern Europe, and are considered quarantine pests for most European countries. The pests under study have substantial interceptions in EUROPHYT database each year.

The FLYDETECT project aims to contribute to the existing knowledge about novel detection and interception tools and strategies for the above species and to explore some basic aspects of their biology that will be useful in projecting their potential spread in Europe.

FLYDETECT is reviewing the available trapping tools and devices for tephritid fruit flies to provide updated knowledge on detection strategies for fruit flies. In addition, national monitoring surveillance data for fruit flies of the involved partners is being used to define the distribution and spread of the selected fruit flies in Europe. Using Mediterranean fruit fly as a model species, FLYDETECT utilizes monitoring data from Southern Europe up to Central Europe (Austria). Mediterranean fruit fly is limited to warmer climate but lately has expanded its distribution northwards. In Northern Italy, for example, it has become a major pest for apples, jeopardizing the integrated pest management scheme for codling moth.

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As cold tolerance is of utmost importance for expansion and population build-up in new areas, the cold tolerance ability of Mediterranean fruit fly will be explored by comparing populations coming from areas with different altitude. The population originating from high elevation is expected to be more cold tolerant. This information will offer the opportunity to model dynamic dispersal and colonization of northern cooler areas. In combination, cold tolerance abilities and trapping data will provide a complete picture of the dynamics of expansion of Mediterranean fruit fly. Our monitoring data of 2016 compared with those of 2017 are expected to be very valuable as very low temperatures were recorded in December 2016 and January 2017 in the Balkan Peninsula.

Infestation by tephritid fruit flies can be undetectable during harvest, storage and transport to the point of use, thus, inspectors should perform destructive sampling in a large proportion of the commodity. It is known that infested fruits emit specific volatile compounds. The profile of volatiles emitted could be used for the development of technology-intense method of rapid detection of infested fruits. The FLYDETECT consortium aim to determine infestation-specific volatile compounds-indicators by headspace- solid phase micro extraction- gas chromatography- mass spectrometry (HS-SPME-GC-MS) in order to develop a rapid, reliable and cost effective method aiming to reduce the time required for a reliable inspection and to avoid the unnecessary destructive sampling, for the infection of medfly on sweet orange (*Citrus sinensis* (L.) Osbeck, variety Navelin).
The identification of the volatiles emitted by oranges at different developmental stages from oviposition to final instar larvae exit have shown major differences between healthy and infested fruits. Hexyl hexanoate is the main ester in infested and oviposited fruits. In healthy oranges, Valencene was the predominant compound. The relative high amounts of *E*-(*β*)-ocimene in infested and oviposited oranges compared to healthy ones, is associated with damage to the fruit peels of *Citrus* species.

Project ID: Development and implementation of early detection tools and effective management strategies for invasive non-European and other selected fruit fly species of economic importance (FLY DETECT)