

1. Content of the 'Topic Description' document

1.1. Topic area

Pest/vector biology, epidemiology, taxonomy.

1.2. Topic title

Ceratitis capitata: better knowledge for better risk management.

1.3. Description of the problem the research should solve

Ceratitis capitata (Wiedemann), also known as Mediterranean fruit fly, is considered one of the world's most destructive plant pests. A highly polyphagous species able to feed on over 300 hosts, it is known to be capable of adapting to a wide range of climates. Originating in Africa, the pest has spread to almost any other continent. In the EPPO region it is mainly present in its southern part, where it is particularly damaging for *Citrus* and *Prunus*; records in Northern or Central Europe refer to interceptions or short-lived adventive populations only. Comprehensive information on *Ceratitis capitata* occurrence, both in spatial and temporal terms, is crucial for understanding not only the current and historical extent of its occurrence, but also the conditions where it is able to survive and areas susceptible to potential invasion and establishment. Recently, an extensive literature study was performed which allowed to collect data from 43 countries and nearly 500 unique locations (Szyniszewska *et al.*, 2014). Researchers involved in the project will exchange information on the current situation in each (European) country: occurrence records, timing of records and their locations, plant hosts, life stages and number of generations, capture methods, climatic and weather conditions in the location of occurrence, mode of overwintering, transshipment places and packing stations nearby the outbreaks.

Different traps and lures have been developed and used over decades to survey fruit fly populations: Jackson traps, Steiner traps, Yellow Panels, Cook and Cunningham, Tephri traps, Champ traps associated to trimedlure (TML) or food attractants have been proved effective for *Ceratitis capitata* males and females monitoring in support to control activities and eradication campaigns. The annex of ISPM 26 includes tables with suitable trap and attractant combinations for various fruit flies, including *C. capitata*. However, partners might have different experiences with trap-attractant combinations in different situations. Therefore a knowledge exchange or trials concerning the effectiveness of the various combinations might offer valuable information for the development of early detection tools. The distance and time effectiveness of the different dispensers should be compared.

C. capitata has been the subject of intensive genetic analysis, largely driven by efforts to use genetic manipulation to improve the sterile insect technique (SIT) for integrated pest management (IPM). The whole genome of *C. capitata* was sequenced in 2016 (Papanicolau *et al.*, 2016) and will be instrumental to the development of methods for the identification of genome-wide polymorphisms that can be used for population genetic analysis, to track historical spread routes and identify critical pathways. Genetic analysis will also allow to link gene families to characters such as adaptation, invasiveness and resistance (to insecticides). The project will contribute to characterize populations occurring worldwide. Concrete information could be obtained, if partners have specimens caught in their countries from different years and maybe different areas, which could be compared to each other and to specimen provided by countries where *C. capitata* is already widely spread. In case of doubt, this could also provide information about the relations between specimens caught in different years at the same spot and provide an answer to the question, if a population has already established in a certain space or if it is only an adventive population deriving from introduced specimens.

1.4. Description of the expected results

The expected outputs are:

- Overview of the geographical distribution of *Ceratitis capitata* in all countries involved in the project; history of invasion will be drawn based on identified molecular markers.
- Biological characterization of populations occurring worldwide.
- Review of early detection tools and management strategies used in different countries.
- Models for pest's spread and temperature models of numbers of generations in different climatic regions and impact upon future climate conditions.

1.5. Beneficiaries of this research product

- The project will benefit to National and EU policy makers (by providing information to support risk management and policy-making processes).
- National Plant Protection Organisations (NPPO's), including phytosanitary inspectors (by providing information on early detection tools and effective risk management strategies).

1.6. Research funders and research contribution/ distribution

Funding organisation	Research activity and researchers involved
<p>1. University of the Azores, Portugal</p> <p>David João Horta Lopes david.jh.lopes@uac.pt</p>	<p>-Project coordination. -To analyse insect pest population dynamics in some of the Azorean islands. -To map orchards and cultures areas, as well as abandoned orchards and hosts trees. This mapping serves the purpose to develop a host fruit Geographic Information System (GIS) layer for the GWR analysis.</p> <p>Contact person: David João Horta Lopes E.mail address: david.jh.lopes@uac.pt</p>
<p>2. Austrian Agency for Health and Food Safety, Austria</p> <p>Sylvia Blümel sbluemel@ages.at</p>	<p>-National monitoring activities in fruit production areas and regions with previous catches of <i>C. capitata</i>. -Provision of data and specimens from monitoring activities for further analyses by project partners.</p> <p>Contact person: Alois Egartner E.mail address: alois.egartner@ages.at</p>
<p>3. Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail, France</p> <p>Géraldine Anthoine geraldine.anthoine@anses.fr</p>	<p>-To study the morphology of the third instar larvae from different geographical origins where <i>Ceratitis capitata</i> is established. -To assess the possibility of characterizing these populations, if they exist. The larvae identification will be confirm by molecular analysis if necessary.</p> <p>Contact person: Valérie Balmès E.mail address:valerie.balmes@anses.fr</p>
<p>4. Bundesministerium für Ernährung und Landwirtschaft, Germany</p>	<p>-National monitoring activities in apples and stone fruit. -Provision of data and specimens from</p>



<p>Bettina Beerbaum Bettina.Beerbaum@bmel.bund.de</p> <p>Silke Steinmüller Silke.steinmoeller@julius-kuehn.de</p>	<p>monitoring activities for further analyses by project partners. -Population genetic analysis. -Knowledge exchange about traps and lure used for monitorings.</p> <p>Contact person: Peter Baufeld E.mail address: peter.baufeld@julius-kuehn.de</p>
<p>5. Nederlandse Voedsel-en-Warenautoriteit, The Netherlands</p> <p>Martijn Schenk M.Schenk1@nvwa.nl</p>	<p>-To collect data on the geographical distribution of <i>C. capitata</i> in the Netherlands by conducting surveys. -Monitoring activities will be based on Jackson traps baited with trimedlure. -Providing that sufficient <i>C. capitata</i> flies are collected, the material will be made available for population genetic analysis.</p> <p>Contact person: Antoon Loomans E.mail address: a.j.m.loomans@nvwa.nl</p>
<p>6. Główny Inspektorat Ochrony Roślin i Nasiennictwa, Poland</p> <p>Janina Butrymowicz J.Butrymowicz@piorin.gov.pl</p>	<p>-To provide data on the geographical distribution of <i>C. capitata</i> in Poland as a result of conducted monitoring programme. Monitoring activities are based on McPhail traps installed in orchards and places of storage of harvested fruits. If pest's individuals is collected, it will be possible to provide preserved material for population genetic analysis to interested researchers involved in the topic.</p> <p>Contact person: Tomasz Konefał E.mail address: t.konefal@piorin.gov.pl</p>
<p>7. Instituto Nacional de Investigação Agrária e Veterinária, I.P., Portugal</p> <p>Maria Leonor Cruz leonor.cruz@iniav.pt</p>	<p>-Study on the history of invasion in Europe and for the development of early detection methods.</p> <p>Contact person: Eugenia de Andrade E.mail address: eugenia.andrade@iniav.pt</p> <p>Contact person: Célia Mateus E.mail address: celia.mateus@iniav.pt</p>
<p>8. Ministrstvo za kmetijstvo, gozdarstvo in prehrano, Slovenia</p> <p>Erika Oresek Erika.Oresek@gov.si</p>	<p>-To monitor <i>C. capitata</i> on the whole territory of Slovenia. -To identify the possible presence of <i>C. capitata</i> in fruits of different fruit species, for example: peach (<i>Prunus persica</i>), fig (<i>Ficus carica</i>), apple (<i>Malus domestica</i>), pear (<i>Pyrus communis</i>).</p> <p>Contact person: Mojca Rot E.mail address: mojca.rot@go.kgzs.si</p>



<p>9. Valencian Institute of Agricultural Research, Spain</p> <p>Francisco J. Beitia beitia_fra@gva.es</p>	<p>-Contribution to be detailed.</p> <p>Contact person: Francisco J. Beitia E.mail address: beitia_fra@gva.es</p>
<p>10. Research and Development Institute for Plant Protection Bucharest, Romania</p> <p>Constantina Chireceanu cchireceanu@yahoo.com</p>	<p>-Survey activities to detect <i>C. capitata</i> in orchards and other crops with Tephri traps. -Data on the geographical distribution of <i>C. capitata</i> in Romania. - Specimens of adults captured in our country provided for various analyses.</p> <p>Contact person: Constantina Chireceanu E.mail address: cchireceanu@yahoo.com</p>
<p>11. Higher Agronomic Institute of Chott-Meriem, Tunisia</p> <p>Brahim Chermiti chermiti54@yahoo.fr</p>	<p>-Early detection and management strategies used in Tunisia. -Effect of climate change and global warming in the future distribution of <i>C. capitata</i>.</p> <p>Contact person: Brahim Chermiti E.mail address: chermiti54@yahoo.fr</p>
<p>12. Centre National des Sciences et Technologies Nucléaires, Tunisia</p> <p>Meriem M'saad Guerfali msaad_tn@yahoo.fr</p>	<p>- Biological characterization of populations occurring worldwide, based on identified molecular markers. - Early detection and management strategies used in Tunisia.</p> <p>Contact person: Meriem M'saad Guerfali E.mail address: msaad_tn@yahoo.fr</p>
<p>13. Institute of Plant Protection, Ukraine</p> <p>Nataliia Skrypnyk natalija.skripnik@yandex.ua</p>	<p>- Contribution to be detailed</p> <p>Contact person: Nataliia Skrypnyk E.mail address: natalija.skripnik@yandex.ua</p>

1.7. Research project partnership outside Euphresco

Euphresco funding ensures a certain level of transnational collaboration among Euphresco member countries. It is possible, if the funding consortium is interested, to contact funding organisations or research groups outside the geographical area covered by Euphresco members. The Euphresco coordinator could advertise the research topic in order to have an enlarged collaboration. If funders are interested in this possibility, please check the case below:

The funding consortium of the topic mentioned in section 1.2 requires to advertise the topic outside the Euphresco network

1.8. Any other relevant information on content

The Euphresco project FLYDETECT (2015-E-156) is focussing on determining cold hardiness of *Ceratitis capitata* (activity led by Greece) and management options for places of productions (activity led by Bulgaria). Exchange of information will ensure optimal use of resources. The national (Croatia) project 'Controlling fruit flies in the Balkans and Eastern

Mediterranean' (Euphresco code 2014HCad) ran from 2014-2015 focussed on surveillance and management procedures and could have produced useful outputs.

A consortium led by Mr Papadopoulos (School of Agricultural Sciences, GR) is currently preparing a proposal to address the H2020 2017 topic on emerging pests. The proposal 'Invasive fruit flies (Tephritidae): a major threat to the European fruit industry and a model for generic response system to pest invasions' (FLYIN) will deal, amongst other activities, with the development of diagnostic test and the FLYIN consortium would be interested to carry out test performance studies or proficiency tests with NPPOs-laboratories. Also, they will organise surveys to harvest data for model development and they are interested to collaborate with organisations in this framework as well.

2. Euphresco management aspects of the project

2.1. Indication of the topic budget

Funding organisation ^a	Mechanism ^b	Total Budget ^c
1. UAC (PT)	NC	€ 16 000
2. AGES (AT)	NC	€ 48 485
3. ANSES (FR)	NC	€ 20 000
4. BMEL (DE)	NC	€ 35 000
5. NVWA (NL)	NC	€ 25 000
6. PIORIN (PL)	NC	€ 8 700
7. INIAV (PT)	NC	€ 15 000
8. MKGP (SI)	NC	€ 17 000
9. IVIA (ES)	NC	€ 20 000
10. ICDPP (RO)	NC	€ 2 000
11. ISA-CM (TN)	NC	€ 5 000
12. CNSTN (TN)	NC	€ 20 000
13. NAAS (UA)	NC	€ tbc
total		€

2.2. Expected duration of the project (only for non-competitive topics)

24 months.

2.3. Identification of project coordinator

Has the research project coordinator been identified?

- Yes
 No

2.4. Any other relevant information on topic organisation and management

A research project coordinator has not been identified. Funders will not allocate funds to projects that cannot be coordinated.

^a First member is project coordinator. A minimum of two partners are necessary for each proposal. Add lines as needed.

^b Please indicate the preferred mechanism (e.g. real pot RP; virtual pot VP; non-competitive NC), or several mechanisms if there is flexibility.

^c Optional, as this amount can still change in the next phase. In-kind contribution should also be indicated in this column.