

1. Content of the 'Topic Description' document

1.1. Topic area

Diagnostics, field detection and surveillance.

1.2. Topic title

Epitrix II.

1.3. Description of the problem the research should solve

Epitrix Foudras 1860, is a genus of flea beetles (Coleoptera: Chrysomelidae: Alticinae) that has a worldwide distribution and consists of nearly 180 species. Most of the species occur in the neotropics (South and Central America) and only 12 and 10 species are known from North America and Europe, respectively.

Several species of *Epitrix* are reported to feed on foliage and/or tubers of potatoes. In the European Union, emergency measures have been introduced to prevent the introduction of the EPPO A1 listed species *Epitrix tuberis*, *E. similaris* and *E. subcrinita* which are currently found in North America and are known to cause damage to tubers. *E. cucumeris* (another North American species, which is also found in Portugal) and the newly described *E. papa* (previously misidentified as *Epitrix similaris*), (currently known distribution is limited to Portugal and some regions of Spain) also damage tubers and are listed as EPPO A2 species, however this is currently under review. *E. hirtipennis* and native European species of *Epitrix* (such as *E. pubescens*) may also feed on foliage but are not known to cause damage to potato tubers. Neotropical species are poorly documented compared to the species found in the Holarctic. However, some of them (such as *E. yanazara*) are well-known potato pests in South America and could also be of concern for European phytosanitary authorities. Therefore, there is a need for developing knowledge on South American *Epitrix* species.

Above ground symptoms are caused by adult beetles feeding on foliage (creating 'shot hole' damage to leaves). However, the most serious damage is to the tubers as larvae feed below the epidermis digging galleries. This usually remains superficial and does not affect the flesh of the tuber. The tubers will show long sinuous corky lesions and small holes. The tunnelling may result in deep cracks, rough and pimply skin and distortion of the tuber.

Epitrix species are very similar in their external morphology and difficult to distinguish in the field or in the lab even by specialists. Therefore there is a need for development of morphological identification keys and quick molecular detection methods for the benefit of the plant inspection services.

The life cycle comprises the overwintering adult beetles emerging from the soil in spring. Eggs are deposited in the soil near the base of a host plant. After eggs hatch, the larvae feed on roots and/or tubers. Pupation takes place in the soil. The number of generations for the different *Epitrix* species is still debated but at least one species has 2-3 generations per year. 4-5° C is suitable for survival of adults and possibly of pupae; it is not known if pupae cannot develop at 5°C. The species *E. papa* and *E. cucumeris* disperse by flight and saltation.

Monitoring is difficult. No trapping methods are available at the moment. Only inspection of potato fields for haulm damage and presence of adult beetles and inspection of tubers for the long sinuous corky lesions and small holes is at the moment available.

During Euphresco Epitrix I project, real-time PCR assays were developed for the *Epitrix* species: *E. papa*, *E. cucumeris*, *E. similaris*, *E. brevis*, *E. hirtipennis* and *E. pubescens*. The

Danish generic *Epitrix* assay has also been tested against the individual species listed above and was found to successfully detect all of them. An update to the EPPO diagnostic protocol on *Epitrix* spp. was prepared with an identification key based on the morphology of male and female genitalia and a voucher reference collection was set out for all EU regulated and European species.

1.4. Description of the expected results

The project should yield the following products:

1. Further validation of generic assay. Design and validation of real-time PCR assay for the remaining species, *E. tuberis*, *E. subcrinita* and *E. hirtipennis*. As shortage of sample in *Epitrix* I was one of the main limiting factors more samples are required to carry out the remainder of the work.
2. Morphological and molecular characterization of some South American species feeding on potato and improvement of the reference collection.
3. Detailed information of the life cycle of at least the two flea beetles established in Portugal and Spain (*E. papa* and *E. cucumeris*). Determining whether beetles could overwinter under conditions commonly found in different European countries (North and South).
4. Identification of insecticides & biologicals which are effective in controlling the *Epitrix* species.
5. Pheromone traps for monitoring and early warning of *Epitrix* spp.

1.5. Beneficiaries of this research product

The project will benefit to any phytosanitary inspectorate that wishes to conduct surveys for these pest species.

1.6. Research funders and research contribution/ distribution

Funding organisation	Research activity and researchers involved
1. Science and Advice for Scottish Agriculture, United Kingdom David Kenyon david.kenyon@sasa.gsi.gov.uk	-Project coordination. Contact person: David Kenyon david.kenyon@sasa.gsi.gov.uk Contact person: Fiona Highet fiona.highet@sasa.gsi.gov.uk
2. Department of Plants, Ministry of Food, Agriculture and Fisheries, Danish AgriFish, Denmark Mogens Nicolaisen mn@agro.au.dk	-Validation of generic <i>Epitrix</i> assay. Assistance in development of species-specific assays. Contact person: Mogens Nicolaisen mn@agro.au.dk Contact person: Annie Enkegaard annie.enkegaard@agro.au.dk
3. French Agency for Food, Environmental and Occupational Health & Safety, France Géraldine Anthoine geraldine.anthoine@anses.fr	-Morphological and molecular characterization of some South American species feeding on potato and improvement of the reference collection. Contact person: Jean-François Germain



	jean-françois.germain@anses.fr Contact person: Raphaëlle Mouttet raphaelle.mouttet@anses.fr
4. Netherlands Food and Consumer Products Safety Authority, The Netherlands Martijn Schenk M.Schenk1@nvwa.nl	-Performing a survey for the presence of <i>Epitrix</i> spp. in the Netherlands, using traps that were developed for early warning in a previous project on <i>Epitrix</i> . Contact person: Antoon Loomans a.j.m.loomans@nvwa.nl
5. National Institute for Agricultural and Veterinarian Research, Portugal Leonor Cruz leonor.cruz@iniav.pt	-INIAV will contribute with the development of traps for <i>Epitrix</i> monitoring, and with molecular biology methods for species diagnosis. Contact person: Conceição Boavida Conceicao.boavida@iniav.pt

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

Information to sharpen the profile of sought partners could be useful (but not mandatory): country/region (if there are preferences), skills/expertise required, etc.

The project consortium would specifically like to approach potential collaborators in North America.

1.8. Any other relevant information on content

2. Euphresco management aspects of the project

2.1. Indication of the topic budget

Funding organisation ^a	Mechanism ^b	Total Budget ^c
1. SASA (GB)	NC	€ 38 500
2. MAFF (DK)	NC	€ 2 000
3. ANSES (FR)	NC	€ 37 200
4. NVWA (NL)	NC	€ 6 000
5. INIAV (PT)	NC	€ 39 455
total		€ 123 155

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

36 months.

2.3. Any other relevant information on topic organisation and management

^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.