

## Designing Strategies for the sustainable control of the whitefly *Dialeurodes citri* and the South African mealybug *Delottococcus aberiae* in citrus fruit

### Summary

El Baix Ebre and El Montsià regions produce more than 95% of Catalonia's citrus fruit, most of which is *Clemenules* mandarin variety, occupying an area of 8,800 ha. There are currently two pest species threatening citrus production: the whitefly *Dialeurodes citri* and the South African mealybug *Delottococcus aberiae*. The whitefly *D. citri* is a pest which has been present in Catalonia for years, but whose population has recently increased, with causing imbalance in the entomofauna and harm to plant health. The South African mealybug is a pest that has only recently arrived in the area, but has a focal point in Catalonia, causing significant damage, as the affected fruit is not suitable for sale.

Current control strategies for these two pests are mainly based on applying synthetic insecticides. This strategy is not sufficiently effective and may have a negative impact on biological control agents, causing imbalances in the ecosystem. Optimising the control of these species requires strategies integrating different tools: biological, technical, chemical and cultural controls.

The operational group aims to design effective control strategies for *D. citri* integrated into the current plant health plan and provide the basis for controlling *D. aberiae*, which will enable effective control using currently available tools. Achieving these objectives will help meet the challenge of controlling these pests, increasing the competitiveness of the citrus sector by obtaining quality fruit.

The actions will be carried out in two parallel pilot tests: Pilot test 1 for whitefly control strategies; and Pilot Test 2 for the basis for controlling South African mealybug.

The results will be disseminated through the European Innovation Partnership (EIP), over the different dissemination platforms of the operational group members, social media and by organising and/or attending conferences and congresses.

### Objectives

Minimising the impact of the pest species *D. citri* and *D. aberiae* in order to obtain high quality citrus fruit and improve the competitiveness of the Catalan citrus sector. *Dialeurodes citri* has been a pest in Catalan citrus fruit growing for years, while *D. aberiae* is in a phase of expansion. However, no effective control strategy has been found to minimise the impact of either pest on citrus crops. Current control strategies for the two pests are based mainly on applying synthetic insecticides. These strategies have not been sufficiently successful, and their indiscriminate use can negatively affect biological control agents and cause imbalances in the ecosystem.

The specific objectives of the project are:

- Design effective control strategies for *D. citri* and include them in existing integrated pest management programmes in citrus fruits, minimising the environmental impact and risks of control methods to human health.
- Establish the basis for the control of *D. aberiae* in citrus fruits, permitting effective control with currently available tools, adapted to different degrees of incidence of the pest.
- Check the efficacy of the different tested tools in reducing the population of both pests.
- Bring together and combine these techniques to provide effective strategies for sustainable control of *D. citri* and *D. aberiae*.

## Description of the actions planned in the project

Two pilot tests will be carried out in line with the specific objectives of the operational group:

1. **Pilot test 1.** Developing control strategies for *D. citri* included in existing integrated pest management programmes for citrus fruit.
  - Activity 1.1. Surveying the incidence of the pest on citrus trees in Les Terres de l'Ebre to provide an up-to-date map of its distribution and severity.
  - Activity 1.2. Studying and monitoring the seasonal dynamics of different developmental stages of *D. citri* in two citrus-growing areas of Les Terres de l'Ebre.
  - Activity 1.3. Assessing the efficacy of plant protection products authorised for the control of *D. citri* on eggs, young nymphs, older nymphs and adults in laboratory studies.
  - Activity 1.4. Studying the native natural *D. citri* enemy complex
  - Activity 1.5. Spot trials to study the efficacy of applications to reduce the presence of sooty mould in fruit.
  - Activity 1.6. Study on the effect of interior pruning of trees to allow good aeration and better penetration of phytosanitary products.
  - Activity 1.7. Study on the effect of reducing nitrogen fertilising on the size of the *D. citri* population, reducing it by 20% compared to conventional fertilising.
  - Activity 1.8. Designing strategies for the chemical control of *D. citri* within integrated pest management programmes.
  
2. **Pilot test 2.** Establishing the basis for controlling *D. aberiae*
  - Activity 2.1. Study of the incidence of the pest in citrus trees in Les Terres de l'Ebre to provide a distribution and severity map.
  - Activity 2.2. Study of the phenology of the tree in two citrus varieties, and the study and monitoring of the seasonal dynamics of the different *D. aberiae* developmental stages on the tree and with sticky pheromone traps to determine the best time to apply the control strategy.
  - Activity 2.3. Establishing the basis for controlling *D. aberiae* and defining strategies: chemical, biological, cultural and biotechnical control.

Thus, during the years in which the project will be running, different strategies based on the results from the pilot tests will be used.

## Expected results and practical recommendations

The expected outcome of these actions is the design of effective and environmentally friendly control strategies for *D. citri* and *D. aberiae*. This proposal aims to work towards a more technology-based citriculture, with greater technical knowledge leading to safe improvements throughout the production process.

The expected results from implementing these actions are:

- Developing control strategies for *D. citri* included in existing integrated pest management programmes in citrus fruit.
- Establishing the basis controlling *D. aberiae* and defining strategies.

## Leader of the Operational Group

**ORGANISATION:** CITRICS TERRES DE L'EBRE, SAT

**Coordinator of the Operational Group****ORGANISATION:** CATALAN FEDERATION OF AGRICULTURAL COOPERATIVES (FCAC)**Other members of the Operational Group (grant recipients)****ORGANISATION:** LA CANAREVA, SL**ORGANISATION:** MONTFRUITS EXPORT, SL**ORGANISATION:** EXPORTADORA D'AGRIS D'ALCANAR, SCCL**ORGANISATION:** ACTEL SCCL**Other members of the Operational Group (not recipients of the grant)****ORGANISATION:** IRTA - Institute of Agrifood Research and Technology**Subject area(s) of application**

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

**Geographical area(s) of application**

PROVINCE(S)	REGION(S)
Tarragona	Baix Ebre and Montsià

**Dissemination of the project (publications, conferences, multimedia, etc.)**

The project results will be disseminated through the European Innovation Partnership (EIP) and the various dissemination platforms (websites) of the different operational group members.

At least two technical conferences will be scheduled to disseminate the results. They will also be disseminated through technical articles, in the media and through other elements for dissemination in the sector. Attendance and/or organisation of conferences and congresses, preparation of press releases, articles, fact sheets, etc., and dissemination over social media and the Internet are planned.

## Project website

## More information on the project

PROJECT DATES	TOTAL BUDGET
Starting date: July 2021	<b>Total budget:</b> €146,280.00
	<b>DACC funding:</b> €67,647.60
Current status: Under way	<b>EU funding:</b> €51,032.40
	<b>Own funding:</b> €27,600.00

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*Order ARP/113/2021 of 20 May, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ACC/1660/2021, of 27 May, announcing the call for the grant.*

