

ALMOND: key factors in improving the management of brown rot in almonds

Summary

There were 38,800 hectares of almond trees in Catalonia in 2016, and an increase in the irrigated area of 75% in the last 5 years. The positive outlook for the almond market, the need for alternative crops and the emergence of new varieties is leading to the establishment of new intensive plantations, with many positive results. Brown rot is one of the diseases that causes the most economic damage in almonds, as it affects the flower and recently set fruit, which has a direct impact on productivity. Control of the disease is based on cultural methods aimed at reducing the sources of inoculum of the pathogen, chemical treatments primarily during the blooming/fertilisation period, and the use of varieties with some degree of tolerance. Few fungicides have been recorded as controlling brown rot in almonds.

Changes in agricultural practices in almond growing have led to a significant increase in brown rot, which is more common in specific varieties, and this has given rise to an increase in fungicide applications. The epidemiology of *Monilinia spp.* in peaches and nectarines has been studied in some depth in recent years. However, most of the epidemiology relating to almonds is unknown, and this has prevented appropriate control measures from being designed.

In this context, this project aims to address the unknown factors related to: the significance of the damage caused by *Monilinia spp.* and its contributory factors, the epidemiology of brown rot, by correctly identifying the causative agent (*M. laxa*, *M. fructigena* or *fructicola*) and the existence of fungicide-resistant strains. Efficient and sustainable control programmes can be implemented if these questions are answered.

Objectives

The general objective of this project is to improve knowledge of the causative agents of brown rot in almonds in order to improve control of the disease. Specific objectives:

- 1- Study the epidemiological factors affecting the incidence and severity of the disease and its adaptive capacity in the Vall de l'Ebre area.
- 2- Characterise and monitor the symptoms and quantify the damage and losses associated with the disease.
- 3- Identify and quantify the *Monilinia spp.* populations causing brown rot.
- 4- Determine the resistance/susceptibility to fungicidal products of *Monilinia spp.* populations isolated under intensive growing conditions of this crop.

Description of the measures planned in the project

The following measures are envisaged:

- Determine the location, distribution and incidence of primary and secondary inoculum throughout the crop's phenological cycle.
- Determine the final impact of the disease on the fruit and its distribution.
- Isolate and identify strains causing brown rot.
- Determine the incubation period and latency of each species of *Monilinia* in freshly set flowers and fruits.
- Characterise and monitor the symptoms of the disease in the crop's various phenological stages.
- Evaluate crop losses and deteriorations in fruit quality as a result of brown rot.
- Determine the resistance/susceptibility of *Monilinia spp.* to fungicidal products and their frequency.

Expected results and practical recommendations

The results anticipated with the execution of this project are specified below:

- The presence or otherwise of primary and secondary inoculum on the almond farms of the Vall de l'Ebre production area will be ascertained, as well as their location in the field and impact throughout the phenological cycle, including at the time of harvest. In addition, their correlation with agro-climatic factors and the factors playing the most important role in the development of the disease will be ascertained. The time required to observe symptoms of disease in freshly set flowers and fruits will also be determined.
- The relationship between the severity of the disease and the damage that can be observed in the field and its relationship with the associated losses will be established. The loss of quality in the almond grain during processing (colour, etc.) due to the disease will also be ascertained.
- The incidence of brown rot in the Vall de l'Ebre area and the causative species will be determined.
- The susceptibility/resistance of *Monilinia spp.* strains causing brown rot in almonds to the main fungicides applied to control the incidence of brown rot in various almond producing areas will be ascertained, as well as the causative species and their prevalence.

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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

<input type="checkbox"/>	Energy management
<input type="checkbox"/>	Waste and by-product management
<input type="checkbox"/>	Biodiversity and environmental management
<input type="checkbox"/>	Food quality/processing and nutrition
<input type="checkbox"/>	Supply chain, marketing and consumption
<input type="checkbox"/>	Competitiveness and agricultural and forestry diversification
<input type="checkbox"/>	General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
LLEIDA AND TARRAGONA	LLEIDA: EL PALLARS JUSSÀ, EL PLA D'URGELL, LA NOGUERA, LES GARRIGUES, EL SEGRITÀ AND L'URGELL TARRAGONA: EL BAIX CAMP, EL TARRAGONÈS, LA CONCA DE BARBERÀ, L'ALT CAMP, LA RIBERA D'EBRE, EL BAIX EBRE, EL PRIORAT AND LA TERRA ALTA

Dissemination of the project (publications, seminars, multimedia, etc.)

In order for the results obtained to benefit the participants, and as many companies as possible, this project will include the following internal and external actions:

The internal actions will be those that will take place within the beneficiary companies of the Operational Group, and they will therefore be for the participating members of the group and will be disseminated at all levels of the company (from management to the field). Meanwhile, the external actions will be open to the general public.

INTERNAL ACTIONS:

Dissemination of the results to the companies participating in the project. This dissemination to companies will take place at various stages while the project is being undertaken in order to maintain fluid and continuous communication between the companies and the technology centre. The subjects to be covered will be both the presentation of results and the planning of the tests to be carried out.

EXTERNAL ACTIONS:

1. Dissemination of the results by participation in technical seminars for the sector.
2. Drafting of informative articles.

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2019	Total budget: €211,364.00
Completion date (month-year):	DARP funding: €86,380.08
Current status: Underway	EU funding: €65,163.92
	Own funding: €59,820.00

With funding from:

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Generalitat de Catalunya
Departament d'Agricultura,
Ramaderia, Pesca i Alimentació



Fons Europeu Agrícola
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