

FRUIT FORECAST



Summary

Meteorological variability caused by climate change produces uncertainty in crop growth, which is an added difficulty in crop planning, fruit growing in particular. The increase in volume and quality variability in peach and cherry production requires more and more investment in resources and technical equipment to plan harvests without improving accuracy.

Technical teams use different techniques (such as sampling, ripening and capacity controls) to establish the above variables of volume and optimal harvest time beforehand, but there is much room for improvement in the reliability of the results provided by these systems.

The large number of variables affecting both quality and quantity of production (such as weather conditions, plot characteristics, production areas, etc.) make obtaining reliable predictions using traditional approaches highly complex.

The operational group formed by the cooperative group FRUITS DE PONENT, and the CERIMA CHERRIES fruit company specialising in the production, packaging and export of cherries worldwide, in conjunction with the Institute of Agrifood Research and Technology (IRTA) and the RAW DATA company specialising in big data technology, will develop a tool based on prediction models that anticipate information on changes to quality parameters and harvest volumes for the peach and cherry sectors to improve the reliability of harvest planning.

Objectives

The main objective of the FRUIT FORECAST Project is to develop a model that provides advance information on the two main variables affecting the harvest planning in the peach and cherry growing: volume and harvest ripening.

Improving the reliability of harvest planning is a critical factor for competitiveness of fruit producers, while reliable harvest planning allows farmers to:

- 1) Make strategic business decisions, such as the optimal time to harvest.
- 2) Negotiate sales contracts (prices, delivery dates and volumes) with potential customers.
- 3) Reduce production costs thanks to more efficient resource management (such as hiring staff and machinery at the right time)
- 4) Optimise cold storage and logistics capacity for fruit plants.

Description of the measures planned in the project

This Pilot Project is scheduled to run from March 2020 to March 2023 and is based on big data technology that will integrate multiple sources of information to develop prediction models to reduce uncertainty in harvest planning. The data sources that will be used in this project are divided into four main blocks:

- 1.) Agro-meteorological databases (sources: Meteocat, AEMET, MeteoBlue)
- 2.) Satellite images with different indices
- 3.) Historic data from production companies
 - a) Ripening controls, using fruit quality parameters such as chlorophyll degradation

in peach (measured by DA-meter) and sugar content in cherry (measured by reflectometer).

- b) History of production volumes per plot (source: plant ERPs)
- c) Capacities (source: company records) 4.)

Characterisation of the plots using:

- a) Maps/soil types
- b) Orchard details (such as surface, age of the trees, variety, rootstock and shaping system)

Throughout the three years of the project, the following actions will be carried out in different phases:

Phase A: Data recovery. Creation, recovery, processing and standardisation of data from project members. We will work on plots and their characterisation, histories of peach and cherry entries to the warehouse, capacity and ripening controls throughout the project, hyper-localised meteorological data obtained from the METEOCAT network, AEMET or Meteoblue, and maps of the plot locations. All this data will be gathered in a database thereby facilitating the rest of the phases.

Phase B: Selecting the plots to be sampled using prediction models to identify the most representative ones for each variety. The database created in phase A will be used to do this and the plots that best correlate to the global volumes of each variety will be calculated from the historic data of the participating agricultural companies. These will be the plots used to obtain more thorough volume measurements.

Phase C: Field data collection. Each year a minimum of six peach varieties (minimum one plot per variety) and six cherry varieties (minimum one plot per variety) will be evaluated.

Phase D: Creation and training of prediction models, results testing and interaction with beneficiary companies in order to make the models as reliable as possible. The data collected in phase A, phase C (samples) and additional sources, such as indicators extracted from satellite images, will be used. In this phase, the first static prediction system will be created, operating in beta phase. Thus, the first model will be progressively validated together with the members of the Operating Group.

Phase E: Creation of a tool to display the results provided by the models. Companies must be able to interact with the predictions and view the harvest and ripening predictions on a map. They must also be able to add their latest ripening controls to the system. A means of communication between the system and the FRUITS DE PONENT and CERIMA CHERRIES technical teams will be analysed and created so that they can use the results as easily as possible and facilitate decision-making.

Expected results and practical recommendations

- Definition and validation of the set of variables needed to create each prediction model.
- Creation of the different prediction models, aimed at obtaining predictions of volume and ripening date by production plot.
- Validation of the results from prediction models with higher reliability levels than current methods and approved by the project beneficiary companies. It is hoped that a prediction model with greater than 95% reliability in terms of crop volume and ripening will be achieved.
- Technological development with image recognition to speed up field capacity measurement, using smartphone images.

Leader of the Operational Group

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Coordinator of the Operational Group

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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
- 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)
Lleida, Tarragona	Segrià, Ribera d'Ebre

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

It is planned to organise a number of actions as soon as the first results are obtained GROUP BROCHURE:

https://www.femac.org/wp-content/uploads/2021/03/fruit-forecast_fulleto.pdf

Project website

<https://www.femac.org/fruitforecast/>

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): March 2020	Total budget: €148,612.00
Completion date (month-year): March	DARP funding: €60,734.64
Current status: Underway	EU funding: €45,817.36
	Own funding: €42,060.00

With funding from:

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Order ARP/133/2017 of 21 June, 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 ARP/1531/2019, of 28 May, announcing the call for the grant.



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



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