

Improvement to hazelnut cultivation techniques, by efficient use of irrigation water and mechanical pruning

Summary

Two actions will be carried out in the hazelnut orchards of El Camp de Tarragona. First of all, irrigation strategies will be tested to obtain an accurate idea of hazelnut tree water requirements and the period when it should be applied to ensure efficient use of water. The second action involves mechanically pruning in both adult orchards, to rejuvenate the trees and allow more light into the orchard, and young trees, to shape them in a specific way.

Objectives

The main project goal **is to improve cultivation techniques for hazelnut orchards** in the Tarragona area, to improve production, reduce costs and make water savings, all with the aim of making orchards more competitive.

More specifically, the irrigation water needed for hazelnut trees will be determined and mechanical pruning will be applied to both adult and young trees, all with the intention of promoting more competitive orchards.

Finally, the results will be transferred to the sector, in different dissemination and transfer actions (dissemination articles, talks, field conferences, etc.)

Description of the measures planned in the project

The project 'Improvement in hazelnut cultivation techniques, by efficient use of irrigation water and mechanical pruning' aims to improve different strategic points in the current hazelnut growing method. This project consists of two different parts:

- **Efficient use of irrigation water:** Water management is a key factor in the management of any crop and is becoming increasingly relevant in an area affected by long periods of drought that affect the watercourses.

- **Mechanical pruning:** One of the more expensive tasks in hazelnut growing is manual pruning. While pruning regrowth is a difficult task to mechanise, further diminished with the use of low regrowth rootstock such as the 'Dundee', already present in many orchards, mechanising pruning the aerial part of the tree is relatively easy, although it has not often been applied to this crop. It should be borne in mind that in traditional hazelnut growing, in the Camp de Tarragona area, aerial pruning is a practice farmers have been reluctant to carry out, but over time it has been shown to greatly improve production in the zone.

1. Irrigation strategy trial

This trial tests different irrigation strategies and quantities for self-rooted hazelnut trees of the 'Negret - IRTA® -N-9' variety, and trees grafted onto 'Dundee' rootstock.

Four situations are considered:

- Drip and surface irrigation, based on evapotranspiration (ETc) needs, applied from June to September (reference thesis, R0)
- Drip and surface irrigation, based on ETc needs, applied from April to September (alternative thesis, R1)
- Drip and surface irrigation, based on ETc needs and soil moisture probes, applied from April to September (alternative thesis, R2)
- Underground irrigation, according to ETc needs and soil moisture probes, provided from April to September (alternative thesis, R3)

Six trees will be evaluated for each thesis (3 self-rooted trees and 3 grafted trees) where the effect of irrigation on the production, fruit quality and hazelnut tree growth will be studied: vigour (diameter of the trunk 20 cm from the ground) and crown volume.

2. Mechanical pruning trial

For this trial, two moments for implementing mechanical pruning will be considered:

2.1. Trees in full production

The actions will be applied to established orchards, where alleys lack light, causing a major drop in production.

This trial will be carried out on three farms with trees in full production, but with different characteristics. For each thesis, a comparison will be made with trees on which the established normal tasks will be performed. These orchards already have a history of production so they can be assessed as to whether this new type of pruning causes variations in average production.

Each thesis will cover an area not exceeding 1 ha, where each year one alley will be pruned but not the next two; the following year, the pruned alley will be the first one not pruned the previous year, and so on. Thus, over a 3-year cycle the whole farm will have been pruned without causing a drastic drop in production in the year of pruning due to a decrease in a large part of the orchard's production volume. As the hazelnut trees bear fruit on old branches in the second and third years, the pruned alley is expected to recover production, and by doing so alternately, there will be sufficient increase by the 3rd year to compensate for the years of pruning.

The evaluation will use control alleys in the same orchard. Production from each of the test alleys will be evaluated separately for each farm.

2.2. Trees being shaped

This test will be carried out in an orchard with 1-year-old trees where pruning will be carried out to shape them from the first pruning, using appropriate mechanical equipment for the type of branches, depending on their year of growth. In this case, the shaping pruning mechanical and manual methods will be compared, assessing their growth and differences in how early they start production.

In both cases (2.1 and 2.2), the pruned wood will be cut with a mechanical chipper and left on the surface for decomposition and incorporation into the soil.

Five trees will be assessed for each pruning thesis where the following controls will be performed: pruning time, weight of cut wood, production and characteristics of the hazelnut.

Expected results and practical recommendations

The results from this proposal will be very useful for the sector, as they will provide the basis for recommending practical actions in hazelnut orchards, leading to more efficient use of irrigation water, and will provide guidance for mechanical pruning. Specifically, the practical recommendations for the sector will be:

With regard to irrigation:

- Information on the most suitable facilities (underground irrigation, installation of sensors, etc.)
- Times of year when the hazelnut tree needs more water
- Quantity of water to apply in order to obtain good fruit production and quality

With regard to pruning:

- Directions on how to carry out mechanical pruning
- Whether it is appropriate for adult trees and at what frequency (every year, every 3 years, etc.)
- Whether it is advisable to do it in young trees that are being shaped

Leader 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)
Tarragona	Baix Camp

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

Different actions are planned for project dissemination:

- The sector will be informed of the start and progress of the project at the National Hazelnut Seminar (Annual Technology Transfer Plan (PATT) Conference), held annually in early June.
- In addition, members of Coselva will be informed of the project through the Cooperative's usual communication channels.
- Visits for technicians and producers to the hazelnut trial at the Mas del Víctor Estate (La Selva del Camp) will be organised, which is where the trial is being conducted.
- Once the results are available, they will be disseminated at PATT conferences and trade fairs.
- Actions will be carried out to disseminate results at different hazelnut events and fairs in different towns in Catalonia.
- The project and the results will be disseminated at the annual Conference of ADV Technicians
- The results may be published in industry journals.
- There are also plans to disseminate the project via a website, videos and panels in the El Mas del Víctor Estate hall.

Project website

Under construction

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): July 2020	Total budget: €200,000.00
Completion date (month-year):	DARP funding: €79,800.00
Current status: Underway	EU funding: €60,200.00
	Own funding: €60,000.00

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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.

