POM-ZERO: apple production minimising the use of phytosanitary

Summary

One of the current problems in apple production is the presence of residue on fruit, hindering its sale in certain markets while generating a degree of distrust among consumers, ultimately affecting sales. In this context, protection for the plants is one of the cornerstones of the production process for achieving high quality production with the maximum commercial value, but it also leads to residue on the apples. Most commercial apple orchards use alternative techniques to conventional chemical treatments primarily, but the dependence on phytosanitary applications is still considerable, hence the number of treatments using health protection products is still very high. For this reason, this project has applied and assessed a global strategy for defence from disease and pests in order to obtain high-quality production with minimal residue. This overall strategy was based on biological control and alternatives to conventional chemical treatments on commercial apple orchards that were completely enclosed with mesh.

Objectives

The main objective of this project was to produce residue-free apples with yields and quality levels equal to those obtained in conventional or integrated production. This involves improving the pest and disease management system in commercial apple orchards by integrating the latest developments and prioritising cultural methods and organic or more sustainable products in order to significantly reduce chemical phytosanitary treatments.

The secondary objectives are to promote the use of alternative methods to plant protection products; reduce the level of residue and problems arising from the presence of residue on fruit; restore, conserve and improve biodiversity; modernise fruit farms by prioritising defence methods with low environmental impact, foster cooperation for innovation between the production sector and research, and finally, improve the Girona apple growers' competitiveness as a result of the opportunity to produce residue-free fruit which therefore has a high added value.

Description of the actions carried out in the project

The actions include all the necessary measures for sanitary defence from disease and pests in commercial apple orchards to achieve high quality production with minimum phytosanitary residues, using techniques with minimal impact on the environment and which are safe for human health. Biological control methods and other alternatives to phytosanitary treatments are prioritised.

Task 1. Design and production of protocols adapted to each farm and to each agronomic situation. Organic products will be introduced gradually for disease control.

Task 2. Agronomic practices: management of the opening and closing of nets according to the biology of the pests. Removal of leaves immediately after leaf fall to reduce the propagules of the various fungal pathogens. Installation of pheromone diffusers and monitoring traps for control of the codling moth and peach moth.

Task 3. Adaptation of farms to improve the establishment of auxiliary fauna by building shelters for useful fauna and releasing auxiliary fauna, and planting of flowering bands.

Task 4. Monitoring of pests and diseases, and use of decision support systems based on biological models of pest development and infection risk prediction models.

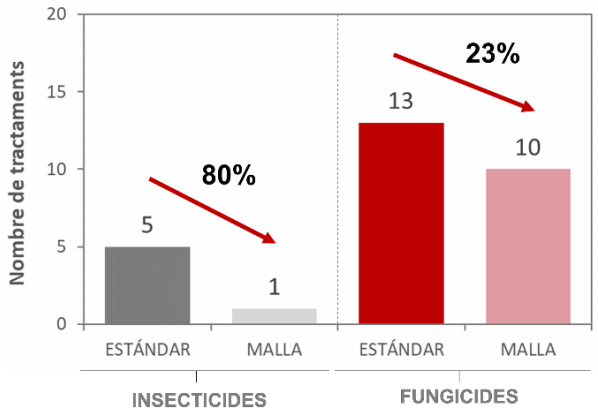
Task 5. Administration of the appropriate treatments if the economic thresholds are exceeded and/or if there is a risk of evidence of significant damage to production or when the risk prediction models indicate risk.

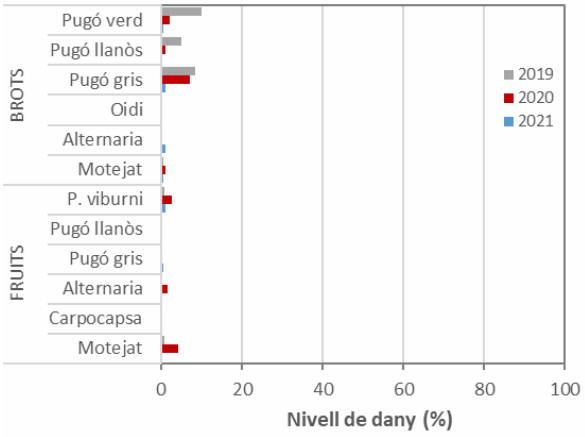
Task 6. Regular assessments of the auxiliary fauna and the levels of damage due to the various pests and fungal infections, and determination of the strategy to be followed according to the level of damage.

Task 7. Dissemination of the most important results obtained to specialist personnel and apple producers throughout the project.

Final results and practical recommendations

The total enclosure of the farms along with a thorough monitoring of pests and diseases, together with the application of more sustainable strategies led to a significant reduction in the number of phytosanitary treatments, while achieving good overall control of all the pests and diseases, and leaving undetectable levels of residue on the fruit.





Number of treatments

STANDARD MESH

INSECTICIDES FUNGICIDES

Level of damage (%)

OUTBREAKS

Green aphid

Woolly aphid

Grey aphid

Powdery mildew

Alternaria

Scab

FRUIT

P. viburni

Woolly aphid

Grey aphid

Alternaria

Codling moth

Scab

Conclusions

1) All the pests and diseases were effectively controlled in most cases, with very low levels of damage to the fruit at harvest.

2) The incidence of some of the pests was too high on some of the farms, including the grey aphid on the Closa Boscos II and BIO16 farms, the woolly aphid on the BIO16 farm, and the tiger on the CAMPUS farm.

3) The number of insecticide treatments was significantly reduced compared to the farms using integrated production in the area, and they were limited to only a preventive treatment for aphids on some of the farms.

4) The defence strategy must be strengthened, especially with regard to aphids, by incorporating complementary methods which are compatible with the use of auxiliary fauna to increase the likelihood of success in the control of these pests, such as releasing auxiliary fauna and improving winter disinfection treatment.

5) The fungicide treatments were reduced, the treatment strategy for scab was changed, and the number of fungicide treatments was reduced by almost 20%.

6) Residue-free fruit was obtained by replacing all the fungicide treatments with checks for *Alternaria* and conservation with potassium bicarbonate.

7) Total enclosure seems to have a negative effect on fruit production and quality, which may be associated with varying environmental conditions.

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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): Girona, Barcelona, Lleida

REGION(S): L'Alt Empordà, El Baix Empordà, El Baix Llobregat, El Segrià, El Pla d'Urgell, L'Urgell, La Noguera, Les Garrigues

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

Various results transfer activities have been carried out throughout the project included in the PATT. These include follow-up meetings of the Fruit Growers Technical Committee and the Summer Fruit Growing Seminar organised at IRTA Mas Badia in 2020 and 2021, which were attended by over a hundred fruit growers, technical workers and other specialists involved in the apple sector. Over the two years, they had the opportunity to see and learn about a number of technical solutions to maintain elite fruit growing using state-of-the-art technologies. The documentation submitted is available on the RuralCat website.

Project website

http://www.giropoma.com/pom-zero-produccio-de-poma-minimitzant-lus-de-fitosanitaria-quimics/?lang=ca

More information on the project

PROJECT DATES	TOTAL BUDGET
Starting date: July 2019	Total budget: €122,222.44
End date: September 2021	DARP funding: €49,916.40
Current status: Executed	EU funding: €37,656.22
	Own funding: €34,649.82

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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/1282/2018, of 8 June, announcing the call for the grant.

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