Extended Practice Abstract Nº 17

Study on the biology of the grape leafhopper

Challenge

The grape leafhoppers *Jacobiasca lybica* and *Empoasca vitis* are very unfamiliar pests for many farmers, but have experienced a rapid expansion. When their population levels are high, they can cause the defoliation of the vineyard even when the fruit is unripe. This not only results in a qualitative loss but also reduces the vigour in the next season.

Solution

The use of kaolin sprayed on the vineyard creates a layer that protects the vine from the insects biting and significantly reduces the damage to the crop. Kaolin does not create resistance in the leafhoppers.

Benefits

The project helps us to better understand the pest and identify the species that are affecting the vineyards in our region. The use of kaolin sprayed three weeks before the peak (pre-veraison) at a dose of 5%–10% can reduce the percentage of affected leaves by more than 30%.

Applicability box

Theme
Biodiversity
Natural resources conservation
Pest management
Grapes

Context
Climatic limitation

Application time
For grape leafhopper treatment, it is crucial to treat before the damage is done, depending on the area (early May–early June).

Required implementation time
Early in the morning

Period of impact
The same year

Equipment
Airblast sprayer – Kaolin 95%

Practical recommendation

For conventional farmers:

- Begin the treatments of the leafhoppers early. Do not wait until you see 200 adults per trap per week to begin the treatment. Begin the treatments once you see 50 adults/trap/week.
- Alternate acetamiprid and cyhalothrin or another synthetic pyrethroid to avoid creating resistance.
- Keep treating the vineyard after harvest. The insecticides change the pattern of the curve, and the peak usually takes place once the conventional farmer stops the treatments. This can happen even in late October, reducing the migration of the resources right before dormancy.

For organic farmers:

- Identify the species of pest you have through molecular methods. In 2024, there are no taxonomers in Europe able to identify this insect. Another way to deduce the species you have is through the most abundant parasitoid in your vineyard.
- Identify the main beneficial insects in your vineyard. The strategy will change depending on whether you want to increase the population of predators or parasitoids.
- Look for plants that benefit from the presence of your most abundant natural enemies. For example, if *Empoasca vitis* is the most abundant leafhopper in your vineyard and *Anagrus* spp. is your main parasitoid, you can plant *Salvia officinalis*, *Mentha spicata*, or *Nepeta x faassenii*, which are particularly useful to attract *Eupteryx melissae,* another leafhopper that has no effect on vineyards but is a pest of aromatic plants. This new leafhopper will offer *Anagrus* an overwinter refuge.

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- Control the pest with kaolin without any fear of affecting natural enemies. Kaolin, as a mineral, has no effect on parasitoids, only creating a layer that disturbs leafhopper nymphs.

Existing materials

Videos

https://www.youtube.com/watch?v=QEBc9FgBTmQ&t=20s
https://www.youtube.com/watch?v=OVDdY9zVLbA

Web links

https://bodegasenguera.com/enemigos-naturales-papel-de-la-biodiversidad/

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Simplified cost/benefit analysis

The new threat to Mediterranean viticulture: the grape leafhopper (*Jacobiasca lybica* and *Empoasca Vitis*)

Introduction – presentation of ex-ante and ex-post situation

The leafhopper is causing serious damage in viticulture, particularly in the Mediterranean region. Since 2023, it has been necessary to spray crops to avoid the devastating effects of this pest. Considering that this pest depends on high temperatures and that the summer of 2024 in the region was colder in comparison to previous seasons, it is likely that the leafhopper will become an annual pest, and therefore several treatments must be done to control it.

There is one effective way to reduce leafhopper damage without affecting natural enemies: the use of kaolin. Kaolin treatments can reduce damage by over 30% if the treatment takes place before the damage is evident and the pest levels rise. Moreover, a reduction in leaf damage will have a tremendous impact on parameters associated with grape quality such as °Brix, titratable acidity, pH, total anthocyanins, total tannins and several aromatic compounds, among other parameters. The trial was developed in a vineyard in Valencia (Spain).

Economical costs and benefits

Legend

Estimated indicator

Measured indicator

It is crucial to do at least one treatment with kaolin (50 kg/ha) before the pest level reaches 50 adults/trap per week (standard yellow traps 10x25 cm) and to repeat the treatment after heavy rain.
Costs are estimated on a per-hectare basis.

	Ex-ante	Ex-post
Variable costs		
Input		
*BASF Kaolin Surround** **There are other kaolins that are 10 times cheaper, but so far, they cannot be used in viticulture.*	Organic vineyards are not usually sprayed against this pest. In conventional viticulture, 1–2 sprays are required per season.	€4.54/kg (dose: 50 kg/ha) → €227/ha No. of treatments needed: - Low pressure from leafhopper: €454/ha (2 treatments) - High pressure from leafhopper: €1,135/ha (5 treatments)
Machine costs (fuel + depreciation)		2.0
Total		456.0–1137.0
COMPARISON	Global increase from 25% to 49% of the cost:  Despite the increase in cost, the leafhopper can reduce yield, wine quality and wood maturity, with indirect effects on the next harvest, and even kill the plant if it is not treated.	

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Environmental costs and benefits

Energy	Not measured, but a worsening of the impact can be considered:
Energy consumption increases due to each product application pass that must be made, compared to not treating the pest.	
Water	Unmeasured impact:
There is no direct relationship between this practice and the indicator in question.	
Soil	Unmeasured impact:
No direct relationship between this practice and the indicator in question.	
Air	Unmeasured impact, but a worsening of the impact can be considered:
No direct relationship between this practice and the indicator in question, but a worsening of it can be considered due to emissions for each pass to apply the product.	
Biodiversity	Unmeasured impact:
No direct relationship between the practice and the indicator in question.	

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Project on the grape leafhopper: the new threat to Mediterranean viticulture

Short description of the project

The general objective of the project is to study the biology of the grape leafhopper. The specific objectives are to:

- Identify the leafhopper species in the Autonomous Community of Valencia.
- Understand the pest's life cycle.
- Evaluate the damage in the vineyards of the Autonomous Community of Valencia.
- Describe the pest control strategies implemented.

Benefits

The project has identified that kaolin sprayed three weeks before the beginning of the major peak of the pest is an effective treatment to control leafhoppers.

Stage of implementation

The project ended in 2023. Considering the results, the research team is organising the methodology to continue the project in 2025.

Key data box

Theme
Biodiversity
Natural resources conservation
Pest management
Grapes

Context
Climatic limitation

Duration
2022–2023

Partners involved
Instituto Cavanilles de Biodiversidad y Biología Evolutiva (ICBIBE), SAEM, La Baronía de Turís CoopV., Bodegas Enguera

Budget
€100,000

Particularity
DNA Barcoding for leafhopper species analysis

Main achieved or expected results

1. Although the sample size is moderate, *Empoasca vitis* and *Jacobiasca lybica* are the most prevalent species present.

2. The leafhopper population develops exponentially at the end of June, reaching its peak in the middle of August.

3. The grape leafhopper is a pest in 7 out of 10 vineyards, particularly in the southern part of the region.

4. Conventional insecticides create resistance that can reduce their effectiveness. The use of 5% kaolin can reduce leafhopper damage by more than 30% and does not create resistance or negatively affect beneficial insects.

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Figure 1: Location of the study area

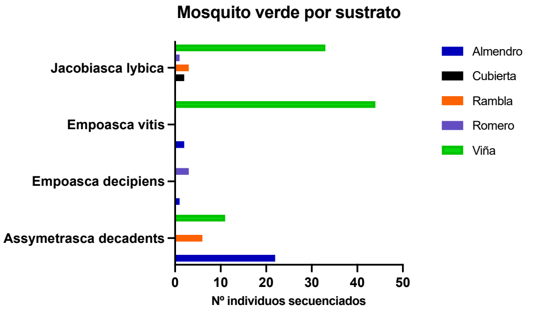

Figure 2: Leafhopper species found in different crops and ecological infrastructures around the blocks

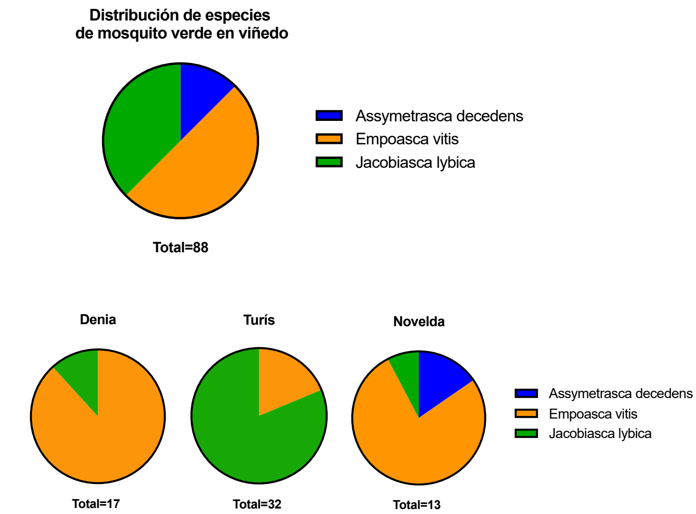

Figure 3: Distribution of leafhopper species in the vineyards and the three properties with the most DNA sequences analysed

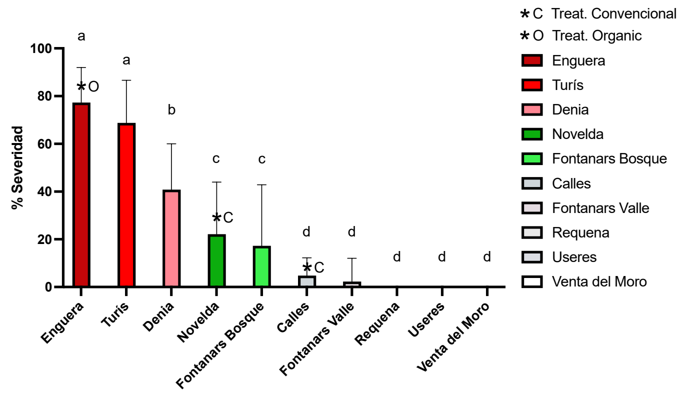

Figure 4: Leafhopper damage expressed in percentage of leaf affected

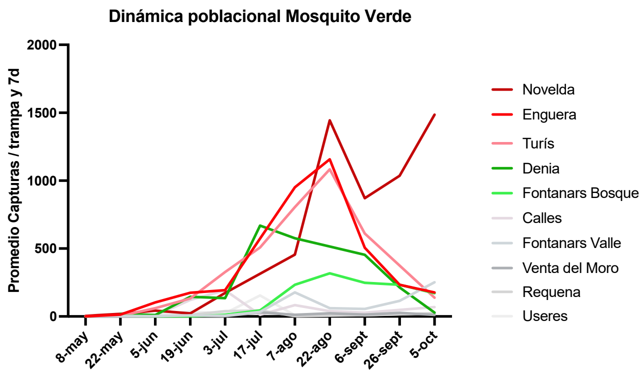

Figure 5: Leafhopper population dynamics

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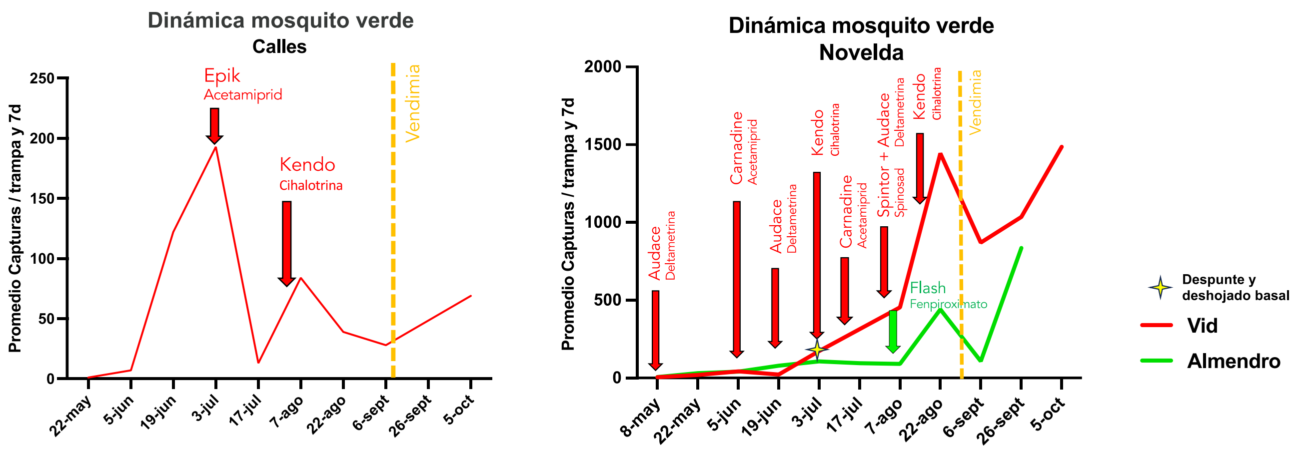

Figure 6: Conventional treatments and their effect on leafhopper population dynamics

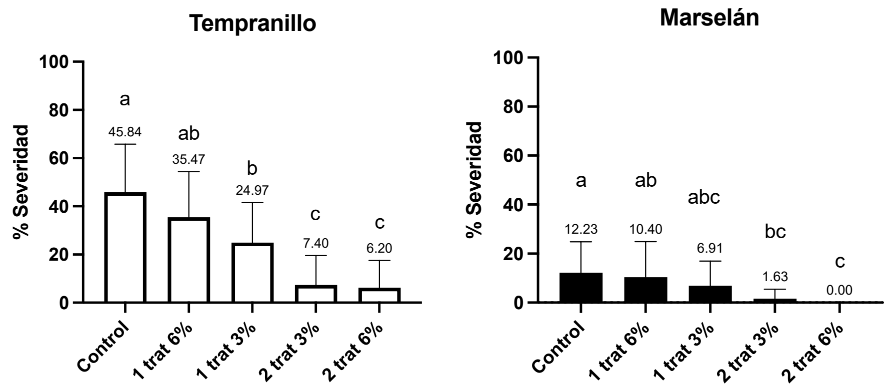

Fig 7: Effect of kaolin on reducing leafhopper damage in Marselan and Tempranillo vineyards

Existing materials

Videos

https://www.youtube.com/watch?v=QEBc9FgBTmQ&t=20s
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