SPRINT SUCCESS STORIES

BIOCONTROL FOR PROTECTING PEPPERS FROM THRIPS IN SOUTHEAST SPAIN

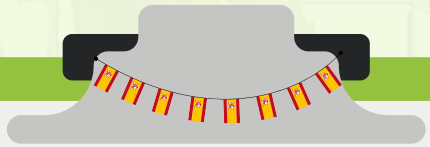
Since the 1990s, producers in southeast Spain have been using biocontrol as an alternative to pesticides to reduce insect pest burdens in greenhouse-produced peppers. Researchers discovered a predatory bug capable of controlling the main pest of peppers. Since then, researchers have identified other biological control agents against whitefly, aphids, and pest caterpillars. As a result, farmers now protect around 10,000 hectares of peppers from key pests, enhancing food security and making pepper production more competitive.

THE CHALLENGE

- *Frankliniella occidentalis* is a species of flower thrip which poses a particular threat to peppers grown in greenhouses as it transmits tomato wilt virus.
- During the mid-1990s, up to 27 applications of crop protection products consisting of 2-3 different active pesticides were being applied in greenhouses growing peppers.
- Many of these pesticides were broad-spectrum, so also affecting beneficial insect populations and the wider environment. Over half of these pesticide applications were to target this particular species of thrip.

KEY OBJECTIVE

Drawing on successful experiences with biocontrol from other countries and comprehensive research and field trials to identify an effective agent for managing flower thrips in peppers, offering a sustainable alternative to pesticides.



RESEARCH FOR IDENTIFYING AGRONOMIC SOLUTIONS

Research was crucial for identifying biocontrol solutions. Initial experiments with Northern European species were unsuccessful, which led to tests with native alternatives, including *O.laevigatus*.

Continuous efforts focused on understanding pest biology and ecology, enabling the adaptation of biocontrol methods to address new challenges, including controlling emergent pests.

Through providing insights into population dynamics, species interaction, and effective release schedules for natural enemies, research was able to maximise the efficacy of biocontrol efforts.

THE SOLUTION

A predatory bug, *Orius laevigatus*, was found to successfully reduce pest thrip populations during farm trials in 1994. This biocontrol solution was supported by farmers and technicians as they were motivated to reduce use and make their crop more competitive for exports.

The pest: Flower thrip, *Frankliniella occidentalis*
Credit: CABI

The biocontrol agent: *Orius laevigatus*
Credit: Naturespot

A key reason why this species of flower thrip is a crop pest is because it transmits tomato spot wilt virus (pictured right, credit: Horticultural Development Company).

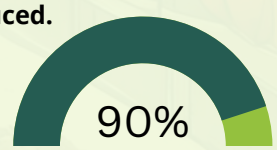
CREATING SUITABLE CONDITIONS FOR BIOCONTROL SPECIES

Several conditions can affect the ability of *O. laevigatus* to control pest thrips, including sudden increases in temperature, drops in environmental humidity, or a lack of flowers (important for feeding the biocontrol agent)

Solutions:

1) Greenhouses were adjusted to ensure their conditions remained more constant;

2) Pepper varieties which flower more often were introduced.



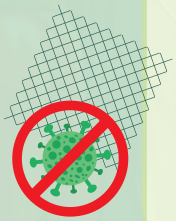
of the pepper-producing land in the Campo of Cartagena (~1800ha) has transitioned from chemical to biological control.

SPRINT SUCCESS STORIES

MAXIMISING CONTROL: ADDITIONAL MEASURES ALONGSIDE BIOCONTROL

In addition to using the predatory bug to control thrip, other agronomic changes were also made to reduce pest pressure:

1. An obligation to use plant material free of viruses and thrips in plantations
2. Encouraging hedgerow planting outside of the greenhouses as these support biocontrol populations, thus reducing costs due to less need to re-populate them
3. Placing mesh in greenhouse openings
4. Uprooting and destruction of pepper plants with virus symptoms
5. Introducing other biological methods, including a predatory mite*, for controlling additional crop pests (e.g., whitefly, aphids) to avoid using chemical treatments which affect the biocontrol agent of the thrip



LESSONS LEARNED

1. **Adaptability and flexibility** are key due to the potential onset of unanticipated challenges, e.g., a scarcity of biocontrol agents, increases in pest populations
2. **Collaborative efforts** among researchers, technicians, farmers, and institutions were instrumental in overcoming barriers
3. **Applied research is crucial** before introducing new technologies such as biocontrol
4. **Creation of a regulatory framework** is essential to support transition

TRANSFERABILITY

Following the successes seen in the Campo of Cartagena region, over 80% of greenhouse peppers in nearby Almeria (~7500ha) adopted biological control instead of chemicals between 2002-2007.

BENEFITS OF BIOCONTROL

- Biocontrol agents are only released once, early on in the pepper crops' life cycle, giving producers more time to focus on other tasks
- Certain tasks, including staking and harvesting, can be carried out at any time when biocontrol is being used, as they no longer need to revoke access to greenhouses as would happen when applying pesticides
- The timings of supplying peppers to buyers are no longer restricted due to chemical applications, allowing producers to be agile, meeting specific market demands or commercial needs
- The significant reductions in pesticide applications implied a reduction in chemical residues in crops and thus greater safety for consumers
- As the area cultivated under biological control increases, greenhouse environments become stabilized with beneficial fauna, reducing the risk of crop pest infestation
- Biological control reduced exposure to pesticides for growers, resulting in a notable improvement in quality of life.

Peppers growing in a greenhouse in Spain
Photo credit: Hortidaily

THE ECONOMICS OF BIOCONTROL

Pepper production is economically important for the Murcia region of Spain, generating around €110 million for the area every year. According to regional assessments, the benefits of introducing biocontrol largely outweigh the cost, solely based on the financial aspects. As a result, production has become more economically viable. The benefits of biocontrol are even greater taking into account environmental benefits and improved quality of life for producers.

*predatory mite: *Amblyseius swirskii.*

Icon credit: RealIPM

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