



IFAPA

Physical protection is the first line of defense against arthropod-transmitted virus in greenhouse vegetables.



**Carmen GARCÍA, Leticia RUIZ,
Almudena SIMÓN, Dirk JANSSEN**
IFAPA, Centro La Mojonera.
Camino San Nicolas 1, 04745
La Mojonera, Almería, Spain
mariac.garcia.g@juntadeandalucia.es



Instituto de Investigación y Formación Agraria y Pesquera
CONSEJERÍA DE AGRICULTURA, PESCA Y DESARROLLO RURAL



Unión Europea





The province of Almería, located in southeastern Spain, has nearly 30,000 ha of horticulture crops produced in greenhouses. Viral diseases are considered one of the biggest problems of this horticulture and of particular concern are so-called emerging viruses transmitted by whiteflies.

About 1,600 ha of the greenhouses are dedicated to organic farming, whose standards recommend the use of plant protection methods that include biological control, physical control and plant health treatments restricted to a number of natural active ingredients.



To date, nine whitefly-transmitted viruses have been reported in Almería. Following the entry in 2000 of *Cucumber vein yellowing ipomovirus*, producers increased whitefly control significantly, and even the government of Andalusia issued mandatory and recommended physical-structural, hygienic and agronomic plant health measures.

Since then, both biological control and the physical measures are implanted in the greenhouses of Almería, and significantly minimized the damage caused by viruses transmitted by whiteflies.

In 2013, Tomato leaf curl New Delhi begomovirus first appeared in zucchini crops from Almeria, and urged farmers to improve the physical protection of the crops.



OBJECTIVE

To inventory all physical protection measures used most in the greenhouses from Almeria.

MATERIALS & METHODS

All data were collected through a face-to-face survey conducted among the advisor departments of 10 farmer cooperatives, including ecological crop farms.



The greenhouse structure and the insect exclusion capacity constitute the first line in physical crop protection against pests. Some farms have greenhouses with a double indoor structure and independent insect screens. The plastic films most used are 800 gauge and are designed to last for three crop campaigns. Some films contain UV-filtering additives that interfere with vision-based spread of insects.



20x10

16x10

6x6 threads.cm⁻².

About 99% of the greenhouses are equipped with insect-excluding screens in the roof and lateral ventilation windows, and with different mesh sizes, most of them being 16x10 and 20x10 threads.cm⁻².

Dust and dirt tends to reduce porosity of window screens. Pressure washing using only water is sufficient to restore the ventilation capacity.



Our legislation demands the existence of double doors and an antechamber at the entrance of greenhouses.

Thermal blankets are commonly used, especially immediately after planting. These blankets consist of a modern continuous composite of polypropylene fibers, and are applied directly onto the crop or suspended over a small and simple arc structure.



The sealing of the greenhouse components is fundamental. There should be neither holes nor damages in the structure; if they are identified they should be sealed with polyurethane foam spray. It is also important to ensure a good seal where the structure touches the ground.

