

# New product for the mating disruption of *Aonidiella aurantii*



**EPA**

ECOLOGÍA Y PROTECCIÓN AGRÍCOLA S.L.

Ignacio de Alfonso  
Luzerne, ABIM 2012

# Ecología y Protección Agrícola S.L.



**EPA SL** was founded in Carlet (Spain) in **1997** by a group of agronomists interested in the dynamization of **new growing technologies** by means of **research** as the main tool for **agricultural development**.

# Ecología y Protección Agrícola S.L.

Our products are conceived to yield efficient control techniques that must be **respectful to the environment, the auxiliary fauna and the human being**, becoming a powerful **option** to intensive chemical treatments.

All of them possess a **high specificity and a low or very low risk level**.

Its use **does not** produce any kind of **chemical residue in the crop**.



# Ecología y Protección Agrícola S.L.



Main activities of EPA SL:

- **Manufacturers of pheromones and other semiochemicals**, of both high-purity and technical qualities, for **monitoring and control** of insect pests.
- **Development** of strategies and products for **bio-rational control** of agricultural crops.

# Ecología y Protección Agrícola S.L.

- **R+D : The basis of our activity.**  
Our main research efforts are driven to **semiochemical synthesis** and the **isolation of unknown pheromones** of agriculturally relevant species.
- On the other hand, we focus on the development of **controlled release devices** by means of our **own proprietary patented technology.**



# Ecología y Protección Agrícola S.L.

EPA SL offers a wide range of pheromone-based products for insect monitoring and control for agricultural and forestry pest management.

[www.epa-ecologia.com](http://www.epa-ecologia.com)



# California Red Scale

**Scientific name:** *Aonidiella aurantii* Maskell

**Order:** Hemiptera

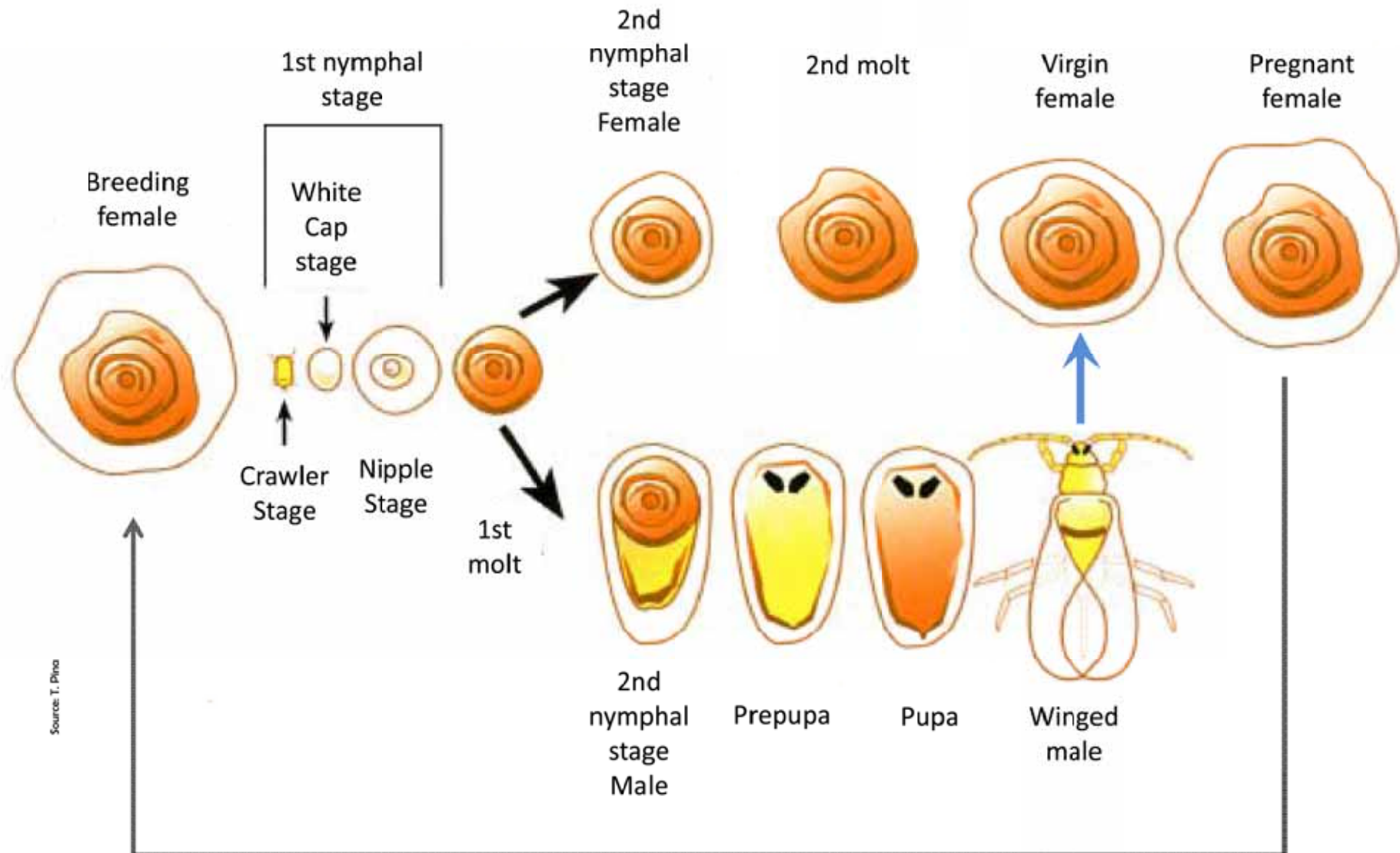
**Family:** Diaspididae

**Target crops:** Citrus (Orange, Mandarine, Lemon).

**Damage:** Fruit depreciation by aesthetical damage (spotting scales). Loss of yield. Plant death.

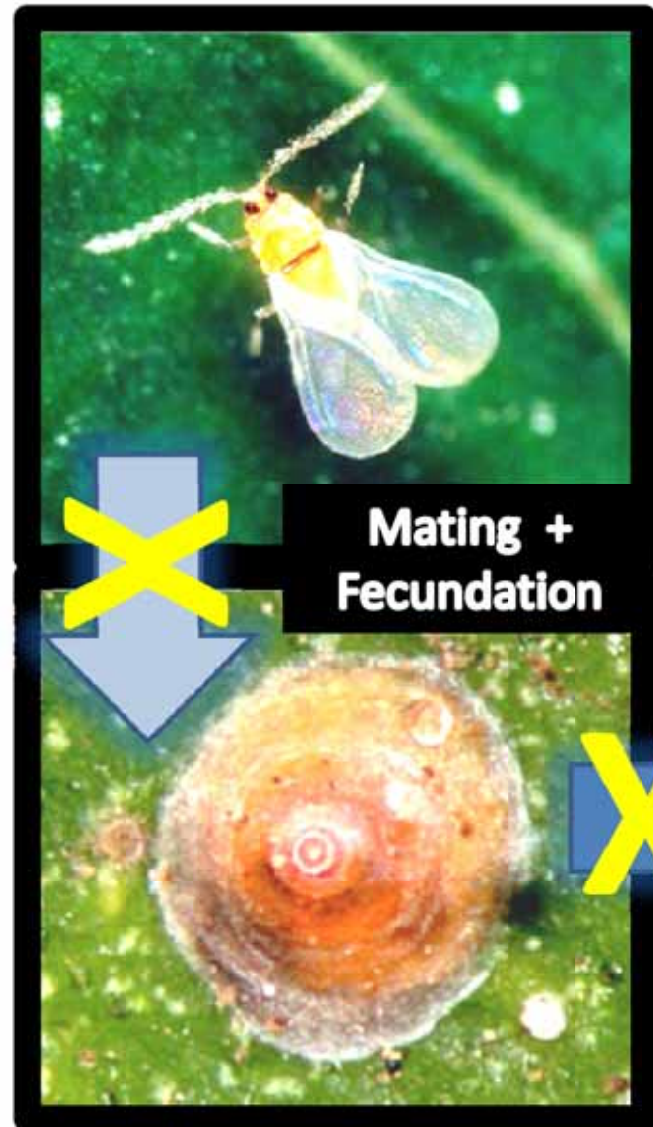
**Geographical distribution as a citrus relevant pest:** Southern Europe (ES, PT, IT, GR), US (CA), South Africa, Australia and Northern South-America (URU, BR, AR).

# Life cycle of *Aonidiella aurantii*

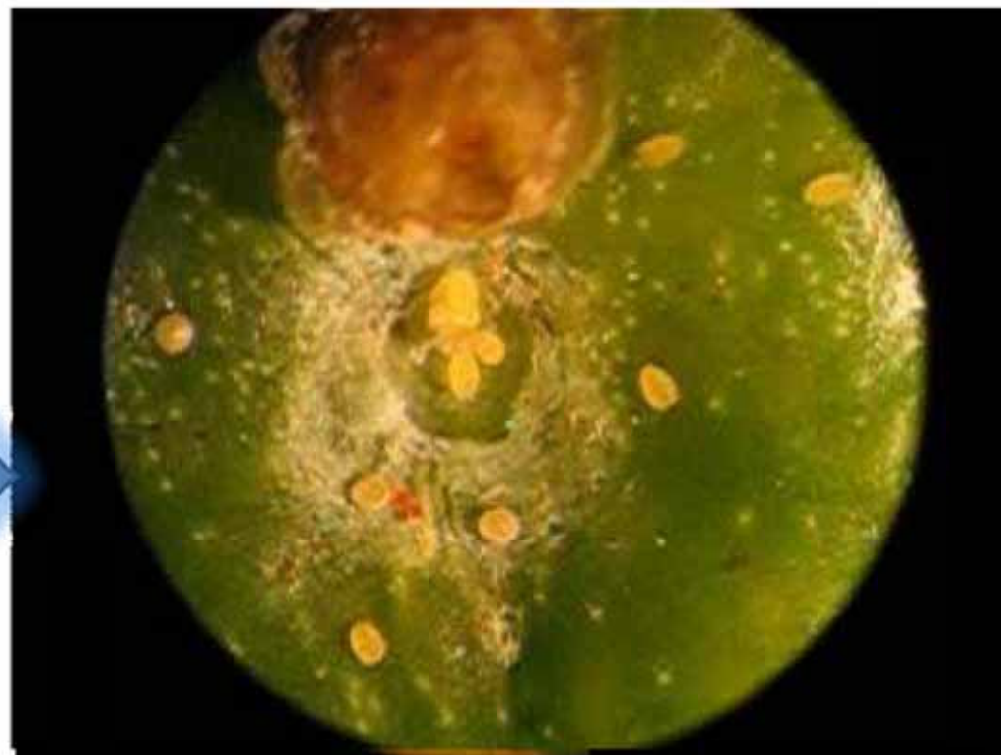




# Life cycle of *Aonidiella aurantii*



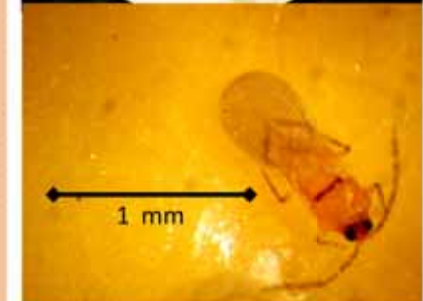
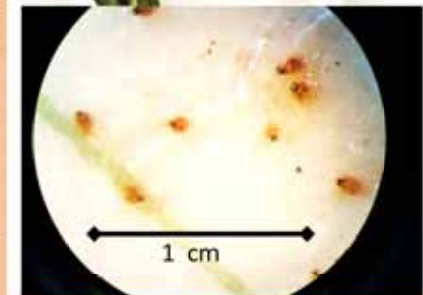
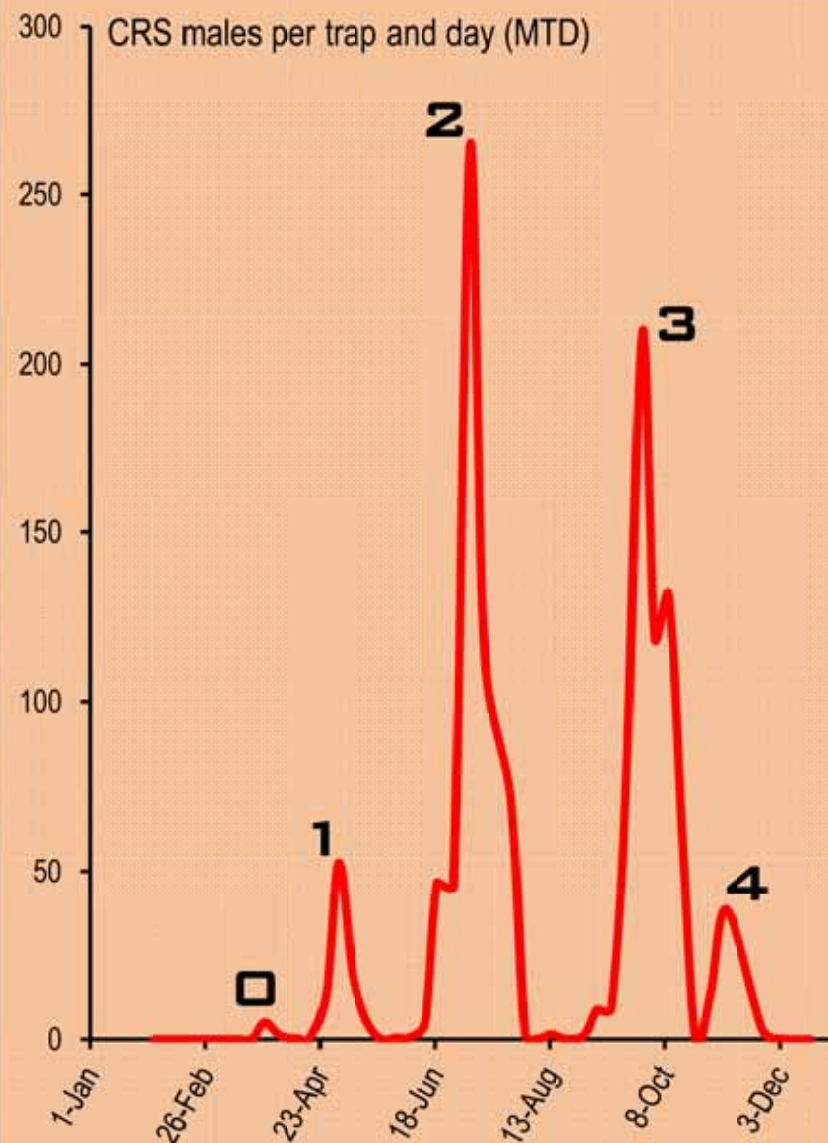
**Mating disruption avoids copulation and fecundation, it is focused on males.**  
Chemicals and oils are based on annihilation of crawlers.



*California red scale breeding female over crawlers.*

# Population dynamics

10



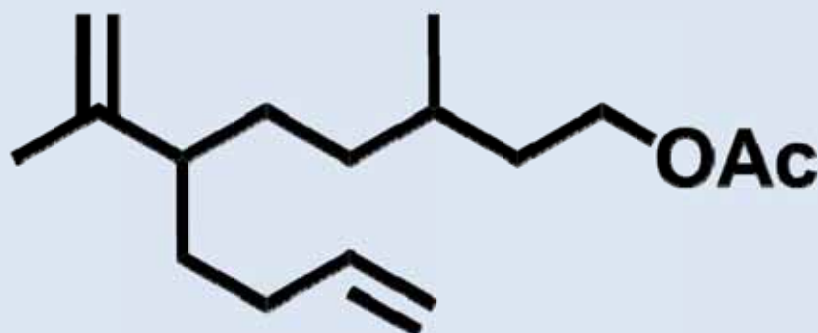
# CRS Mating disruption

California Red Scale  
Mating disruption  
development had  
two keystones:

- Pheromone synthesis
- Suitable emitter



## Sex pheromone of *Aonidiella aurantii*



**3-Methyl-6-isopropenyl-9-decanyl acetate**



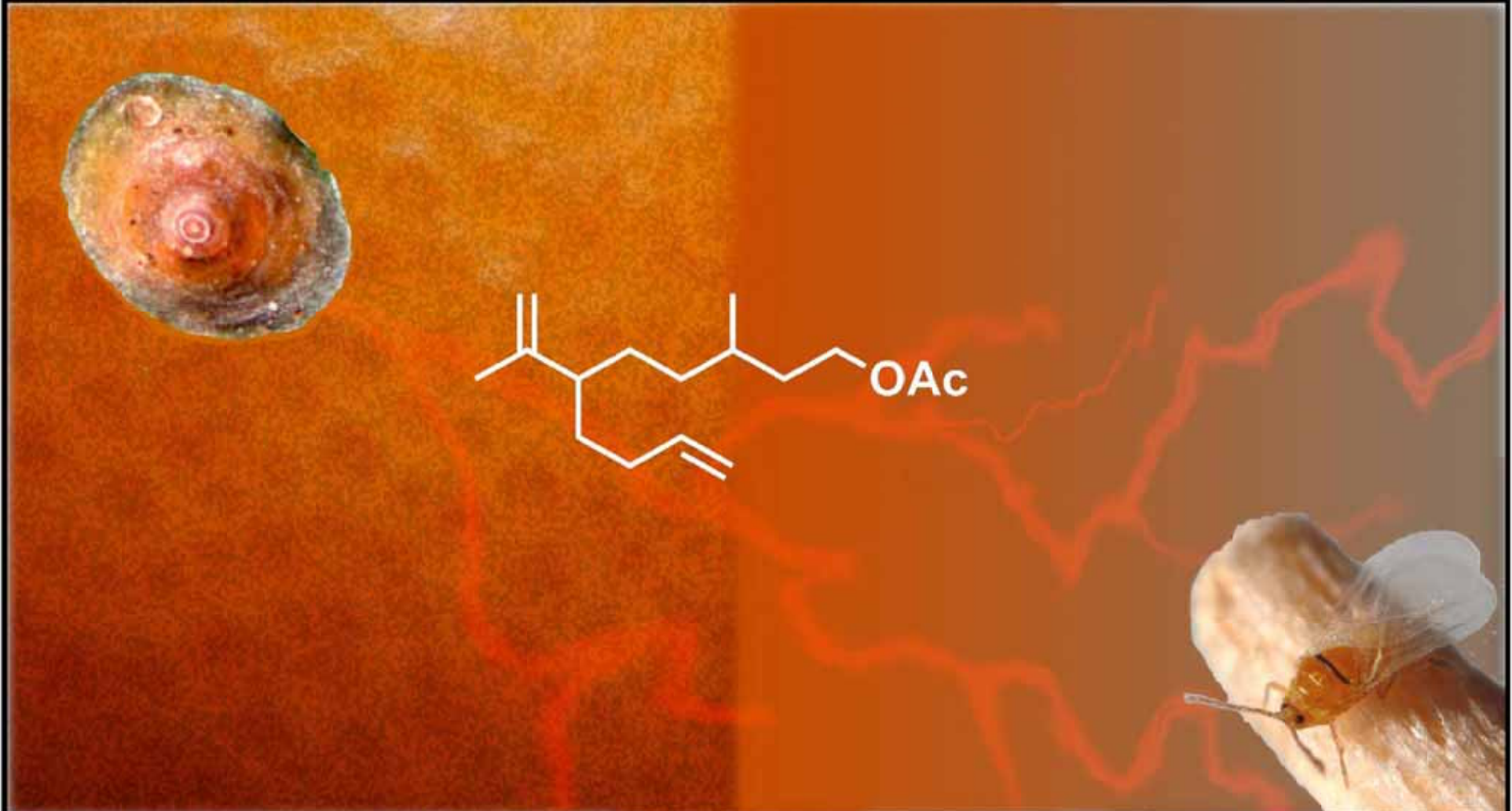
California Red Scale sexual pheromone was isolated and identified by Wendel Roelofs and coworkers in 1977. It was not until 2002 that EPA SL and CEQA-UPV decided to explore the existence of mating disruption and its possible use for controlling this citrus pest. The development of an large-scale, commercial and cost-effective synthesis of this substance has been feasible after more than 8 years of research, in collaboration of Organic Chemistry Department of Universidad de Valencia.

# Mesoporous-material-based emitters are suitable devices for adequate release

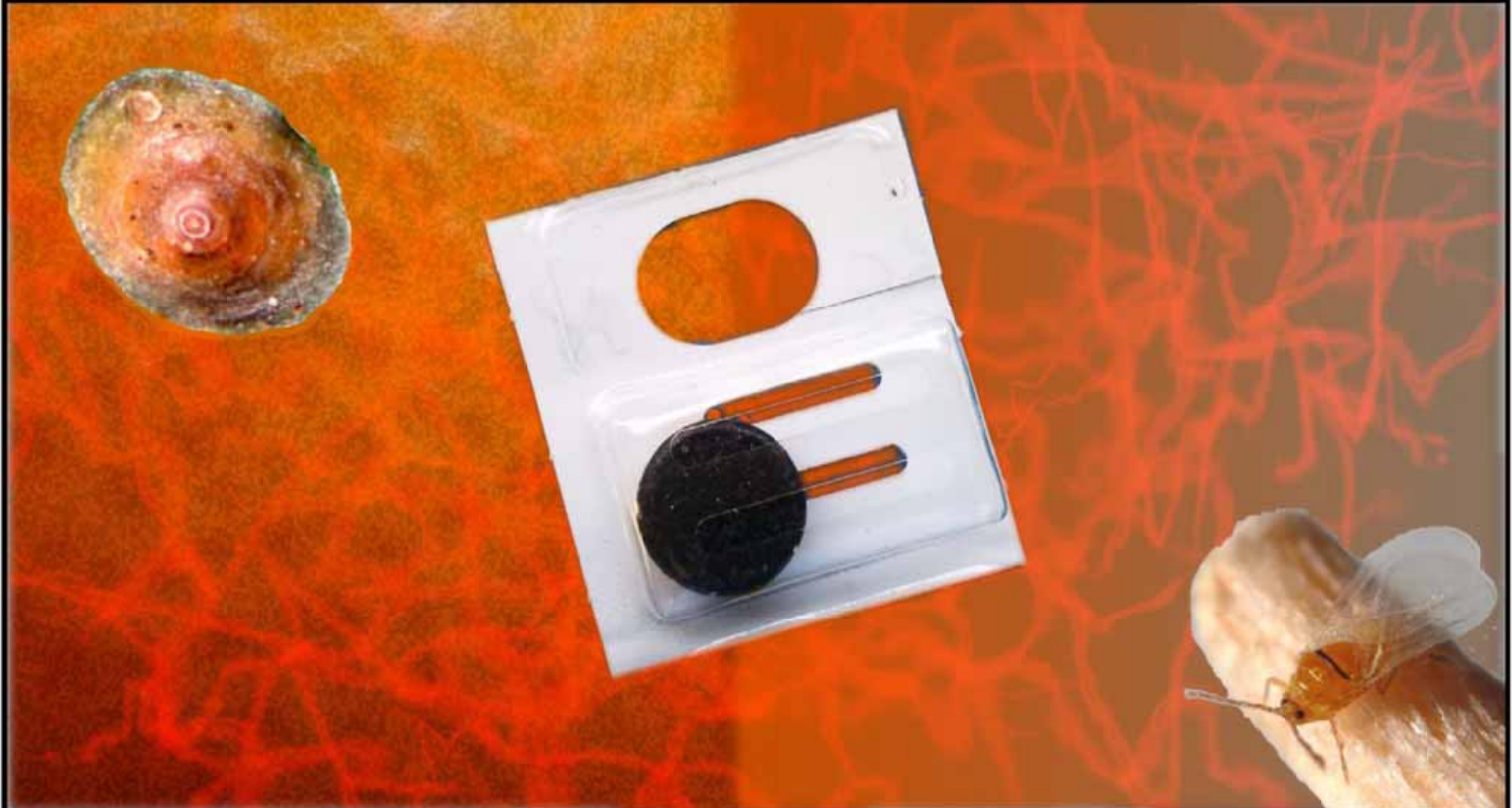
The formulation of pheromones into dispensers that provide a long-lasting and sufficient release to afford the desired effect is the main technological challenge for MD success. High specific-surfaced mesoporous-clay based emitters allowed us to achieve this goal. This unique and internationally patented own technology has permitted the development of this new product. Only after extensive research it has been possible to obtain the optimum compressed formulation. The emitter is provided inside a pre-cut blister format and it is ready-to-use saving application cost.



California Red Scale males seek and find virgin females by means of pheromonal scents.



**Pheromone-loaded airborne causes that the males cannot localize the females position. Thus, the mating is avoided and the pest progress is stopped.**



# Why is mating disruption suitable for CRS control?

16



## FEMALE

- It is static over the plant.
- It has not parthenogenetic reproduction, fecundation is needed in order to produce offspring.

## MALE

- Nearly blind, olfactory cues are the basis of its orientation.
- Has a lifespan of approximately 24 hours, short time to mate.
- It is not a skilled flyer and moves no long distances.





# Using Mating Disruption for CRS control<sup>17</sup>

**All techniques have their limitations, MD too:**

**Big and wide plots diminish  
edge effects leading to  
optimum performance.**

# Using Mating Disruption for CRS control

**All techniques have their limitations, MD too:**

**It is not suitable for small plots and isolated trees. High degree of control is found for large area strategies.**

## Using Mating Disruption for CRS control

**All techniques have their limitations, MD too :**

**This technique is able to control low to moderate California Red Scale populations.**

**At very high densities, the serendipious finding of females by males are so frequent that MD is not possible.**

## Using Mating Disruption for CRS control

**All techniques have their limitations, MD too :**

**For highly infested areas there is a need for a former shock treatment in order to dramatically reduce CRS populations before MD treatment.**

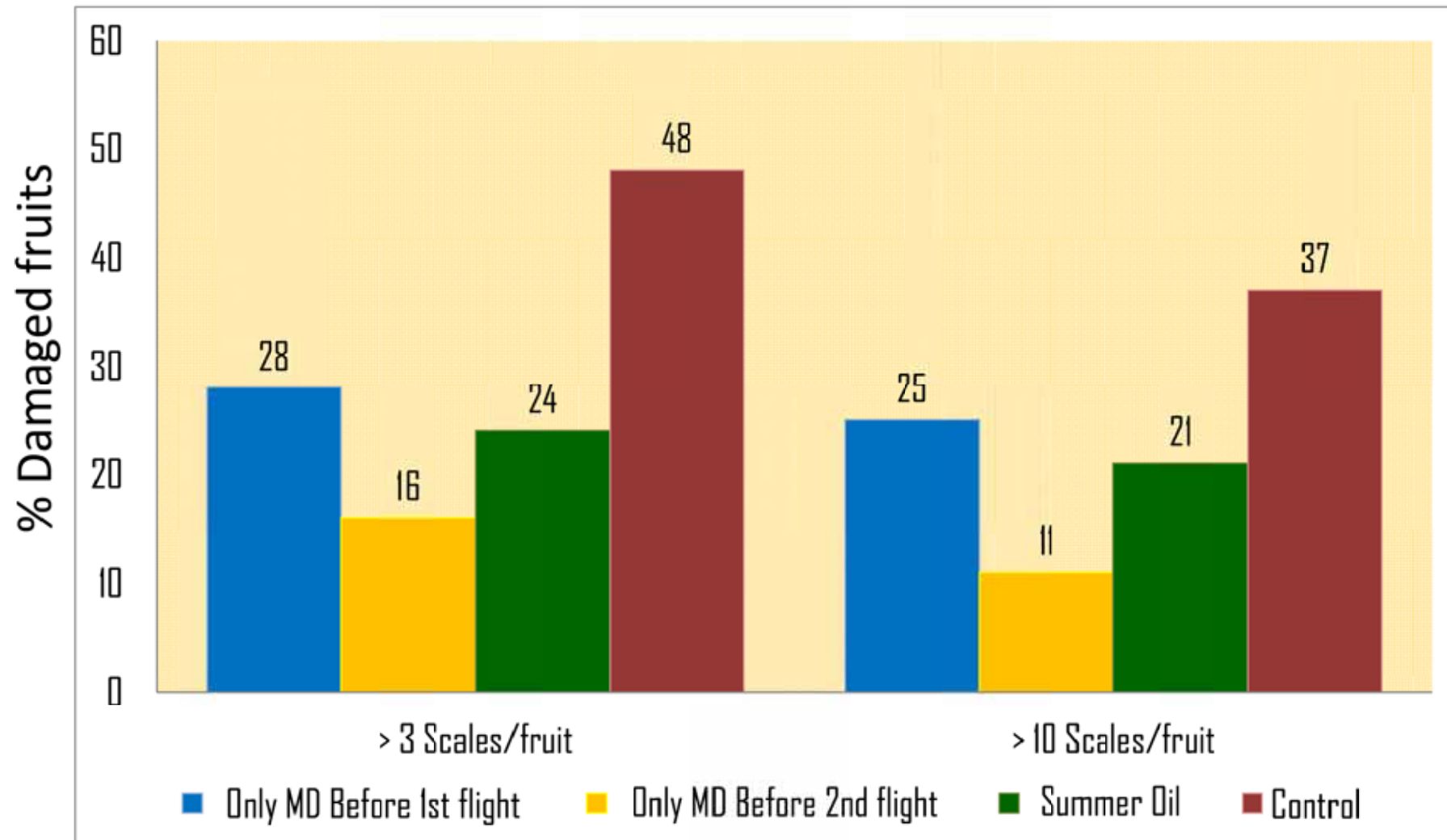
# Dosing

21

**As a general advice, you should use 480-500 units/Ha in order to obtain the expected control efficacy.**

**This orientative density may vary depending on crop sensitivity and plot size. Blisters should be homogeneously distributed along the orchard and inside the trees.**

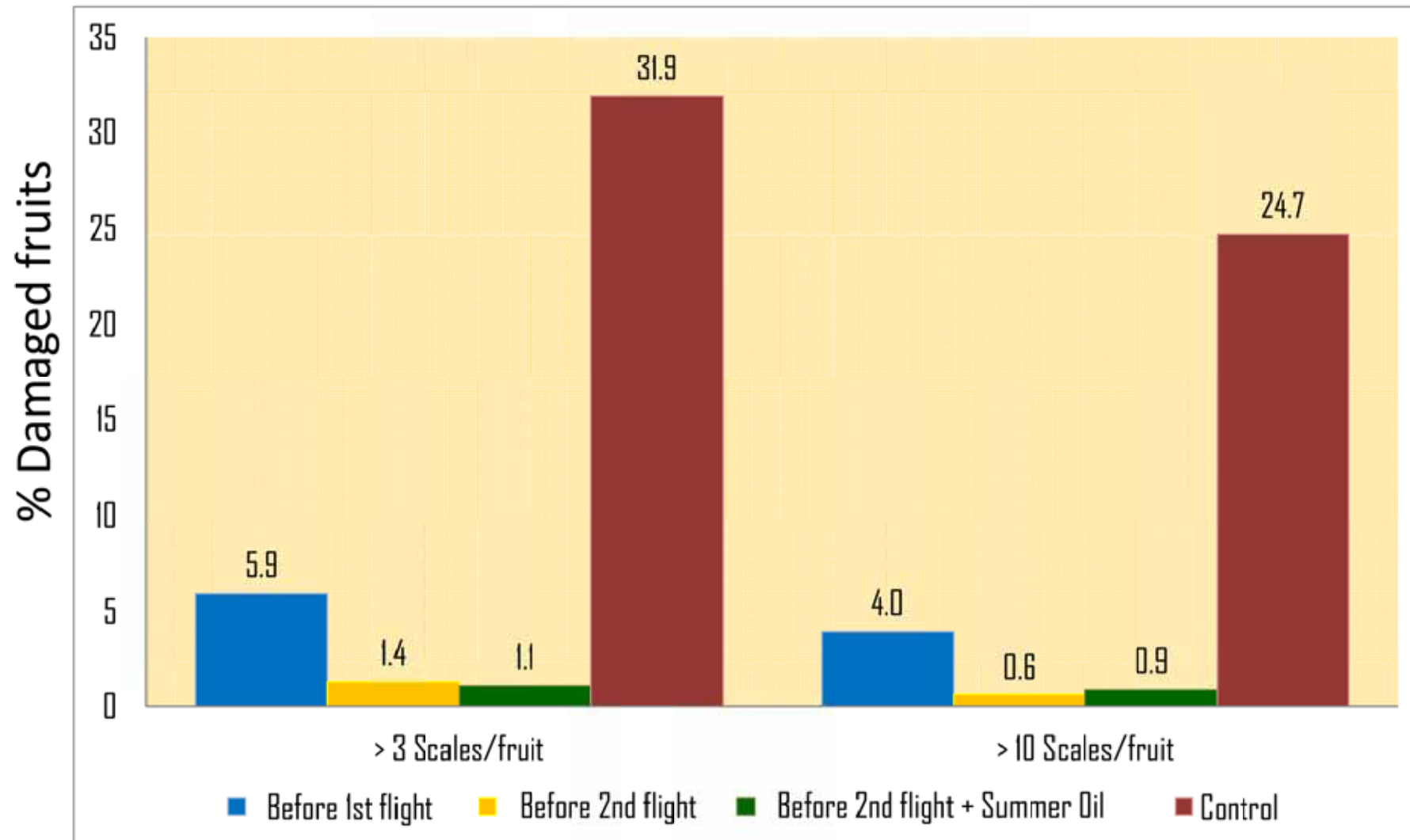
# Efficacy trials



**Summary 2009**

# Efficacy trials

24

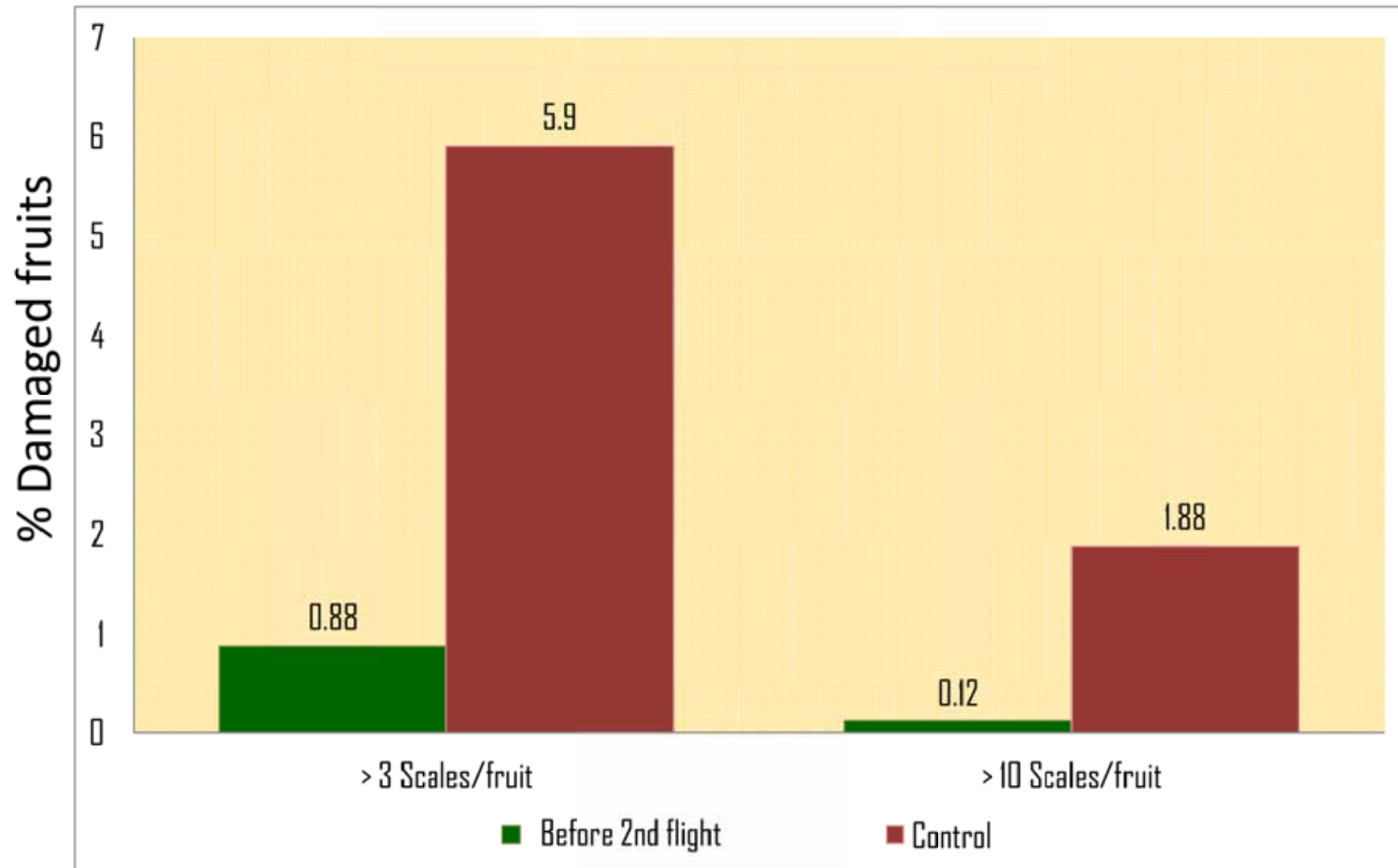


**Summary 2010**



# Efficacy trials

25



**Summary 2011**

# Summary

**CRS MD strongly reduces California Red Scale populations and damage over citrus crops**

**CRS MD works better if it is applied after 1st male flights but before the 2nd male massive flight**

**CRS MD is fully compatible with summer oil treatments to be used against other citrus pests (like mites and mealybugs).**

**CRS MD shows a cumulative effect. Its efficiency becomes multiplied when it is used year after year in the same plot.**

# Summary

**CRS MD is fully respectful to beneficial organisms and specific for *Aonidiella aurantii*.**

**CRS MD is not a toxic, does not generate any crop chemical residues.**

**CRS MD does not lead to resistance, neither favours the progression of other pests.**

**CRS MD is compatible with organic farming.**

**CRS MD is safe for the user and environmentally friendly.**

Thank you for your attention !



**EPA**

**ECOLOGÍA Y PROTECCIÓN AGRÍCOLA S.L.**

Find out more at... [www.epa-ecologia.com](http://www.epa-ecologia.com)