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## Several strategies to increase the number of aphidophagous hoverflies in Mediterranean greenhouses

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 CIBIO  
 CENTRO IBEROAMERICANO  
 DE LA BIODIVERSIDAD

## INTRODUCTION

- BC easier with well enclosed greenhouses → central and northern Europe (RAMAKERS, 2004)





- Mediterranean areas:**
  - Low isolation conditions of greenhouses
  - Easy access for insect pests
  - Chemical control-based IPM
  - Easy access for natural enemies → syrphids ?



## INTRODUCTION

- Increasing floral resources on crops
  - new habitat + pollen & nectar
  - predators, parasitoids and pollinators




 Certain flowering plants on crops margins attract syrphids (HICKMAN & WRATTEN, 1996)


**Are syrphids also attracted to greenhouses?**

- Aspects:
  - ease of crop harvesting
  - potential to become a weed
  - potential to attract pests or pathogens to the crop
  - **to support the extreme conditions in Mediterranean greenhouses**


## INTRODUCTION

**Augmentative biological control:** release of natural enemies


- Inoculative
- Inundative




*Coccinella septempunctata*




*Aphidius ervi*




*Aphidius colemani*



*Episyrphus balteatus*



*Chrysoperla carnea*



*Aphidoletes aphidimyza*

## OBJECTIVES




1. Measure the effects of introducing flowering plants to the natural populations of syrphids, by studying both larvae and adults.
2. Assess methods that increase the permanence time of releases of *Episyrphus balteatus* adults (De Geer, 1776): introducing flowering plants and managing greenhouse structure.

Effect of flowers on natural populations

## METHODOLOGY

### IMMATURE STAGES

- Two control greenhouses and two ones with flowering plants: coriander and sweet alyssum
- 9 days sampling, from 5-5-2004 till 3-6-2004
- *Myzus persicae* focus of similar severity (level 3 on a 0-4 scale) and same age → each sample = 200 leaves/greenhouse → n = 18,
- Climatic room (22°C, 85% HR, light cycle 16:8) → adults reintroduced.







Effect of flowers on natural populations

## METHODOLOGY

### ADULT STAGES

- No aphids presence
- 10 greenhouses
  - 5 control and 5 with flowers
- 8 days from 17-5-2005 to 24-5-2005
- Sample: visual census during 15 min. by walking along the greenhouse
- N=80

Effect of flowers on natural populations

## RESULTS


### IMMATURE STAGES

### ADULT STAGES

Methods to increase release permanence

## METHODOLOGY

- Releases: 20 adults (purchased) of *Episyrphus balteatus* (2 days old) in each experimental field
- Previously marked on the thorax
- Maximum number of days that they are observed



### INTRODUCTION OF FLOWERING PLANTS

- Equal to previous experiment

### MANAGING GREENHOUSE ENCLOSURES

- 10 greenhouses: 5 enclosed and 5 open
- 7 days from 14-6-05 to 20-6-05
- No aphids and no introduced flowers were present

Methods to increase release permanence

## RESULTS

### INTRODUCTION OF FLOWERING PLANTS

**Maximum permanence:**

- Control = 5 days
- With flowers = 6 days

**Mean permanence:**

- Control =  $2,9 \pm 0,48$  days
- With flowers =  $3,2 \pm 0,44$  days

↓

No significant differences

Methods to increase release permanence

## RESULTS

### MANAGING GREENHOUSE ENCLOSURES

**Maximum permanence:**

- Close = 6 days
- Open = 6 days

**Mean permanence:**

- Close =  $4,5 \pm 0,6$  days
- Open =  $2,1 \pm 0,8$  days




**Significant differences**  
(n=10, U= 78,5, p= 0,03)

Effect of flowers on natural populations

## DISCUSSION

**Selected flowering plants in greenhouses result in an increase of aphidophagous hoverflies, both adult and larvae**

- 1st year → Larvae study showed a greater syrphid community with flowers.
- Data on adults in the first year had a high variability between greenhouses, due to non-controlled presence of aphids.
- 2nd year → With no aphids, syrphid adults were more abundant when flowers were present

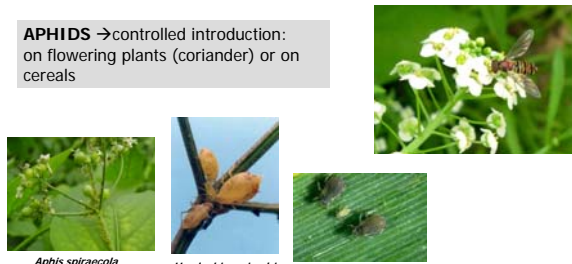




Effect of flowers on natural populations

### DISCUSSION

First time in crops under cover → in Mediterranean greenhouses, natural populations of syrphids could be established.

**APHIDS** → controlled introduction: on flowering plants (coriander) or on cereals




*Aphis spiraeicola*      *Hyadaphis coriandri*      *Rhopalosiphum padi*

Effect of flowers on natural populations

### DISCUSSION

**It has not been proven yet, that simply by introducing insectary plants, biological control of aphid pests could succeed.**



More beneficial insects from natural communities, means fewer insects would have to be purchased by growers

Methods to increase release permanence

### DISCUSSION

**Introducing flowering plants is not an effective method to increase the permanence of *E. balteatus* releases in greenhouses of pepper crops in aphids absence.**

It could be important in those crops with poor floral resources


**Sealing greenhouses leads to an increase of adults permanence.**

Managing the greenhouse barriers should be considered when syrphid releases are made → other aspects of farming (temperature, pests,...)

Methods to increase release permanence

### DISCUSSION

**We have not assessed the release effectiveness, just two methods to increase its permanence.**



**With aphids absence, the maximum permanence is 6 days.**

This is not long enough to be gravid → syrphid releases as a **preventive** method, and without aphid presence appears not to be an effective strategy

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Thank you for  
your attention

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