



Trichogramma

A success story against *Ostrinia nubilalis*,
in maize crops,

and now against *Tuta absoluta*
in tomato crops.

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ABIM, Lucerne 2009





BIOTOP: Sub company of Invivo Group in France

Involved in R&D, production and commercialization of products for alternative plant protection methods,

- **1975:** beginning of researches, with INRA, on *Trichogramma* against the ECB
- **1985:** commercialization of *T. brassicae*

Products:

- **Trichogramma:** *T. brassicae*, *T. achaeae*, *T. evanescens*.
- **Ladybirds:** *H. axyridis*, *A. bipunctata*.
- **Other predators:** *Macrolophus*, *Orius*, *Anthocoris*, ...
- **Pheromone, traps, Bt, ... :** Ecopom, Mastrap, Vectobac DT,

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Trichogramma (Micro-Hymenoptera ; <1mm)

Small egg parasitoid wasp against lepidopteran pests



**About 200 different species
already identified,
10-15 species commercially
used in the world,**

**Biotop is the leader *Trichogramma*
company in Europe, producing**

T.brassicae, T. evanescens, T.achaeae,

**and other species in development
(*T.chilonis, T. cacoeciae, ...*)**

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***Trichogramma* : a performing beneficial**

Very well adapted for large scale utilization, with massive releases and costs comparable to chemical insecticides

***T. brassicae* against the ECB :**

- **Used every year on more than 100 000ha in France, Germany, Switzerland, Czech Republic**
- **Mainly with just one release / season**
- **A technical and commercial success**



TRICHOGRAMMA AGAINST ECB IN FRANCE

Technical evolutions in Biotop's system



Capsules spread on soil and then hung on plant with cones

**New patented
Dispenser (2003)**



TRICHOGRAMMA AGAINST ECB IN FRANCE

Simplified and improved progressively :

- 1985 3 releases, *Trichogramma* in capsules on soil,
- 1992 2 releases, capsules on soil or plants,
- 1996 1 release, capsules on plants,
- 2003 new dispenser, on plants,
- 2005 increased persistence of action

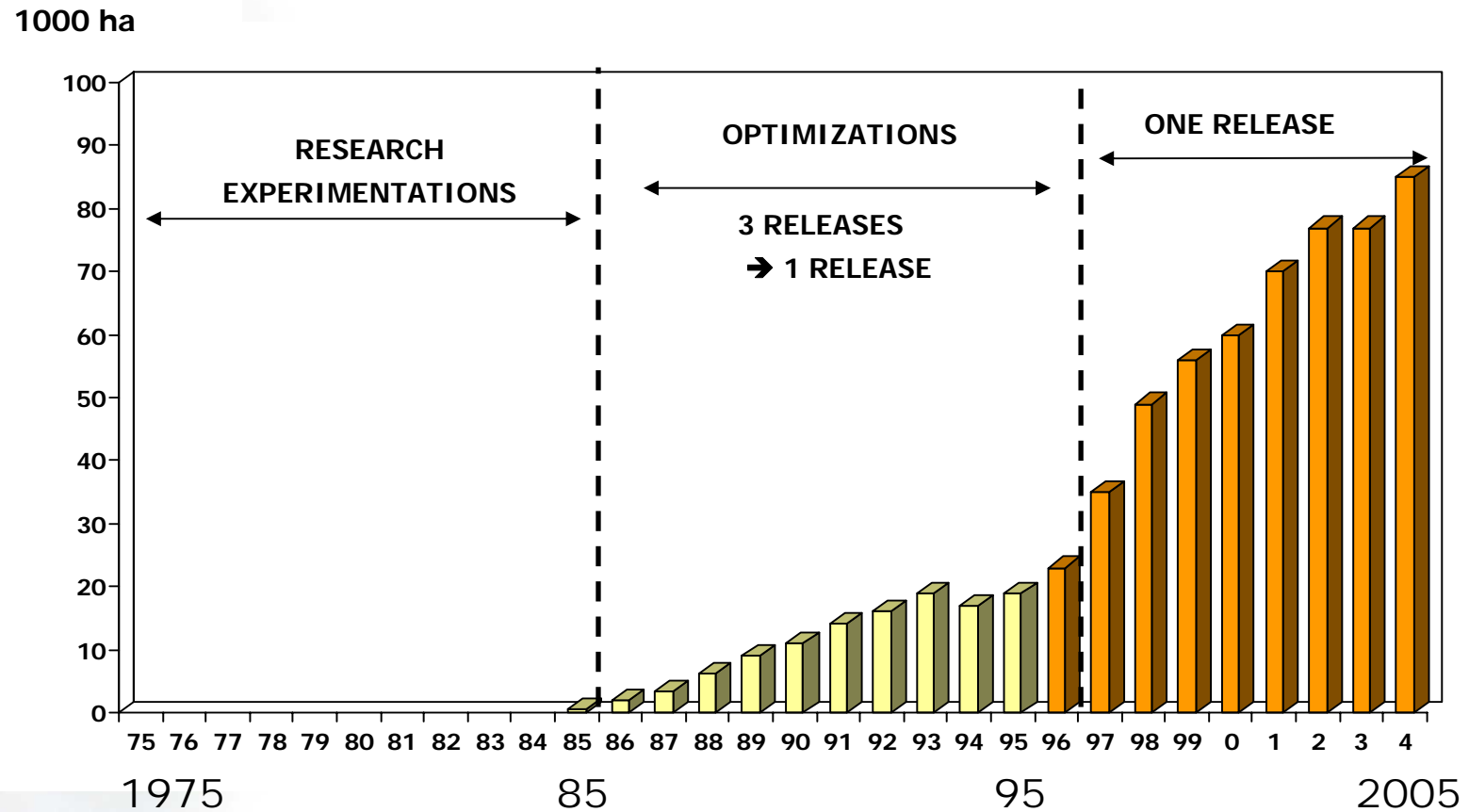
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TRICHOGRAMMA / ECB IN FRANCE

MORE THAN 20 YEARS FOR A SUCCESS STORY





A new *Trichogramma* development

- ***T. achaeae* an excellent agent now in development against *Tuta absoluta***
(Enric Vila)
- **important points to develop Trichogramma project and future steps with *T. achaeae* on Tuta**
(Firouz Kabiri)



***Tuta absoluta*: accidentally introduced in Spain in 2007**

- ❑ It spread very fast throughout Spain, also in Europe (France, Italy, Holland, Switzerland, ...) and North Africa (Algeria, Morocco...).
- ❑ Nowadays, a big social warning due to:
 - Important damages on tomato and other Solanaceae crops.
 - Problems to export.





Agrobío

Established in 1995



www.agrobio.es



Research Department



Technical-commercial



Total 105 persons

Production



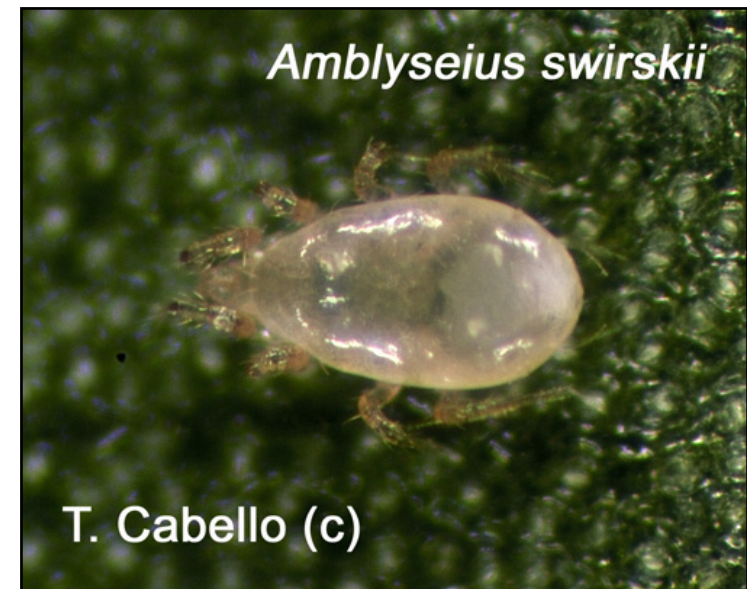
Work Areas



1.- Bumblebees



2.- Beneficial insects





Trichogramma achaeae

Cosmopolitan specie (nowadays, identified in 11 countries)

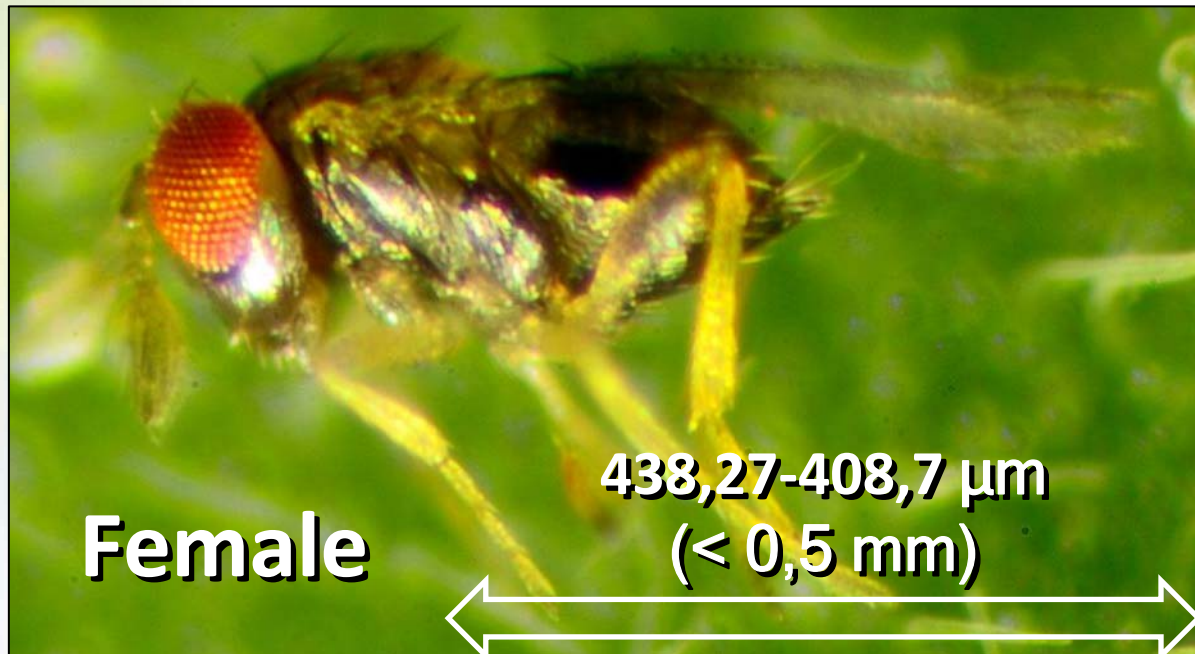
Distribution:

Europe: Spain, Russia.

Asia: China, India, Russia.

Africa: Cape Verde.

America: Argentina, Barbados, Chile, Trinidad & Tobago, USA.





Trials and Results

→ **2007:** Biology of *Trichogramma* in lab conditions (UAL).

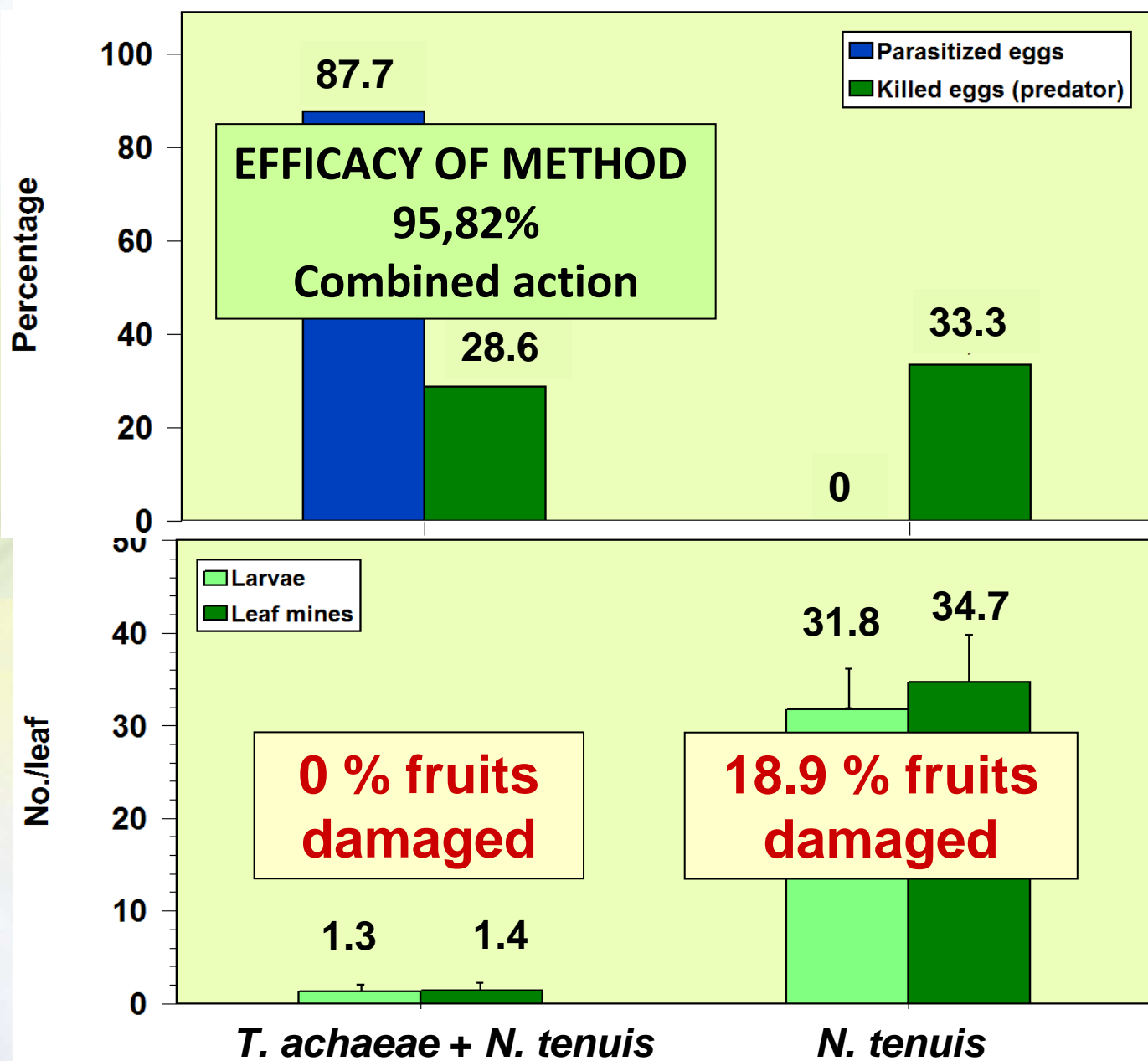
→ **2008/09:**

- 4 Semifield trials (R&D facilities of Agrobío).
(Published on *IOBC/wprs Bulletin Vol. 49, 2009*)
- Trials in experimental greenhouse. February- May.
- Trials with *T. achaeae* in 20 commercial greenhouses.



Results

Evolution of *Tuta absoluta* 62 DAYS after releases in experimental greenhouses (second generation)



Results

STARTING 3rd GENERATION (T+75 days)

Universidad de Almería

Agrobio

WITH *T. achaeae*

WITHOUT





Conclusions of this trial

- ▶ The only use of *Nesidiocoris tenuis* is not enough to control the pest.
- ▶ The combined use of both natural enemies gave an excellent result (efficacy 95,8 %).
- ▶ The native specie *T. achaeae* is very effective, more than natural enemies of *Tuta* in its original area (Southamerica)



Trials of *T. achaeae* in commercial greenhouses

- June- August 2009 (most in course).
- 20 greenhouses on different areas.
- 90 % have a good control of the pest after 3 months without any chemical treatment against *Tuta*.



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Trichogramma achaeae against *Tuta absoluta*



**Patented dispenser:
performant, easy to use**

After the very good results in trials, the recommendation for use is based on:

- a) Prevention and monitoring (cleaning soil, physical barriers, trapping, ...).
- b) Early releases (as soon as the first adult of *Tuta* is captured) in order to start the control on the first generations of the pest.
- c) Release 250 000 – 1000,000 T/ha/week.
- d) Combination with mirid predators (*N. tenuis*, *M. caliginosus*).
- e) weekly sampling method, to adapt release rate and to apply Bt if needed.





New success story with *Trichogramma*

- **Find a good beneficial:** *T. achaeae* is very well adapted to warm conditions, and also with low environmental risk (can not overwinter in the South of France),
- **large production capacity:** availability of the host *Ephestia kuehniella* and of the know how on rearing and packing of the beneficial,
- **quality control policy,**
- **field trials,**

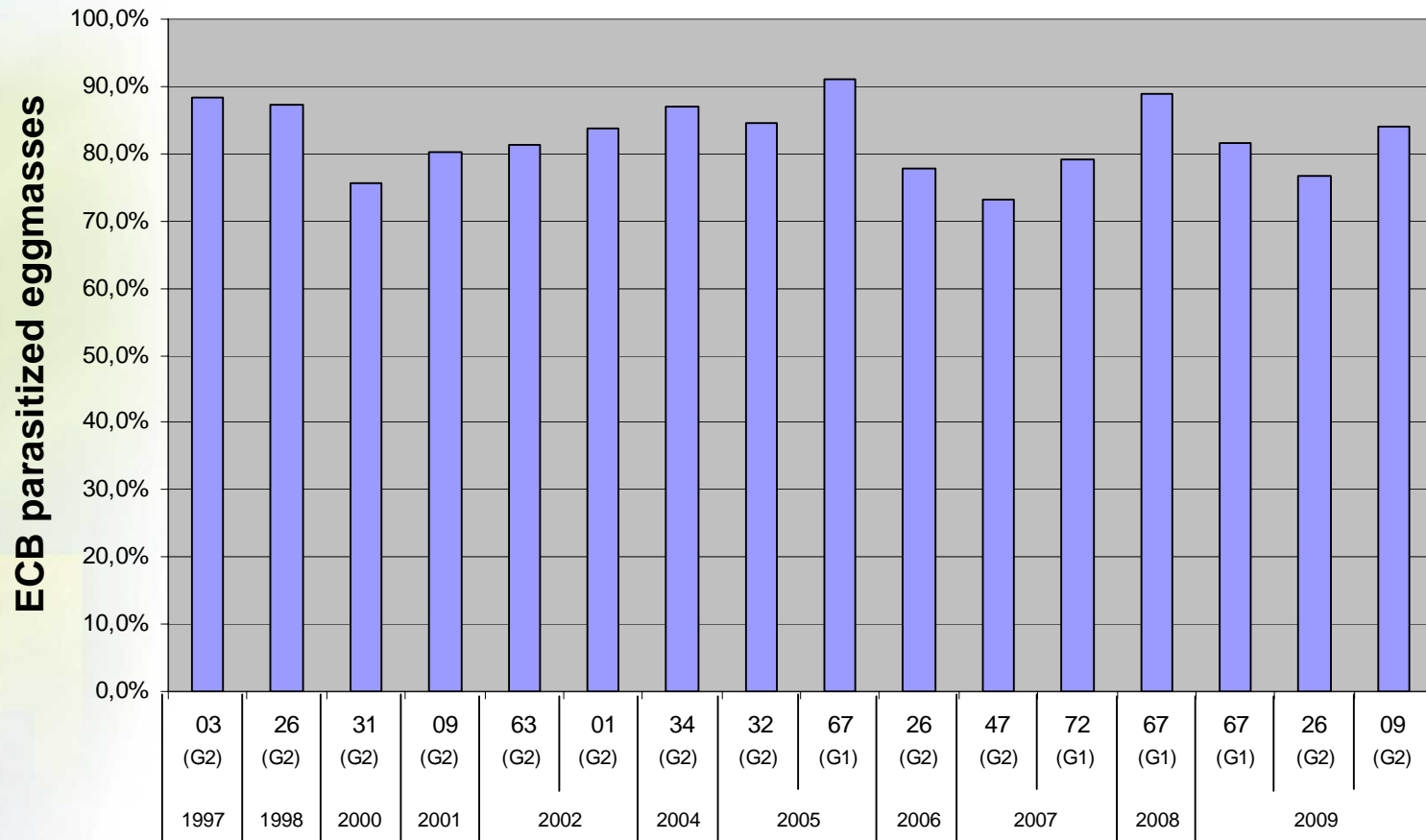
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Quality Control, the base for understanding and improving the system

→ Controls: rearing, quality of the product and field efficacy





Trichogramma against ECB: adaptation to the pest and crops

ECB	crop	ECB risk	Number of Release	Number of dispenser/ ha	Number of Tricho/ha (X1000)
1st Generation	Grain, seed and silage corn	Low	1	25	150
		Medium	1	25	225
		High	2	25 + 25	225 + 150 375
	Sweet corn	All situations	2	25 + 25	225 + 150 375
2nd Generation	Grain and seed corn	Low	1	50	300
		Medium	1	50	375
		High	2	50 + 50	375 + 225 600
	Sweet corn and Field pepper	All situations	2	50 + 50	375 + 225 600



***T. achaeae*: current experimentations**

Laboratory and field experimentations to improve and facilitate the method, mainly:

- Delayed hatching *Trichogramma* to reduce release number,
- Storage possibilities (*T. brassicae* can be stored several months)
- Study dispersion methods adapted to different crop situation,
- Improve the knowledge on *Tuta* biology for better integrating *T. achaeae*, Mirids, Bt and chemicals,
- study side effect of chemicals in order to help farmers to switch to IPM (sometimes during the season, after failure of chemicals)





***Trichogramma* and reduction of chemicals use**

- **Chemicals are difficult to use against *Tuta*:**
larvae in mines, overlapping generations all over the season, risk of resistance, ... (in Spain, Spinozade usable only 3 times/season in order to prevent resistance)
- **Necessity to combine chemicals and beneficials:**
better pest and resistance management in order to reduce the use of chemicals and also to save their efficacy when their help is needed.





***T. achaeae*: next steps**

- **International research to develop *T. achaeae* in different countries in greenhouses:**
 - **Check performance in different *Tuta* extending areas.**
 - **Develop a protocol according to conditions in each area.**

- **Also develop trials for outdoor tomato productions**



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Public / Private cooperation

- **Success against ECB: thanks to close cooperation between Biotop and INRA,**

- **Very promising project on *Tuta*: thanks to close cooperation between Biotop, Agrobío and University of Almería,**

- **And now new cooperations start with:**
 - **INRA (ULB-URIH in Sophia Antipolis)**
 - **other research institutes and partners**

- **It is necessary to promote public/private cooperations, for quick and large development of IPM.**





THANK YOU FOR YOUR ATTENTION



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