



Biocontrol pivotal moments

Rice Biocontrol success story in Albufera of Valencia (Spain)

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The challenge



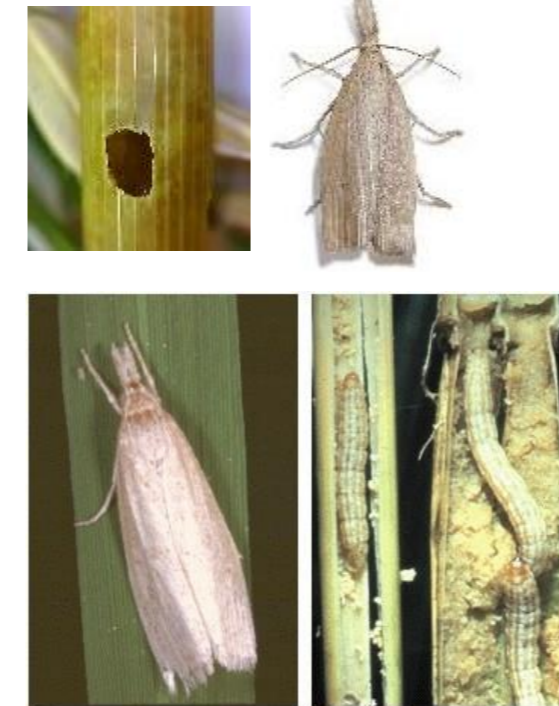
Project Background

Location: Albufera de Valencia

- 15,300 ha of rice surrounding 3,000 ha of freshwater lagoon
- Rice introduction is attributed to the Arabs during the 8th century
- Paella, made with round grain rice and originated in Valencia (PDO), is the best-known dish in Spanish cuisine
- Rice fields are surrounded by an area with 2,2 millions inhabitants
- Next to touristic areas

Site of international importance for birds

- Migratory bird special site
- Natural Park since 1986
- Ramsar Convention wetland since 1989
- Special Protection Site for Birds and Nature 2000 since 1990, and
- Site of Community Importance since 2006



Problem

- First detected in 1933, Rice Stem Borer became the most important pest for Valencia rice fields
- Use of organophosphates by aerial application to control rice stem borer (ban of aerial spraying since 2009 by the Directive 128/2009 of Sustainable Use of Pesticides)
- Detrimental effect on birds, fish, insects and aquatic ecosystems



Solution

- Pest control by sex pheromone for rice stem borer integrated into farming practice
- Multi stakeholder interaction to find a solution: growers, industry, university and government for coordination and financial support



Evolution of the pest control in the area

Traditional agriculture – 30' to 50'



1933-1950
CULTURAL PRACTICES

The 'Era of synthetic insecticides' – 50' to 90'



1950-1965
ORGANOCHLORINATED & ORGANOPHOSPHATES
INSECTICIDES

1965-1988
COLLECTIVE AERIAL SPRAYING (OP)

1988-2005
AERIAL SPRAYING + MATING DISRUPTION

The switch to biocontrol – 90' until today



2006-2009
HIGH DENSITY MATING DISRUPTION (100 units/ha)

2009-2013
LOW DENSITY MATING DISRUPTION (31 units/ha)

2014-Present
LOW DENSITY & BIODEGRADABLE MD (31 units/ha)

Which are the activities?

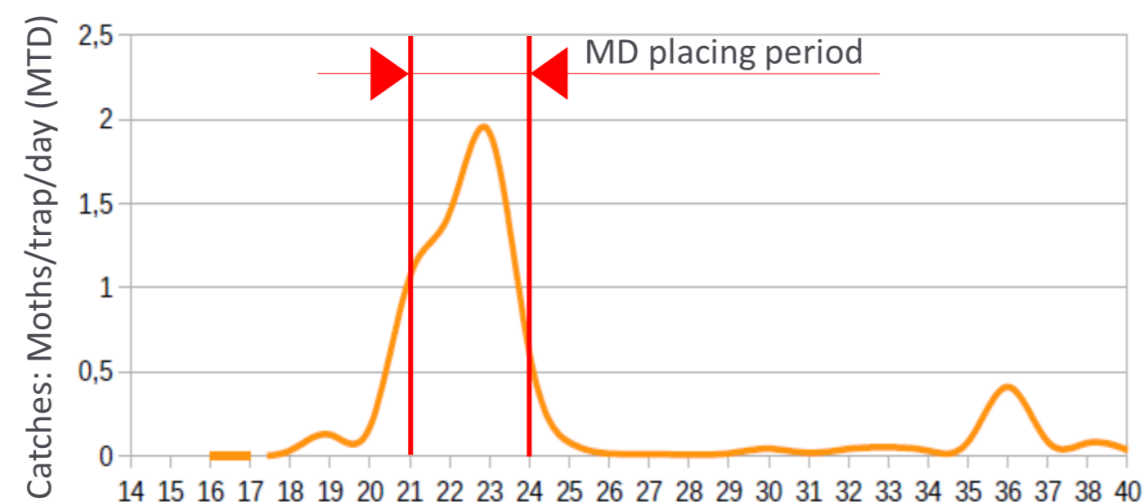
Preparation and placing in the field

- 480,000 dispensers to be prepared and placed (18x18m)
- Coordinated by Generalitat Valenciana who provides maps, GIS
- Very important ensuring to do the placement in the whole area and at the same time
- Prepared and placed by growers (Cooperatives)
- Up to 35 people working for these tasks



Monitoring and damage surveys

- Catches are very low (under 2 MTD) and drastically reduced after placing the pheromone dispensers
- In the 70's catches reached 60-70 MTD
- The Economic Injury Level is 25-60 stems attacked per m²
- Today, levels of damage in Valencia are always below 1 stem attacked per m² (in the 70's were 30-90)



Linked to other EU initiatives



- Directive 2009/128/EC Sustainable use of pesticides
- Early detection surveys for other harmful organisms

The costs

- Rice stem borer MD declared compulsory and of Public interest in Valencia
- 500,000 €/year (32€/ha) funded by GVA
- Compatible with the internal market (R2022/2472 art. 26)



What has been the impact so far?

01 TECHNICAL RESULT

Since 2006 the pest is fully controlled by mating disruption avoiding of the use of approx. 50,000 L of synthetic insecticides each year.

Close to 100% effectiveness, insignificant damage, lower than conventional spraying.

02 ECONOMIC RESULT

Lower cost than conventional spraying.

The use of mating disruption allows the coexistence of an important economic activity (such as the rice cultivation) in an area which has been declared a natural reserve and that is, additionally, a touristic site in the region.

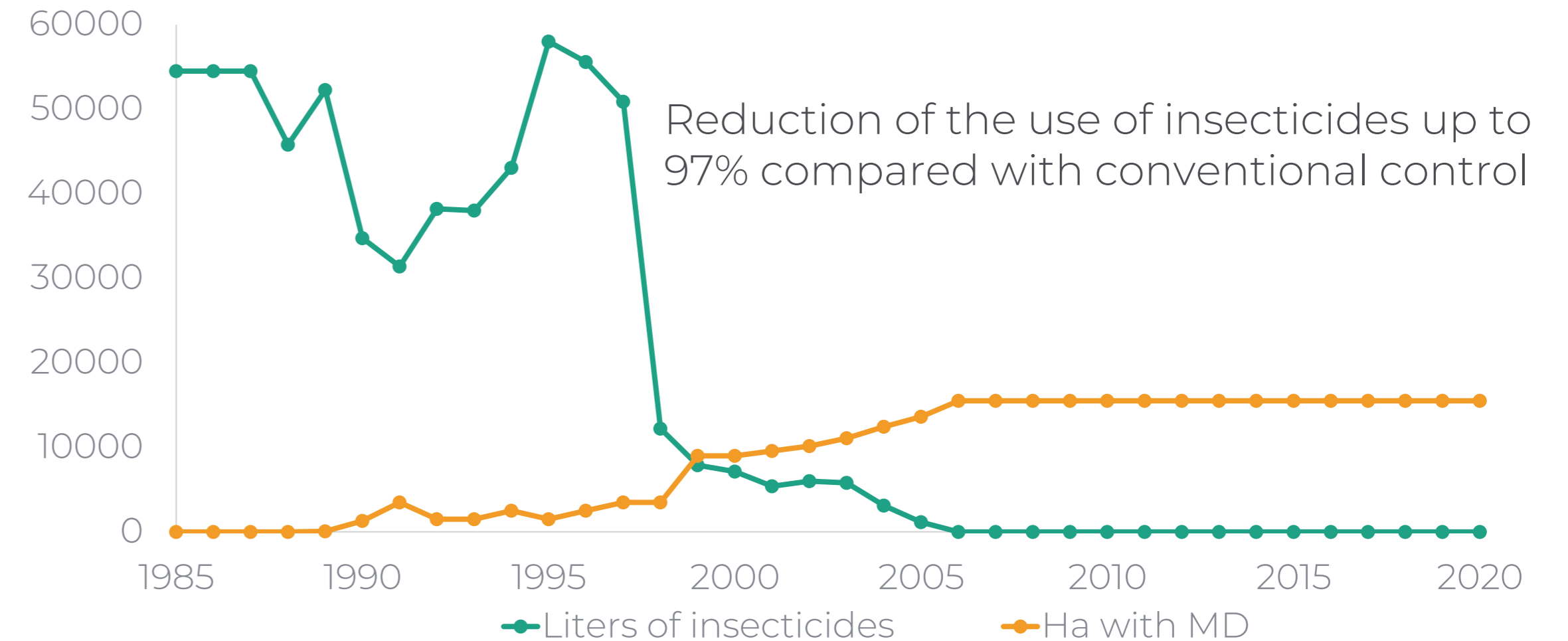
03 SOCIETAL RESULT

Production of insecticide-free rice. And significant reduction of operators, workers and bystander exposure to hazardous substances and chemical pesticides.

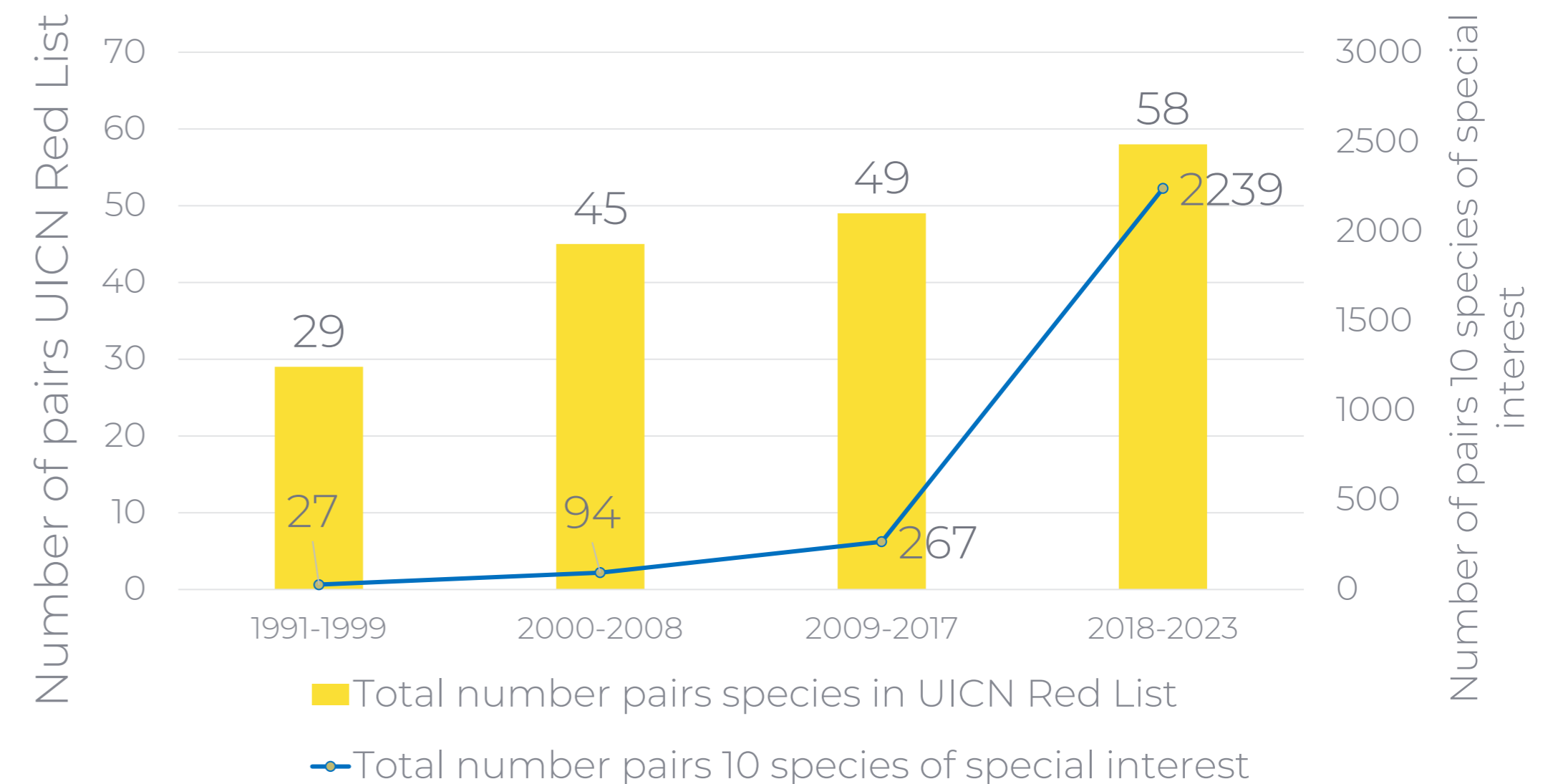
04 ENVIRONMENTAL RESULT

The switch to biocontrol allowed to significantly decrease pollution and environmental exposure to chemical pesticides, increasing biodiversity enabling resilient rice cropping systems.

Evolution of insecticide use



Evolution of nesting aquatic birds





**Area wide
integrated pest
management
for South
African citrus
mealybug
(*Delottococcus
aberiae*)**



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Background



Problem

- Exotic pest detected for the first time in the CV in 2009, now present in 164 municipalities
- Pest native from South Africa
- Direct damage: weakening of the tree, fruit deformation and fruit size reduction
- Indirect damage: sooty mold and secondary moths attacks
- 17.5% of the fruits deformed in the most damaged county
- Insecticide EU ban (Chlorpyrifos in 2020)



Solution

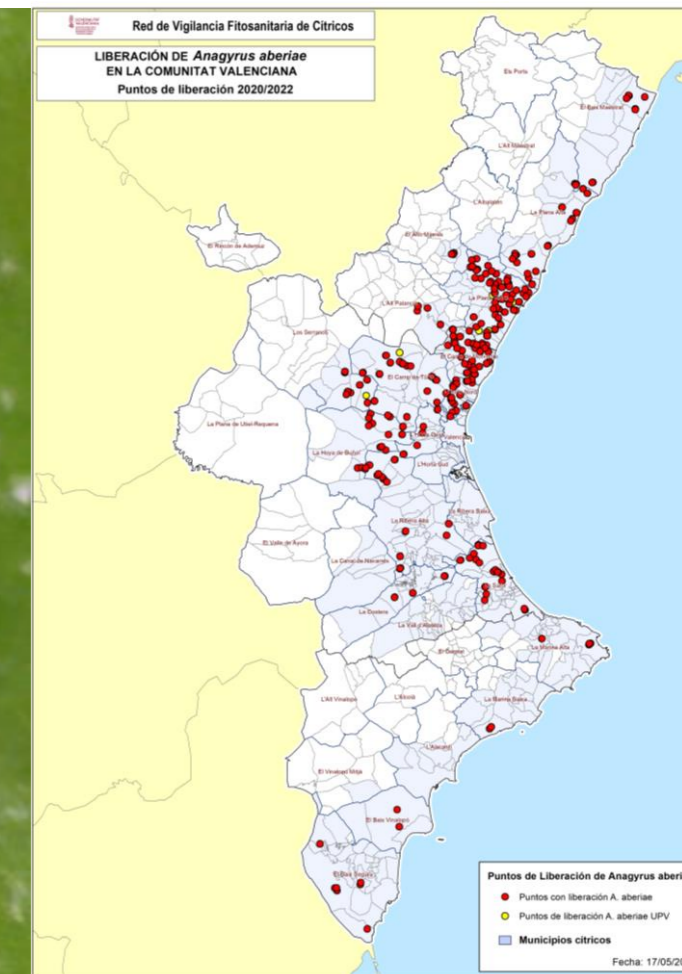
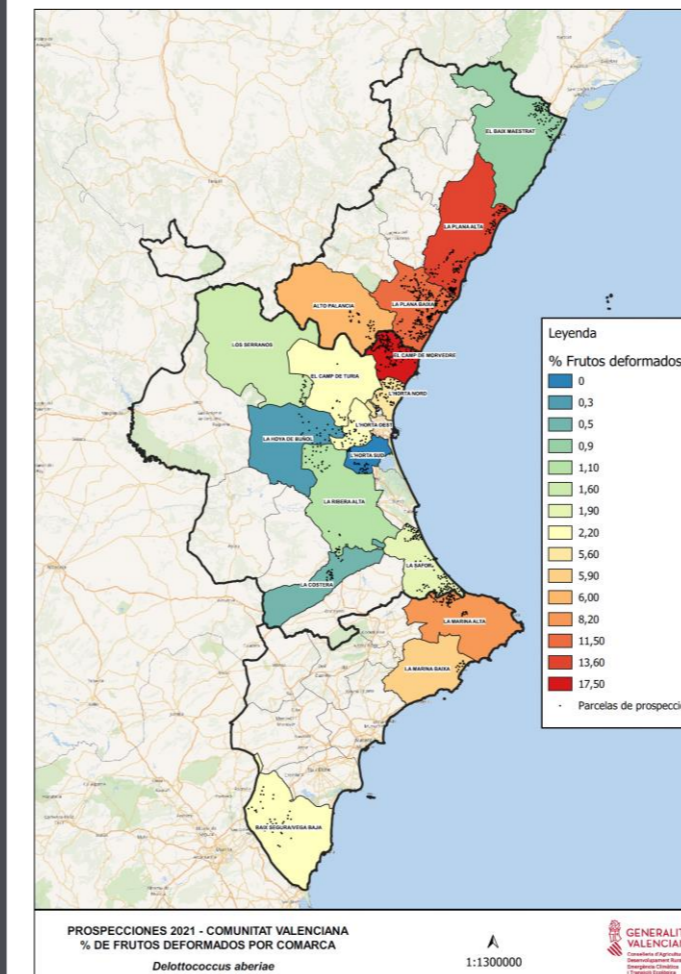
- Area wide integrated pest management
- Including cultural, biosafe and hygienic measures
- Several biocontrol measures (predators, parasitoids and sexual pheromone Attract&Kill devices)
- Monitoring and advised control measures

Biocontrol solutions



Biological control: parasitoids

- Classical biocontrol strategy with the specific parasitoid *Anagyrus aberiae*:
 - Studies in origin and parasitoid importation
 - Complementary studies in Spain, and first releases (2020)
 - Mass rearing and 1,550 releases in 164 municipalities from 27 counties



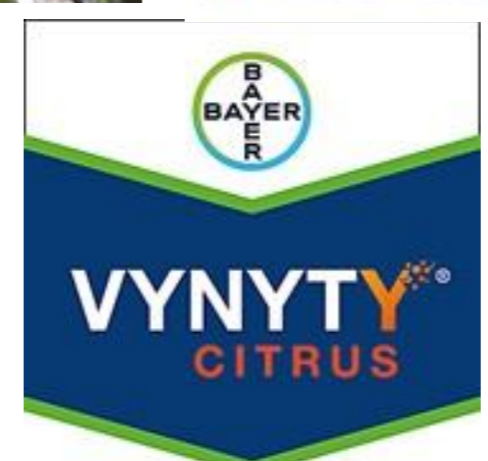
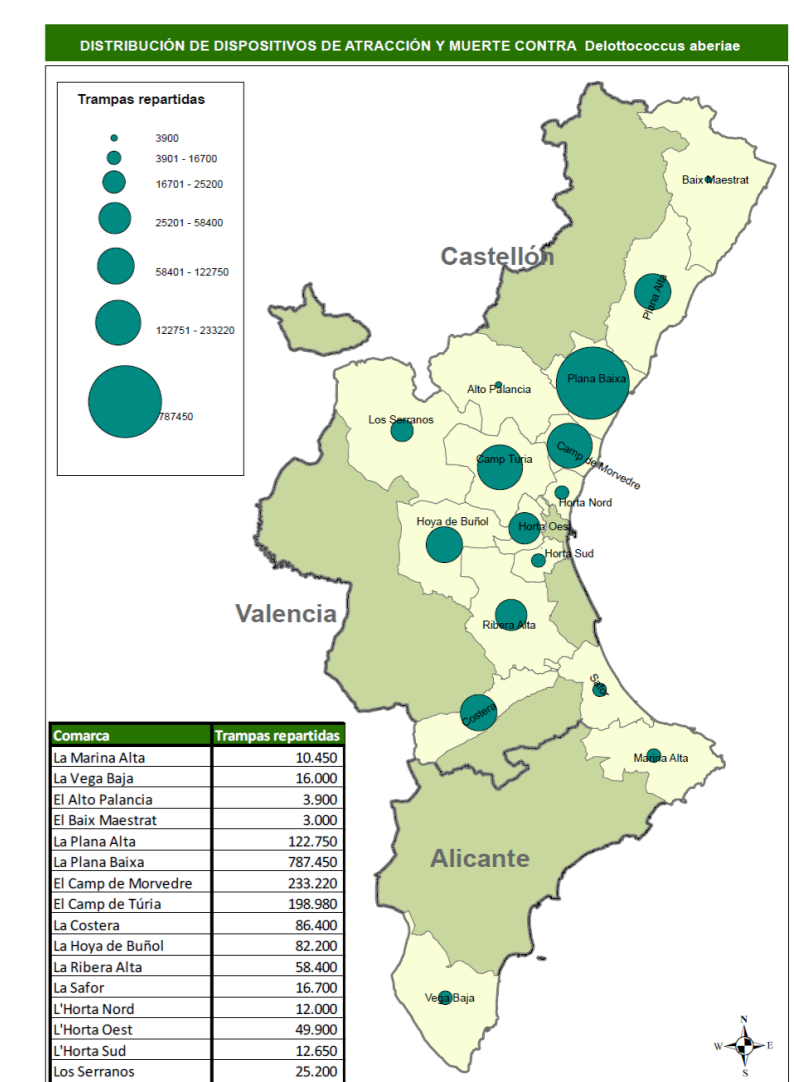
Biocontrol solutions

Biological control: predators

- Releases of BCA predator *Cryptolaemus montrouzieri*:
 - Reared in public insect facilities since 1928
 - Also collaboration with 48 additional mass rearing facilities
 - Additional releases of 14 million adults from public procurement

Biocontrol: Mass A&K devices with sexual pheromones

- Development of A&K devices with sexual pheromone and pyrethrins:
 - Under a memorandum of understanding with UPV-CEQA
 - Emergency authorisation from the Ministry
 - Near 9,000,000 devices delivered and 40,000 ha covered since 2021

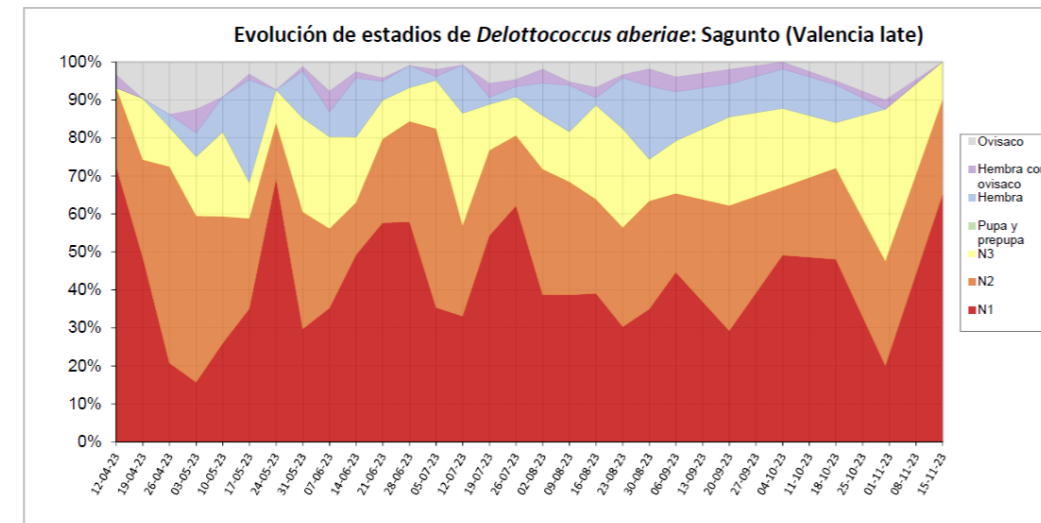
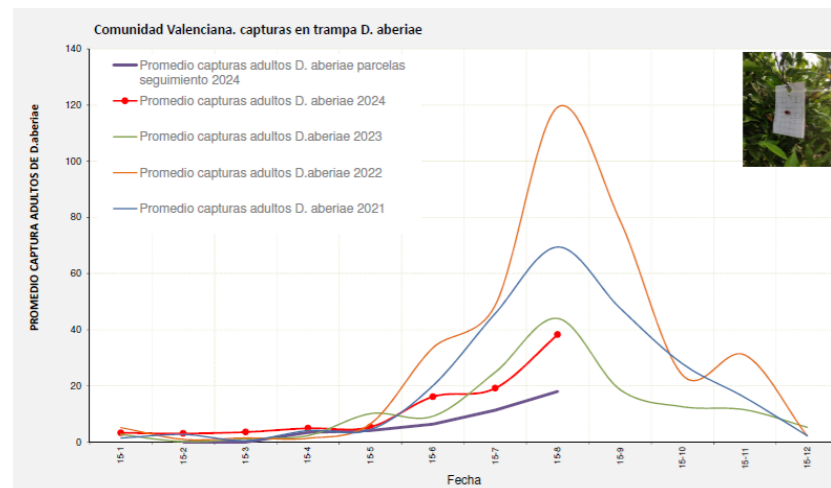


IPM strategy

Cost: 15,600,000 € since 2021

Monitoring and advised control measures

- Weekly information about pest population dynamics per counties

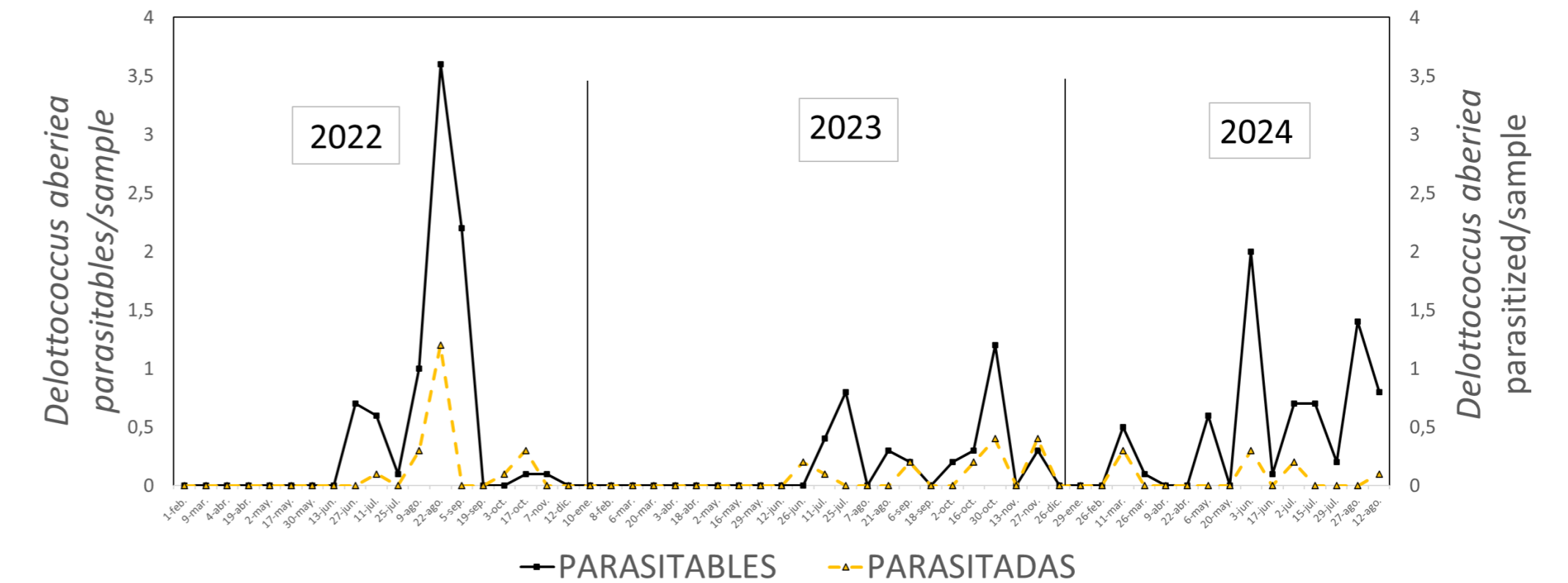


- Insecticide treatments in critical moments (paraffin oils, acetamiprid, sulfoxaflor and spirotetramat)
- Ant management and biosecurity measures (hot water picking boxes cleaning, operators clothes cleaning, organised growers and operators movement between orchards)

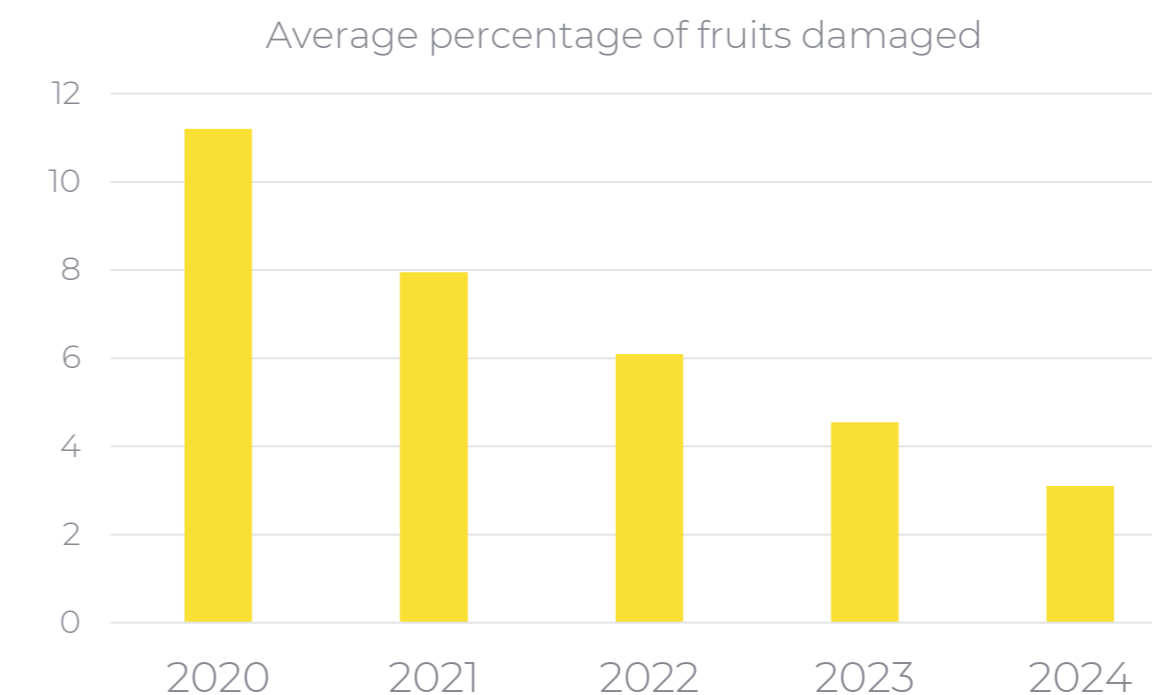


Results

- Successful recovery of *Anagyrus aberiae* females from the field (64% of surveyed orchards)
- Recovered up to 1,7 Km from the nearest release point



- Generalised decrease evolution of damages on fruits, from 11% to 3% in 5 years after 4,400 orchards and 1,7 million fruits surveyed



Biocontrol

Pivotal moments

- In late 1920's first public mass rearing facilities for BC insects
- In Rice, late in the 80's first mating disruption trials
- In citrus, Spanish exports banned in US for phytosanitary reasons (2001)
- Medfly resistance to Malathion (2004) and pyrethroids (2015)
- In fresh vegetables, Isofenphos-methyl RASFF alerts in 2006
- New EU Rules: SUD and strict PPP registration process : 2009
- African Citrus Psyllid hard to find in northern Spain and Portugal after the parasitoid *Tamarixia dryi* import and release.



Future

- More EU support in CAP for biocontrol strategies: Operational Programmes for Producers Organisations, greening measures, Eco-schemes

CULTIVO	PLAGAS ESTRATEGIA	ESTRATEGIA DE CONTROL	IMPORTE CON CARGO AL PROGRAMA OPERATIVO(% DEL COSTE DE LA FACTURA)
CITRICOS	Piojo rojo de California: <i>Aonidiella aurantii</i>	Confusión sexual	39%
	Piojo blanco: <i>Aspidiotus nerii</i>	Organismos de control biológico (parasitoides)	
	Cotonets (excepto cochinilla de Sudáfrica): <i>Planococcus citri</i> , etc.	Organismos de control biológico (parasitoides)	
	Pulvinaria: <i>Pulvinaria polygonata</i>	Organismos de control biológico (depredadores)	
	Cochinilla de Sudáfrica: <i>Delottococcus aberiae</i>	Organismos de control biológico (parasitoides y depredadores)	
	A. aurantii y/o Cotonets: P. citri, etc. y/o D. aberiae	Organismos de control biológico (depredadores)	
		Trampeo masivo	
	Mosca de la fruta: <i>Ceratitis capitata</i>	Trampeo masivo y Organismos de control biológico (depredadores)	
		Trampeo masivo y Organismos de control biológico (depredadores y parasitoides)	
		Trampeo masivo	
Trampeo masivo y Organismos de control biológico (parasitoides cotonets incluido Delottococcus y/o D. aberiae)			
	Trampeo masivo y Organismos de control biológico (depredadores cotonets y parasitoides piojo)		
	Trampeo masivo y Organismos de control biológico (depredadores y parasitoides)		
	Trampeo masivo: Captura masiva		
	Trampeo masivo: Captura masiva		
	Trampeo masivo: Atraer y matar		
	Trampeo masivo: Atraer y matar		



- Reduced administrative burdens for BCA and Biocontrol PPP
- Reciprocity for Sustainable use of PPP and MRL's to third countries exporting food and feed to the EU

**Thanks for
your attention**



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