Rice in Albufera of Valencia

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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’

The ‘Era of synthetic insecticides’ – 50’ to 90’

The switch to biocontrol – 90’ until today

1933-1950
CULTURAL PRACTICES

1950-1965
ORGANOCHLORINATED & ORGANOPHOSPHATES INSECTICIDES

1965-1988
COLLECTIVE AERIAL SPRAYING (OP)

1988-2005
AERIAL SPRAYING + MATING DISRUPTION

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

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

20014-Present
LOW DENSITY & BIODEGRADABLE MD (31 units/ha)
Which are the activities?

**Preparation of the dispensers**

- Site of international importance for birds

**Problem**

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**Solution**

- Which are the activities?
  - Preparation of field work (GIS-CAP)
  - Placing dispensers in the field

**Preparation of field work (GIS-CAP)**

- In brackets the number of dispensers for each field, area, polygon or municipality

**Placing dispensers 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 during the season

- 51 monitoring points
- Serviced weekly, even before the rice sowing
- Catches are very low (under 2 MTD) and drastically reduced after placing the pheromone dispensers
- In the 70’s catches reached 60-70 MTD

Field surveys for damage

- More than 450 fields surveyed for damages
- The Economic Injury Level is 24-61 stems attacked per m²
- In the 70’s, these damages were 30-90 stems attacked per m²
- Today, levels of damage in Valencia are always below 1 stem attacked per m²
Which are the activities?

Improve efficiency and cost of biocontrol

- By using a volatile capturer, and with UPV research results
- We’ve been able to reduce dispenser density from 100 to 31 dispensers per ha (from 10x10m to 18x18m)
- The efficacy of the technique has been maintained

Improvement of dispenser performance

- Registration of the product in Spain and submit to the call of tenders
- Improve the dispenser:
  - reducing the amount of remaining pheromone
  - biodegradability of dispensers (cellulose replacing PVC)
Directive 2009/128/EC to achieve the sustainable use of pesticides

By using MD, the application rate is reduced almost 40 times, from 296.4 g of insecticide per ha in chemical control to only 7.75 g of pheromone per ha.
What are the costs?

• Since 2002, the Spanish Plant Health Law allows to declare of Public Interest the control of a specific pest, under certain conditions

• In 2004, the regional department of agriculture declared of Public Interest the control of Rice Stem Borer (compulsory collective control by mating disruption).

• Today, supply, preparation and placing of dispensers: 450,000 €/year
• In 2008-2010 the cost was 66 €/ha, 2,2 times higher than now (30€/ha)
• They’re funded entirely by the regional department of agriculture (Generalitat Valenciana)
• This aid is compatible with the internal market (R702/2014 art. 26 Aid for the costs of control of plant pests as part of a public programme at regional level)
What has been the impact so far?

TECHNICAL RESULT
Since 2006 the pest is fully controlled by mating disruption avoiding the use of approx. 50,000 L of synthetic insecticides each year. Close to 100% effectiveness, insignificant damage, lower than conventional spraying.

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.

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

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

- Reduce the number of dispensers/ha (reduce the placing costs: 10 dispensers per ha)
- Reduce the winter populations and spraying only pest refuges or foci
- Adjust treatment dates by selective pheromone application at hotspots
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