Implications of emerging plant pests for Integrated Pest Management

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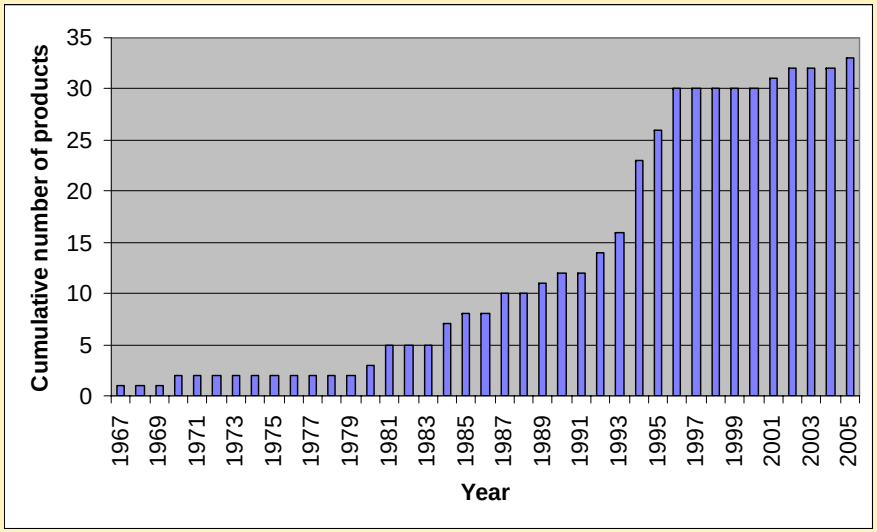
International Biocontrol Manufacturers Association (IBMA)

- Worldwide association of Producers (and distributors) of Biological Control Agents
- Since 1995
- 180 members

- 4 divisions:
  - **Invertebrate Biological Control Agents (IBCA's)**
  - Microbial BCA's
  - Semiochemicals
  - Natural & Biochemical Products

Invertebrate Biocontrol Industry

- Based on augmentative biocontrol (seasonal releases)
- Mainly greenhouse vegetables, ornamentals is growing sector
- Small sector: 50 producers, 90% less than 20 employees
- Turnover: ± € 300 million
- Competition high: 25 species > 90% market



Implications of emerging plant pests for Integrated Pest Management (IPM)

- Systems approach:
  - Prevention: hygiene, exclusion
  - Management: mechanical, biological, cultural
  - Biological control: cornerstone
  - Chemical control: last resort

Directive 2009/128/ EC on the Sustainable Use of Pesticides (SUD):

Art.4

Member states shall adopt National Action Plans to set up their quantitative objectives, targets, measures and timetables to reduce risks and impact of pesticide use on human health and the environment and to encourage the development and introduction of Integrated Pest Management and of alternative approaches and techniques in order to reduce dependency on the use of pesticides

Art.14

Member States shall take all necessary measures to promote low pesticide-input pest management, giving wherever possible priority to non-chemical methods, so that professional users of pesticides switch to practices and products with the lowest risk to human health and the environment among those available for the same pest problem. Low pesticide-input pest management includes Integrated Pest Management as well as organic farming...

Implications of emerging plant pests for Integrated Pest Management

Emerging plant pests for greenhouse crops:

- DAISIE top 100:
  - *Aphis gossypii*
  - *Bemisia tabaci*
  - *Liriomyza huidobrensis*
  - *Spodoptera littoralis*

- *Spodoptera exigua*
- *Liriomyza trifolii*
- *Frankliniella occidentalis*

- *Tetranychus evansii*
- *Tuta absoluta*

IAS as threat for IPM programmes?

Bale et al. 2007:

"These newly imported pests have threatened the biological control of existing pests because governments usually respond to pest invasions by initiating extermination programmes based on frequent application of pesticides, thereby killing the natural enemies of 'old' pests.

Therefore it is crucial to identify effective natural enemies of new pests before or soon after invasion, in order to maintain stability in the commercial biological control of existing pests."

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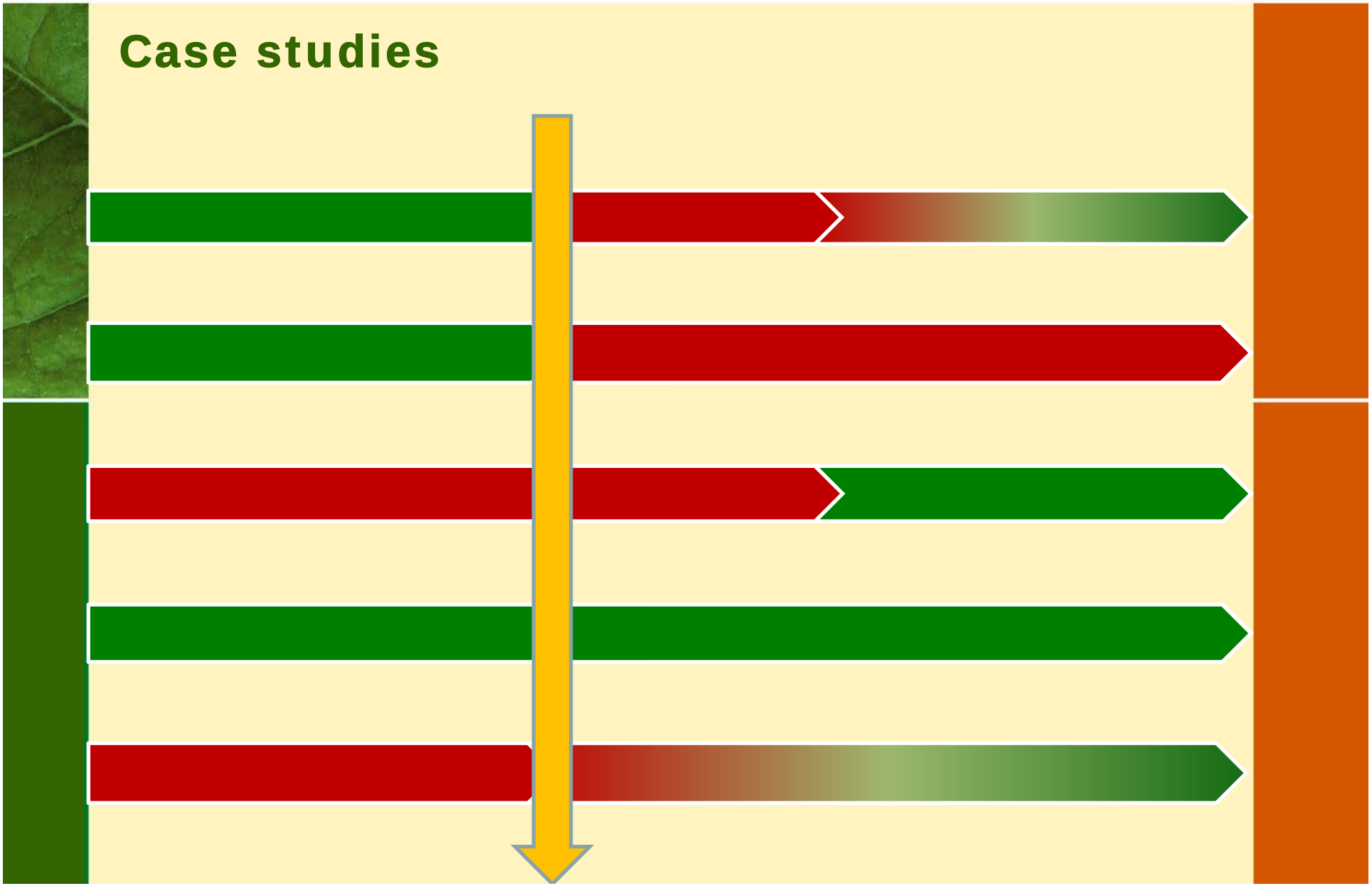
Case studies



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Frankliniella occidentalis in NL

- Origin: N.America
- In Europe since mid 1980s
- Damage in cucumber and many other crops
- IPM: *Phytoseiulus persimilis*, *Encarsia formosa*, leafminer parasitoids, *Amblyseius cucumeris*
- Effect on IPM:
  - Balance highly disturbed
  - Solution combination of cultural practice, new release strategy existing BCA, new BCA's:
  - *Orius spp.* (1991), *Amblyseius swirskii* (2005)
  - Took min. 10 years

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Diaphorina citri in Florida asian citrus psyllid

- Origin: Asia
- Invading Florida and south US since 1998
- Vector of huanglongbing – Citrus Greening
- IPM: Balance based on classical biocontrol
- Effect on IPM:
  - Chemical control
  - Classical BC programm destroyed
  - *Tamarixia radiata* ???

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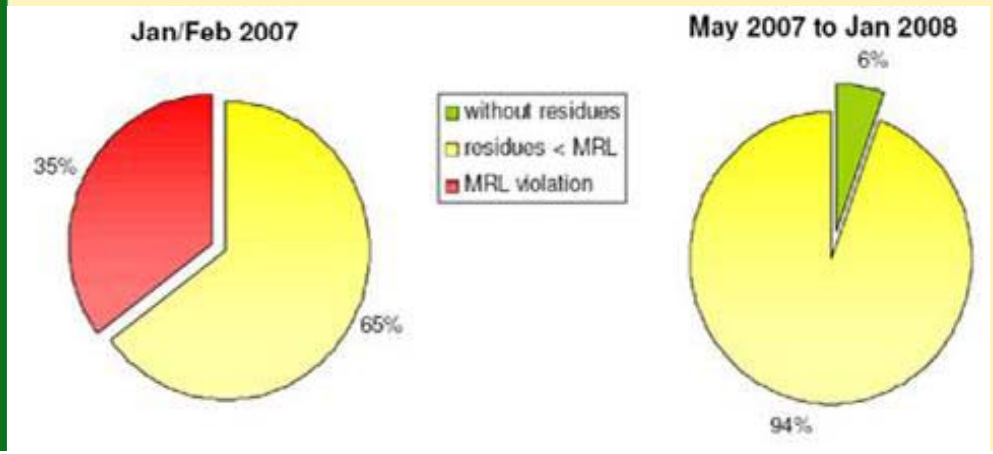
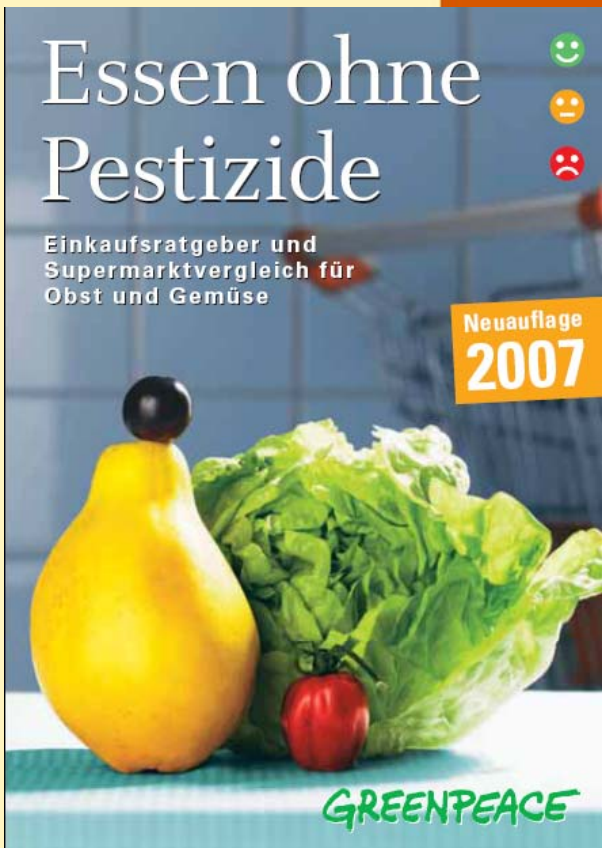
Bemisia tabaci in Spain

- Origin: south-east Asia
- Invasion via N. America
- In Europe since 1985
- Vector of TYLCV
- IPM in S. Europe not widely developed until 2007:





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Bemisia tabaci

- Effect on IPM
  - In S. Europe not widely developed
  - Time to develop biological solution
  - Green revolution: prepared
  - BC agents:
    - *M. pygmaeus* (S. Europe) since 1993
    - *E. eremicus* (US) since 1995
    - *E. mundus* (S. Europe) since 2002
    - ***N. tenuis*** (S. Europe) since 2003
    - ***A. swirskii*** (M. East/ Italy) since 2005

Tuta absoluta in the Mediterranean

- Origin: South America
- First record EPPO region 2006, Catalonia
- Now spreading around Mediterranean
- Pesticides not effective
- IPM in tomato Spain: based on *Nesidiocoris tenuis*, generalist predator, appeared to be also effective against *Tuta absoluta*




Tuta absoluta in the Mediterranean

- Origin: South America
- First record EPPO region 2006, Catalonia
- Now spreading around Mediterranean
- Effect on IPM:
  - Solution ready: *Nesidiocoris tenuis*, generalist predator, in combination with hygiene, cultural practices, pheromones

Spain (IPM)

Other Mediterranean countries

Conclusion Case studies

- Development of new products takes time
- Invasive pest sometimes trigger for IPM
- Generalist predators make system more robust

- Regulation is an increasing threat for the development of new products
- Example: larval parasitoid from South America for the control of *Tuta absoluta*

Threats in regulation: Access

- **Nagoya protocol on Access & Benefit Sharing (ABS)**
  - Result of CBD 1992:

    "*The fair and equitable sharing of the benefits arising out of the utilization of genetic resources* "
  - Genetic resources are owned by source countries
  - Nobody knows how
  - Reserve by authorities and institutes
  - Working group CGRFA Stakeholders different sectors

  - ➢ Access limited
  - ➢ Costs from early start of research increased, potential candidates could be dropped in early stage
  - ➢ Time for developing product increased

Threats in regulation: import

- **European IAS Strategy**
  - Preventive measures include Biocontrol agents?
  - Precautionary principle
  - What if an umbrella construction will be developed?

- **Veterinary regulation**
  - Veterinary law includes insects/ mites
  - How to guarantee the absence of veterinary diseases
  - Which authorities are willing to declare?

Threats in regulation: release

- **ISPM 3** Guidelines for the export, shipment, import and release of Biocontrol Agents and other beneficial organisms (2005)
- **EPPO guideline 6/2** Guidelines for Import and release of non-indigenous biocontrol agents (2010)
  - Risk assessment:
    - Cold tolerance for northern countries important criterium
    - Southern countries ?
  - Harmonisation
  - Procedures?

➢ Increased time and costs for research and administration

Threats in regulation: other biocontrol agents

- **‘Biopesticides’**
- **EC 91 / 414**
  - Long and expensive procedure:
    - 3 -7 years
    - Costs 1,5 – 5 million

- **EC 1107 / 2009 : into force next week!**
  - Product registration per zone (only new active ingredients!)
  - Deadlines fixed
  - Improvement ?

Implications of emerging plant pests on IPM

- **Increasing need for exotic BCA's**
  - Result of invasive exotic species
- **Tendency towards native species**
  - Result of CBD and subsequent regulation
- **Reaction time increased**
  - Increased time for research required
  - Hurdles of regulation
- **Promising candidates sometimes not developed to products**
- **Increasing problems to maintain IPM programmes**
- **Goals of SUD directory difficult to achieve**
- **YES, emerging plant pests are a threat for IPM**

From re-active to pro-active
From prevention to preparedness

- Prevention impossible
- PRA after arrival too late

- *Pro active approach: early evaluation of potential new invasive pests*
- *EC wide research for potential biological control methods, incl. classical BC*
- *Smooth procedures esp. for exotic BCA's*
- *Fast track procedures*

What is our next challenge?

Tomato psyllid ?

Pepper weevil ?

Neoleucinodes elegantalis

Citrus psyllid/ huanglongbing?

References

- Bale, J.S., J.C. van Lenteren and F. Bigler, 2007. Biological control and sustainable food production. Phil. Trans. R. Soc. 363: 761-776.
- Lenteren, J.C. van et al.,2011. Will the Convention on Biological Diversity put an end to biological control? Revista Brasileira de Entomologia 55(1): 1–5.

- *www.ibma-global.com*

Thank you