Pesticide reduction- what are the alternatives?

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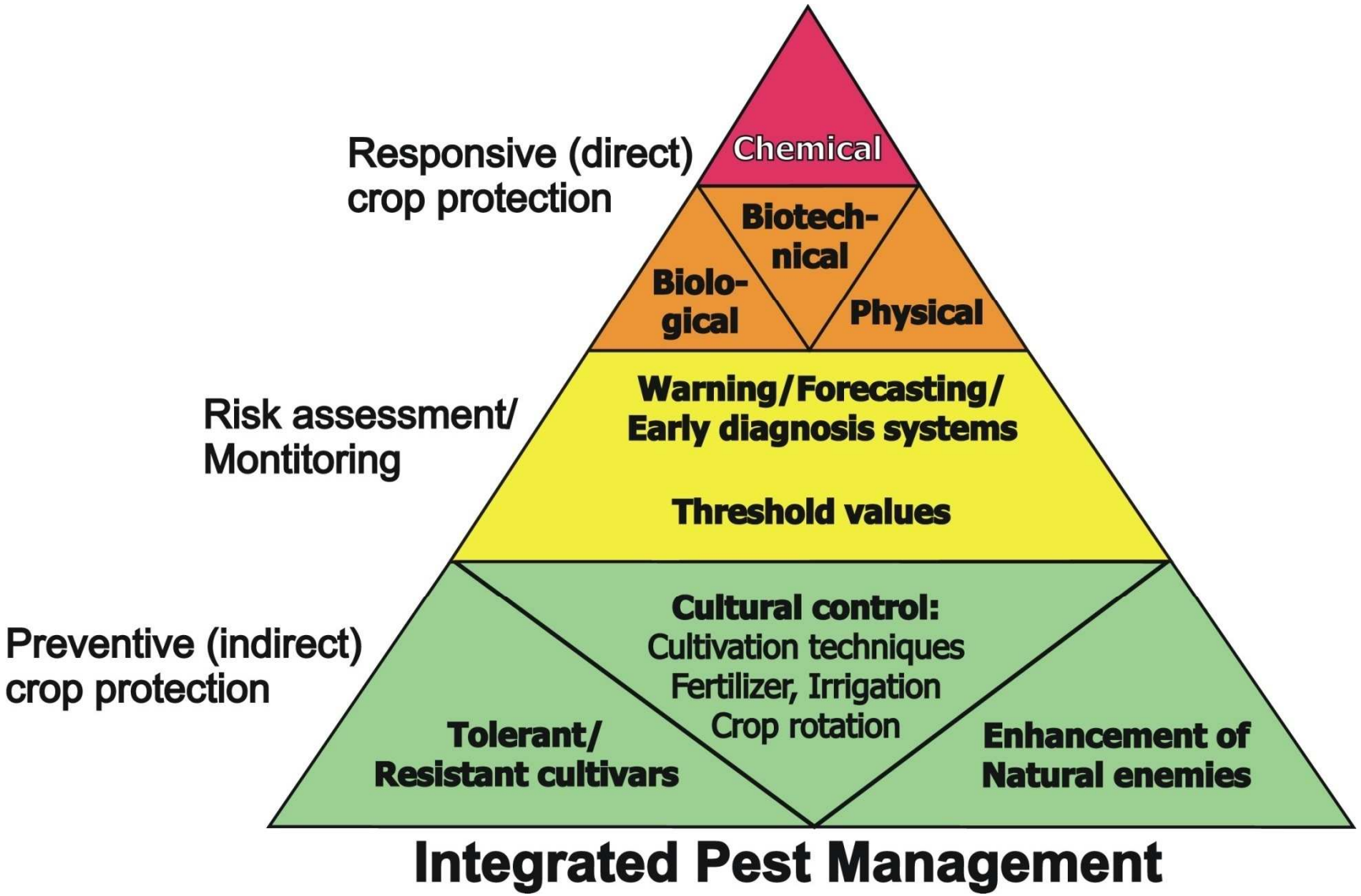
The IPM strategy



Preventive control methods in IPM

Method/Measure	Insects	nematods	diseases	weeds
Certified seeds & plants	+	+	+	-
Field hygiene (eg residue man.)	+	+	+	+
Choice of varieties, cultivars	+	+	+	+
Crop rotation, crop sequence	+	+	+	+
Fertilization (eg N)	+	-	+	+
Timing of field management (e.g. sowing, harrowing)	+	+	+	+
Pruning (eg trees, grapevine)	+	-	+	-
Cover crops, tillage	+	+	+	+
Enhancement of nat.enemies	+	(+)	+	+

Preventive measure has impact (+), has no impact (-)

Example given in this presentation

Direct non-chemical control methods in IPM

Method/Measure	Insects	Nematods	Diseases	Weeds
Biological control	+	+	+	+
Pheromones: Mating disruption	+	-	-	-
Pheromones: Mass trap., A & K	+	-	-	-
Sterile Insect Technique (SIT)	+	-	-	-
Exclusion netting	+	-	-	-
Physical control (e.g. mechan., thermal)	(+)	-	-	+

Preventive measure has impact (+), has no impact (-)

Examples given in this presentation

Case studies of successful IPM measures

1. Field hygiene, crop sequence, resistant cultivars, tillage: Fusarium diseases


2. Crop rotation: Corn root worm

3. Biological control: European corn borer

4. Biological control: Pests and diseases in glasshouse

5. Sexual pheromones for insect control: rice borer


6. Sterile Insect Technique (SIT): Medfly in citrus

Effect of preventive methods on *Fusarium* incidence on wheat

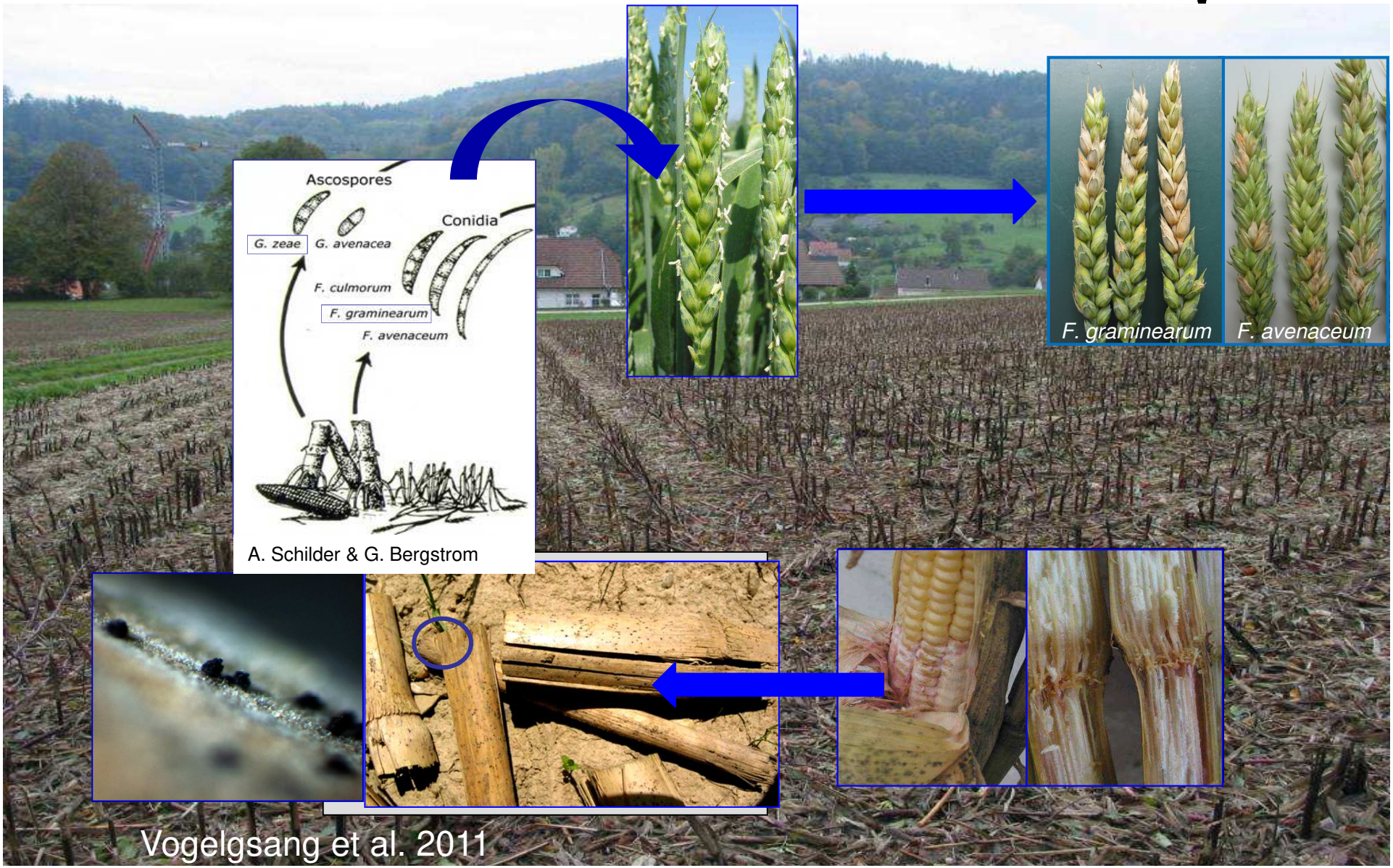
Factors having impact on *Fusarium* incidence:

- Variety
- Crop rotation, crop sequence
- Tillage & residue management

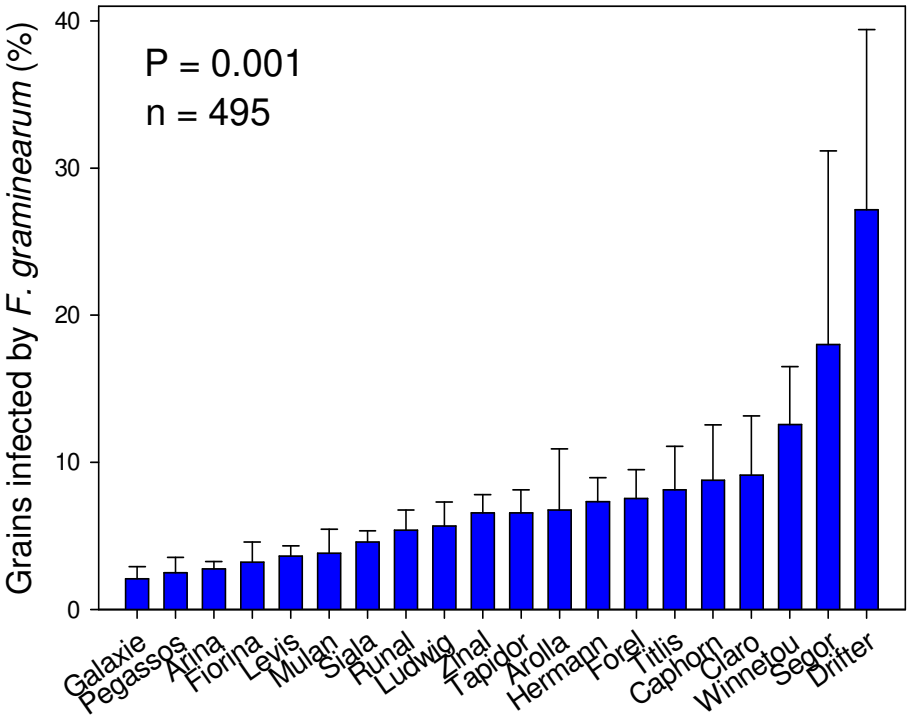
photos: B. Dorn & H. R. Forrer

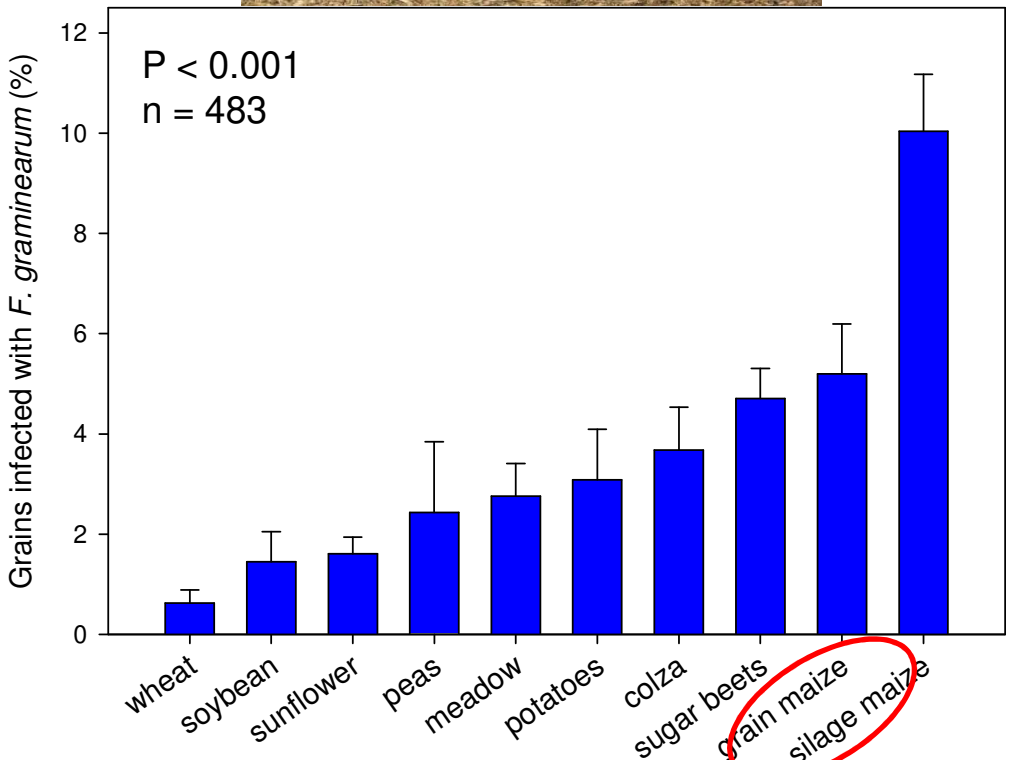
Vogelgsang et al. 2011

Fusarium graminearum life cycle



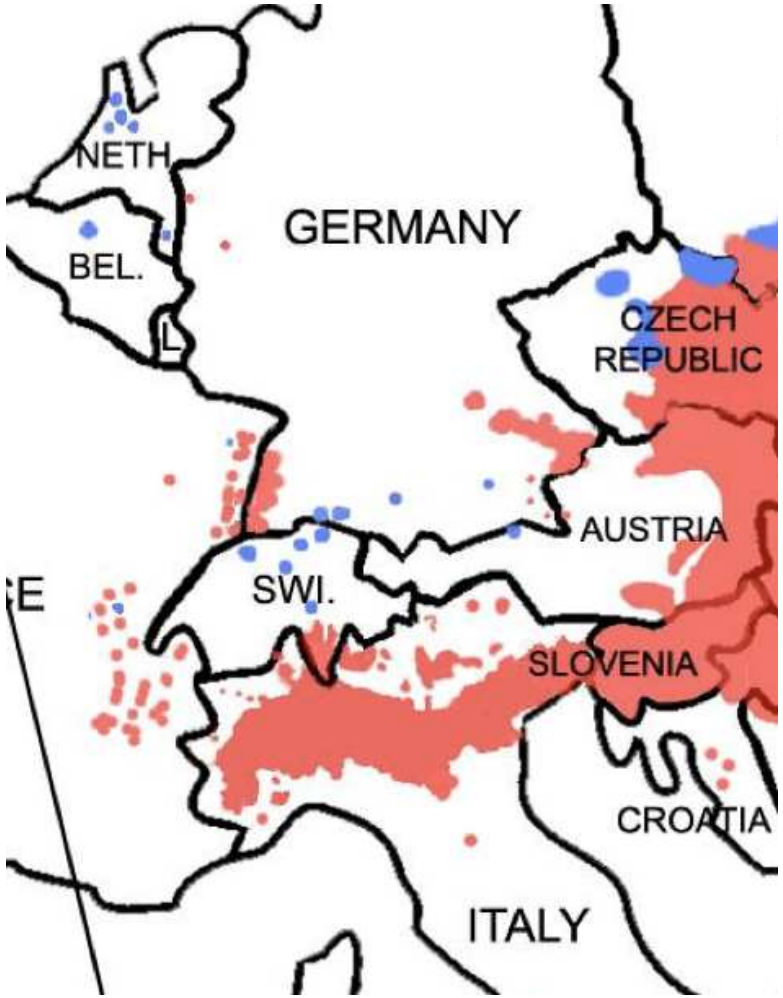
Effect of variety and crop sequence on *F. graminearum*





Vogelgsang et al. 2011

Crop rotation to prevent damage by the Western Corn Rootworm



Barriers Farmer‘s economy, farm structure,

Incentives Ban of insecticides, decrees, environment (e.g. water prot. zones)

Biological control of the European corn borer with *Trichogramma*






Facts

- *Trichogramma* is used on 150‘000 ha of maize
- Efficacy is comparable to insecticides

Barriers

- Costs are higher than insecticides
- Application on large farms is laborious
- Farmers have to learn a new system

Incentives

- Technical difficulties with insecticide applicat.
- No secondary pest outbreaks
- Appropriate for small/medium sized farms
- Subsidized in some countries/regions

IPM in protected crops - a multi-pest approach

Courtesy J.C. van Lenteren, Wageningen Univ., NL

Facts

- Intensive production of high value crops requires high protection level
- Uniform environment offers optimal conditions for pests
- Large areas of glasshouses concentrated in same location

From pesticides to IPM and biocontrol

Barriers

- New systems to learn

Incentives

- No pest resistance to pesticides
- Worker safety and pesticide use
- Less phytotox and higher yield
- Use of pollinators
- No waiting period for harvest, no residues

Courtesy J.C. van Lenteren, Wageningen Univ., NL

Worldwide use of pheromones for mating disruption in 2011

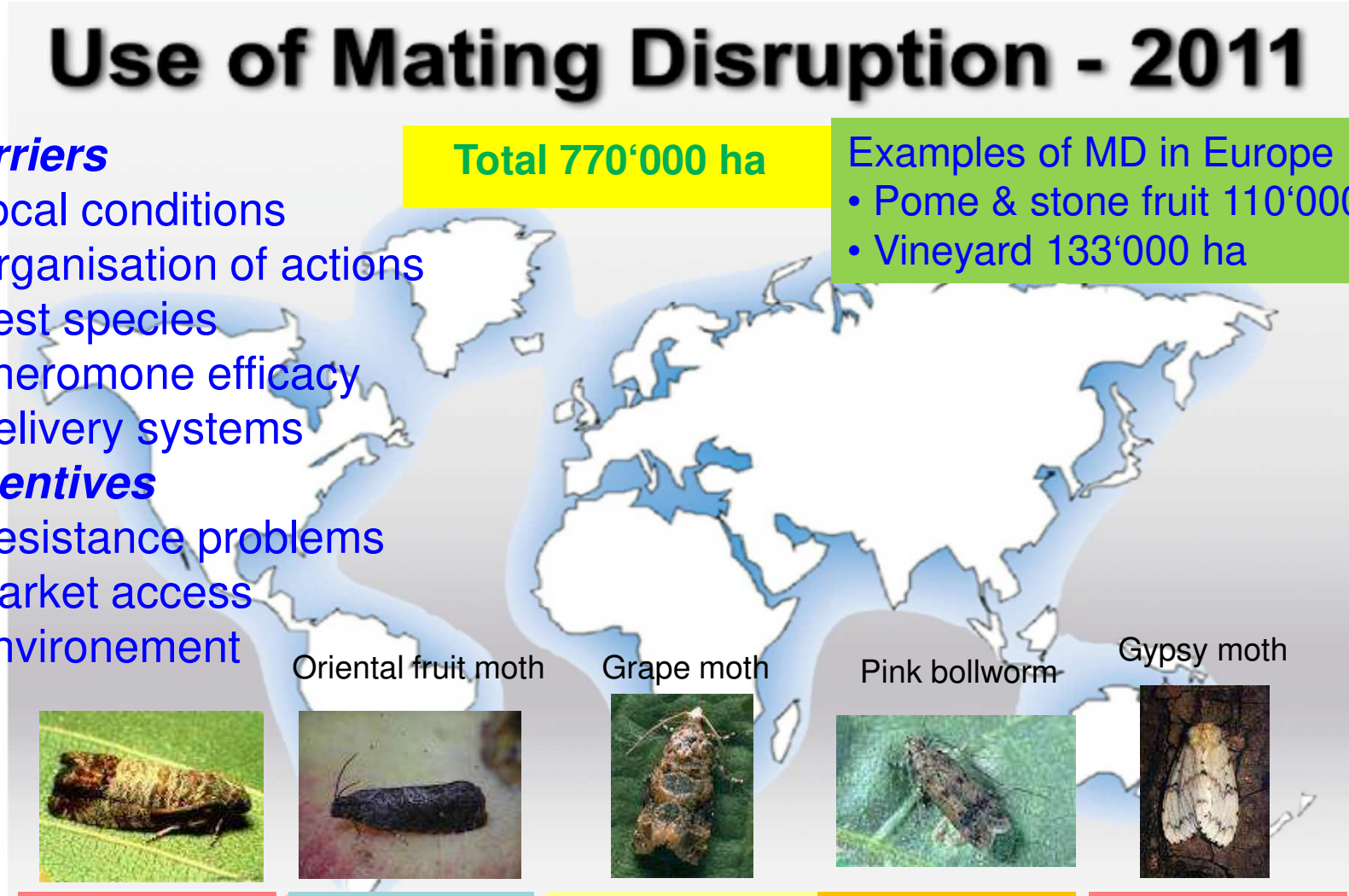
Use of Mating Disruption - 2011

Barriers
- Local conditions
- Organisation of actions
- Pest species
- Pheromone efficacy
- Delivery systems

Incentives
- Resistance problems
- Market access
- Environement

Total 770‘000 ha

Examples of MD in Europe
- Pome & stone fruit 110‘000 ha
- Vineyard 133‘000 ha



Oriental fruit moth	Grape moth	Pink bollworm	Gypsy moth
CP:204‘000 ha	CM:58‘000 ha	LB:152‘000 ha	PG:78‘000 ha	LD:154‘000 ha

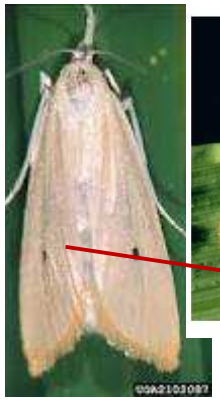
European vineyards with mating disruption in 2010




Country	Total vineyard surface (hectares)	Vineyard treated with MD (hectares)	%
Germany	102,000	70,000	68.6
France	867,000	20,000	2.3
Italy	847,000	16,500	1.9
Spain	1,169,000	14,500	1.2
Switzerland	14,800	7,000	47.3
Austria	49,900	2,400	4.8
Czech Republic	17,700	1,300	7.3
Portugal	248,000	1,200	0.5
Hungary	75,000	300	0.4
Slovakia	17,600	100	0.6
Cyprus	15,300	100	0.7
Total	3,423,300	133,400	3.9

Thomson and Jankins, 2012

Mass trapping of the Rice stem borer in the Ebro Delta, Spain

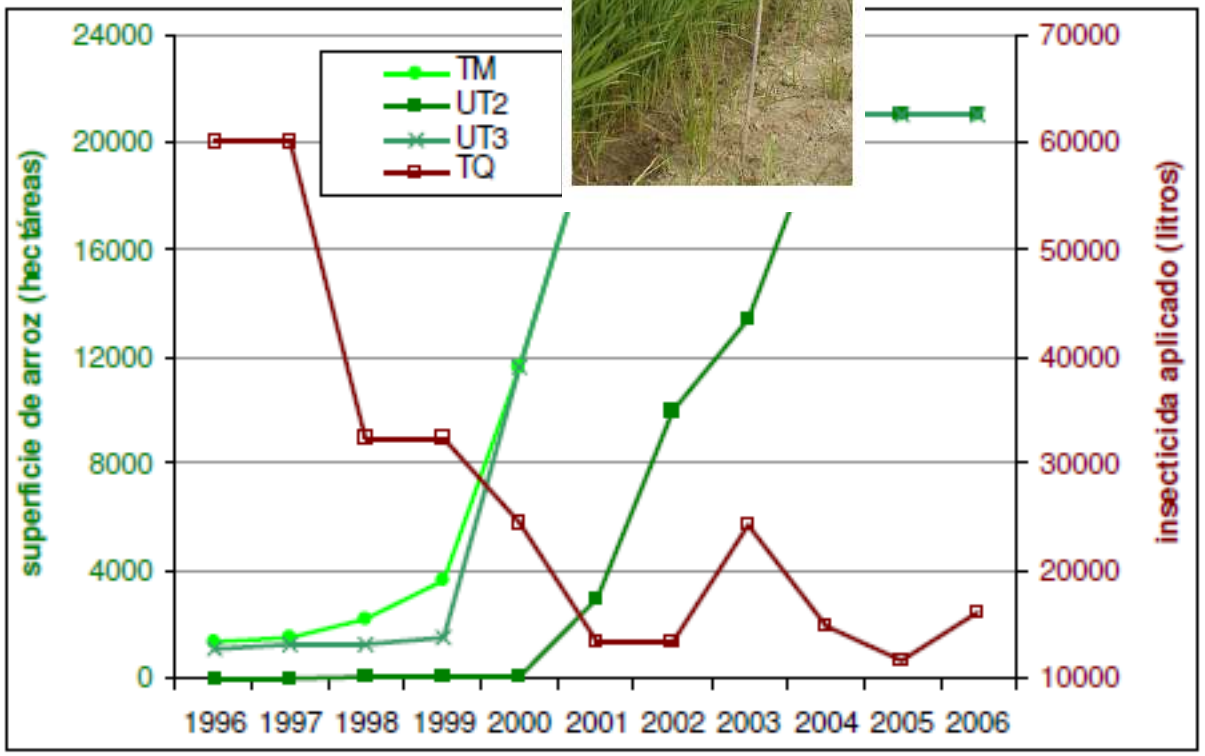


Barriers

- New technology

Incentives

- Environment (nat. res.)
- Fish production
- Tourism
- High income from rice



Sterile Insect Technique & CS against the Medfly in fruit crops

Facts

- Key pest in Med.Regions on many fruit crops
- Heavy insecticide use
- SIT technology used on 152‘000 ha of fruit crops in 2010
- Traps with chemosterilant bait

Barriers

- New system, efficacy unknown, costs

Incentives

- Export to USA & CND (strict quarantine regulations, market)
- Areal application prohibited
- Good control of Medfly (SIT & chemosterilants)

Lessons learned from case studies

- IPM is a valid and solid concept for pesticide reduction in all crop types. IPM is resource efficient and economic
- Major incentives for farmers to apply IPM are economic benefits e.g. market access, problems with pesticides (resistance, environment, residues, health), techn. difficulties, government decrees
- Lots of alternatives are available and waiting to be adopted by farmers (slow technology transfer!)
- Added value to health and environment by IPM must pay off for farmers

Thank you for your attention and join IOBC now!

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