



Crop case and system case studies

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FOOD
QUALITY
AND
SAFETY



ACTA



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Crop case studies

Objectives

- Exploit the *current knowledge* on optimised pesticide use in existing cropping systems
- Develop optimised crop protection strategies and applied them in different agro-ecological contexts
- Change end-user practice from a 'pesticide only and no-risk attitude' towards a more integrated strategy

Crop case and system case studies in ENDURE



Crop case studies

– Crops should represent different domains of crops:

- Major and minor crops
- Annual and perennial crops
- Arable and vegetable crops
- Field and glasshouse crops

Crop case and system case studies in ENDURE




Crop case studies

- Wheat
- Potato
- Tomato
- Pomefruit
- Integrated Weed Management (Maize)
- Maize
- Field vegetables
- Banana
- Grapevine



Crop case studies

-  Focus on one specific crop pest issue, e.g. fungal diseases in wheat, late blight in potato and whiteflies in tomato

Output:

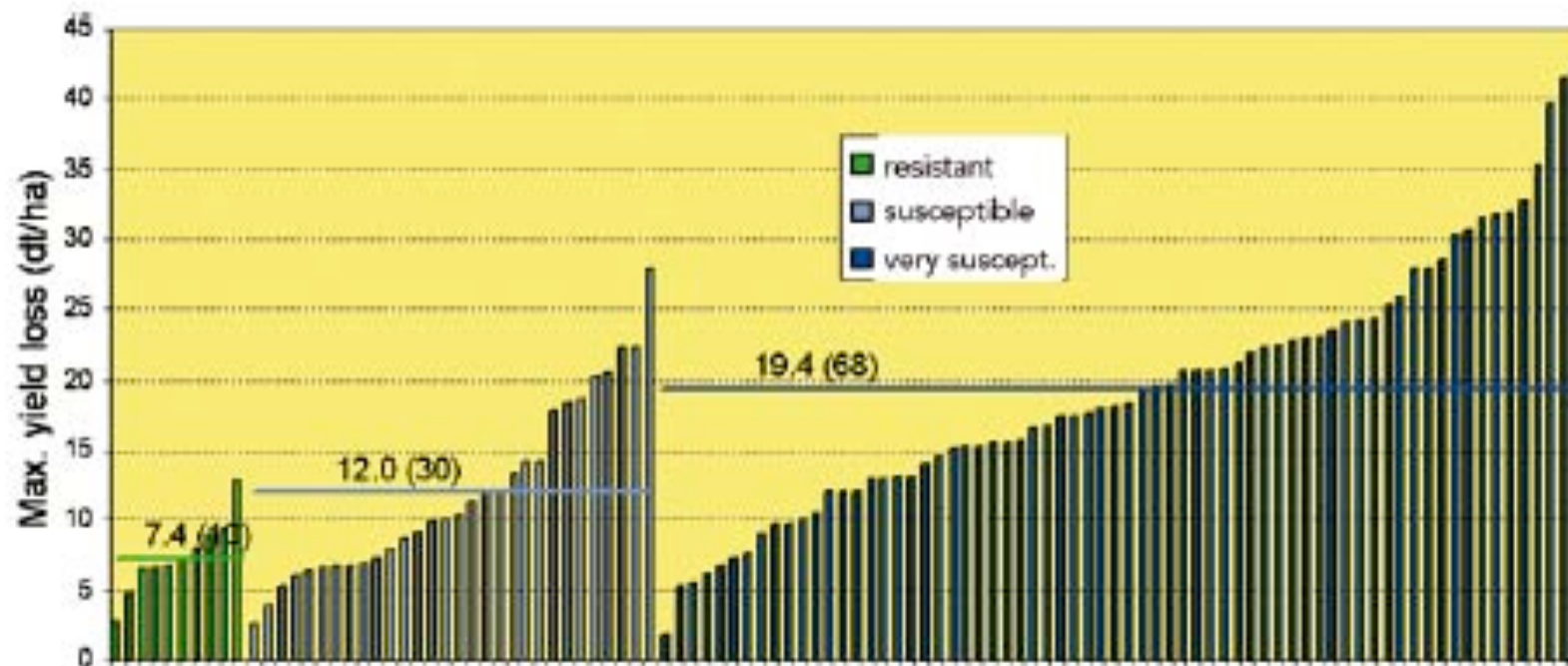
- Reports
- Guides for advisors and farmers (From Science to Field)
- Input to Endure Information Centre

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Wheat

Significans of cultivar resistance



Source: 108 trials in France

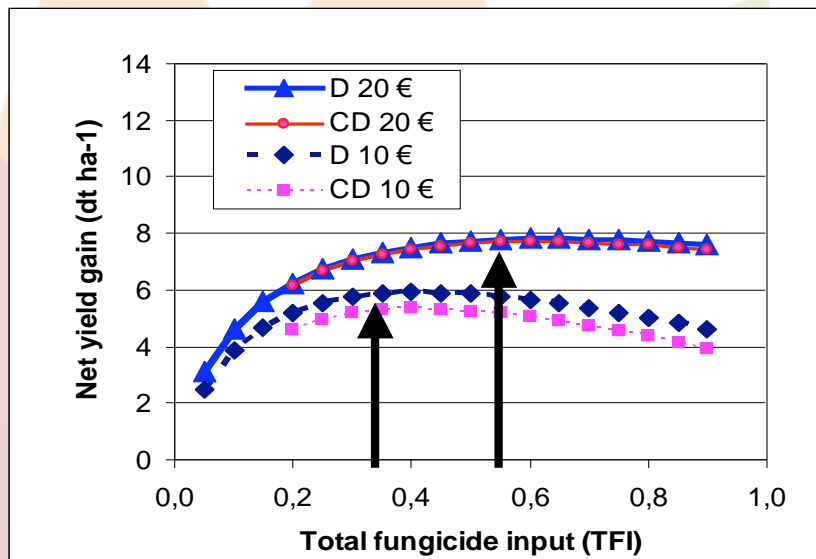
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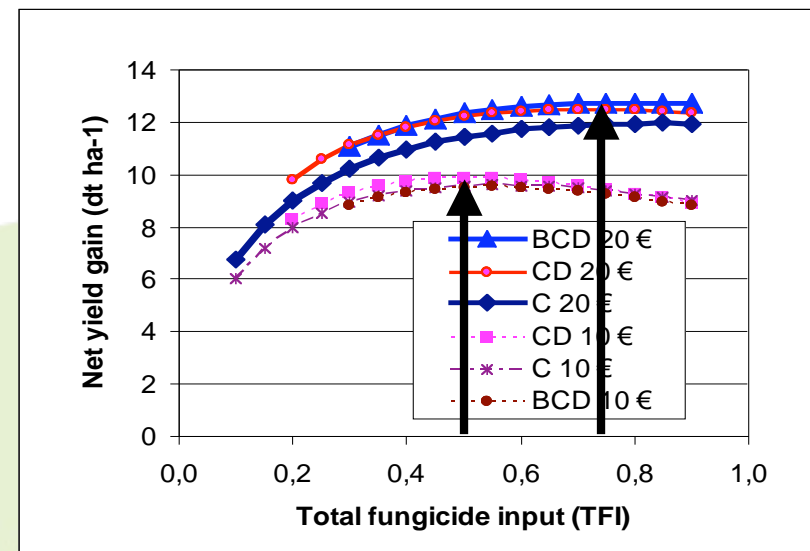
Wheat

Cultivar resistance and fungicide requirement

Resistant cultivar



Susceptible cultivar



A: GS 25-31, B: GS 32-36, C: GS 37-50, D: GS 51-64

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FOOD QUALITY AND SAFETY



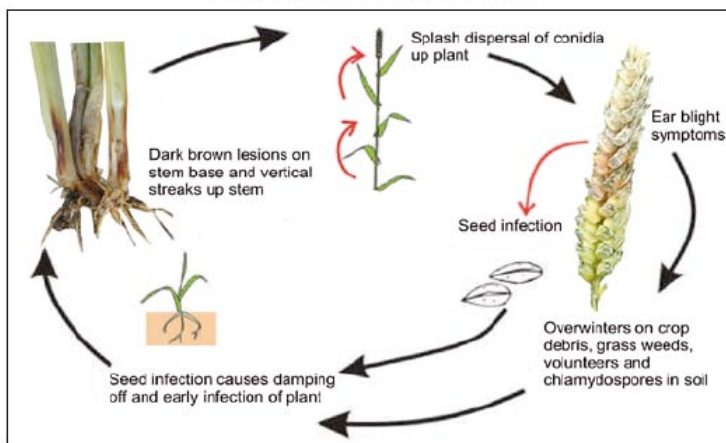
Wheat Fusarium

DON risk assessment grid on wheat ARVALIS-Institut du végétal 2008

Previous crop	Tillage	Varietal susceptibility	Risk category
Cereals, oilseed rape, flax, peas, beans, sunflowers	Ploughing	Low susceptibility	1
		Medium susceptibility	1
	No ploughing	Susceptible	2b
		Low susceptibility	2a
		Medium susceptibility	2a
		Susceptible	2b
Sugar beet, potatoes, soya, others	Ploughing	Low susceptibility	2a
		Medium susceptibility	2a
	No ploughing	Susceptible	2b
		Low susceptibility	2a
		Medium susceptibility	2a
		Susceptible	3
Grain maize, sorghum (forage maize)	Ploughing	Low susceptibility	2a
		Medium susceptibility	(2a) 2b
	No ploughing	Susceptible	3
		Low susceptibility	(3) 4
		Medium susceptibility	(4) 5
		Susceptible	(5) 6

Figure 4: Decision key for DON risk (Source: Arvalis, France)

Typical life cycle of *Fusarium* species in wheat.



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Wheat EuroWheat

EuroWheat
Home Project Information Pathogens Fungicides Cultivars Decision support Public documents

02 November 2009

Login
Login name:
Password:

2nd Workshop

Participants at the 2nd EuroWheat workshop at Julius Kuehn Institute, Berlin, Germany, 11th-12th March 2009.

Survey on the use of disease thresholds
New guideline on monitoring of diseases in wheat and a survey on control thresholds used in different countries.

[Read more...](#)

Welcome to EuroWheat
EuroWheat is an Internet based platform aiming at collating and displaying host- and pathogen characteristics, and pesticide efficacy on a European scale. Bringing together existing information from national programs and ensuring that these data are in a format, which can be readily understood trans-nationally, are expected to provide significant added value on a European scale. New disease- and resistance data will be published on the platform as soon as possible to support effective disease control, deployment of host resistances and breeding programs.

Present information available are:

- Virulences in the yellow rust population
- Ranking of wheat cultivars for susceptibility to Fusarium and different testing methods
- Disease names in six different languages
- Effectiveness of fungicides ranked in different countries
- Fungicides international trade names
- Fungicide resistance as present in Europe
- Survey on pesticide use and yield responses to fungicides in EU countries
- Yield level and yield losses from specific diseases in 8 EU countries
- Information on disease thresholds and DSSs used in Europe
- Cultural practices impact on disease development
- National documents on disease management

EuroWheat is funded by the ENDURE project and Aarhus University.

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Web site provided by Aarhus University, Faculty of Agricultural Sciences, Department of Agronomy and Environment
Report technical problems to webmaster: Eoul.Lassen@aarso.dk
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Comparison of Fungicide efficacy across countries

Find information on the efficacy of the most important compounds against cereal diseases across countries in Europe. [Read more...](#)
In 2009, information will be provided on fungicide resistance cases in specific pathogens by country.

Yellow rust pathotypes in Europe

New data for 2008 have been uploaded.
Most important pathotypes in Europe 1993-2008...
Evolution of pathotypes over years and countries
[Pathotypes on Europe map](#)

<http://www.eurowheat.org/images/group2009.jpg>

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Potato

Late blight



Reducing primary inoculum sources

Decision Support Systems

Performance of fungicides

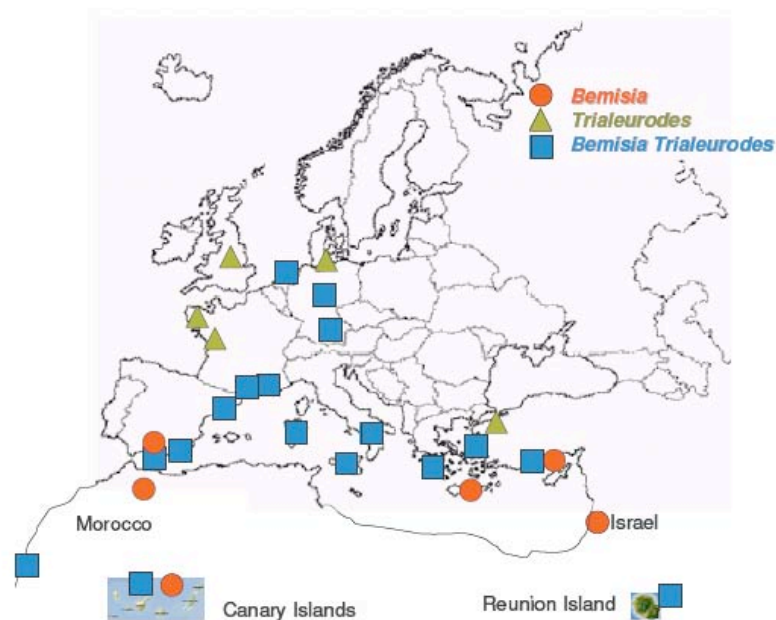
Cultivar resistance

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Tomato

Whiteflies – occurrence of pest and virus



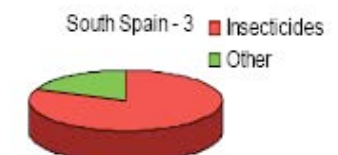
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Tomato

Whiteflies – occurrence of pest and virus

Area	Cycle	Total surface (ha)	%Chemical	% IPM-Insec.	%IPM-BC	% Organic
Germany	A	3	-	-	90,5	9,5
	C	17	6	18	70	6
South France	A	20	-	18	72	10
	B	35	-	100	-	-
	C	50	-	20	80	-
North Spain-1	A	31	11	19	69	1
	B	18	7	8	69	16
North Spain-2	A	17	30	50	20	-
	B	15	30	50	20	-
South Spain	A	6700	3	78	19	-
	B	3300	7	58	35	-



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Tomato

Whiteflies – tools to manage the pest



Chemical control

Biological control

Exclusion

IPM strategies



Pomefruit

Scab, brown spot and codling moth -
State of art of prevention and control strategies

- 🌻 Lake Constance (Germany and Switzerland),
- 🌻 Cataluña (Spain),
- 🌻 Emilia Romagna, South Tirol and Trentino (Italy)
- 🌻 Rhone Valley (France)
- 🌻 Belgium
- 🌻 The Netherlands
- 🌻 Sweden.

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Pomefruit

Integrated control of codling moth

Element of the strategy: Population Monitoring: Pheromone traps				
State of the art		Ready	Under development	
		9	0	
Perspectives for (further) implementation		Negative	Neutral	Positive
		2	2	3
Obstacles	None	Labour	Economic	Practical
	X			
Use in practice (% of growers)		From 5% to 100% in IPM strategies.		

Element of the strategy: Decision Support Systems: Tolerance Thresholds				
State of the art		Ready	Under development	
		5	2	
Perspectives for (further) implementation		Negative	Neutral	Positive
		0	1	3
Obstacles	None	Labour	Economic	Practical
	X			
Use in practice (% of growers)		Lower than for phenology models.		



Pomefruit

Scab, brown spot and codling moth -
State of art of prevention and control strategies

Conclusions:

- Knowledge of integrated control well known
- Modern communication technologies are used
- Importance of different tools the same in the North and South
- New EU member states could profit from existing tools
- Bottlenecks exists, e.g. acceptance of resistant cultivars and technical and economic reasons



Integrated Weed Management Comparing strategies in maize



- Standard chemical treatment
- IWM (inter-row cultivation + chemical)
- Advanced IWM (less herbicide than IWM)

Pisa (I), Dijon (F) & Flakkebjerg (DK)



Integrated Weed Management Comparing strategies in maize



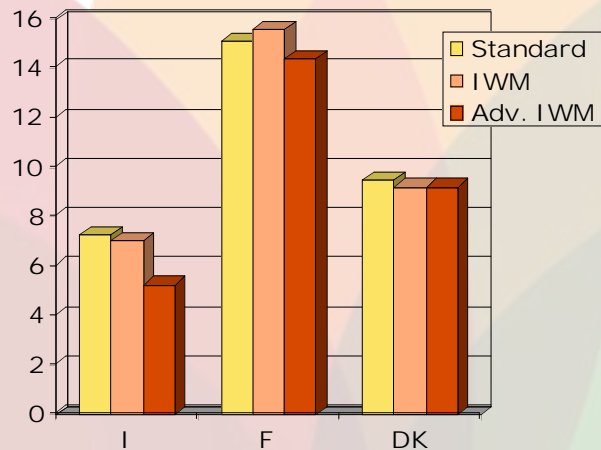
- Standard and IWM provided similar weed control
- Advanced IWM provided poorer weed control in Pisa but not in Dijon and Flakkebjerg

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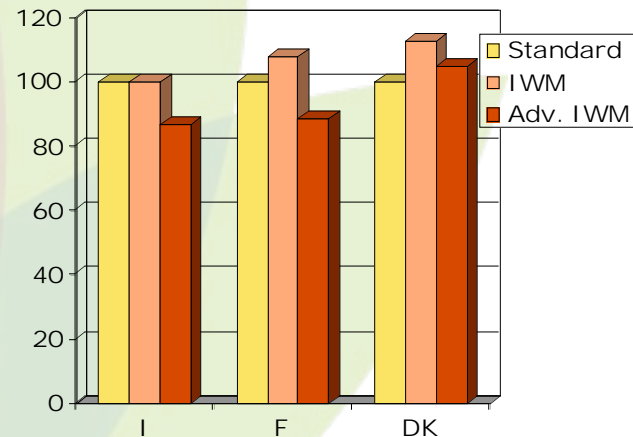


Integrated Weed Management Yields, costs and environmental impact

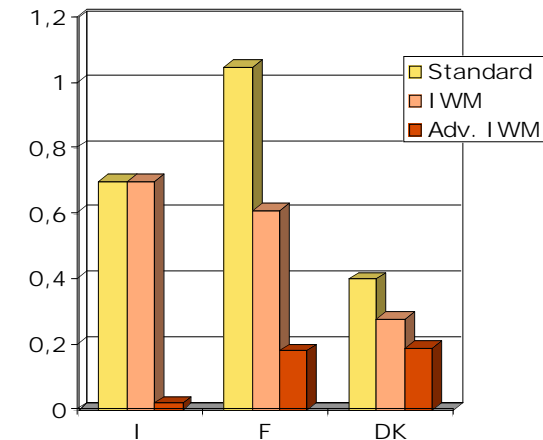
Cob yield (t DM/ha)



Relative costs



Environmental index
(I_{pest})





Integrated Weed Management

Other options for Integrated Weed Management

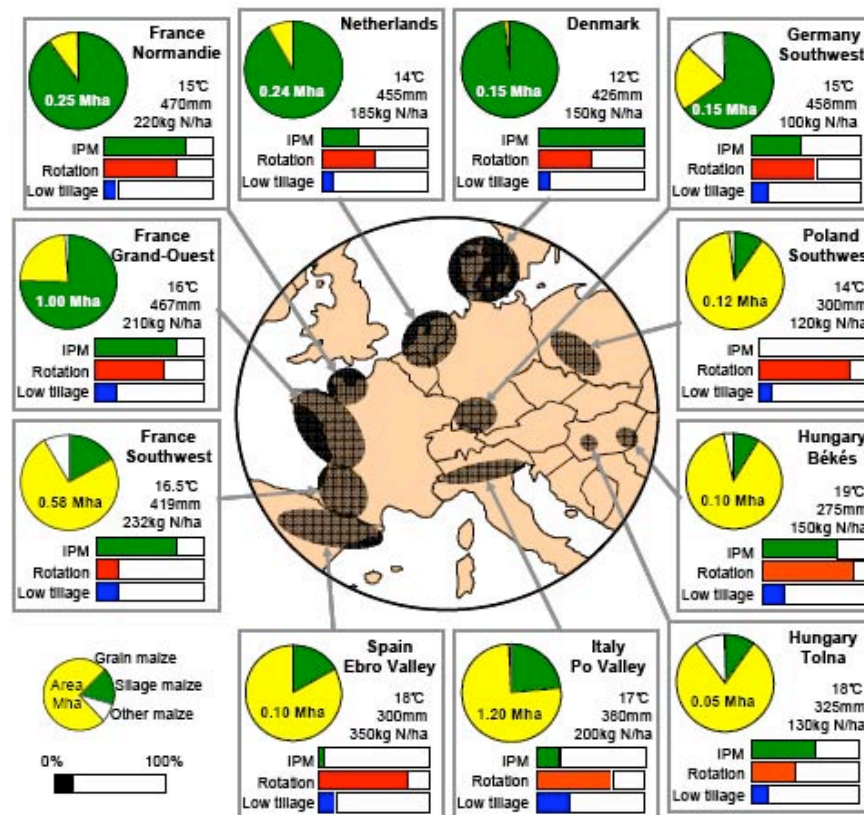
- Crop rotation
- Stale seedbed
- Cover crops
- Intra-row cultivation

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Maize

Key pests and options to reduce pesticides in eleven European regions



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Maize

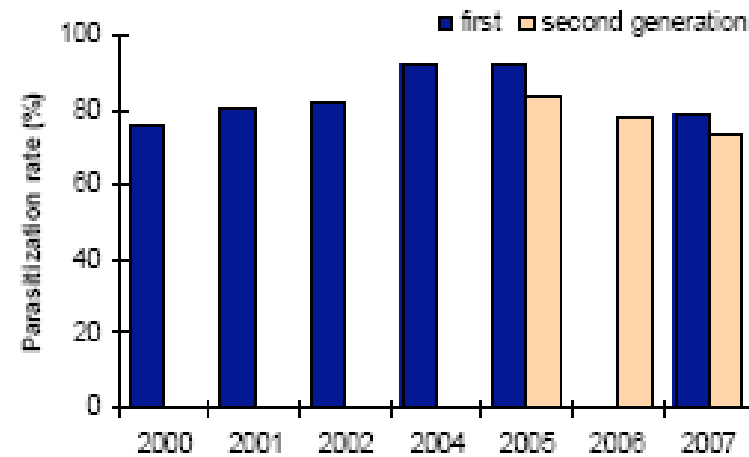
Importance, occurrence and population development of insect pests

Order	Species	Hungary Békés	Hungary Tolna	Italy Po Valley	Spain Ebro Valley	France Southwest	France Grand-Ouest	France Normandie	Netherlands	Denmark	Germany Southwest	Poland Southwest
Lepidoptera	<i>Ostrinia nubilalis</i> (Pyralidae)	→	→	→	→	↑	+	+			↑	→
	<i>Sesamia nonagrioides</i> (Noctuidae)			+	→	↑	+				+	
	<i>Agrotis</i> spp. (Noctuidae)	→	→	+	→	+	+	+	+	+	+	+
	<i>Helicoverpa armigera</i> (Noctuidae)	→	→	↑	↑	+					+	+
Coleoptera	<i>Diabrotica virgifera virgifera</i> (Chrysomelidae)	→	→	↑							+	↑
	<i>Agriotes</i> spp. (Elateridae)	+	→	→	+	→	+	+	+	+	→	→
Stemorrhyncha	Aphididae	→	↑	+	→	→	+	+	+	+	→	→
Diptera	<i>Oscinella frit</i> (Chloropidae)	→	→	+	+	→	→	→	→	→	→	↑
Auchenorrhyncha	<i>Zyginidia scutellaris</i> (Cicadellidae)	→	→	→	→	→	→				→	+

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Maize European corn borer



Parasitization rate of first and second generation ECB after mass release of *Trichogramma* wasps

Source: Biotop, Valbonne, France

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Maize Fusarium



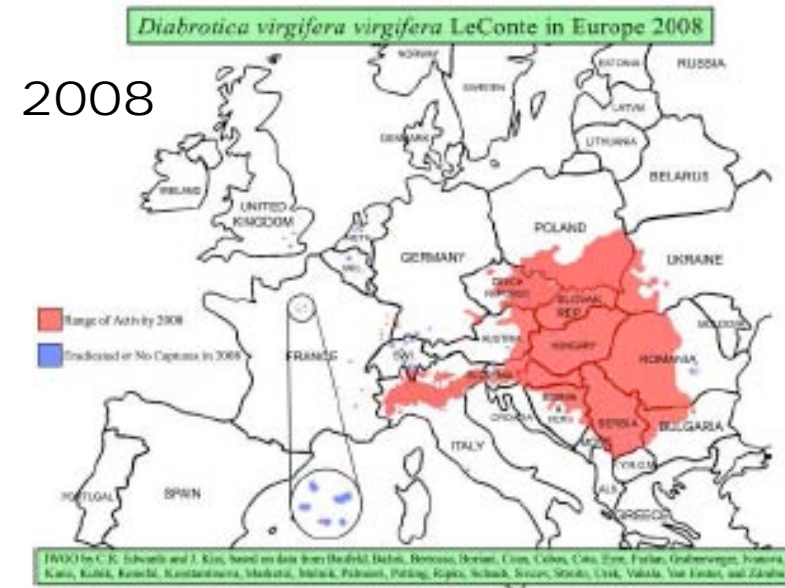
Management Factors	Impact
Strategic	
<i>Crop rotation</i>	High
<i>Crop residue management</i>	High
<i>Good nutrient supply</i>	Medium
Tactical	
<i>Variety choice</i>	Medium
<i>Seed quality</i>	Low
<i>Sowing time</i>	Low
<i>Crop structure</i>	Low
Control measures	
<i>Disease control</i>	Low
<i>Weed control</i>	Low
<i>Insect Control</i>	High
<i>Harvest and storage</i>	High

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Maize

Western Corn Rootworm





Field vegetables

Tasks:

- PPP (including BCA) availability in selected EU countries (*major differences*)
- Evaluation of past and ongoing research on soil fumigation and steaming
- Joint experimentation
- Landscape management to improve biological control



System case studies

- 🌻 Identify science-based sources of innovation for implementing alternative crop protection strategies (from basic research and case studies)
- 🌻 Promote a system approach and explore the potential of ecological approaches
- 🌻 Identify relevant criteria for assessing the sustainability of crop protection strategies
- 🌻 Design *ex ante* assessment tools through knowledge-based models that would make it possible the evaluation of innovative strategies



System case studies

Designing innovative crop protection strategies requires:

- that emerging technologies are considered (DNA-based detection techniques, robotics, IT, etc),
- that new sources of resistance genes are explored
- that the potential of landscape management of cropping systems or deployment of semiochemicals for reducing pest incidence are considered
- etc.



System case studies

- 🌿 **Orchard systems**
- 🌿 **Winter crop-based systems**
- 🌿 **Maize-based systems**



System case studies

Maize-based systems

Status

- Describing current systems in different regions
- Proposing advanced systems making use of existing tools and technologies



System case studies

Maize-based systems

- 🌽 **MS1: Silage maize, in rotation, irrigated**
- 🌽 **MS2: Silage maize, in rotation, not irrigated**
- 🌽 **MS3: Silage maize, not in rotation, irrigated**
- 🌽 **MS4: Silage maize, not in rotation, not irrigated**
- 🌽 **MS5: Grain maize, in rotation, irrigated**
- 🌽 **MS6: Grain maize, in rotation, not irrigated**
- 🌽 **MS7: Grain maize, not in rotation, irrigated**
- 🌽 **MS8: Grain maize, not in rotation, not irrigated**

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System case studies Maize-based systems

Practices	MS1-MS5	MS3-MS7	MS6
Field margin management	X		
Early detection	X		
Major tillage (ploughing)	X		
Crop resistance	X	X	
Crop choice in rotation	X		X
Variety choice	X		
Early sowing	x	x	X
Insecticides	X	X	X
Seed treatments	x	x	X



System case studies

Maize-based systems

Status

- Describing current systems in different regions
- Proposing advanced systems making use of existing tools and technologies
- Compare the economic, environmental and social sustainability of the current and advanced systems using DEXiPM
- SWOT (Strengths Weaknesses Opportunities Threats) analysis



System case studies

Maize-based systems

Future activities

- Design innovative systems
- Compare the economic, environmental and social sustainability of the innovative systems to that of the current and advanced systems using DEXiPM

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Thank you for your attention

Questions?