



# GM / non GM maize crops in France



XVth Eurofins International Seminar  
Paris, 23th February 2007



# The A.G.P.M.

## French Corn Growers Association



AGPM  
maiz'EUROP

- The maize organisation since 1934
- 150 000 maize growers
- Maize in 2006 :
  - 1,5 million ha of grain maize
  - 1,4 million ha of silage maize
  - 23 000 ha of sweet corn
  - 38 000 ha of seed maize
- 2 main missions :
  - *An economic mission and trade-union : maize growers income*
  - *A lobbying mission at national and international levels*



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# AGPM position on the GM maize



- ✓ Liberty of choice
- ✓ Scientific evaluation and regulatory rules :
  - ↪ G.M. event : E.F.S.A. and national food safety agencies
  - ↪ G.M. varieties : national Agencies in charge of the variety registration
- ✓ The G.M. varieties have assets :
  - on a technical view
  - on a environmental view
  - on an economic view



# GM maize production in France

## History and EU context



1997 - 1998

1999 - 2004

15 G.M.  
varieties  
registered

1 800 ha  
G.M. maize

No commercial production  
No market !

- New EU rules on traceability and labeling
- The chain maize works to determine practical rules for coexistence (2002 to 2004)



# GM maize production in France



## History and EU context

### 2005 / 2006

Commercial productions engaged or re-initiated within the European Union

with the implementation of the official / professional rules based on scientific programs

Country	2005	2006
Czech Republic	300 ha	1 300 ha
Germany	250 ha	1 000 ha
Portugal	800 ha	1 300 ha
Spain	53 000 ha	54 000 ha
France	500 ha	5 200 ha
Total	55 000 ha	63 000 ha



# Research program : POECB



## Components

"The French experience in co-existence management"

- **Goals**

- Study the coexistence between conventional and GM maize under field conditions

- Analyse the benefits of Bt technology

- Collect operational data in order to guarantee the traceability of the GM cultures from field to silo

- **Maize chain partners** : Cooperatives and Trade companies, Technical Institutes, Seed chain

- **Thematic**

- ① Pollen dispersal
- ② G.M. productions traceability
- ③ Co-existence management

**POECB**

Programme Opérationnel d'Évaluation des Cultures issues des Biotechnologies



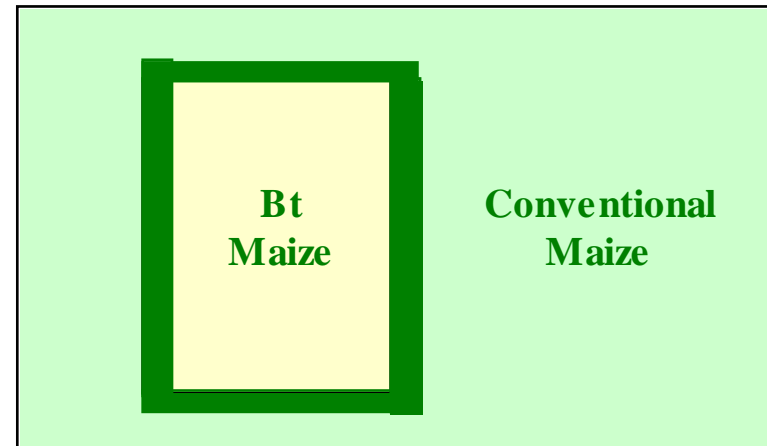
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# Research program : POECB



## Experimental device for pollen dispersal study

- 3 years experiment (2002 - 2004) on 7 locations
- Identical crop configuration : plot of Bt maize surrounded by isogenic conventional maize



- Worst-case scenario conditions :
  - *Bt maize and conventional maize are isogenic*
  - *Synchronous flowering*
  - *Conventional maize is sowed downwind of the Bt emitter crop*



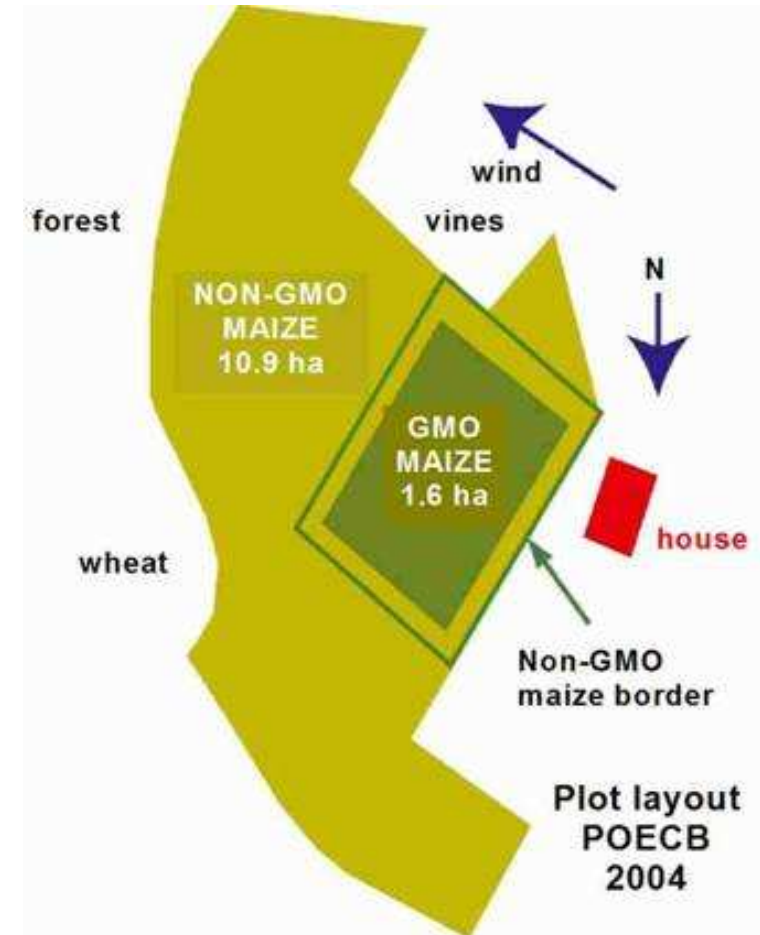
# Research program : POECB

## Pollen dispersal results

Mean values of the G.M. contents depending on the conventional maize field depth

Field depth	GM content (% GM DNA)	
	Total field area	After eliminating 10m border strip
40 m	1.00%	0.75%
50 m	0.81%	0.50%
75 m	0.59%	0.39%
100 m	0.52%	0.29%
150 m	0.25%	0.14%
200 m	0.25%	0.17%
300 m	0.19%	0.13%

\* Average data on several POECB fields (2002/2003/2004)



↪ Cross-fertilization levels in the conventional field identical in size to the Bt plot, and sowed downwind, are less than 0.9 %.

↪ A ten-metre buffer zone leads to a strong decrease of GM DNA contents in conventional plots.

# Research program : POECB

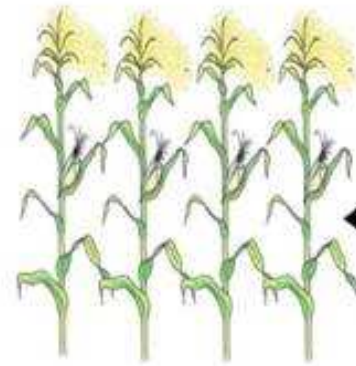
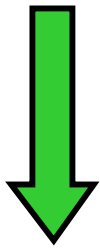
## Pollen dispersal results



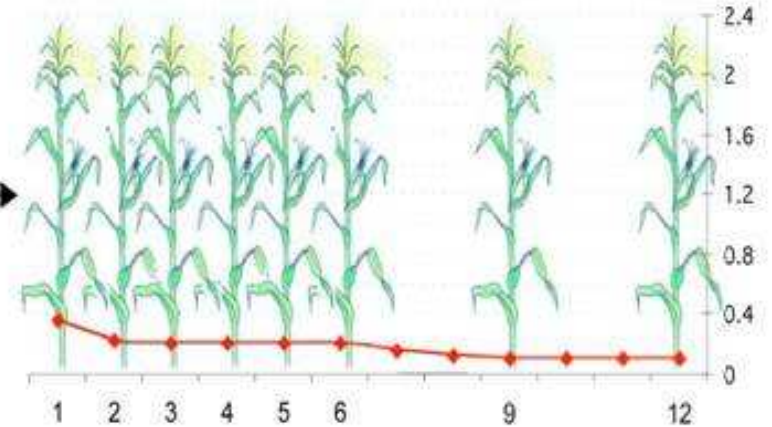
### GM MAIZE

### CONVENTIONAL MAIZE

Situation 1



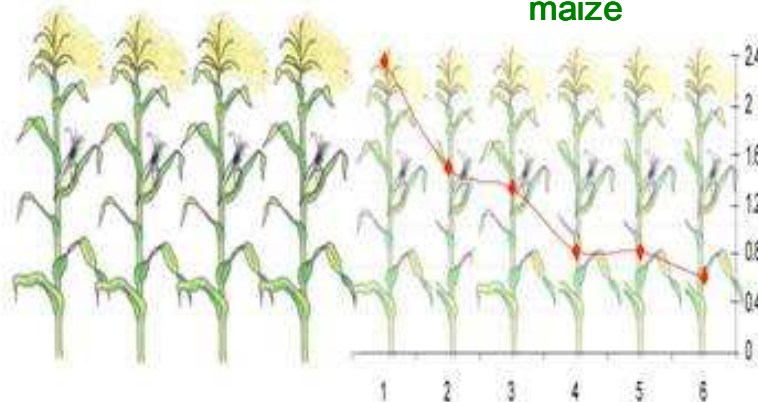
Distance d'éloignement  
18 mètres



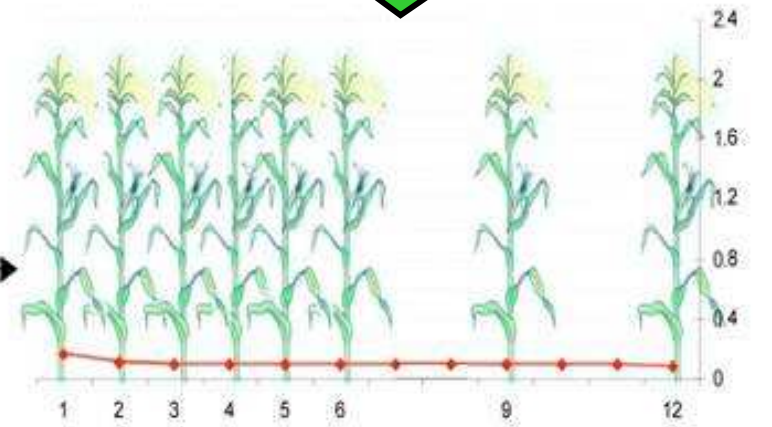
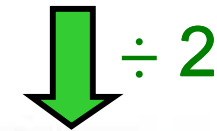
Situation 2



Conventional  
maize



Distance d'éloignement  
18 mètres



# Research program : POECB



## Pollen dispersal results

### French results similar to other EU countries results

- ↪ French P.O.E.C.B. experiment results are similar to those obtained in the Spanish study on the coexistence between Bt and non Bt maize.
- ↪ P.O.E.C.B. results are very close to German study, with G.M. contents slightly below over 10 to 20 m.
- ↪ Many other studies are conducted at present in the EU (UK, Switzerland, Belgium, Italy, ...)



# Research program : POECB



## Traceability from the field to the silo

### Setting up a Quality Management System with traceability procedures at each step of the maize chain :

- Drill cleaning after Bt sowing
- Harvest order preset
- Combine harvester control :  
Emptying harvester after GM maize harvest, and cleaning it with conventional maize → no detection of GMO in the conventional maize
- Transport control (trucks, documents)
- Drying procedures :  
To achieve GM levels lower than 0.9%, the necessary conventional maize volume depends on the initial GM maize moisture and quantity
- Feed industry :  
Only one conventional maize batch is necessary to clean the system after a GM maize batch (no cleaning between batches)

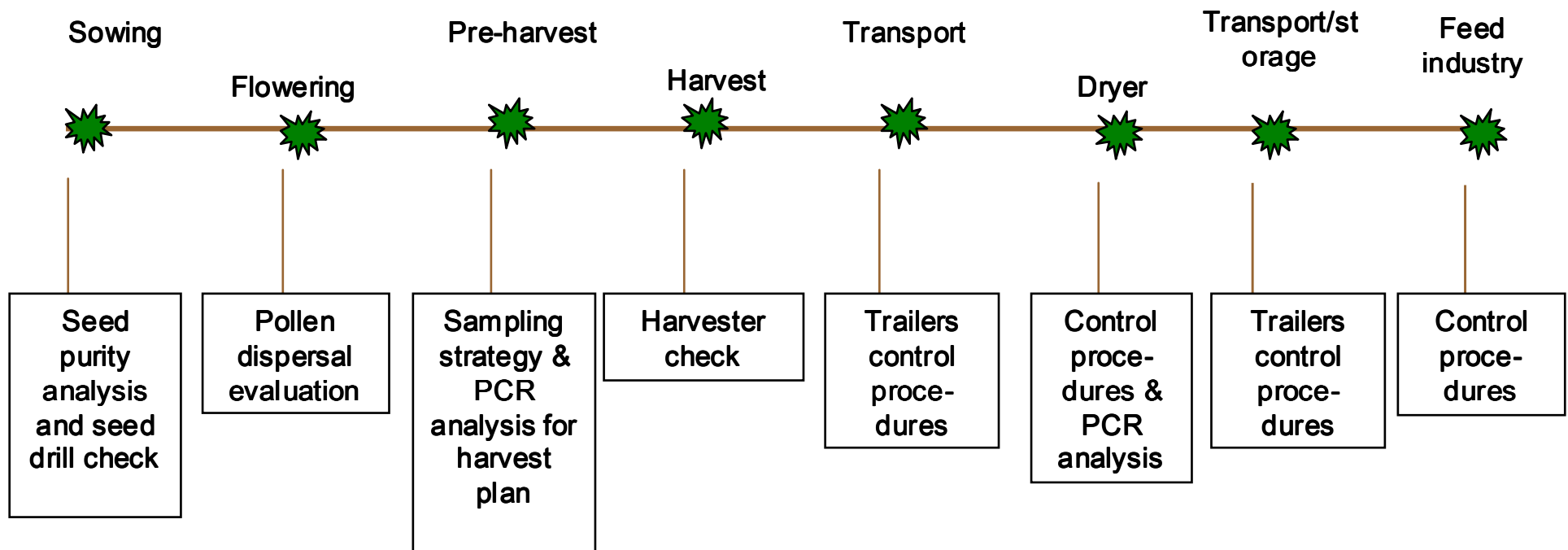


# Research program : POECB



To guarantee the traceability

*Analysis and controls along the maize chain to better identify admixture, ...*



*... to control critical factors and ensure traceability*

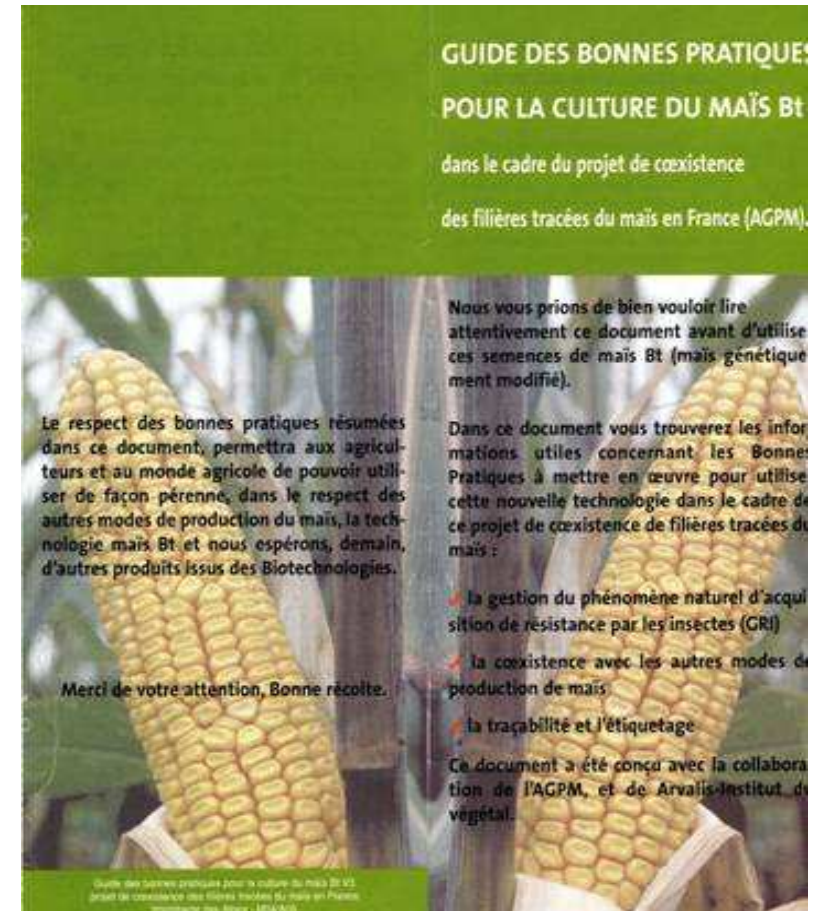
# From POECB to PACB : ensure the coexistence



## Coexistence guide for the GM and non GM crops

A professional guide ...

- Information
- Buffer zone
- Cleaning of equipment
- Quality management System



... which is a base for co-existence legislation  
in preparation in France.



# From POECB to PACB :

## ensure the coexistence



Pre-vulgarisation in 2005, technical support in 2006

Year	2005	2006
Maize growers	15	17
Bt maize area	80 ha	100 ha
Locations	7 departments	12 departments
Areas	South West France	All the main grain production areas
GM plots	From 1 to 20 ha	From 1 to 27 ha

**PACB**

Programme d'Accompagnement des Cultures issues des Biotechnologies

Scientific information gathered by POECB use in the “Good Practice guide for GMO cropping”, safeguarding the specificity of each type of production.



2006 :



## First large scale results in France

### Incidence of corn borer pressure on yield

A yield increase of 10% over conventional maize

Pest pressure	Difference with conventional maize (q/ha)	Technology cost * (euro/ha)	Economic gain ** (euro/ha)
Low	+ 5,5	40	+ 26,0
Average to high	+ 11,5	40	+ 98,0
Overall (13 trials)	+ 9,2	40	+ 70,4

\* Protection cost : 23 euros per dose (50 000 seeds) – Sowing density : 85 000 seeds/ha

\*\* Base selling price (average) for maize : 120 euros/ton

*Source : PACB 2006 (13 trials)*



2006 :

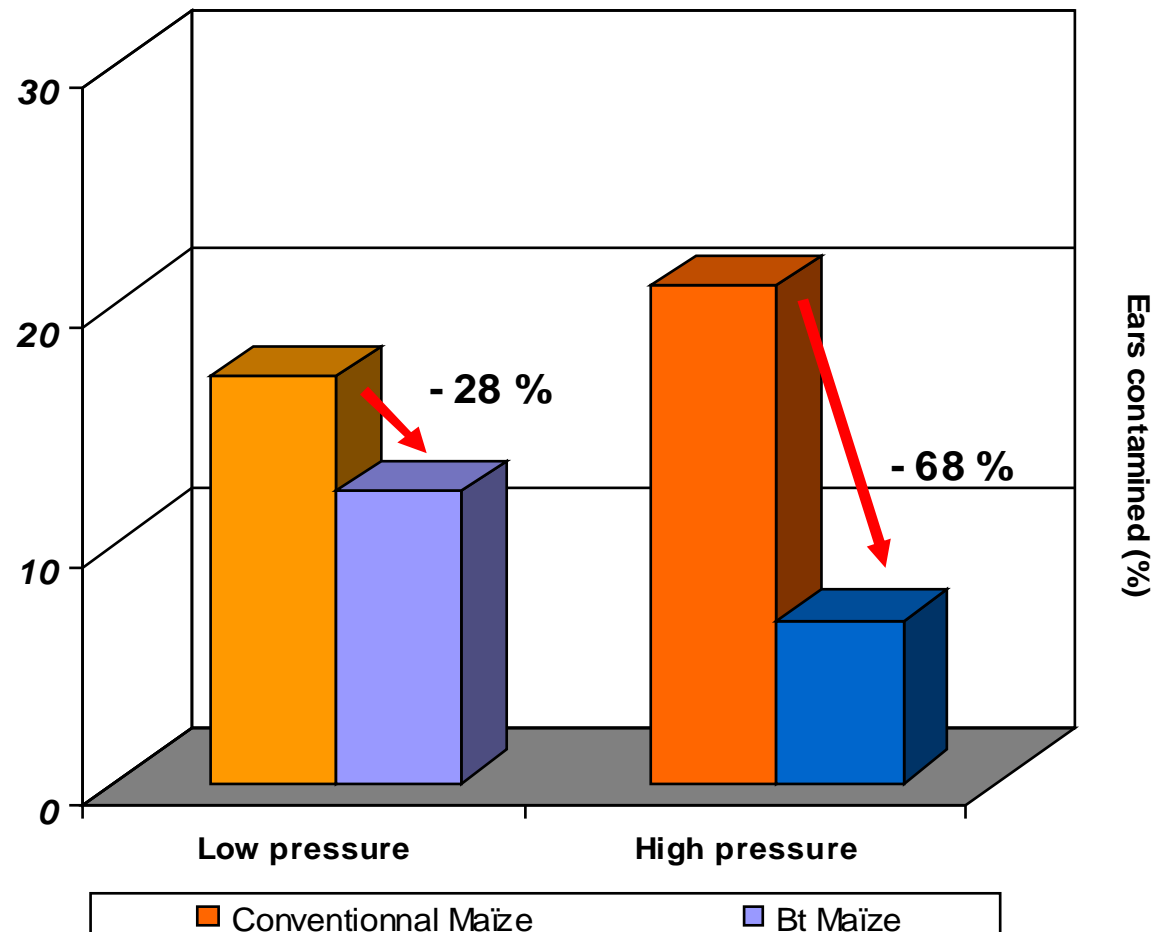


## First large scale results in France

### Incidence of corn borer pressure on grain quality

*Effect of Bt maize MON810 on F.moniliforme frequency on ears*

*In high pest pressure levels, efficacy on borers results in a reduction of the frequency F.moniliforme of 68%*



**Source : PACB 2006**

(13 trials)



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2006 :

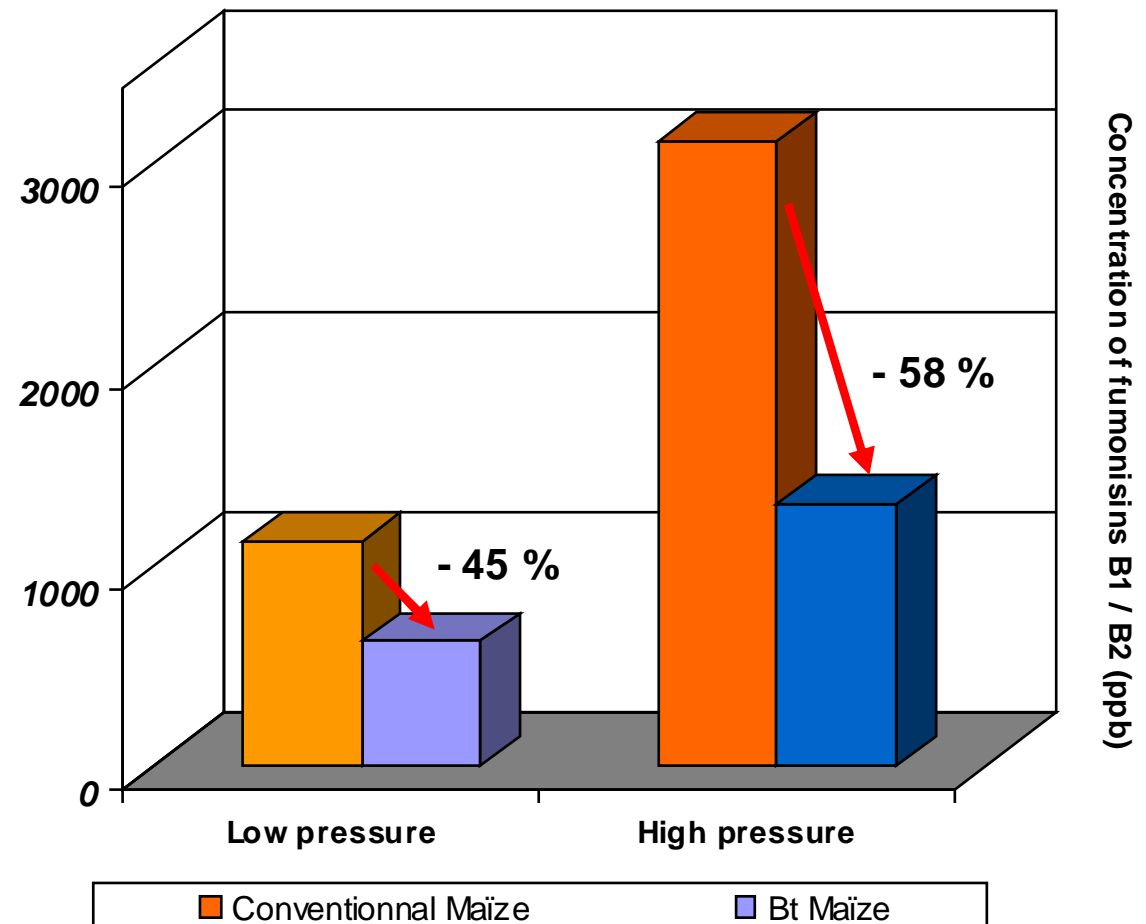


## First large scale results in France

### Incidence of corn borer pressure on grain quality

*Effect of Bt maize MON810 on Fumonisin concentrations in grain*

*Fumonisin concentration (B1 + B2) are reduced from 45% (low infestations) to 58% (high infestations)*



**Source : PACB 2006**  
(13 trials)



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2006 :



## First large scale results in France

Incidence of corn borer pressure on harvest easiness

GM MAIZE



CONVENTIONAL  
ISOGENIC MAIZE



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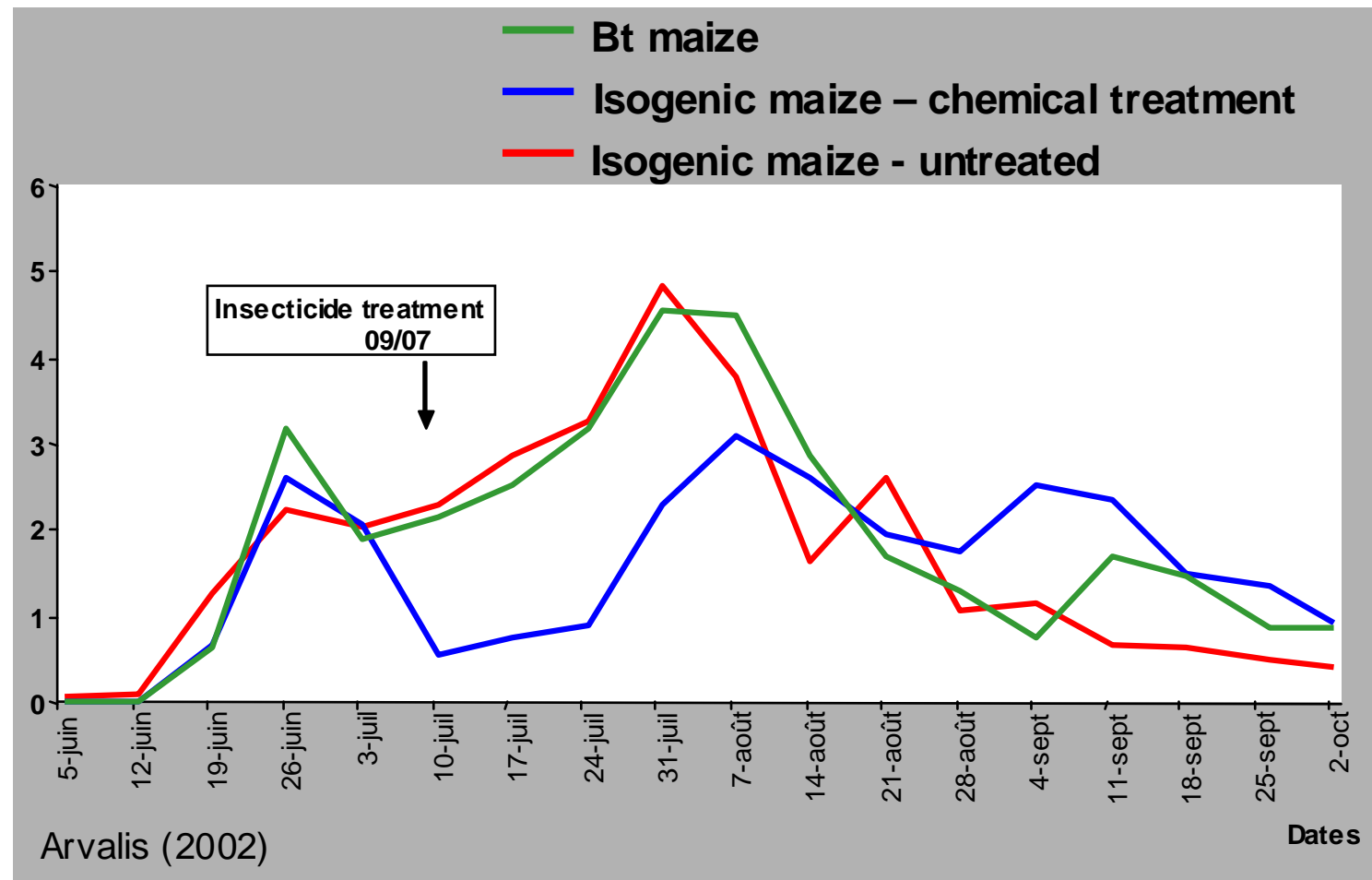
2006 :

## First large scale results in France

### Environmental benefits of Bt maize



*Evolution of non-target insects populations (beetles, ...)*



2006 :

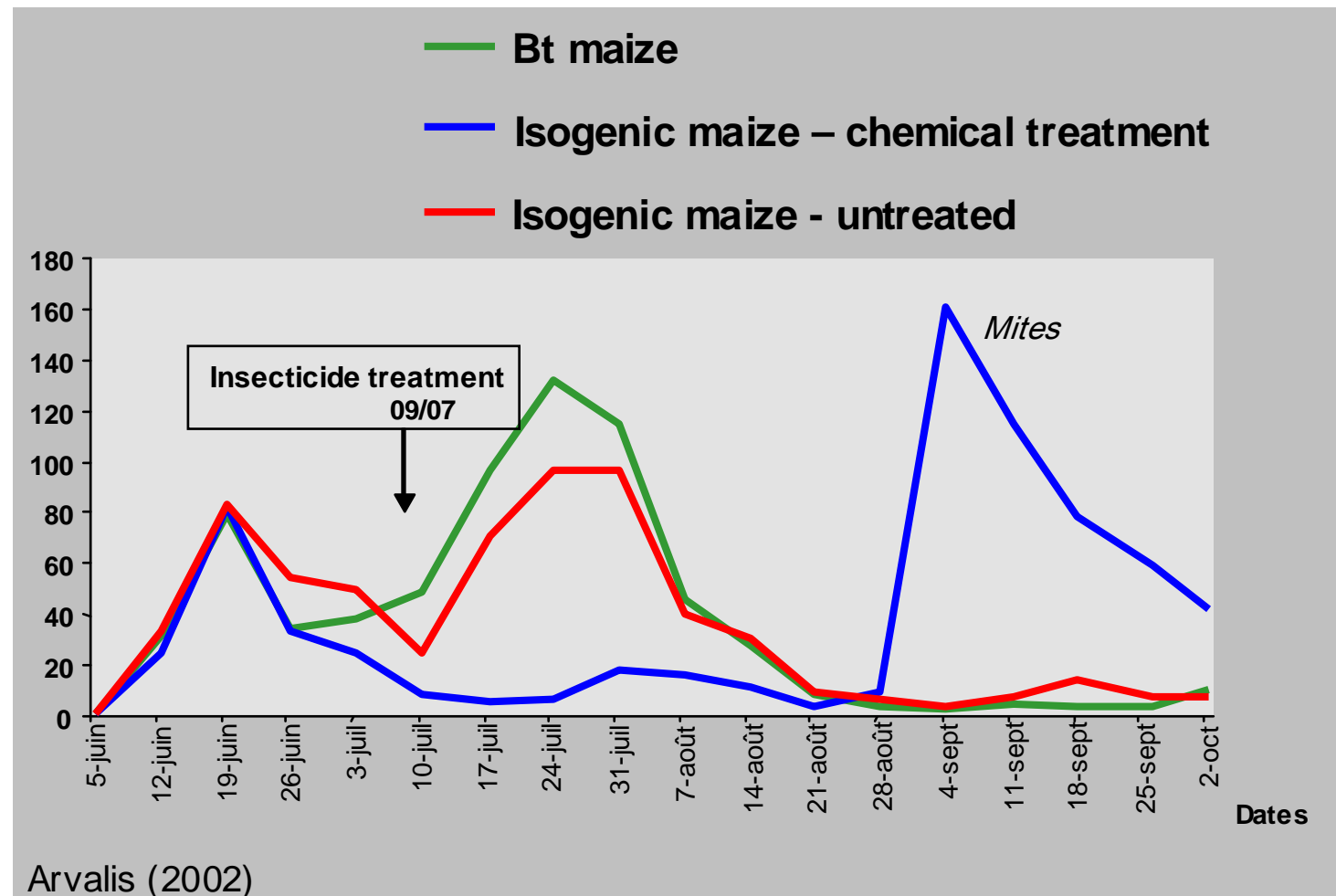


## First large scale results in France

### Environmental benefits of Bt maize

*Evolution of non-target pests populations (aphids, mites, ...)*

*The non target pest population evolution in Bt maize is similar into non-treated conventional maize*



2006 :

## First large scale results in France

Conclusions : convincing results



- Bt efficacy is close to 100%, vs. insecticides (less than 50% - 2006 conditions)
- Yield increase of 10 % with Bt maize
- Preserved quality (*reduced fumonisins concentrations*)
- The implementation of simple rules guarantees the labeling threshold (0,9%)



# Prospects 2007

## In the European Union

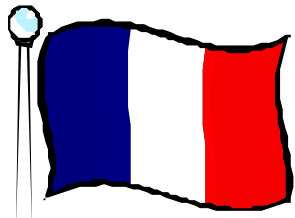


- **Bt maize development confirmation within the E.U. 27** (Czech Republic, Germany, France, Portugal, Spain, Slovakia, Romania ?)
- **Greater focus on mycotoxins in E.U.**
  - New regulation on mycotoxins in cereals
  - Crops will need efficient protection to achieve the goals
  - Bt maize is one helpful tool to manage mycotoxin risk



# Prospects 2007

## In France



- **The Bt maize acreage will continue to expand**
  - increased pest pressure
  - good technical results in 2006
  - more and more farmers are interested in the technology
- **Official rules for GM production**
  - decrees are expected
  - A.G.P.M. will give technical support for the maize growers wishing to cultivate Bt maize



A wide-angle photograph of a cornfield. The foreground is filled with green corn plants with yellowing tassels. The field extends to a flat horizon line. In the distance, there is a line of trees and a few buildings under a clear, bright blue sky.

**Thank you for your attention**