

« 5th Fusarium-toxin Forum »  
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# Fusarium-toxin enforcement and compliance in cereals in France

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5th Fusarium-toxin forum



# ***COPA-COGECA, INTERCEREALES and ONIGC***

**COPA-COGECA: the voice of European farmers and co-ops since 1958 - 76 Member Organisations - 30 million farmers - 40.000 co-ops**

**INTERCEREALES: professional organization of the cereal sector in France**

- Production
- Storage
- Trade
- First processing industries (food and feed)

**ONIGC: public institution which gathers together**

- Representatives of the government
- Representatives of the cereal production, trade, first processing industries and consumers

# Introduction

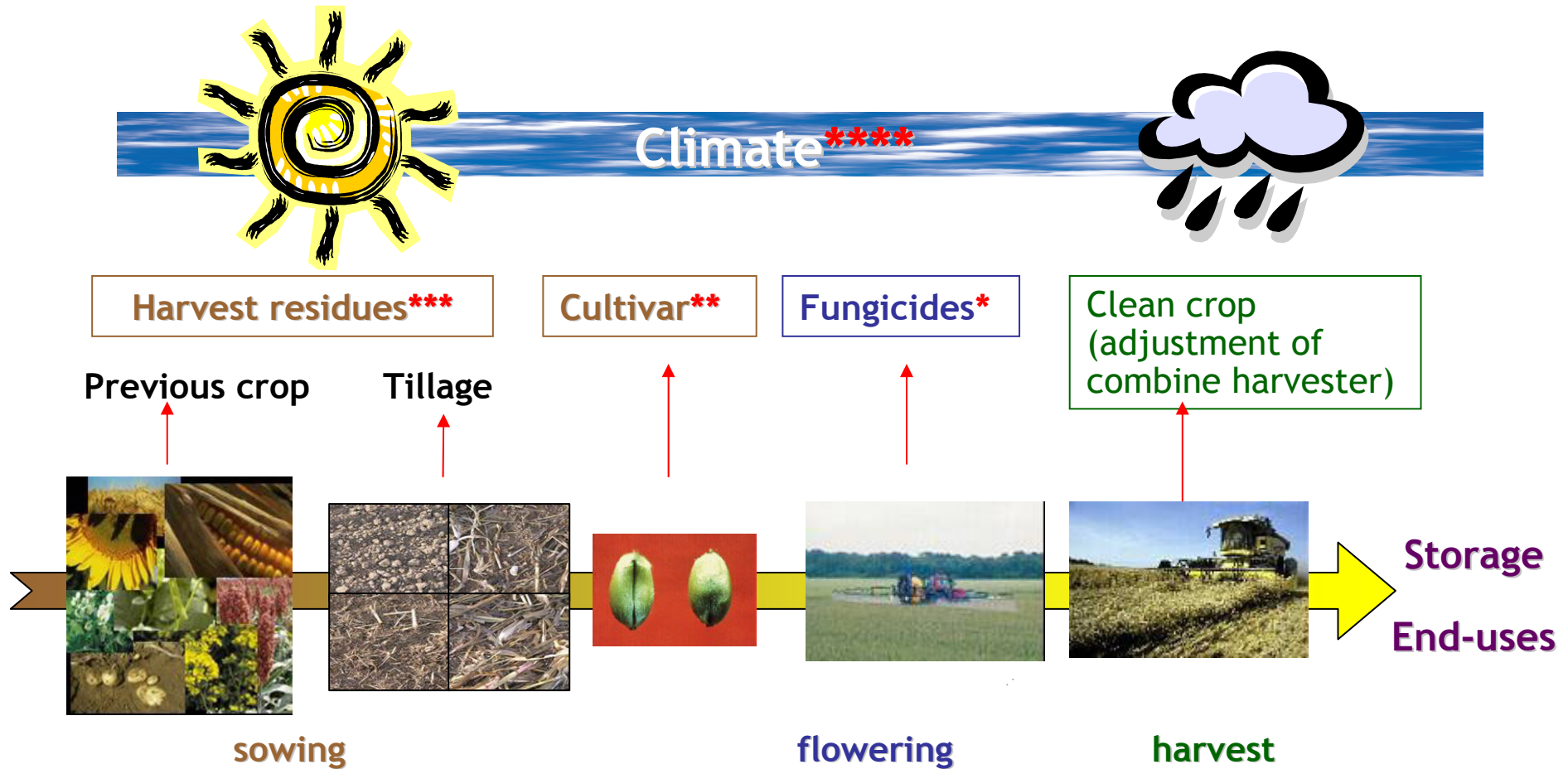
- DON : the most common Fusarium-toxin found in cereals produced in France and Europe
- Zearalenone and fumonisins : also in maize
- Fusarium-toxins : maximum levels into force from 1st July 2006 for human consumption (1st October 2007 for maize)
- Being under maximum levels = a new condition to accede to the market
- Mycotoxins : very stable compounds, not degraded during processing
- **Prevention is better than cure !**

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- ① Prevention research
  - ② Dissemination
  - ③ Occurrence: problem of difficult years
  - ④ Validated methods of sampling and analysis

# ① Prevention research

- National surveys to evaluate the natural occurrence of production
  - Farm field surveys with coops and traders to identify involved factors, weigh the importance of these factors and study their interactions
  - Experimental trials :
    - Contamination pathways of *Fusarium*
    - Impact of soil management
    - Evaluate the cultivar susceptibility
    - Evaluate the impact of borers
    - ...
  - National research programme (RARE, ANR...)
- **An effective collaboration between all levels of activity of cereal sector:** authorities and public institutions, research institutes, farmers, storage and trade organisations, first processing organisations, seed and agrochemical companies...




# DON contamination in wheat is plurifactorial



Factors : from the highest (\*\*\*\*) to the lowest (\*) of importance

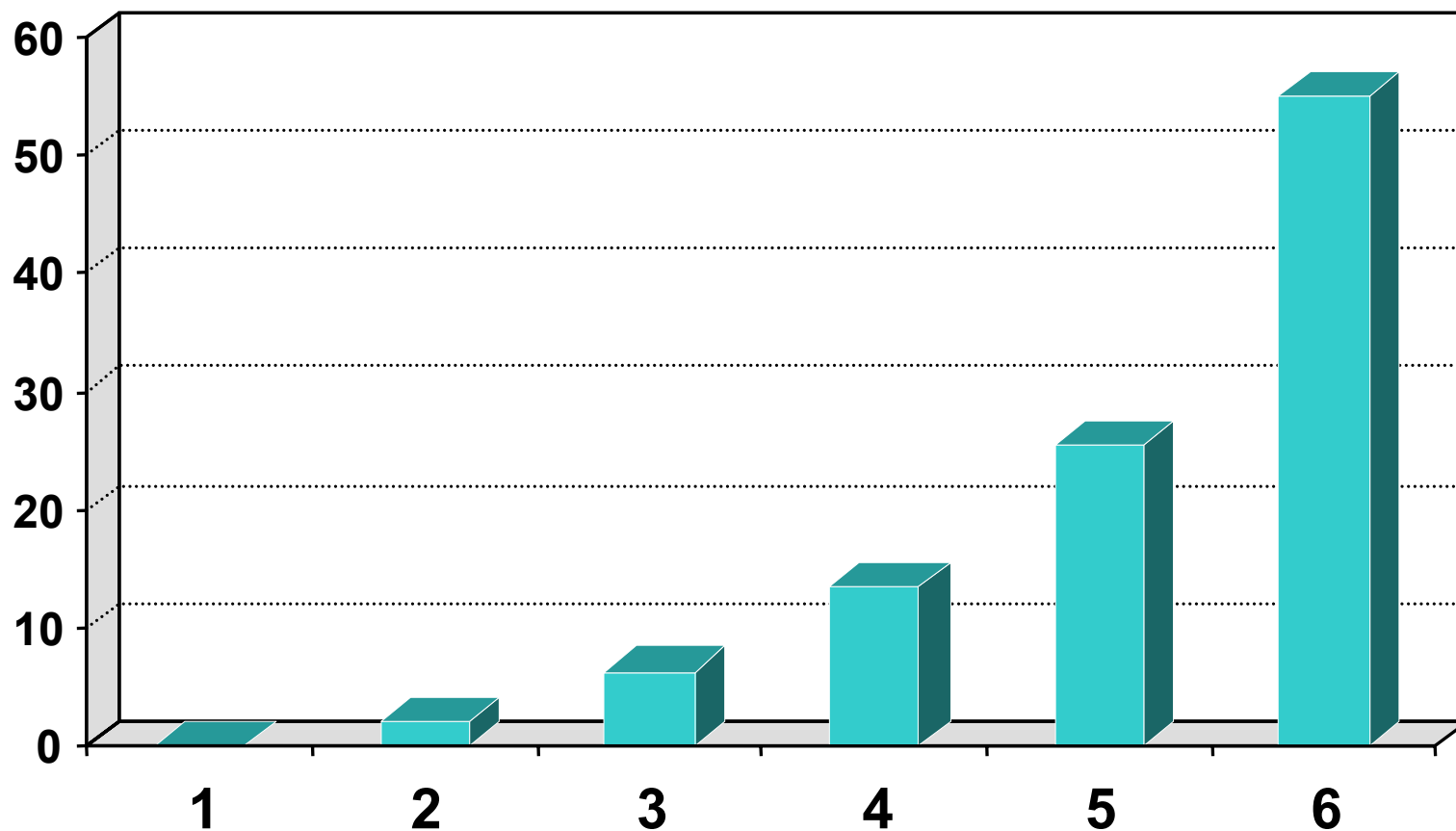
ARVALIS-Institut du végétal, 2005

# Agronomic factors and DON risk in wheat

Previous crop	Soil cultivation	Cultivar susceptibility	Risk and Recommendation
 <p>Cereals, rapeseed, flax, pea, fababean, sunflower</p>	Ploughing	Low Middle High	1
	No Ploughing	Low Middle High	
 <p>Beet, potato soya, others</p>	Ploughing	Low Middle High	2
	No ploughing	Low Middle High	3
 <p>Maize, sorghum</p>	Ploughing	Low Middle High	2
			3
	No ploughing	Low Middle High	4
			5
			6

## Part of samples (%) above DON maximum level in wheat according to agronomic risk

% > 1250 µg/kg





# Identification and weight of different factors for DON/ZEN in maize

+++++



Climate



+++

Harvesting time (1st nov) et  
“late sowing”

++

Cultivar susceptibility  
No ploughing  
Harvest residues processing

+

Insects  
Moisture around fields

# Identification and weight of different factors for fumonisins in maize

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Climate



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Borer insects

And all favorating factors (lack of residues processing, lack of treatment against borer, ...)

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Harvesting time > 1st nov ; date of sowing

Cultivar susceptibility ; Hydric stress ;

Moisture around fields

+

Wounds on ears

# *Fusariotoxins risk assessment on maize grain : limiting the factors accumulation*

Without borers				With borers			
Harvest Date	Varietal susceptibility to F. moniliforme / F. graminearum	Residues management	Risk category	Harvest Date	Varietal susceptibility to F. moniliforme / F. graminearum	Residues management	Risk category
< 15/10	Others varieties	satisfactory	A	< 15/10	Others varieties	satisfactory	B
		unsatisfactory	A			unsatisfactory	C
	Most susceptible	satisfactory	B		Most susceptible	satisfactory	C
		unsatisfactory	B			unsatisfactory	D
15 au 31/10	Others varieties	satisfactory	B	15 au 31/10	Others varieties	satisfactory	B
		unsatisfactory	B			unsatisfactory	C
	Most susceptible	satisfactory	C		Most susceptible	satisfactory	C
		unsatisfactory	C			unsatisfactory	D
1 au 15/11	Others varieties	satisfactory	B	1 au 15/11	Others varieties	satisfactory	C
		unsatisfactory	B			unsatisfactory	C
	Most susceptible	satisfactory	C		Most susceptible	satisfactory	D
		unsatisfactory	C			unsatisfactory	E
> 15/11	Others varieties	satisfactory	B	> 15/11	Others varieties	satisfactory	D
		unsatisfactory	C			unsatisfactory	E
	Most susceptible	satisfactory	C		Most susceptible	satisfactory	E
		unsatisfactory	D			unsatisfactory	E

\* Risk : from A , lowest risk to E, highest risk

Source : ARVALIS Institut du végétal, 2007



# Part (%) of samples above maximum levels\* for at least one mycotoxin in maize

N=637

National data 2003-2005



## ② Dissemination

- Technical meetings, forum, workshops...
- Press, technical documents, leaflets...
- Training sessions...



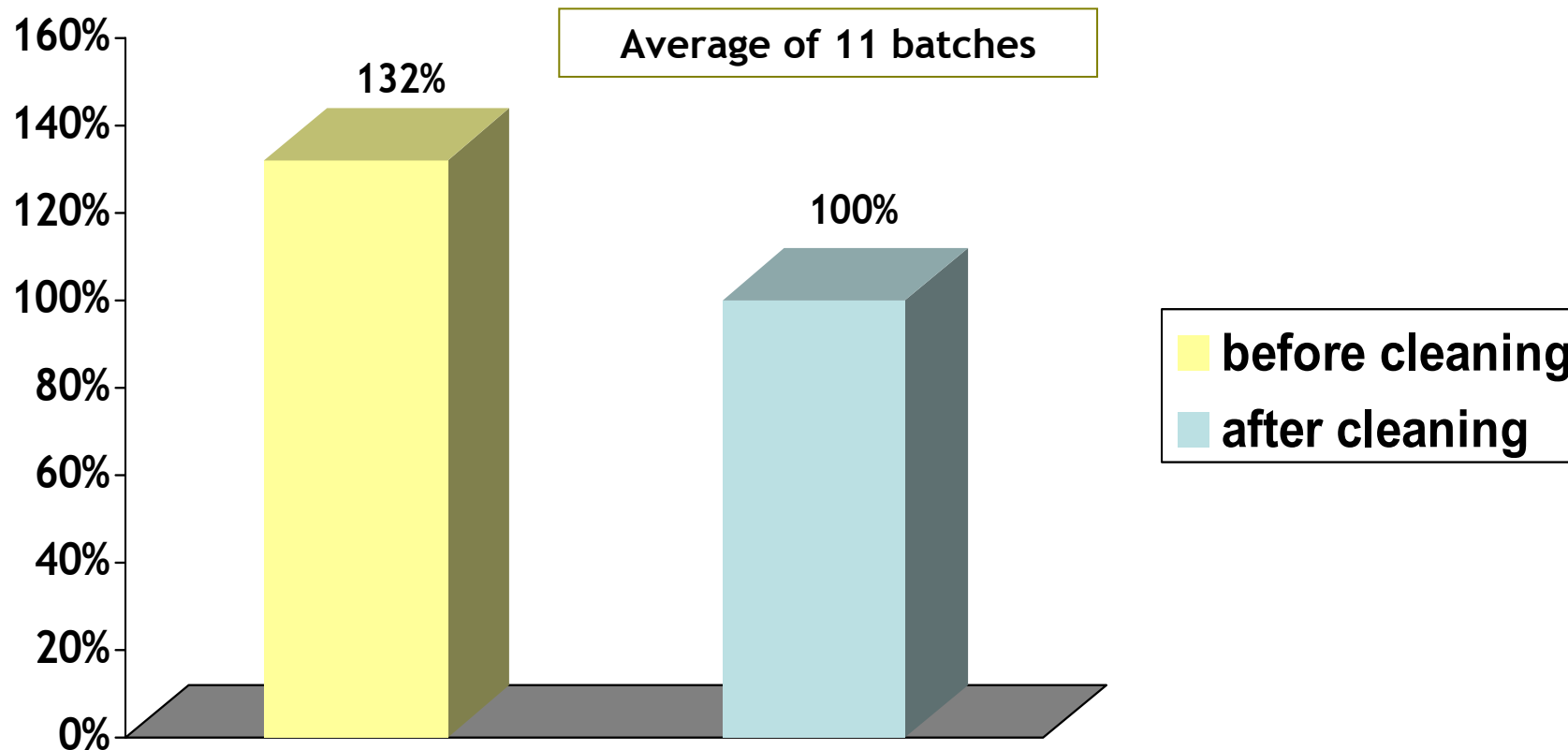
### ③ Occurrence: *problem of difficult years*

- Despite all the work to prevent toxin accumulation, climate is the main influencing factor and leads to great variations in mycotoxin levels
- Situation of maize in 2006 (DON, zearalenone and fumonisins)
- Situation of wheat and durum wheat in 2007 (DON)
  - High levels in grains
  - Problem of pics
  - Progression of Fusarium into the kernel with flours more contaminated and more variable than usually

## *Activity of collectors*

- All data come directly from fields, with the maximum of variability
- The technical activity of collectors reduce this variability
  - Receiving (identifying, sampling, classifying...)
  - Packaging (cleaning, sorting, drying, gathering)
  - Storing (cooling, transferring between silos...)
  - Dispatching (loading, sampling)

# Effect of cleaning on DON content in wheat



Arvalis - Institut du végétal



## ④ *Reliable sampling and validated analysis methods*

### Reliable sampling methods:

- The Regulation proposed for food is **unapplicable** for large volumes in practice and is adding costs
  - Fusarium-toxins: non homogeneous distribution (even inside a field): distribution depends on fields constituting the batch
- A more appropriate sampling procedure for Fusarium-toxins is possible (see ONIGC presentation...)

## ④ *Reliable sampling and validated analysis methods*

### Reference analysis methods (for LABS):

- Complex analysis with high uncertainty : conflicts between sellers and buyers, in particular in difficult years!
  - Several examples en 2007!
- Necessity to have standardized and normalized methods
- Not appropriate for the screening of batches

### Rapid analysis methods (for OPERATORS):

- Necessity to have rapid, accurate and **cheap** methods for a first screening of batches

# Conclusions

- Influence of climate is essential!
- Despite maximum prevention, problems in compliance remain
- Conflicts between advices or political decisions:
  - annual ploughing against Fusarium-toxins vs minimum tillage for environmental considerations
  - earlier cultivar vs later ones (with higher yield potential!)
  - harvesting time for maize (toxin control vs drying costs)
  - water restrictions for irrigation vs hydric stress
  - authorized pesticides?
  - authorized GMO?
- Necessity to have reliable sampling methods and validated methods of analysis