« 5th Fusarium-toxin Forum »
Brussels,10-11 January 2008

T2 and HT2 in cereals grown in France

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INTERCEREALES
COPA-COGECA

COPA-COGECA, INTERCEREALES

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

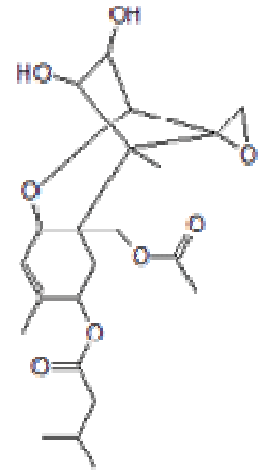
- Production
- Storage
- Trade
- First processing industries (food and feed)

1. Toxicity of T2/HT2
2. Estimated dietary exposure
3. Occurrence
4. Prevention programmes
5. Validated methods of analysis

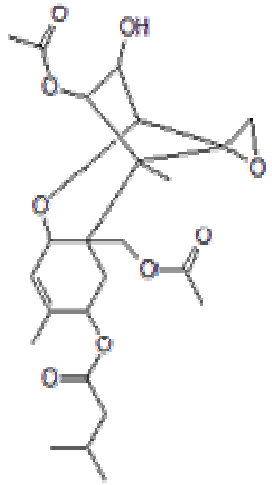
❶ *Toxicity of T2 and HT2 toxins*

- From the group of trichothecenes A
- Produced by *Fusarium langsethiae*, a newly identified species from *Sporotrichiella* section.
- LOAEL = 0.029µg/kg-bw/d based on <u>one</u> experiment in pigs
- Safety factor = 10 x 10 x 5 <u>due to less data available</u>
- <u>t-TDI = 0.06 µg/kg-bw/d (SCF opinion, 30 May 2001</u>

HT 2 Toxin



T 2 Toxin



Toxicity of T2 and HT2 toxins

- *« The toxicity of T2 toxin in pigs in only one short-term study is used as the basis for the safety assessment… Similar effects were not observed in other studies in pigs neither at this nor even at higer doses… »*
- *« …There are deficiencies on metabolism and toxicokinetic studies. To accound for this and the use of a LOAEL, an extra uncertainty factor of 5 was included, giving an overall uncertainty factor of 500… »*
- *« …The toxicity induced by T2/HT2 toxin should be investigated… »*

SCF Opinion, 30 may 2001

Toxicity of T2 and HT2 toxins

- Necessity to have a recent, robust and scientific safety assessment on T2/HT2
- Do not reproduce the case of OTA (reevaluation in 2006 : TDI was increased by a 3.5-fold factor without any change on maximum limits) with a premature Regulation on T2/HT2

❷ Dietary exposure

- « *…For T2 and HT2 toxins, the estimated dietary intake exceed in most cases the t-TDI. However, most occurrence data are obtained by makink use of methods of analysis with high limit of detection… The dietary intake is strongly influenced by the limit of detection of the used analytical methods…*»

856/2005 and 1881/2006 Regulations

➢ Problems with scoop task 3.2.10 report (2003)

- Necessity to have results from different years
- High LOD
- Probably over-estimation of calculated exposure to T2/HT2 toxins

Dietary exposure
Influence of LOD (T2+HT2)

	<=2003	2004-2005	2006-2007
LOD (µg/kg)	80	35	2.5
LOD/2 (µg/kg)	40	17.5	1.25
Exposure (µg/kgbw/d)	6	2.6	0.19
Exposure / TDI (%)	143%	63%	4%

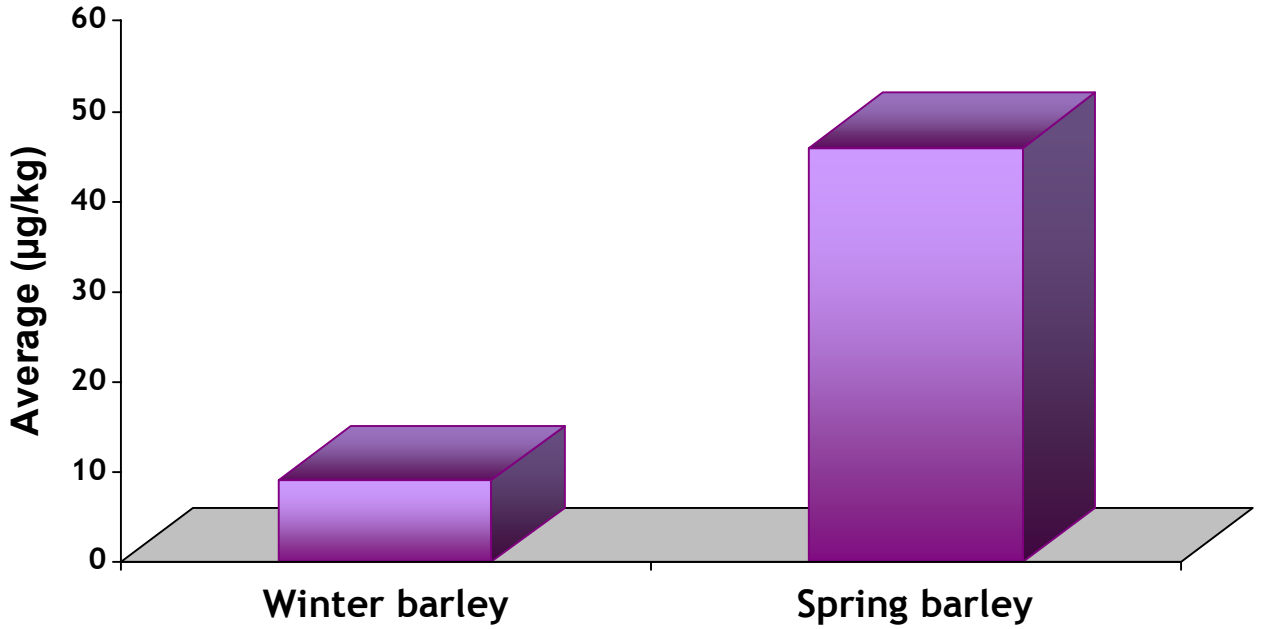
Hyp : If < LOD, then LOD/2 ; 150g/d consumption of cereal products ;
Adult 70kg bw ; t-TDI=0.06µg/kg/d

- The lower the LOD, the lower the calculated exposure !
but also…
- The lower the LOD, the higher the % of samples > LOD !

❸ Occurrence

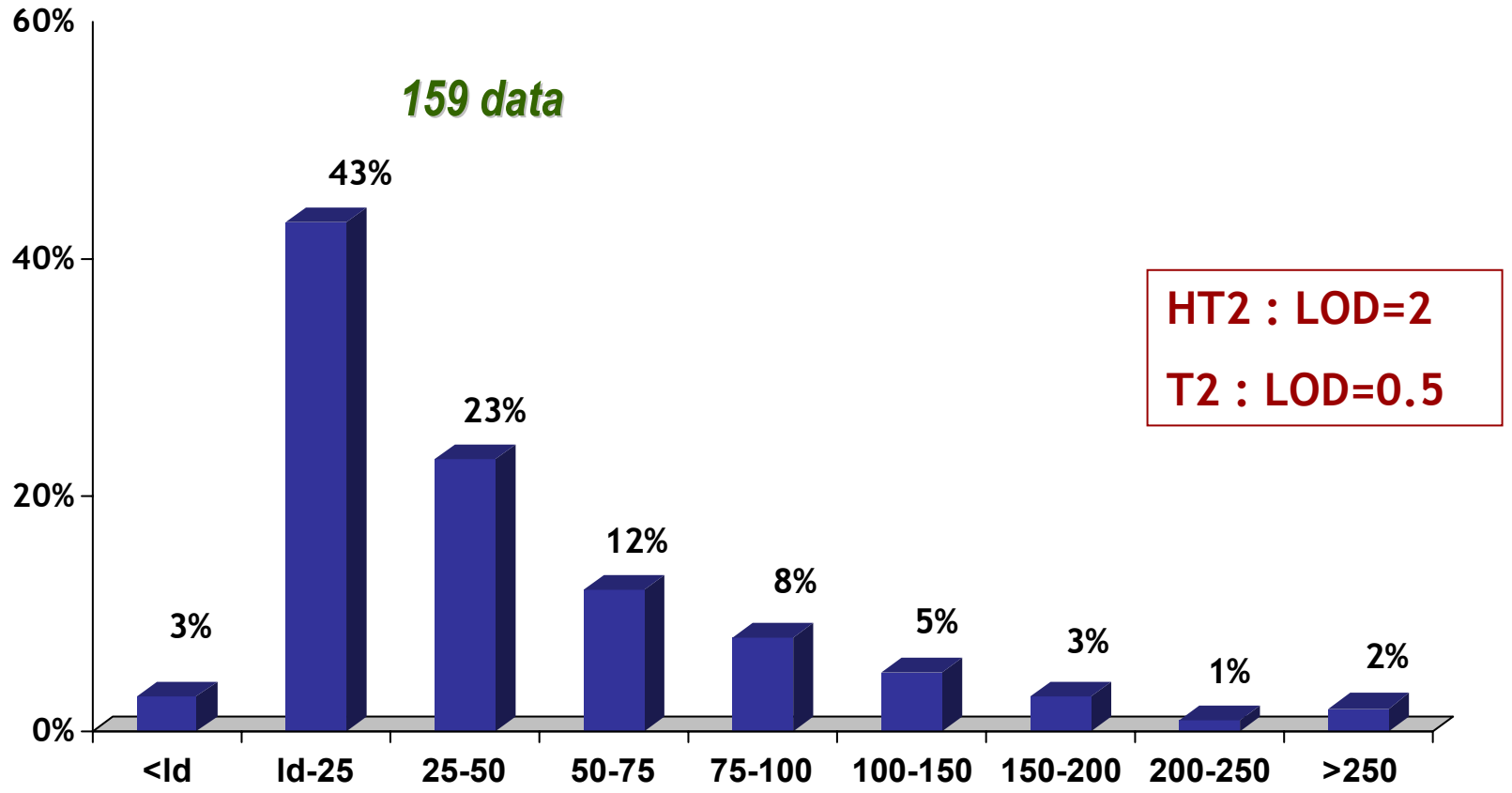
- No data on oats
- Wheat and durum wheat seem to accumulate less T2 and HT2 toxins than spring barley and maize
- Be careful of LOD decrease: results have to be expressed in µg/kg and not in % >LOD

T2 and HT2 in barley (2006-2007)



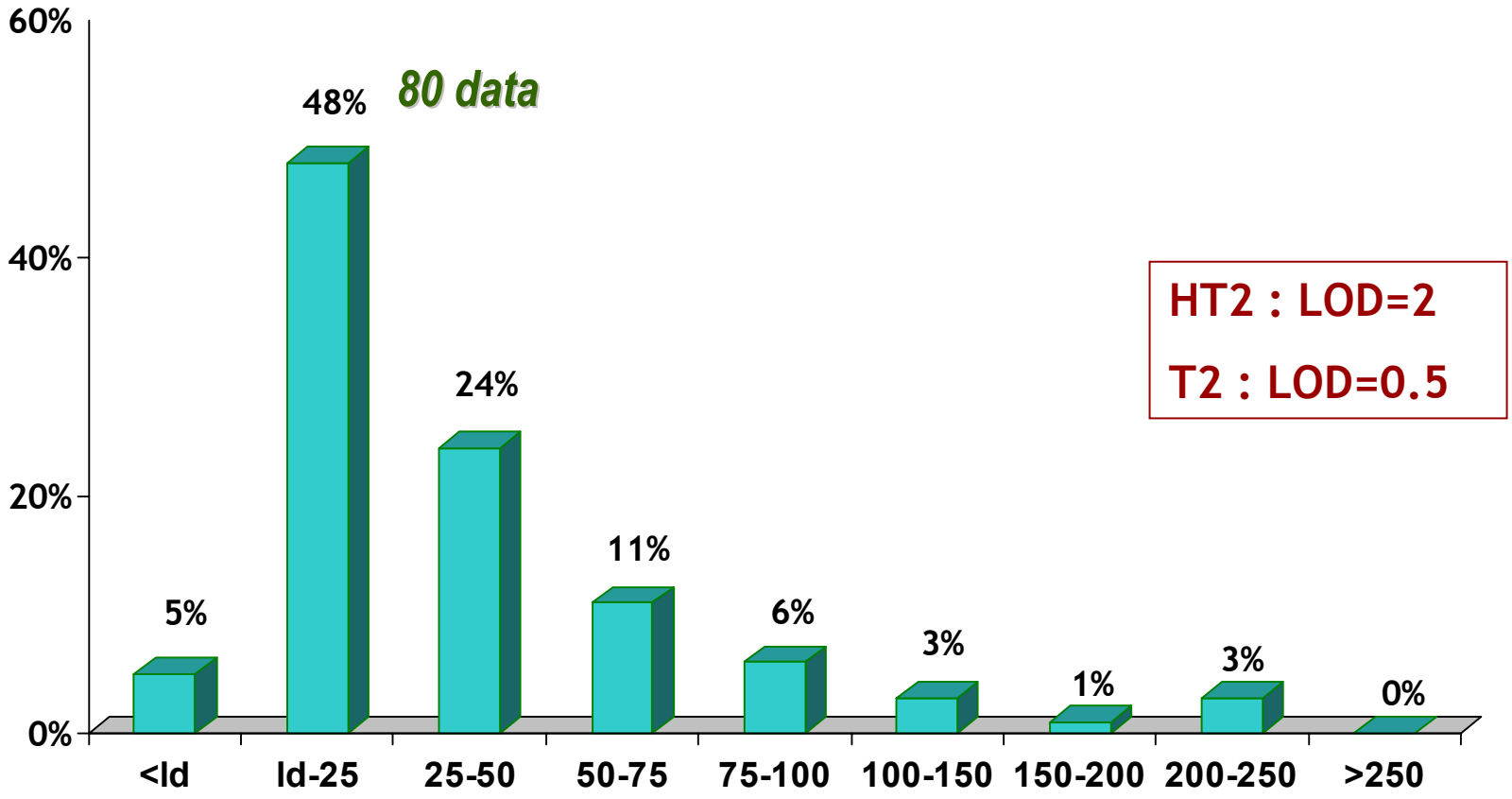
Arvalis (field surveys, 2006 and 2007)

T2 and HT2 in spring barley (2006-2007)



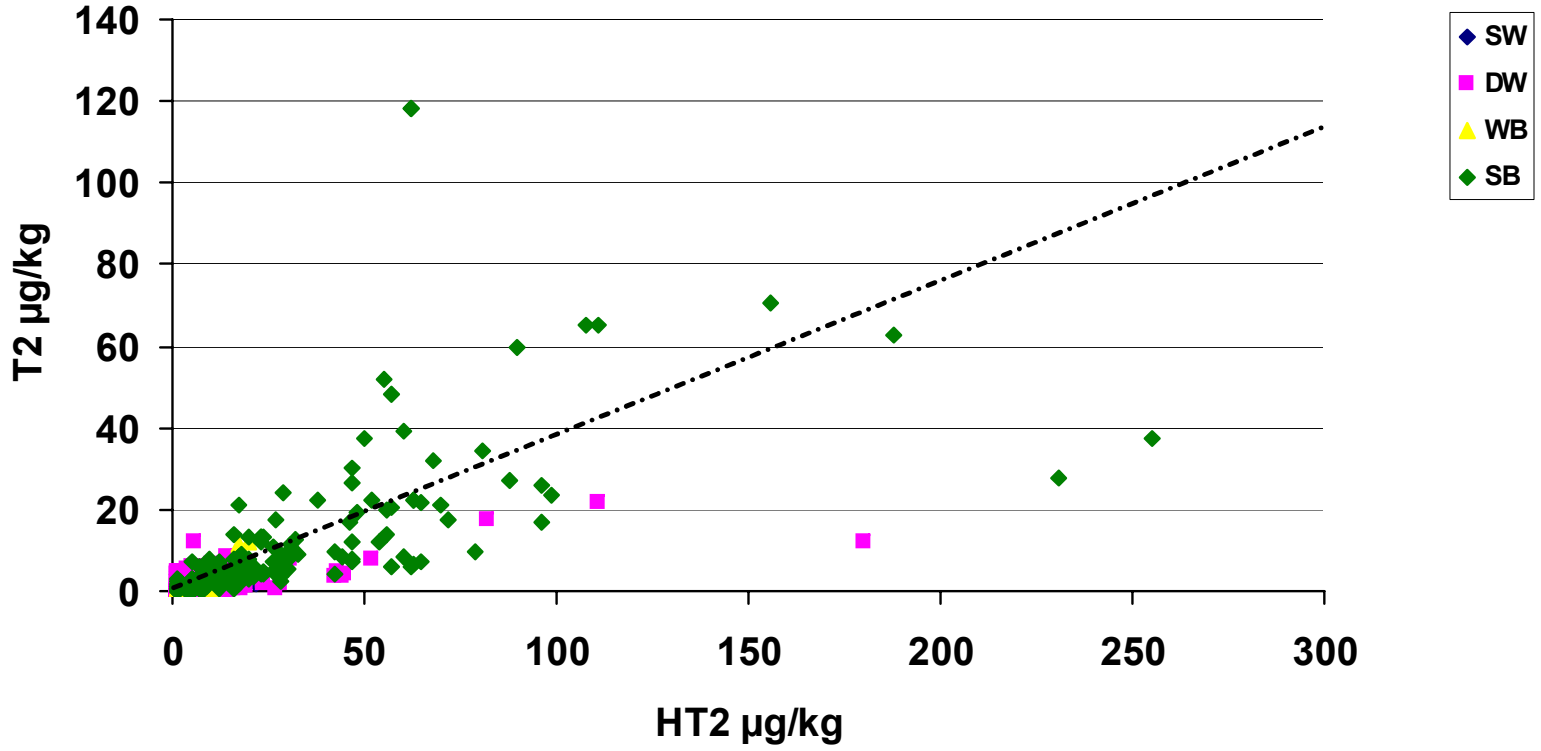
Arvalis (field surveys, 2006 and 2007)

T2 and HT2 in maize (2006)



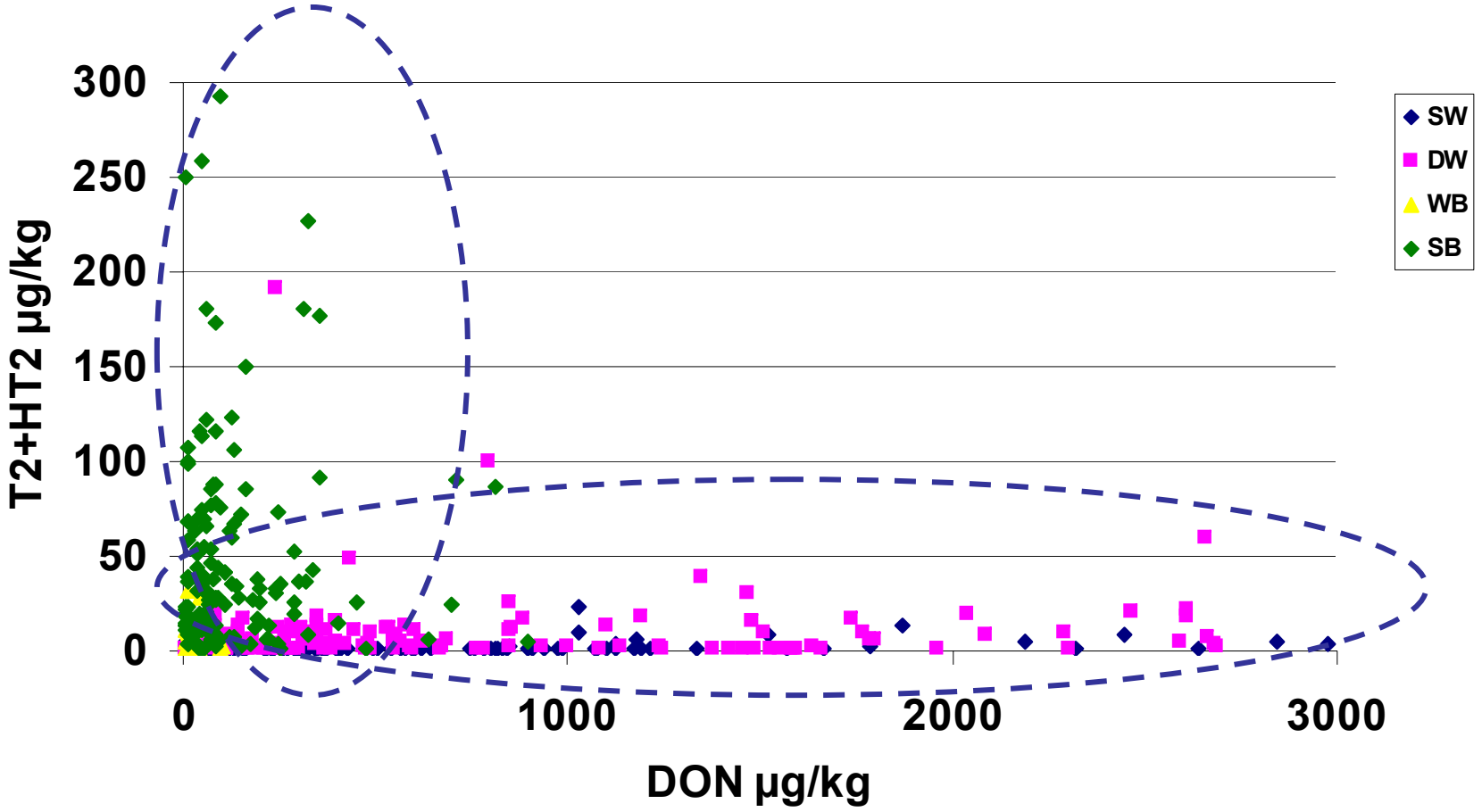
Arvalis-ONIGC (survey 2006)

Relationship between T2 and HT2 in cereals (2006 and 2007)



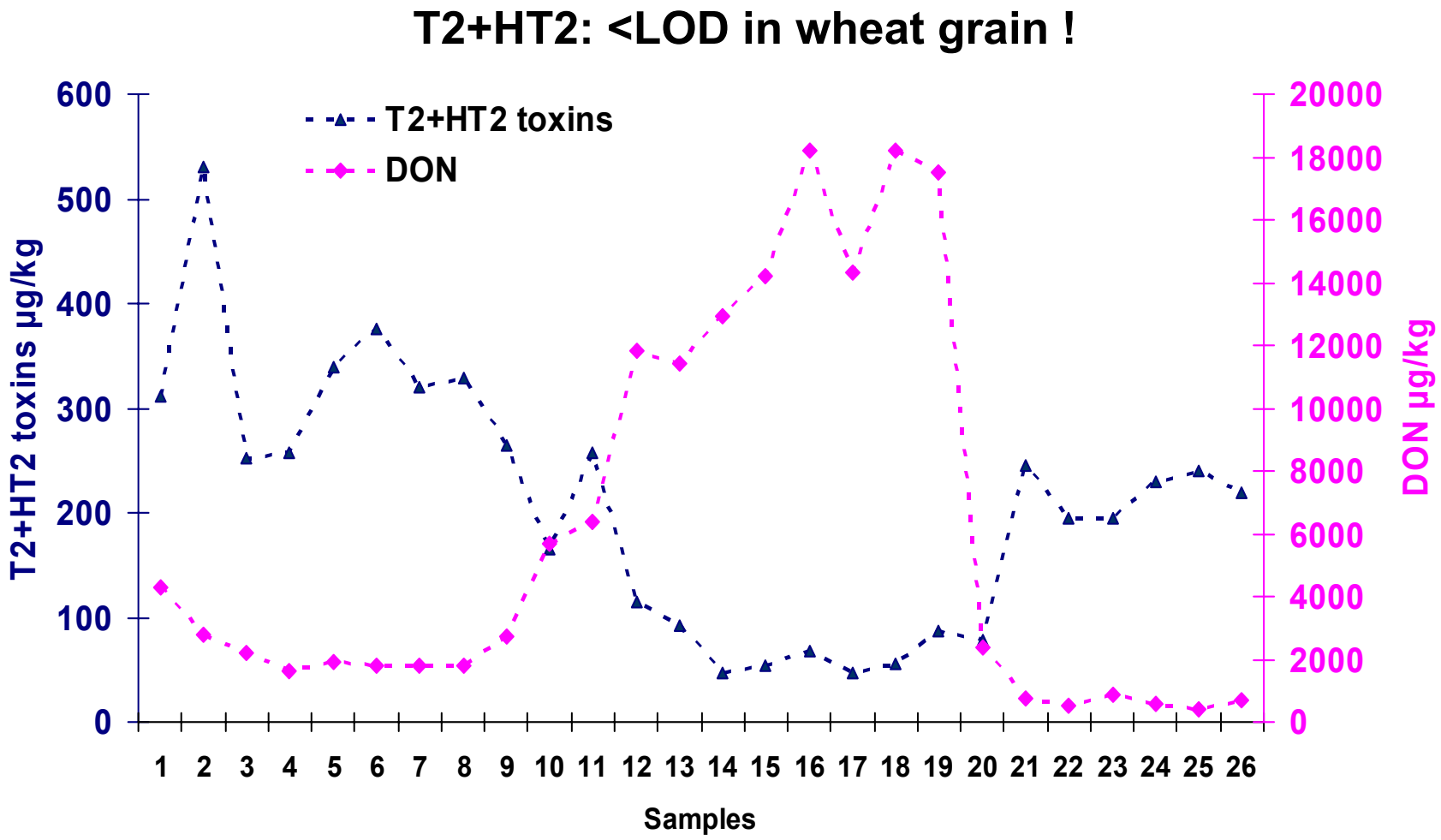
Arvalis (field surveys, 2006 and 2007)

Exclusion between T2+HT2 and DON in cereals (2006 and 2007)



Arvalis (field surveys, 2006 and 2007)

Exclusion between T2+HT2 and DON
Cleaning trial on wheat: results in dusts



Arvalis (2005)

Occurrence

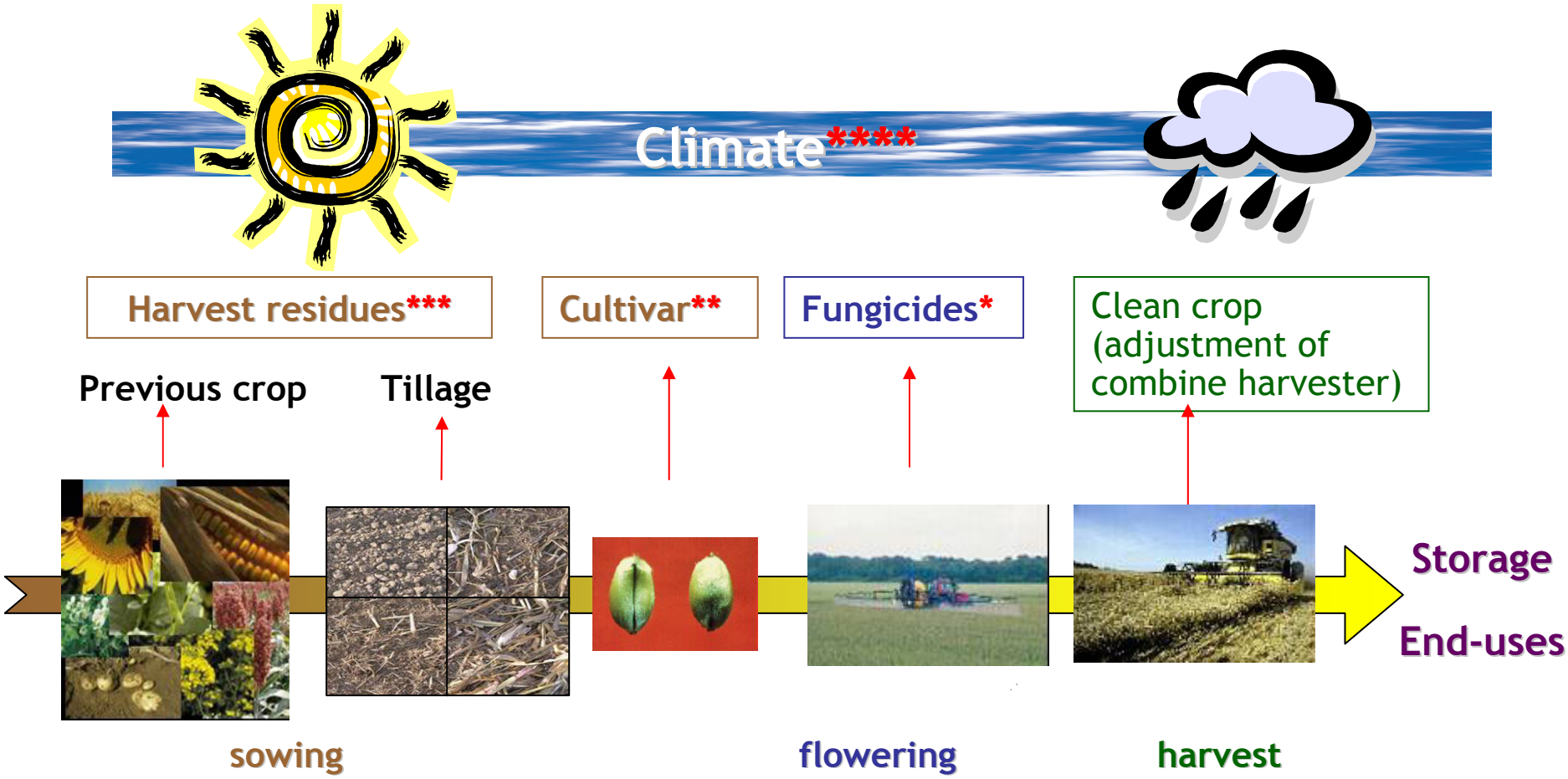
- No data on oats
- Wheat and durum wheat seem to accumulate less T2 and HT2 toxins than spring barley and maize
- Be careful of LOD decrease :results have to be expressed in µg/kg and not in % >LOD
- Exclusion between DON and T2/HT2, TCTA and TCTB = competition between different *Fusarium*
- By applying good agricultural practices to fight against DON accumulation, risk of an increase of T2 and HT2 production ???

❹ *Prevention programmes*

- A network of field surveys in France undertaken by Arvalis in 2006 on barleys
- Characterize the Fusarium-toxins contents (DON, T2/HT2) of barley in collaboration with cooperatives and traders
- Analyse the situation of each region
- Identify involved factors, weigh the importance of these factors and study their interactions
- Improve knowledge, identify the actions of prevention and disseminate good practices

➢ What is known for DON seems to be not applicable for T2/HT2…

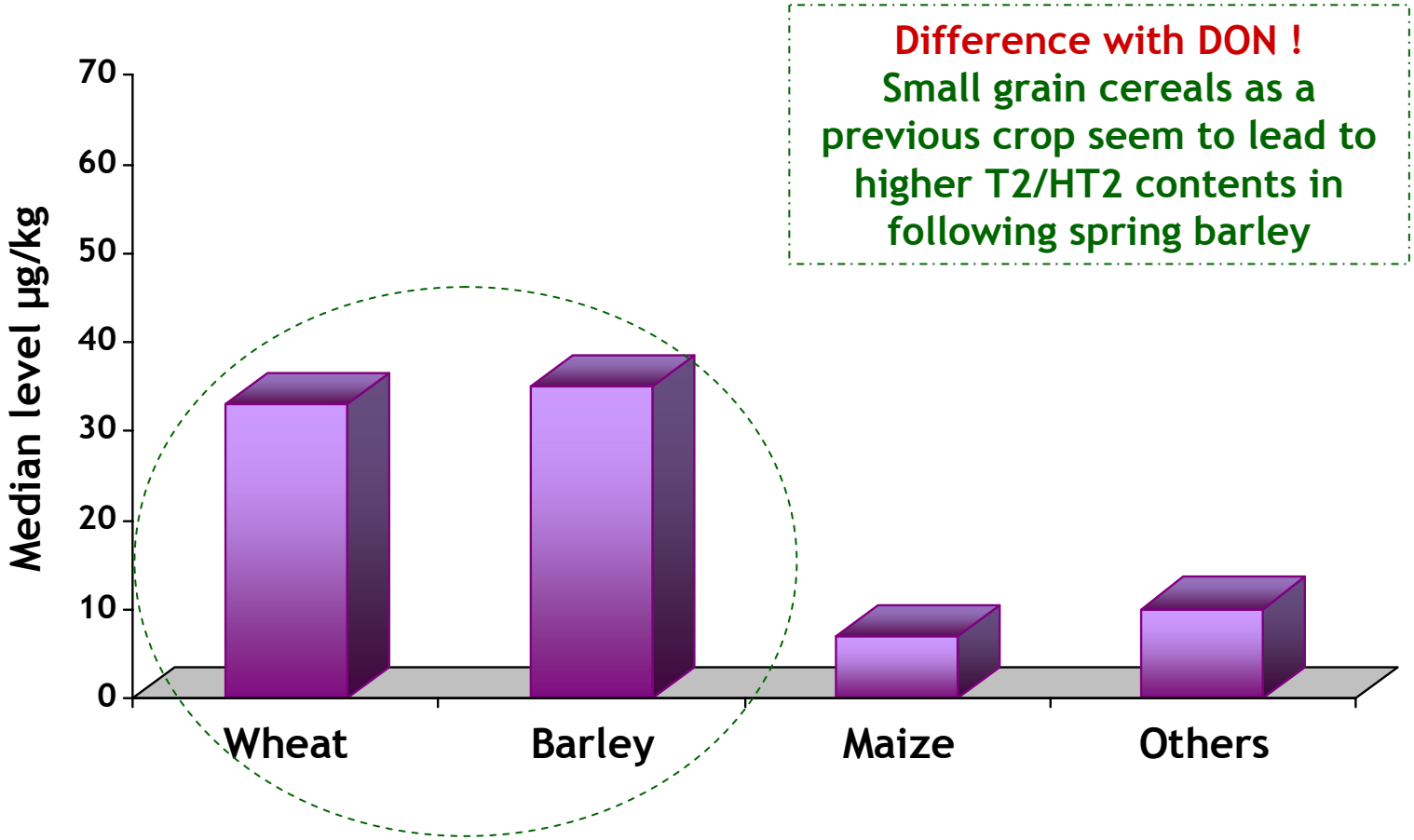
DON contamination in wheat is plurifactorial



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

ARVALIS-Institut du végétal, 2005

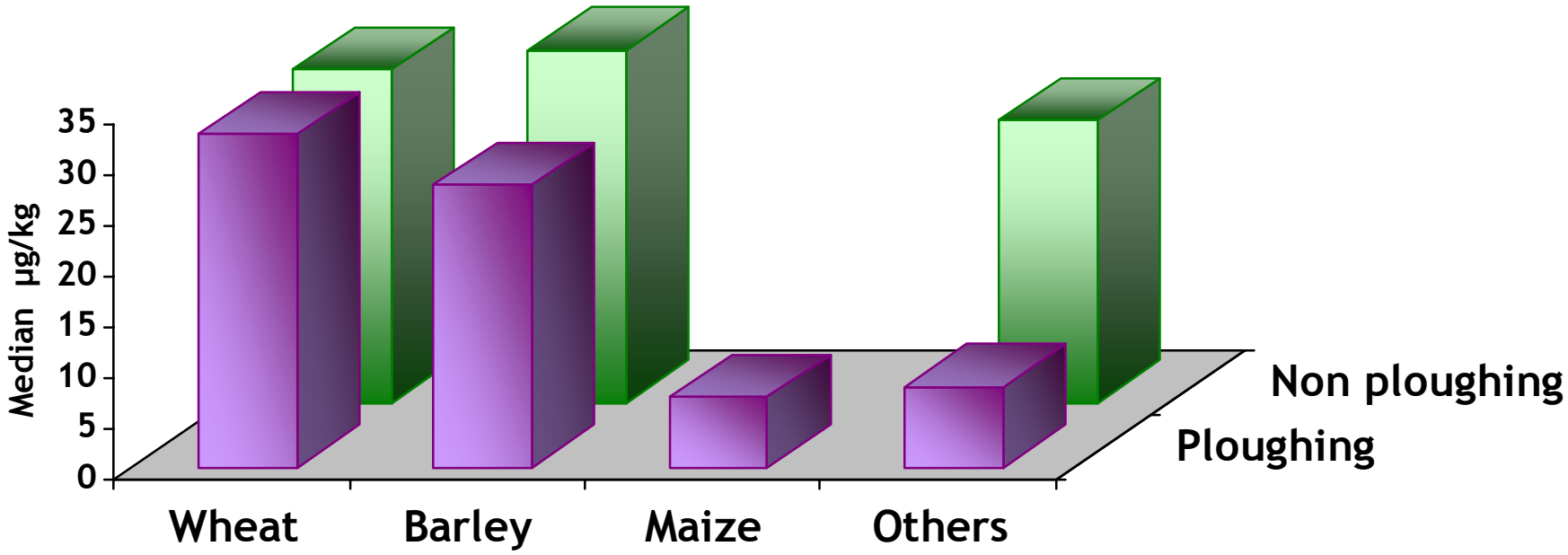
T2+HT2 contents in spring barley according to previous crop



Difference with DON !
Small grain cereals as a previous crop seem to lead to higher T2/HT2 contents in following spring barley

T2+HT2 contents in spring barley according to previous crop and soil cultivation

The effect of non-ploughing is not as obvious as for DON !



Prevention programmes

- Necessity of time to improve knowledge
  - On the biology of the *Fusarium langsethiae*
  - On competition between the different *Fusarium* (TCT B vs TCT A producers)
  - To identify the involved factors, weigh the importance of these factors…
  - To evaluate the cultivar susceptibility to accumulate T2/HT2
  - To identify the actions of prevention and disseminate good pratices
  - To study the effect of cleaning/calibrating to reduce T2/HT2 levels
- Different research programmes have recently started on T2/HT2

❺ *Validated methods of analysis*

- Reference analyses
  - Complex analysis, very expensive equipment, expensive analyses
  - Question of LOD
  - Not appropriate for the screenning of batches

- Rapid analysis methods :
  - Necessity to have rapid, accurate and cheap methods for a first screening of batches
  - Not available ???

Conclusions

- A lack of knowledge at all stages
  - Toxicity assessment
  - Dietary exposure (with updated LOD)
  - Biology of *F. langsethiae* and competition with other *Fusarium*
  - Evaluation of involved factors to establish actions of prevention and disseminate good practices (agricultural, harvest and storage)
  - Analytical methods

- We need time to understand, to improve knowledge and to find solutions - 5 years minimum.