Fusarium mycotoxins in oat varieties

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INTRODUCTION

•One of the negative consequence of the infection of oats by *Fusarium* spp. pathogens is contamination by mycotoxins.

•The aim of the present work was to study the response of oat varieties commonly grown in the Czech Republic to artificial infection with *F. culmorum*. DON and T-2 toxin contents and yield parameters were analysed.

Variety	Type	DON (ppb)		
		2005	2006	2007
Abel	*A.nuda*	740	< LOD	2 877
Detvan	*A.nuda*	2 250	<LOD	2 453
Izák	*A.nuda*	145	358	2 622
Jakub	*A.nuda*	2 160	<LOD	4 768
Saul	*A.nuda*	x	450	9 423
Atego	*A.sativa*	x	179	14 497
Flamingsprofi	*A.sativa*	5 110	256	14 096
Neklan	*A.sativa*	x	<LOD	6 528
Salo	*A.sativa*	10 430	<LOD	26 023
Veli	*A.sativa*	12 620	404	4 718

Table 1. Deoxynivalenol (DON) content in oat varieties inoculated with *F. culmorum*, 2005-2007

Variety	Type	DON (ppb)		
		2005	2006	2007
Abel	*A.nuda*	180	< LOD	< LOD
Detvan	*A.nuda*	186	< LOD	< LOD
Izák	*A.nuda*	162	< LOD	<LOD
Jakub	*A.nuda*	185	< LOD	327
Saul	*A.nuda*	x	< LOD	< LOD
Atego	*A.sativa*	x	< LOD	< LOD
Flamingsprofi	*A.sativa*	236	< LOD	< LOD
Neklan	*A.sativa*	x	< LOD	< LOD
Salo	*A.sativa*	196	< LOD	< LOD
Veli	*A.sativa*	274	< LOD	< LOD

Table 2. Deoxynivalenol (DON) content in oat varieties, non-inoculated, 2005-2007

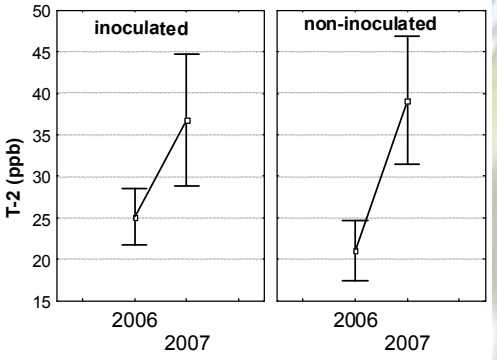

Fig.4. T-2 toxin content, 2006 and 2007

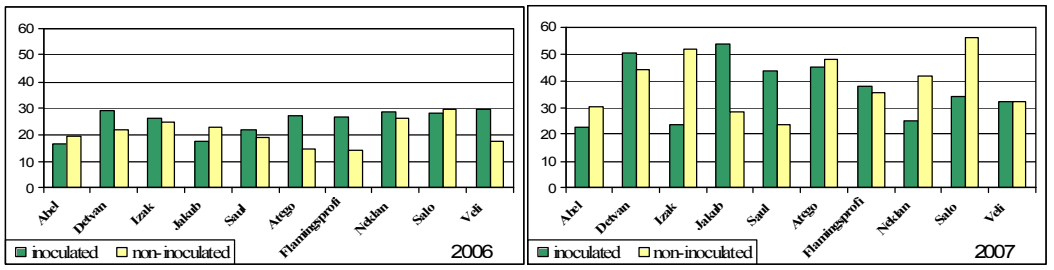

Fig 5. T-2 toxin content in oat varieties, 2006 and 2007

RESULTS

•There were considerable differences in the level of DON content in inoculated treatments in individual years (Table 1). The DON content in non-inoculated treatments was low in all years (Table 2).

•The weather data during the periods of 7 days before anthesis and 10 days after the beginning of anthesis in individual years are given in Figs. 1-3. The inoculation in 2006 was followed by a period without rain and with high temperatures.

•There was a significant difference in the T-2 toxin content between years, but did not significantly differ between inoculated and non-inoculated treatments (Figs. 4,5). .

•Yield parameters were not significantly affected (Figs. 6, 7).

METHODS

• The artificial infection with *F. culmorum* was carried out at anthesis by spore suspension spraying. The content of mycotoxins was assessed using an ELISA assay with the limits of detection (LOD) for DON equal to 134 ppb and T-2 toxin 3.5 ppb in the oat matrix.

•In 2005, four varieties of *Avena nuda* L. (Izak, Abel, Detvan and Jakub) and three varieties of *A. sativa* (Flamingsprofi, Salo and Veli) were sown. DON content was assessed only.

•In 2006 and 2007, the varieties Neklan (*A. sativa*) and Atego and Saul (*A. nuda*) were added to the varieties examined in the previous year. Besides DON, also T-2 toxin content, thousand grain weight (TGW) and grain volume weight (GVW) were assessed.

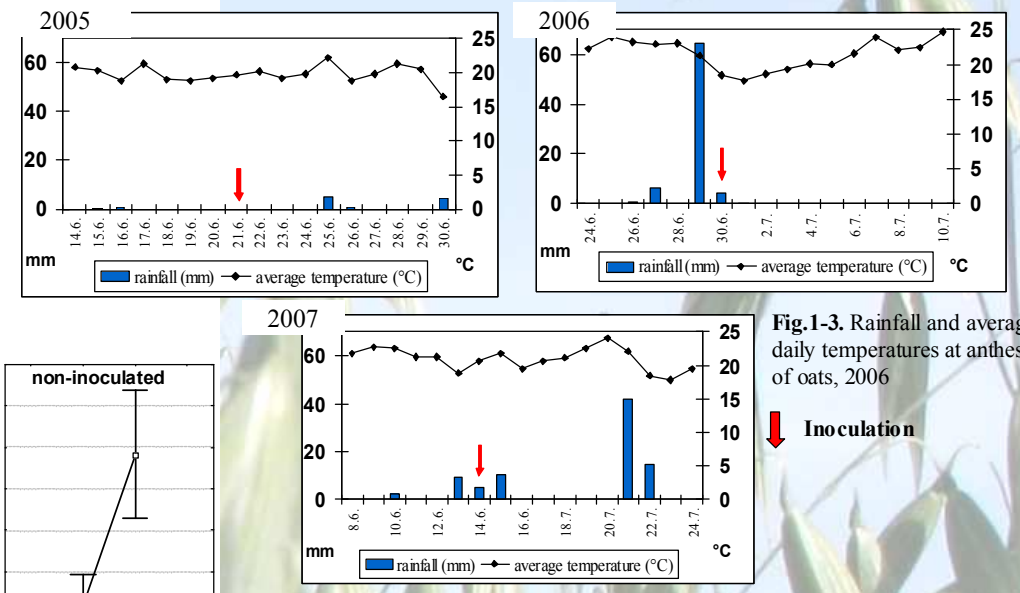

Fig.1-3. Rainfall and average daily temperatures at anthesis of oats, 2006

Inoculation

CONCLUSIONS

•A level of DON content in oat varieties after inoculation with *F. culmorum* considerably differed in individual years.

•In non-inoculated treatments the DON contents were low.

•There were differences among varieties in DON accumulation.

•The T-2 toxin content in inoculated treatments did not significantly differ from non-inoculated ones. T-2 toxin is not produced by *F. culmorum*, but mainly by *F. poae*, *F. sporotrichoides* and *F. langsethiae*.

•There were significant differences between years in T-2 content.

•Though the DON content in inoculated treatments was very high in 2007, the examined yield parameters were not significantly affected.

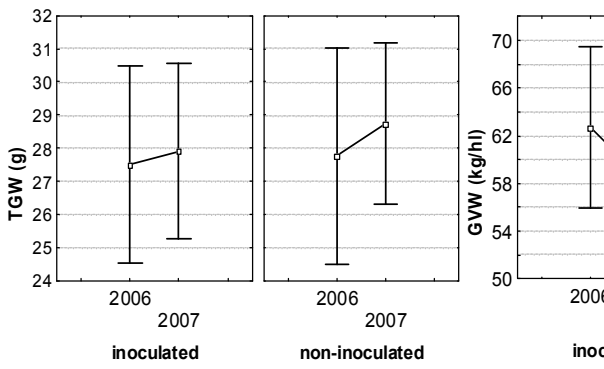

Fig 6. Thousand grain weight (TGW) for oat varieties, inoculated and non-inoculated

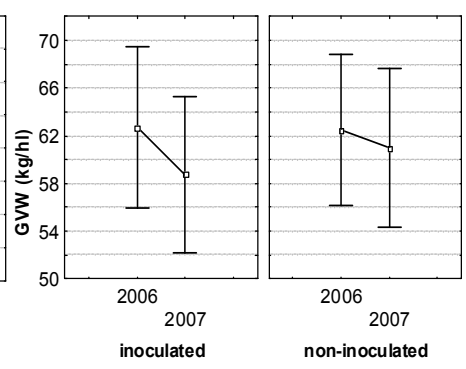

Fig 7. Grain volume weight (GVW) for oat varieties, inoculated and non-inoculated

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