Main agronomic influences on the occurrence of fusariumtoxins (mainly DON) in cereals other than maize. Strategies in production to avoid or reduce the occurrence of fusariumtoxins.

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Monitoring of fusarium 2004-06 - objectives

- Surveying level of mycotoxins in Austrian cereal production
- Will Austrian cereal production be able to fullfill the oncoming thresholds?
- Recheck of agronomic influences on occurrence of mycotoxins (mainly DON) in cereals other than maize like preceeding crop, soil management, treatment with fungicides etc.
- Implementation of advisory programmes
- Development of strategies to minimize the risks of mycotoxins
- Improvement the farmers´ know-how
- Efforts to cooperate with grain dealers
- Establishment of a databasis in case of negative public discussion on this topic.

Number of samples (Austrian monitoring 2004-2006)

	wheat	barley	rye	Durum-wheat	Triticale	oats	total
Burgenl.	49	13	6	13	5	3	**89**
L. Austria	186	39	23	26	11	9	**294**
U. Austria	146	15	11	0	20	10	**205**
Styria	20	5	7	0	7	3	**42**
Carinthia	7	0	3	0	6	6	**22**
Total	**411**	**72**	**50**	**39**	**49**	**31**	**652**

Level of DON in Austria 2004-2006 (average/median)

federal c.	DON µg/kg 2004	samples	DONµg/kg 2005	samples	DON µg/kg 2006	samples	DON µg/kg 2004-06	DON-Median in µg/kg 2004-06	Anzahl Proben
U.Austria	608	54	267	88	274	62	360	130	205
L.Austria	303	103	106	101	398	90	263	53	294
Burgenland	292	28	138	35	240	26	216	90	89
Carinthia	180	7	103	6	98	7	128	55	22
Styria	381	10	134	14	117	18	186	86	42
DON-average	**383**	**202**	**171**	**247**	**305**	**203**	**278**	**83**	**652**
DON-Median	140		49		110		83		

Level of DON corresponding to EC-directive 856/05

DON in µg/kg	B.land	L. Austria	U.Austria	Carinthia/ Styria	Total Austria
0 - 200	62	213	133	46	454 (69,6 %)
201 - 500	16	40	39	12	107 (16,4 %)
501 - 750	2	16	11	3	32 (4,9 %)
751 – 1250	8	13	11	3	35 (5,4 %)
1251 - 1750	0	4	4	0	8 (1,2 %)
> 1751	1	8	7	0	16 (2,5 %)
Total	**89**	**294**	**205**	**64**	**652 (100,0)**

DON-value depending on type of cereal

type of cereal	DON µg/kg 2004	Samples	DON µg/kg 2005	samples	DON µg/kg 2006	samples	**DON µg/kg 2004-06**	DON-Median in µg/kg 2004-06	samples
Wheat	511	121	202	156	337	132	**337**	120	411
Durum-wheat	694	10	152	17	472	12	**384**	220	39
Barley	119	26	21	27	165	20	**88**	0	72
Rye	88	20	38	14	114	15	**80**	0	50
Triticale	227	15	265	19	397	14	**295**	110	49
Oats	104	10	95	11	107	10	**102**	0	31
	383	202	**171**	247	**305**	203	**278**	83	**652**

Influence of preceeding crop on DON value of wheat

prec. Crop	DON µg/kg 2004	samples	DON µg/kg 2005	samples	DON µg/kg 2006	samples	DON µg/kg 2004-06	DON-Median in µg/kg 2004-06	samples
cereals	156	18	81	30	77	20	**104**	60	68
maize-corn	862	57	400	58	588	46	**610**	220	161
maize-sil.	448	3	230	8	149	13	**296**	170	24
oilseeds/ proteincrops	294	31	54	43	159	31	**160**	70	105
sugarbeet/ potatoe	258	13	100	16	273	17	**209**	85	46
others	444	7	-	0	884	5	**505**	55	12
	534	129	**203**	155	**337**	132	**348**	133	**416**

Influence of soil management/seed-system on DON value of wheat

seed-system	DON µg/kg 2004	samples	DON µg/kg 2005	samples	DON µg/kg 2006	samples	**DON µg/kg 2004-06**	DON-Median in µg/kg 2004-06	samples
direct-seed	1245	6	1054	12	483	6	**967**	275	24
cultivator	370	40	126	54	514	57	**328**	100	152
plough	547	74	135	90	178	69	**280**	130	233
	523	120	203	156	337	132	**338**	127	409

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Influence of preceeding crop, soil management, seed-system on DON value of wheat 2004-06

seed-system	plough			cultivator			direct-seed		
preceeding-crop	DON µg/kg 2004-06	DON-Median in µg/kg 2004-06	samples	DONµg/kg 2004-06	DON-Median in µg/kg 2004-06	samples	DON µg/kg 2004-06	DON-Median in µg/kg 2004-06	samples
cereals	105	70	27	103	50	40	90	90	1
maize-corn	405	200	103	1008	900	25	1352	280	15
maize-sil.	262	160	30	552	665	4	-	-	-
oilseeds/ protein crops	171	110	38	160	60	59	86	0	5
sugar beet/potatoe	128	49	22	216	170	22	1020	1020	2
others	149	50	13	2040	2040	2	-	-	-

Trial results 2002-2006; effects of fungicide treatment on DON value of wheat

Variante	DON in µg/kg	DON in %
No treatment	670	100
Fungicidetreatment (during flowering) **against** fusarium in particular*	250	37
Fungicidetreatment – **not against** fusarium (pre blossom spraying) +)	750	112

*) Folicur/Caramba/Input nach proPlant-Prognose in ES 61-69 (Blüte);
+) Strobilurin+Azol-Kombination in EC 49/51

Effects of fungicide treatment and intensity of fertilisation on DON value

Fung. Treatment	DON µg/kg	**fertilisation** (nitrogene) in kg/ha	samples
yes-special against fusaria	253	152	97
yes but not against fusaria	222	134	55
no treatment	289	92	137
total	278	120	289

Effects of intensity of fertilisation on DON-level, 2004 - 2006

intensity of fertilisation in kilo/hectare	DON µg/kg	DON-Median in µg/kg	samples
up to 100	113	0	211
101 - 120	373	100	75
121-140	399	150	195
141-160	332	140	61
> 160	352	130	80
	278	83	652

Differences in DON value depending on organic/conventional farming, 2005-2006

	DON µg/kg 2005	samples	DON µg/kg 2006	samples	**DON µg/kg 2005-06**	samples
organic	75	35	128	26	**104**	61
conventional	188	212	330	177	**251**	385
	172	247	304	203	**231**	446

Conclusion (1)

- Infection with DON this last 3 years was lower than expected thanks to an appropriate climate ?
- Main risk factors (except the climate) and interaction between the factors could be identified.
- Lots of facts for advisory services
- Most detailed research on mycotoxins in cereals in Austria up to 2006

Conclusion (2)

- Cereals and infestation of mycotoxines (DON) : a combination of several risk factors
- Attention to soil management
- The effect of the preceeding crop can be controlled by the soil management
- No tillage + direct seed of cereals + preceeding crop grain maize = carelessness of the farmer
- Organic grain has lower risk.