

Screening of certified German and Austrian oat varieties for resistance to loose smut from 2009 to 2011 as a precondition for breeding of new oat varieties for organic agriculture

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1 Loose Smut of Oat

- loose smut (*Ustilago avenae*) is a problem in the organic seed propagation
- it can lead to significant yield losses under organic conditions (Menziez et al. 2009)
- according to the German seed law (Saatgutverordnung) the maximum number of smutted panicles on 150 m² are 3 for basic seed and 5 for certified seed (BGBl I 2006)
- current certified varieties are usually preferred by breeders for the development of new varieties

Therefore:

- for the organic seed propagation oat varieties with a high resistance to loose smut are required
- it is necessary to identify the resistance level of the different certified varieties in order to evaluate their suitability for the development of new varieties for the organic seed sector.



Fig.1: Smutted oat panicle

2 Materials and Methods

- artificial inoculation according to the method of Nielsen (1976) in field trials in 2009, 2010 and 2011
- inoculation under partial vacuum at -800 hPa with 1 g spores/litre water in 2009 and 2010.
- in 2011 an increased concentration of 5 g spores/litre water was applied
- determination of the percentage of smutted panicles at plant maturity



Fig.2: Inoculation procedure

4 Conclusion

- only few cultivars can be recommended for organic seed propagation
- in case of low or no infection the testing should be repeated over several years
- the inoculation method can also be used for the testing of gene bank accessions and new breeding lines and thus helps to identify resistant lines suitable for organic seed propagation or breeding
- it would be desirable to build up cooperations with oat breeding initiatives on other locations where different races of loose smut are present

5 Literature cited

- Menziez J.G., Turkington T.G., Knox R.E. (2009): Testing for resistance to smut diseases of barley, oats and wheat in western Canada. *Can. J. Plant Pathol.* 31: 265-279.
- Nielsen J. (1976): A method for artificial inoculation of oats and barley for seed treatment trials on seedling-infecting smuts. *Can. Plant Dis. Surv.* 56: 114-116.
- Bundesgesetzblatt-BGBl I (2006): Anforderungen an den Feldbestand. Anlage 2 (zu § 6 Satz 1), S. 362 – 371.

3 Results

Tab.1: Results of loose smut screening – smutted panicles as percentage of total number of panicles

variety	2009	2010	2011	
	[%] 1 g/l	[%] 1 g/l	[%] 1 g/l	5 g/l
Aragon-check	22,4	5,3	18,1	72,4
Cavallo-check	20,8	10,9	50,9	78,8
Panther-check	19,6	3,4	31,0	67,0
mean-check	20,9	6,5	72,7	
mean-total	7,7	3,0	46,4	
Alfred	6,5	1,3		
Alonso			0,4	
Auron	5,1	2,2	74,0	
Auteuil	0,5	0,2	3,1	
Azur	0	0	0,2	
Buggy	5,0	4,5	49,7	
Canyon	17,6	4,9	48,2	
Curly			3,4	
Dalimil	11,0	1,5	48,9	
Dominik	5,1	0,7	42,2	
Efesos	2,8	9,3	51,5	
Effektiv	4,0	2,0	51,2	
Escudino	2,4	2,1	51,0	
Espresso	1,5	1,5	41,5	
Eugen	8,8	1,4	68,7	
Expander	3,9	2,2	42,8	
Flämingsgold	0,2	0,2	52,3	
Flämingsprofi	12,5	2,2	73,0	
Flocke		4,1	74,5	
Freddy	15,4	6,2		
Gabriel			45,6	
Galaxy		5,7	77,0	
Husky	1,0	0,7	25,5	
Ivory	7,4	1,9	51,8	
KWS Contender	6,4	2,1	22,1	
Max	11,5	2,9	56,6	
Monarch	0	1,3	25,1	
Moritz		0,3	28,5	
Neklan	5,8	0,9		
Obelisk			57,2	
Paddock	3,3	3,8		
Pergamon	2,1	0,9		
President	8,0	4,9	74,4	
Scorpion	9,0	3,5	58,0	
Typhon	4,4	2,2	50,2	
Zorro			9,8	