

Susceptibility of winter wheat cultivars to various isolates of common bunt (*Tilletia caries*)

Problems

Common bunt (*Tilletia caries*) is a damaging fungal disease, affecting the spikes and seeds, which especially impacts organic farming. Winter wheat is most frequently affected. Several races of the fungus have been identified, each of which has different pathogenicity.

Solutions

Given the limited options to treat seeds under organic farming conditions, it is desirable to increase the resistance of organic crop plants to seed-transmitted diseases. Several race-specific, effective resistance genes to bunt have been identified (Hoffmann and Metzger 1976, Goates 2012). It would be possible to achieve broadly effective resistance by pyramiding several *Bt* resistance genes.

Practical recommendations

The wheat cultivars 'Capo' (without bunt resistance), 'Tillexus' (*Bt10*), 'Tilliko' (*BtZ*) and 'Tillsano' (*Bt5* group; Borgen A., Loeschberger F., pers. communication) were included in the study. Seeds were artificially inoculated with 10 spore isolates of common bunt (3 g per kg). These are not single spore isolates. The spores originated from naturally infected spikes collected from different regions of Austria. The trials were carried out using a randomised block design with 2 replicates. The cultivar 'Capo' was heavily infected by all spore isolates (65.7–81.9%). Because 'Tillexus', 'Tilliko' and 'Tillsano' displayed varying reactions, this confirms that they carry different resistance genes. The cultivars reacted similarly to spore isolates 1, 4 and 7 and 2, 6, 9 and 11, respectively. Isolates 3 and 5 or 4 and 8 also elicited similar reactions from the cultivars. 'Tillexus' was more strongly infected by six and 'Tilliko' by two spore isolates. 'Tillsano' showed good resistance to all isolates (3.0–8.5% infected spikes).

Further information

- Hoffmann J.A., Metzger R.J. (1976): Current Status of Virulence Genes and Pathogenic Races of the Wheat Bunt Fungi in the Northwestern USA. *Phytopathology* 66:657-660. DOI: 10.1094/Phyto-66-657
- Goates B.J. (2012): Identification of New Pathogenic Races of Common Bunt and Dwarf Bunt Fungi, and Evaluation of Known Races Using an Expanded Set of Differential Wheat Lines. *Plant Disease* 96(3):361-369. DOI: 10.1094/PDIS-04-11-0339

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Isolate	Capo (-)	Tillexus (<i>Bt10</i>)	Tilliko (<i>BtZ</i>)	Tillsano (<i>Bt5</i>)
Nr. 1	69.5	0.6	0.5	6.1
Nr. 2	77.9	28.0	6.7	3.9
Nr. 3	76.9	69.1	35.2	6.1
Nr. 4	69.7	7.2	3.2	6.5
Nr. 5	65.7	66.5	31.6	4.6
Nr. 6	80.8	48.2	19.3	5.0
Nr. 7	72.7	2.2	1.5	3.0
Nr. 8	81.9	12.9	2.9	5.3
Nr. 9	78.2	28.9	14.9	8.5
Nr. 11	76.4	33.2	15.2	3.3

Table: Spikes displaying symptoms of common bunt infection (%) from four winter wheat cultivars after the seeds were inoculated with 10 spore isolates (average of 4 trials, 2019-2020).

