



**PRACTICE ABSTRACT No. 5**

# Wheat resistance to bunt

**PROBLEMS:**

- Common bunt (caused by *Tilletia caries*(DC.) Tul. & Tul. (syn. *T. tritici*(Bjerk.) G. Winter in Rabenh.) and *T. foetida* (Wallr.) Liro (syn. *T. laevis* Kühn in Rabenh.)) and dwarf bunt (caused by *T. controversa* J.G. Kühn) can cause yield losses of over 80%.
- Bunt sori ("bunt balls") (Fig. 1) contain considerable amounts of trimethylamine, which smells like rotting fish. Therefore, the quality of the grain can be affected even by a very small infestation.
- Bunt diseases threaten farming systems whenever the routine use of chemical seed treatment is not possible. Organic wheat production therefore requires alternative methods of controlling common bunt and dwarf bunt.
- Many control methods used in organic farming have low efficacy against soil-borne pathogens, which is typical for dwarf bunt but may also be important for common bunt.



Fig. 1: Common bunt in wheat: infected spikes (left) with bunt sori (right top) and healthy seeds (right bottom)  
(Photo credit: V. Dumalasova and H. Gausgruber)

## SOLUTIONS:

- Breeding for bunt resistance offers an efficient and sustainable protection strategy, especially for low-input organic production systems.
- To date, sixteen race-specific bunt resistance genes (*Bt1* to *Bt15* and *BtP*) have been identified in wheat, and additional sources of resistance have been reported. In addition, 24 non-race specific quantitative trait loci (QTL) have been identified.
- Marker-assisted selection (MAS) enables breeding and selection for improved and durable bunt resistance by pyramiding and combining multiple race-specific *Bt* genes.

## PRACTICAL RECOMMENDATIONS:

- Measures to reduce fungal infections in organic farming include costly seed analysis, seed cleaning, seed treatments approved in organic farming, and the use of varieties with low susceptibility to bunt diseases.
- Some varieties listed in the CPVO (Community Plant Variety Office) database (Agricultural plant species; [https://ec.europa.eu/food/plant/plant\\_propagation\\_material/plant\\_variety\\_catalogues\\_databases/search/public/index.cfm](https://ec.europa.eu/food/plant/plant_propagation_material/plant_variety_catalogues_databases/search/public/index.cfm)) have shown high resistance to common bunt in tests with artificial inoculation in Austria and the Czech Republic: Aristaro (0-0.5% bunt incidence), Genius (0-9%), Spontan (6.6-9.5%), SW Magnifi' (tested only in 2019 and 2020 in the Czech Republic).
- Some commercial varieties carry resistance genes against some pathotypes but seem to be susceptible to some emerging races: Tilliko (0-24%), Tillsano (8.7-28%; only tested in Austria in 2021), Butaro (0-29.5%), Tillstop (0-48%), Graziaro (0-59%), Tillexus (0.3-67.5%).

## FURTHER INFORMATION

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## ECOBREED CONSORTIUM



### ABOUT ECOBREED:

ECOBREED is a 5-year (2018-2023) project funded by European Union's Horizon 2020 research and innovation programme that will improve the availability of varieties and seed suitable for organic and low-input production. Activities will focus on four crop species i.e. wheat, potato, soybean and common buckwheat, selected for their potential contribution to increasing the competitiveness of the organic sector.

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