

Latest in Breeding for Resistance to Common Bunt in Romania

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Abstract: Common and dwarf bunt (*Tilletia caries* (DC.) Tul & C. Tul, *T. foetida* (Wallr.) Liro and *T. controversa* (Kühn) are potentially important wheat diseases in Romania, especially in organic farming and on small farms, unable in most cases to properly treat the seed. Growing bunt resistant cultivars can be an efficient way to reduce expenses and protect the environment, by reducing use of pesticides. For these reasons, a small breeding program was started in 1972, by crossing the old Turkish wheat PI 178383 (a *Bt9* and *Bt10* carrier) with adapted cultivars. Later, in an attempt to diversify the resistance genes used in the program, several gene sources (including *Bt5*, *Bt8*, *Bt11*, *Bt12* etc.), received from Dr. Bob Metzger (Oregon State University, U.S.) were used as parents. Since, our research effort has focused on: (1) continuously checking the efficiency of known bunt resistance genes against local populations (isolates) of bunt; (2) improving the competitiveness of bunt resistant germplasm by repeated cycles of crossing with adapted cultivars and selection for both bunt resistance and agronomic type and (3) searching for new bunt resistance genes. (1) About ten years of artificial testing with 6–10 isolates/year of bunt collected from Romanian locations representative for natural occurrence of *Tilletia* species, has constantly shown that *Bt5*, *Bt10*, *Bt11*, *Bt12* expressed a high level of resistance. Along with original sources provided primarily by Dr. Bob Metzger and more recently, also by Prof. Blair Goates (National Small Grains Germplasm Research Facility, West Aberdeen, U.S.), advanced lines carrying the most efficient genes were tested and confirmed the transfer of this trait. (2) All bunt resistance gene sources available to us were very tall, susceptible to powdery mildew and leaf rust, were low yielding and had poor baking quality. Progress in improving the competitiveness of bunt resistant lines in the absence of bunt has been slow, but every new cycle has shown definite improvements over the previous ones. Presently available bunt resistant lines are semidwarf and powdery mildew resistant, are better adapted to local conditions and give yields of 90–100% as compared with current check cultivars. They are still deficient in leaf rust resistance and bread making quality. New lines with improved leaf rust resistance and quality are in preliminary yield tests. Accelerated progress is expected by using molecular markers for some of the bunt resistance genes. Markers will also be used to pyramid resistance genes. (3) Search for new bunt resistance sources has identified two potential sources with resistance, presumably coming from the Brazilian cultivar Colonias and from the rye genome. Further testing with a wider range of bunt isolates is under way. Positive experience in accelerated selection of higher resistance to other wheat pathogens, accumulated from larger forms of trans-national cooperation (ring tests), emphasized the need of such approach with regard to common bunt, too. The XVth Biennial Workshop could be a real opportunity in this respect.

Keywords: breeding program; advanced lines; resistance; organic farming