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Edited by

Vojtěch Holubec, Mary Barkworth and Roland von Bothmer

Organizers:

Research Institute of Crop Production
Department of Gene Bank, Prague, Czech Republic

Czech University of Agriculture Prague, Department
of Botany and Plant Physiology, Prague, Czech Republic

What are the *Triticeae* and why a Triticeae Symposium?

This publication constitutes the proceedings of the 5th International Triticeae Symposium which was held in Prague, Czech Republic, June 6–10, 2005. The previous symposia were held in Helsingborg, Sweden (1991), Logan, Utah, U.S.A. (1994), Aleppo, Syria (1997), and Córdoba, Spain (2001). Like its predecessors, the Fifth Symposium brought together individuals in many different disciplines who had in common their interest in the one group of grasses, the *Triticeae.*

What are *Triticeae*

Members of the *Triticeae* form a tribe in the grass family, *Poaceae*. More significantly, they constitute one of the world's most important plant groups. Within the group are found three major cereal crops, namely barley, wheat and rye, all of which are used in a multitude of ways for food, forage, and beverages. The tribe also includes man made crops such as × *Triticosecale* (Triticale), *Tritordeum* (an amphiploid of *Triticum aestivum* × *Hordeum chilense*), developed primarily in Spain and *Triticum aestivum* × *Leymus arenarius* which is being developed in Iceland. Many other species are important as forage crops and as food for wildlife, particularly in Asia and North America. Among such species are Crested wheatgrass (*Agropyron cristatum*), Russian Wildrye (*Psathyrostachys juncea*) and the many species of the genus *Elymus* that grow in the natural grasslands of these two regions. Not all the *Triticeae* are considered good plants. Some, such as *Elymus repens*, *Hordeum murinum* and *H. jubatum*, are considered noxious weeds in at least part of their range.

The *Triticeae* contains altogether around 350 species – the exact number is not known since no comprehensive monographic treatment including all genera and the entire distribution range has been undertaken. Preparation of such a monograph would be an ideal project for a joint international research effort. The tribe has a vast distribution range, being indigenous to all five continents. Most species grow in the temperate zones, but a few species reach subtropical areas. Some species grow at sea level, others above 5000 m in the Himalayas; some species grow in dry habitats, others in wet habitats; some species prefer saline marshes, others grasslands, still others dry steppe communities. These examples (and more could be cited) demonstrate the remarkable ecological amplitude of the tribe.

The *Triticeae* also show a very broad spectrum of biological attributes, ranging from annuals to perennials, from self-compatible inbreeders to self-incompatible outbreeders, and from diploids to duodecaploids. The tribe as a whole is also noteworthy for the extent to which its species, even species in different genera, can be made to hybridize even if they do not do so naturally. For this reason, the whole tribe is actually a gigantic gene pool for crop improvement. Thus, questions of germplasm conservation and utilization are central to much of the research in the *Triticeae*.

Its great agronomic importance, biological and genetic diversity, and high incidence of polyploidy, have also led to the *Triticeae* being a model group for addressing general scientific questions in areas such as:

– phylogeny,
– evolutionary mechanisms,
– polyploidy,
– genome differentiation,
– alien gene transfer,
– incompatibility barriers,
– genetic diversity,
– germplasm conservation,
– utilization and pre-breeding of plant genetic resources.

Why the Triticeae Symposium?

Scientific meetings are today becoming increasingly specialized. There are meetings associated with most of the major crops, for instance, The International Wheat Symposia, The International Barley Genetics Symposia, and The International Rye Symposia. There are also breeders' regional meetings and meetings that focus on particular subjects such as genomics, grass systematics, and germplasm conservation. But there are very few meetings where experienced scientists and students from different disciplines come together for broader discussions, for meetings where plant systematists meet plant breeders or where ecologists interact with gene bank curators. The International Triticeae Symposium is one such meeting. Its primary goal is to bring all these different people together to learn from each other, to understand the paradigms of their different areas, and to listen and discuss the group that is their common focus – the *Triticeae.*

In many cases questions are asked – but not answered because the people do not meet: The plant breeder may ask the taxonomist: *"Why do you always complicate things by all these name changes? For example, some species that were first described in* Triticum*, were later transferred to* Agropyron*, then moved to* Elytrigia *and are now treated in* Elymus*!"* The taxonomist may answer: *"Why don't you make specimens of the plants that you work with so that I may better understand the variability within species?"* The breeder is not aware of the complicated rules of botanical nomenclature, nor that taxonomists really do strive to create a stable taxonomic system, but one that reflects what is known about relationships.

The taxonomist may ask the plant breeder: *"Why don't you use more of the treasure of genes from wild species in your breeding program?"* He/she does not appreciate the delicate and complex process of breeding, where sterility barriers prolong and makes the breeding program even more difficult.

The genebank curator may ask the breeder: *"Why don't you use all the valuable genes present in the genebanks, collected over the world?"* The plant breeder may then answer both the taxonomist and the genebank curator: *"Why should I use all this unadapted germplasm; we have enough variation available in our own elite material!"*

These and many more questions are asked, but not directly answered or discussed if representatives from the different disciplines never meet! The answer from all should be: *"We need a forum to bring people of different subjects together to learn from each other and to develop a mutual understanding leading to a better utilization of the tribe in plant breeding and research!"* This is the main objective for arranging the Triticeae symposium. The amplitude of research in the *Triticeae* is mirrored in the present Proceedings. They also point forward to the next symposium, which will be held in Kyoto, Japan in 2009. Some of the questions and approaches presented in this Symposium will undoubtedly be addressed at that meeting. It is equally certain that there will be new questions raised and new approaches reported. That is the nature of research and what keeps us all involved.

Roland von BOTHMER, Mary BARKWORTH and Vojtěch HOLUBEC