Popular science summary

Hexaploid wheat species: bread wheat (*Triticum aestivum* L. ssp. *aestivum*) and spelt (*Triticum aestivum* L. ssp. *spelta*) are closely related. It is believed that bread wheat originated spelt by mutations that changed its genome. *T. aestivum* is considered world's most important domesticated plant. That species has been exposed to genetic drift and selection processes (both natural and synthetic) over long periods of time what led to genetic erosion of bread wheat varieties. Therefore, breeders more and more often use wild wheat species related to *T. aestivum* to create new wheat varieties characterized by better nutritional and technological properties. Spelt is well adapted to lower fertility soils and is yielding on good level. Many studies indicate that spelt grain unlike bread wheat has better chemical composition, contains more protein with higher nutritional values and mineral compounds. Close relativeness of bread wheat and spelt should assure the development of hypothetic stabile crosses of these species. New genes transfer from more genetic diversified species to bread wheat can improve its quality and quantity properties. It has been proven that spelt can be a source of desirable fungal resistance-linked genes. Powdery mildew (*Blumeria graminis* (DC.) E.O. Speer f. sp. *tritici*) is one of the most dangerous pathogen of wheat. Its presence in cultivation area can lead to yield loss reaching even 40%. Disease resistance systems have been considered to be monogenic or oligogenic resistances. In most cases, single powdery mildew genes are responsible for wheat resistance. The breeders during the process of obtaining new wheat cultivar are looking for the best way to combine resistance genes what is called gene pyramiding. It is a broad-spectrum technique for developing durable resistance in crops. Genetic similarity resulting from the same chromosomes number (2n=6x=42) and considerable homology between bread and spelt chromosomes gives the chance to develop stabile, high-yielding hybrids among these species. On such basis, it seems to be an interesting idea to screening for the most valuable hybrids among investigated hybrids: those that combine good technological and nutritional properties and quality traits with fungal diseases resistance. The planned analysis will focus on diversification of wheat hybrids and their parental components collection from Department of Plant Breeding and Seed Production UWM. Our research will include biochemical and molecular analysis. The use of unique, not only across our whole country, plant material with wide range of diversity is an opportunity to obtain interesting results. The analysis of these results will allow to improve our understanding about wheat-spelt hybrids. Moreover, such observations will be valuable source of knowledge to cereal breeders. To date, there have not been conducted studies concerning genetic diversity of bread wheat and spelt hybrids.