

Identification of the molecular markers linked to the chosen genes in cereals

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Nowadays, plant breeding worldwide is routinely supported by the application of the solutions developed by biotechnology. One of the most important milestones, which allowed for significant improvement of the selection process was the application of the molecular markers for genotyping of the plant material (marker assisted selection, MAS). The major advantage of this approach is fast and reliable identification of the materials carrying desirable genes in the genome. However, the limitation of the MAS is often the insufficient availability of the molecular markers useful for application. Because of that fact development of the new molecular markers linked to important genes (e. g. dwarfing or resistance genes) is of great importance.

Research performed in the Institute of Plant Genetics, Breeding and Biotechnology allowed for the development of the novel sequence specific molecular markers, which has a potential for application in plant breeding. The most important findings include identification and development of molecular detection methods for the novel genetic sources of dwarfism in triticale as well as two genetic sources of powdery mildew resistance in oat. These new genes were introduced into triticale and oat genomes from wild relatives. Subsequently, on the basis of obtained plant material, reliable methods of their molecular detection, based on sequence specific markers, have been designed. Moreover, as a result of our studies, we have adapted molecular markers developed for detection of the several wheat leaf rust (*Lr*) and powdery mildew (*Pm*) resistance genes to an application in triticale in both singleplex as well as multiplex format. Developed molecular markers may provide a valuable tool for detection of the presence in cereals genomes selected genes important for their breeding programs.