Prof. Zbigniew Zwierzykowski

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Field of specialisation

Genetics, cytogenetics and breeding of forage grasses within the *Festuca-Lolium* complex

Research area

- Introgression of genes associated with cold and drought tolerance in the *Festuca-Lolium*;
- Genomic structure, chromosome pairing and recombination in *Festuca-Lolium* hybrids by the use genomic *in situ* hybridization (GISH) and fluorescence *in situ* hybridization (FISH);
- Amphiploid and introgression breeding of *Festulolium*.

Abroad scientific fellowships

- Germany, Institute of Plant Genetics and Crop Plant Research, Getersleben: 1981 (2 months);
- France, Institut Nationale de la Recherche Agronomique (INRA), Lusignan: 1984 (3 months), 1985 (2 months), 1987 (3 months), 1989 (3 months), 1991 (3 months), 1993 (3 months);
- Great Britain, Institute of Grassland and Environmental Research, Aberystwyth: 1998 (3 months);
- USA, University of California, Riverside, USA: 1997 (3 months), 1999 (3 months).

Present projects

- Project of Ministry of Science and Higher Education (no. PBZ-MNiSW-2/3/2006/21): „Identification of genes associated with cold acclimation and frost tolerance in perennial ryegrass (*Lolium perenne* L)", 2007-2011; project leader;
- Project of Ministry of Science and Higher Education (no. N N310 090736): „Studies of cytogenetic stability and fertility in successive generations of the allotetraploid hybrid *Festuca pratensis* × *Lolium perenne*"; 2009-2012; project leader.

Main publications (2005-2011)

- Bocian A., Kosmala A., Rapacz M., Jurczyk B., Marczak Ł., **Zwierzykowski Z.** (2011). Differences in leaf proteome response to cold acclimation between *Lolium perenne* plants with distinct levels of frost tolerance. *J. Plant Physiol*., 168: 1271-1279. doi:10.1016/j.plph.2011.01.029.
- **Zwierzykowski Z.**, Zwierzykowska E., Taciak M., Kosmala A., Jones R.N., Zwierzykowski W., Książczyk T., Krajewski P. (2011). Genomic structure and fertility in advanced breeding populations derived from an allotetraploid *Festuca pratensis* × *Lolium perenne* cross. *Plant Breeding*, doi.10.1111/j.1439-0523.2010.01839.x
- Ghesquière M., Humphreys M.W., **Zwierzykowski Z.** (2010). *Festulolium*. In: B. Boller, U.K. Posselt and F. Veronesi (eds.), Fodder Crops and Amenity Grasses. pp. 288-311. Series: Handbook of Plant Breeding, Vol. 5. Springer.
- Ghesquière M., Humphreys M.W., **Zwierzykowski Z.** (2010). *Festulolium* Hybrids: Results, Limits and Prospects. In: C. Huyghe (ed.), Sustainable Use of Genetic Diversity in Forage and Turf Breeding, pp. 495-507. Springer.
- Książczyk T., Taciak M., **Zwierzykowski Z.** (2010). Variability of ribosomal DNA sites in *Festuca pratensis*, *Lolium perenne*, and their intergeneric hybrids, revealed by FISH and GISH. *J. Appl. Genet.* 51 (4): 449-460.
- Pociecha E., Płażek A., Rapacz M., Niemczyk E., **Zwierzykowski Z.** (2010). Photosynthetic activity and soluble carbohydrate content induced by the cold acclimation affect frost tolerance and resistance to *Microdochium nivale* of androgenic Festulolium genotypes. *J. Agron. Crop Sci.* 196: 48-54.

- Kopecký D., Bartoš J., **Zwierzykowski Z.**, Doležel J. (2009). Chromosome pairing of individual genomes in tall fescue (*Festuca arundinacea* Schreb.), its progenitores and hybrids with Italian ryegrass (*Lolium multiflorum* Lam.). *Cytogenet. Genome Res.* 124 (2): 170-178.
- Kosmala A., Bocian A., Rapacz M., Jurczyk B., **Zwierzykowski Z.** (2009). Identification of leaf proteins differentially accumulated during cold acclimation between *Festuca pratensis* plants distinct in the level of frost tolerance. *J. Exp. Bot.* 60: 3595-3609.
- Pociecha E., Płażek A., Janowiak F., Waligórski P., **Zwierzykowski Z.** (2009). Changes in abscisic acid, salicylic acid and phenylpropanoid concentrations during cold acclimation of androgenic forms of Festulolium (*Festuca pratensis* × *Lolium multiflorum*) in relation to resistance to pink snow mould (*Microdochium nivale*). *Plant Breeding* 128 (4): 397-403.
- Pociecha E., Płażek A., Janowiak F., **Zwierzykowski Z.** (2008). ABA level, proline and phenolic concentration, and PAL activity induced during cold acclimation in androgenic Festulolium forms with contrasting resistance to frost and pink snow mould (*Microdochium nivale*). *Physiol. Mol. Plant Pathol.* 73 (6): 126-132.
- **Zwierzykowski Z.**, Zwierzykowska E., Taciak M., Jones N., Kosmala A., Krajewski P. (2008). Chromosome pairing in allotetraploid hybrids of *Festuca pratensis* × *Lolium perenne* revealed by genomic *in situ* hybridization (GISH). *Chromosome Res.* 16 (4): 575-585.
- Pociecha E., Płażek A., **Zwierzykowski Z.** (2008). Impact of cold-induced antioxidant activity on frost resistance in androgenic Festulolium genotypes. *J. Appl. Bot. Food Qual.* 81: 126-131.
- Rapacz M., Gąsior D., Kosmala A., **Zwierzykowski Z.**, Humphreys M.W. (2007). The role of photosynthetic apparatus in cold acclimation of *Lolium multiflorum*. Characteristics of novel genotypes low-sensitive to PSII over-reduction. *Acta Physiol. Plant.* 29: 309-316.
- Pociecha E., Płażek A., Janowiak F., Janeczko A., **Zwierzykowski Z.** (2007). Physiological basis for differences in resistance to *Microdochium nivale* (Fr) Samuels and Hallett in two androgenic genotypes of Festulolium derived from tetraploid F1 hybrids of *Festuca pratensis* × *Lolium multiflorum* (Festulolium). *J. Phytopathol.* 156: 155-163.
- Kosmala A., **Zwierzykowski Z.**, Zwierzykowska E., Łuczak M., Rapacz M., Gąsior D., Humphreys M.W. (2007). Introgression-mapping of the genes for winter hardiness and frost tolerance from *Festuca arundinacea* into *Lolium multiflorum*. *J. Hered.* 98: 311-316.
- Humphreys M.W., Gąsior D., Leśniewska-Bocianowska A., **Zwierzykowski Z.**, Rapacz M. (2007). Androgenesis as a means of dissecting complex genetic and physiological controls: selecting useful gene combinations for breeding freezing-tolerant grasses. *Euphytica* 158: 337-345.
- Durand J.L., Bariac T., Ghesquière M., Biron P., Richard P., Humphreys M., **Zwierzykowski Z.** (2007). Ranking of the depth water extraction by individual grass plants using, natural ^{18}O isotope abundance. *Environ. Exp. Bot.* 60: 137-144.
- **Zwierzykowski Z.**, Kosmala A., Zwierzykowska E., Jones N., Jokś W., Bocianowski J. (2006). Genome balance in six successive generations of the allotetraploid *Festuca pratensis* × *Lolium perenne*. *Theor. Appl. Genet.* 113: 539-547.
- Kosmala A., Zwierzykowska E., **Zwierzykowski Z.** (2006). Chromosome pairing in triploid intergeneric hybrids of *Festuca pratensis* with *Lolium multiflorum* revealed by GISH. *J. Appl. Genet.* 47: 215-222.
- Kosmala A., **Zwierzykowski Z.**, Gąsior D., Rapacz M., Zwierzykowska E., Humphreys M.W. (2006). GISH/FISH mapping of genes for freezing tolerance transferred from *Festuca pratensis* to *Lolium multiflorum*. *Heredity* 96: 243-251.
- Kopecký D., Loureiro J., **Zwierzykowski Z.**, Ghesquière M., Doležel J. (2006). Genome constitution and evolution in *Lolium* × *Festuca* hybrid cultivars (Festulolium). *Theor. Appl. Genet.* 113: 731-742.
- Rapacz M., Gąsior D., Humphreys M.W., **Zwierzykowski Z.**, Płażek A., Leśniewska-Bocianowska A. (2005). Variation for winter hardiness generated by androgenesis from *Festuca pratensis* × *Lolium multiflorum* amphidiploid cultivars with different winter susceptibility. *Euphytica* 142: 65-73.
- Rapacz M., Gąsior D., **Zwierzykowski Z.**, Leśniewska-Bocianowska A., Humphreys M.W., Gay A.P. (2004). Changes in cold tolerance and the mechanisms of acclimation of

photosystem II to cold hardening generated by anther culture of *Festuca pratensis* × *Lolium multiflorum* cultivars. *New Phytol.* 162: 105-114.