Resistance to powdery mildew in winter barley in Poland

Jerzy H. Czembor[a], Aleksandra Pietrusińska[a],

[a] *Plant Breeding and Acclimatization Institute-NRI / National Centre for Plant Genetic Resources, Poland*

j.h.czembor@ihar.edu.pl

Winter barley is an important cereal crop and it is grown in Central and Western Poland. The powdery mildew caused by *Blumeria graminis* f. sp. *hordei* is one of the most frequently observed diseases on winter barley in Poland and can cause considerable yield losses. The use of resistant cultivars is an effective method to control powdery mildew and the incorporation of new genes for resistance to powdery mildew into barley cultivars has been very useful in controlling powdery mildew. Mlo resistance has become a very important source of powdery mildew resistance in barley because there is no known virulence for these genes.

The present investigation describes the introduction of the *mlo* gene for resistance to powdery mildew (*B. graminis* f.sp. *hordei*) into winter barley cultivars characterized by high and stable yield potential under Polish conditions. We aimed at field testing of the obtained lines with Mlo resistance for their agricultural value.

Four cultivars (Souleyka, Titus, SU Vireni and Metaxa) as high yielding parents were used. In addition, existing resistance genes to powdery mildew in these cultivars were preserved. Two lines (BKH 735 and line 42) as parents with Mlo resistance were used. Line BKH 735 was obtained in the Laboratory of Applied Genetics PBAI-NRI Radzików in 2002-2011. Selection for presence of the *mlo* gene was conducted in backcross populations by phenotyping in the field (natural infection) and under greenhouse conditions (differential barley lines for resistance genes for powdery mildew and differential fungus isolates). In addition, to confirm the presence of the *mlo* gene in backcross populations MAS strategy was applied using SSR markers HVmlo1 and HVmlo3.

Field trials with 200 F_4BC_1 lines were conducted during 2015/16 in 3 locations: in Central (Radzików) and Western Poland (Szelejewo, Wiatrowo). The parental lines were used as control. The aim of these trials was to obtain information on agricultural value of obtained lines. Our results demonstrate the practical use of the introduction of Mlo resistance into background of winter barley germplasm with valuable economical characteristics in Polish agricultural conditions.

This work was conducted in the project: Interaction between powdery mildew (*Blumeria graminis* f.sp. *hordei*) resistance determined by *mlo* gene and economical value characteristics in winter barley. 2014-2020. Programme: Basic Research for Biological Progress in Crop Production; Funded by the Ministry of Agriculture and Rural Development Proj. No. 4-1-04-3-01 (27).