



Characteristics of rye varieties with respect to nutritional and prohealthy properties

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Among cereals, rye is a species with the highest content of bioactive substances. These substances are dietary fibre, with its main components such as arabinoxylans, oligosaccharides, lignin, phytates and a whole range of phenolic compounds beside lignin, including phenolic acids and alkylresorcinols. Rye grains should be used in quantities as large as possible in production of foods enriched with bioactive components as these substances protect against many diet-related diseases. Varieties with their increased concentration seem to be of particular importance in this respect. These varieties could also be used for obtaining specific milling fractions or isolation of certain bioactive substances. In order to make use of grains in such a way it is necessary to examine not only the content of nutrients, also compounds with bioactive pro-healthy properties in individual rye varieties to be cultivated in Poland. Lack of information on genotypic diversity and genotype-environment interaction of the contents of bioactive components among varieties suitable for cultivation in Poland (placed on the National List) inspired us to undertake such studies. They have been conducted within the National Programme in IHAR-PIB in the years 2008-2013.

Analysis of chemical composition was conducted on three sets of winter rye, each of them consisting of eighteen varieties from three different agro-climatic zones in Poland, namely from the western (Świebodzin), north-eastern (Marianowo) and southern (Nowy Lubliniec) zones, from 2010's crop. In every set of these grain samples sixteen components and physical properties were analysed. These components were: protein, minerals, lipids, digestible starch, alkylresorcinols and a dietary fibre complex, including non-starchy polysaccharides with a soluble and an insoluble fraction as well as uronic acids and Klason lignin. Moreover, viscosity of grain extract and physical properties of the grain such as mass of a thousand grains and volume per mass were determined. Based on the results obtained total nutritional value index and potential bioactive properties of grain were determined. The results are presented as mean values of a given component from three locations where rye was cultivated. The results were also statistically analyzed by using two-way analysis of variance.

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It has been shown that the content of nutrients as well as dietary fibre and other components of bioactive kind in rye, similarly to other cereals, have varietal character, yet in a different extend modified by environmental conditions, in which grain was produced. The following varieties were distinctive as regards to nutritional values: Gonello, Bosmo and Słowiańskie. The following three varieties are distinctive as regards their bioactive properties: Bellami, Gonello or Visello, with a mean value of 73.3. In the first case these were mostly varieties with increased content of starch, in the second case varieties mostly with increased content of dietary fibre and high viscosity.

Rye varieties react in different ways to changing soil and climatic conditions as regards the chemical composition. In this respect we could recognize stable varieties, which, irrespective of crop conditions, retained their chemical composition almost unchanged as whole or its selected components only. However, there were also found varieties which shown very unstable chemical composition in general or its particular component under variable agro-climatic conditions.

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