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Phenotypic variability of tartary buckwheat germplasm cultivated under the Czech Republic conditions

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Abstract

Nowadays, Tartary buckwheat (*Fagopyrum tataricum* (L.) Gaertn.), a pseudo-cereal, grabs more attention because of its valuable nutrition, especially protein content and its suitability in a gluten-free diet, and become an alternative cereal in many countries. The characterisation and evaluation are necessary for a selection of superior genotypes that might be used in further breeding programs in local conditions. The objective of this research is to evaluate the yield, morphological traits, and protein contents from 20 genotypes of Tartary buckwheat provided by the Gene Bank of Crop Research Institute (CRI) of the Czech Republic and U.S. Department of Agriculture (USDA). The germplasm was grown under the climatic condition of the Czech Republic during 2020 and 2021. Yields and morphological traits, including plant height, branching, compactness of inflorescence, and the number of flowers were evaluated. The seed storage protein contents, including albumins, globulins, and gliadins were evaluated by Kjeldahl’s method. A significant difference in yield, branching of the main stem, and protein content between each genotype from both years was observed, while the other morphological traits, including plant height, thousand seed weight, compactness of inflorescence, and the number of flowers were stable in each genotype. The average protein content in all cultivars was $13.20 \pm 0.67\%$ of dry weight (dw) in 2020 and was decrease slightly to $10.68 \pm 0.61\%$ of dw in 2021. In addition, the difference in the temperature and precipitation in both years was observed. Therefore, the increase in the yield and decrease in the protein content in 2021 might be caused by the warmer temperature and more precipitation in 2021. However, three genotypes, including Peremoga, Lira, and No.2316, can maintain the high yield and protein content in 2020; hence, they were suggested for cultivation in the Czech Republic and can be used in the further breeding programs. This pilot research can thus be used in further breeding programs to improve the quality of Tartary buckwheat under the conditions of the Czech Republic.

Keywords: Breeding, phenotypic traits, protein content, Tartary buckwheat