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Influence of Gene *Gpc-B1* of *Triticum turgidum* ssp. *dicoccoides* on Grain Protein Content in Bread Wheat

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Aim of the study:*Gpc-B1* encodes a transcription factor that stimulates the mobilization of nitrogen, iron, zinc, and manganese from the physiologically aging vegetative parts of the plant (Dubcovsky, et al., 2006). Through numerous crossings, *Gpc-B1* was transferred to common winter wheat of Kuialnyk variety of Ukrainian breeding possessing high grain quality and good productivity. The aim of the work was to analyze the effect of the *Gpc-B1* gene on protein content in grain in the hybrid generation F_5.

Material and Methods: For reliability, the determination of protein content in grains was carried out by two independent methods – near infrared spectrometry (NIR) and the Kjeldahl method of quantitative determination of nitrogen. For NIR spectrometry, 50 g of grain was ground on a laboratory mill Perten LM 3100 and measured on an infrared analyzer Inframatic 8600 (Perten, Sweden). To determine the total nitrogen content, 0.800 g of the sample was digested with a digester–the programmable infrared boiling system Behrotest InKjel, using a multistage program and Kjeltabs catalyst, and distilled in an automatic steam distiller S4 (Behr, Germany). Titration was carried out with an automatic titrator TitroLine Easy (SI Analytics, Germany) with 0.1 N sulfuric acid. The nitrogen-to-protein conversion factor was 5.7.

Results: 16 lines, analyzed by IR spectrometry, showed the mass fraction of protein from 14.23% to 16.81%. The mother variety Kuialnyk had 13.49% protein and the paternal line Glupro – 16.90%. The average value for the lines, carriers of the studied gene *Gpc-B1*, was 15.37%, which is 1.88 points more than the protein content in the original Kuialnyk variety (an increase of 13.93%). The Kjeldahl method was used to analyze 44 lines. The values of the mass fraction of protein for the lines were 12.14%–16.18%, Kuialnyk – 12.20%, Glupro– the *Gpc-B1* donor line – 15.84%. Estimating for nitrogen, the average value for hybrid lines was 13.56%, which is 1.36 points higher than that of the original Kuialnyk cultivar (increase of 14.40%). It is worth mentioning line 10, which showed significantly more protein than the original parental form Glupro, which suggests a possible interaction of genes in favor of increasing the protein accumulation. The measurements obtained by two different independent methods are in good agreement. For the first time we have shown that the transferred gene *Gpc-B1* from the wild tetraploid emmer wheat in the genetic environment of the state registered variety Kuialnyk is active and raises the protein content in grain by an average of 14%. The proposed approach seems to be promising and can be used to develop new high-yield and high-quality varieties of bread winter wheat.

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