

## Evaluation of variance of some valuable features of einkorn

Polina Ya. TRETIAKOVA, Mikhail Yu. CHEREDNICHENKO

Department of Genetics, Biotechnology, Plant Breeding and Seed Science,  
Russian Timiryazev State Agrarian University, Russian Federation  
polina.tretiakova@yandex.ru

**Aim of the study:** Einkorn (*Triticum monococcum* L. subsp. *monococcum*) is directly associated with soft and hard wheat. *T. monococcum* is considered as a highly nutritious cereal, especially rich in protein and antioxidants. It is a good donor of beneficial signs associated with resistance to various diseases, chemical composition, etc., and can be used in breeding programs to improve the properties of soft and hard wheat. The aim of the study was to characterize the variance of some valuable features of einkorn.

**Material and Methods:** Phenotypic data were analyzed separately, based on the following statistical model:  $y_{ino} = \mu + g_i + r_n + b_{no} + e_{ino}$ . Combined location analysis was carried out using BLUEs (best linear unbiased estimates) and the following statistical model:  $x_{ikno} = g_i + l_k + y_n + b_o + (gl)_{ik} + (gy)_{in} + (gly)_{ikn} + e_{ikno}$ . The best linear unbiased estimator is the result of solving a mixed model related to fixed factors. The procedure of the best linear unbiased estimator is used in cases where it is required to evaluate (rather than to predict) the influence of any factors (usually of a non-genetic nature) on the resultant characteristic in a certain population and certain conditions. BLUEs were calculated when establishing the genetic effect as a fixed value. The variance components were determined by the REML method (restricted maximum likelihood). All calculations were performed using the statistical program R-studio and the program ASReml 3.0. The variance calculation was performed for all characteristics, taking into account the genotype as the main factor, using the ANOVA as a statistical method.

**Results:** Einkorn is a promising crop for use in breeding programs, with the aim of improving features such as the amount of protein, the amount of yellow pigment, and winter hardiness in varieties of hard and soft wheat. The presence of a significant genotypic effect in such features as the time of earing, plant height, winter hardiness, lodging during earing and before harvesting, the amount of yellow pigment and the sedimentation index allows to perform breeding experiments aimed at changing their values. The presence of a negative correlation between the features will allow, by decreasing the lodging, increasing their yield, increasing the time of earing, reducing plant height, lodging and sensitivity to *Septoria*, decreasing the height of the plant, increasing the sedimentation index and the amount of protein. Thanks to positive correlation, it is possible, by decreasing the lodging during the earing, to reduce lodging before cleaning and sensitivity to *Septoria*, and by increasing the amount of protein, to improve the sedimentation index.

**Keywords:** Einkorn, *Triticum monococcum*, valuable breeding features, genetic variance.