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DETERMINATION OF GRAIN QUALITY INDICATORS OF SOFT WHEAT VARIETIES AND ISOLATION OF RECOMBINANTS WITH HIGH IRON ACCUMULATION CAPACITY

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Abstract

Due to the problem of iron and iodine deficiency, Uzbekistan loses up to 1.2% of its gross domestic product annually. Iron deficiency anemia has been identified in 80% of pregnant women, 60% of women of childbearing age, and 57% of school-age children in Uzbekistan. In some regions of Uzbekistan, iron deficiency affects up to 90% of pregnant women.

Keywords: Soft wheat, variety, 1000-grain weight, protein content, grain, iron content, selection.

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Introduction

Based on the above considerations, we will thoroughly analyze the grain quality indicators of ancient varieties belonging to folk selection in the territory of our Republic, as well as soft wheat varieties included in the State Register and newly developed varieties, with particular focus on lines with high iron content in the grain and the analysis of their biometric and agronomic indicators. As a result of the analyses, it was found that the iron content in the grain of the selected varieties and lines ranged from 1.1 to 1.5 mg/100 g.

The ability of plants to grow under conditions of environmental pollution with various metals is ensured by a wide range of resistance mechanisms operating at different levels of plant organization, and the same is observed for iron. Significant progress has been made in understanding these mechanisms thanks to the widespread use of new methods, primarily molecular genetics. It should be noted that various aspects of tolerance of plants to different metals, their assimilation and adaptation by plants are still insufficiently studied and require additional research. At the same time, as in plant species tolerant to heavy metals, in wheat iron triggers a relatively rapid activation of protein synthesis in the presence of these elements, restoring its composition, while in less tolerant plant species this occurs more slowly, and in some cases synthesis does not start at all. Based on this, it was proposed to use the protein composition in plant cells as a criterion for iron accumulation by plants.

In soft wheat (Triticum aestivum), gliadin proteins have been found to be controlled through several independent (unlinked) clusters, and analysis of 100 grains belonging to a single variety population provides a reliable basis for judging the degree of genetic homogeneity or heterogeneity of that variety population.

In addition to several valuable agronomic traits of the studied wheat varieties, it is necessary to identify their genotype for use as a high-iron variety for breeding purposes and to study their genetic nature (Figure 1). Therefore, analysis of the electrophoretic composition of gliadin proteins in samples of ancient local soft wheat varieties is of great importance.

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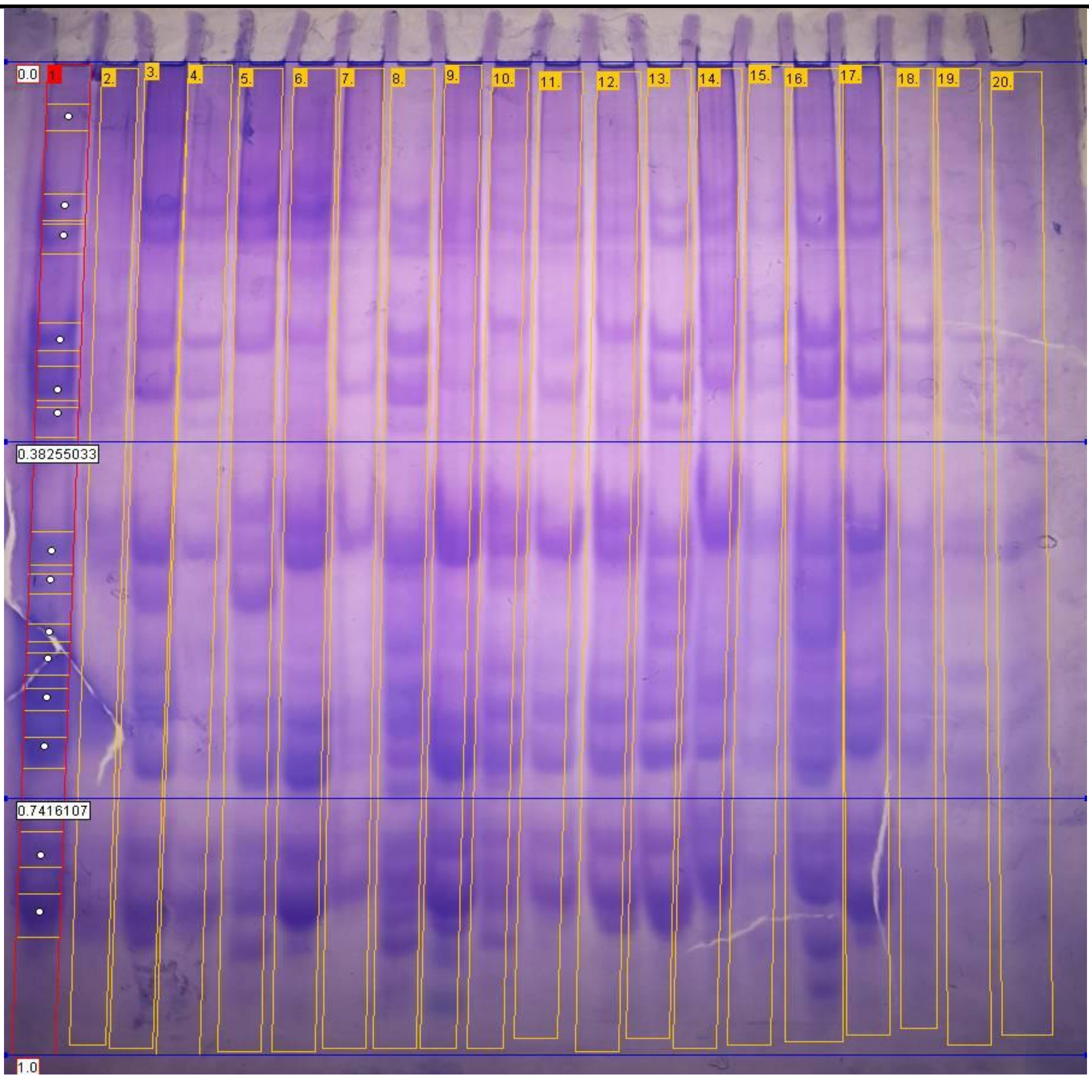

Figure 1. Ancient varieties belonging to folk selection in the territory of our Republic. 1. Red wheat, 2. Bukor bobo, 3. White wheat 1, 4. White wheat 2, 5. Tuya tish, 6. Surxak, 7. Grecum, 8. Kal wheat, 9. Red shark, 10. Qora qiltiq, 11. Red ear, 12. White ear, 13. Qayroq tosh, 14. Red wheat (Long), 15. Red wheat (Boysun), 16. G‘allakor, 17. Ravon

Grain and flour obtained from grinding the grain sample were incinerated, and the Fe content in the resulting ash was determined using an Atomic Absorption Spectrometer AAS 200.

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Among the 20 soft wheat lines presented in the local nursery, analysis results showed the presence of iron, and their electrophoretic spectra in PAAG gel were found to be genetically determined, with these spectra being unique for each line.

Numerous studies have been conducted to map Fe QTLs in wheat. Several biparental mapping populations were used to map these two traits.

Several QTLs for Fe content in wheat grain have been identified, which can be placed in a high-genetic-background environment to improve micronutrient content; in the mapping population, 12% was determined for Fe content, respectively. Two QTLs on chromosome 4B for Fe are pleiotropic, indicating that their simultaneous improvement is possible.

Conclusion

Analysis of the Gurt and Omad varieties showed that their grain contains 1.6 and 1.8 mg of iron, respectively, and their electrophoretic spectra in PAAG gel were found to be genetically determined, with these spectra being unique to each variety. The Yuksalish variety grain was found to contain 1.6 mg and its flour 1.5 mg of iron, and their electrophoretic spectra in PAAG gel were found to be genetically different; it was recommended for use in breeding work as a high-iron variety.

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