# Analysis of biochemical variation in a bread wheat population from the 19th century

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## Introduction

Several studies have indicated that the proteins into endosperm of the wheat suitable for investigation of genetic variation at different bread wheat (*Triticum aestivum*) varieties originated from ancient landraces. In 1967, in the Institute for Crop Husbandry and Plant Breeding of the Hochschule für Bodenkultur in Vienna wheat grains from the 1877 were found among the old seed collections (RUCKENBAUER, 1971).

Their origin was identified later on as an old Hungarian landrace from Mosonmagyaróvár. After the next two generations of seed multipication in 2001 due to the courtesy of Prof. Dr. KAINZ the Institute for Agrobotany obtained a few wheat grain from this multiplied accession. During the two years (2001-2002) some morphological traits (plant height, ear height, number of spikelet per ear, number of seed per ear) were evaluated. We identified five botanical types (var. *albidum*, var. *lutescens*, var. *milturum*, var. *ferrugineum*, var. *erythrospermum*) within the population (GYULAI et al., 2002). Because of the high polymorphism in seed storage protein profiles of wheat, electrophoretic analyses of glutenins and gliadins have proven usable for identification, differentiation and characterization of wheat landraces maintained in genebank collections. The objective of this study has been to analyse seed storage proteins (gliadins and glutenins) in old wheat landrace population and establish their degree of genetic variation.

## Materials and method

Sample was obtained from the germplasm collection at the Austrian Agency of Health and Foodsafety - Agrobiology Linz. Individual seeds of each taxa were used for protein study. Gliadins and glutenins from individual grains were extracted, separated and detected by gel electrophoresis method according to WRIGLEY (1992). For comparison of the protein patterns we used six bread wheat varieties (Bánkúti 5, Bezosztaja 1, Jubilejnaja 50, Basalt, Marquis, Kanzler) and two old Hungarian landraces (Pannonhalma 1839, Tiszavidéki 1934).

## Results and discussion

During to the taxonomical characterisation, in the old Hungarian bread wheat population five botanical types were identified. The most frequent type was var. *erythrospermum* (96 % , *Figure 1*), Four relatively rare types (var. *albidum*, *Figure 2*, var. *lutescens*, *Figure 3*, var. *milturum*, *Figure 4*, var. *ferrugineum*, *Figure 5*) occurred in only 4 % of the botanical types analyzed.

*Figure 1:* **Spike and seed characters of var. *erythrospermum***

*Figure 2:* **Spike and seed characters of var. *albidum***

*Figure 3:* **Spike and seed characters of var. *lutescens***

*Figure 4:* **Spike and seed of characters var. *milturum***

*Figure 5:* **Spike and seed characters of var. *ferrugineum***

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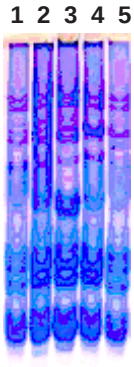


*Figure 5:* **SDS-PAGE pattern of gliadins for var. *albidum* (1-5)**

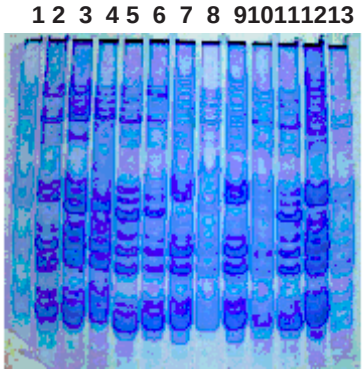


*Figure 6:* **SDS-PAGE pattern of gliadins for var. *lutescens* (1-5), var. *milturum* (6-9), var. *ferrugineum* (10), var. *erythrospermum* (11-12) and Bezostaja 1 (13)**

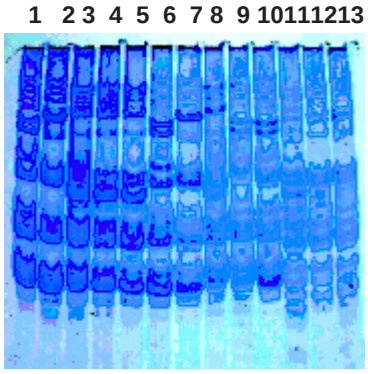


*Figure 7:* **SDS-PAGE pattern of gliadins for Bánkúti 5 (1-10), Marquiz (11), Bezostaja 1 (12), Jubilejnaja 50 (13)**

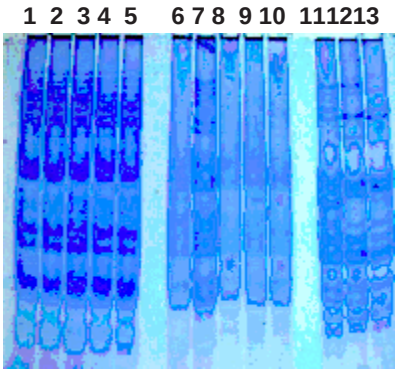


*Figure 8:* **SDS-PAGE pattern of gliadins for Tiszavidéki 1934 (1-5), Pannonhalma 1839 (6-10), Marquiz (11), Bezostaja 1 (12) Jubilejnaja (13)**

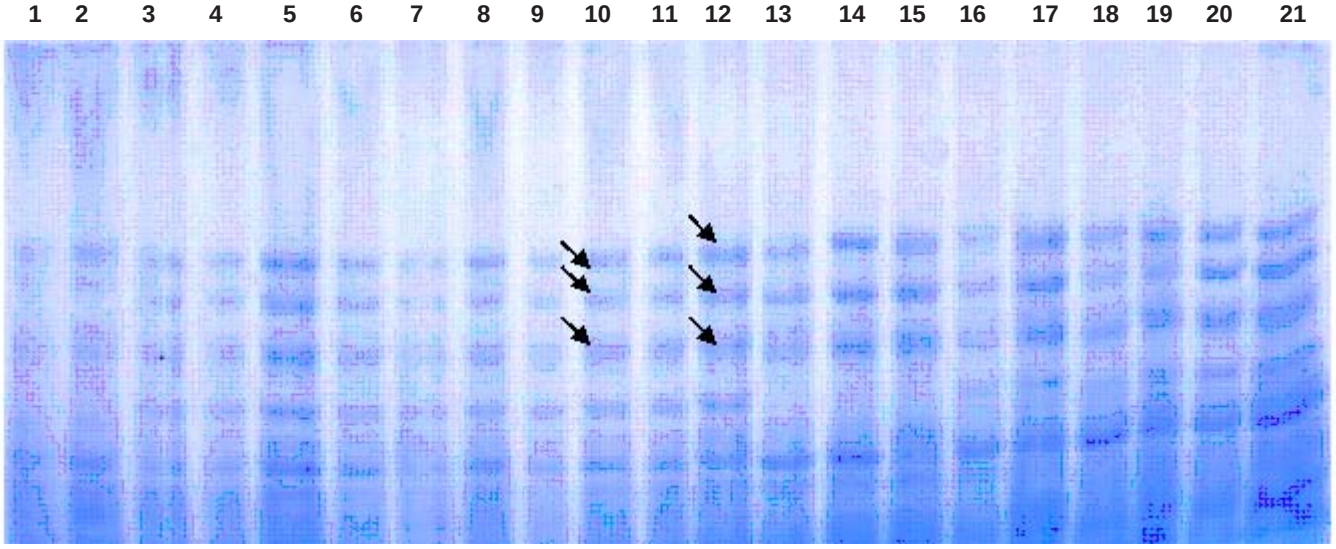


*Figure 9:* **SDS-PAGE electrophoretic patterns of HMW glutenins for Jubilejnaja 50 (1), Basalt (2), var. *lutescens* (3-4), var. *milturum* (5), var. *ferrugineum* (6-8), var. *erythrospermum* (9-10), Bánkúti 5 (11-16), Tiszavidéki 1934 (17-18), Marquiz (19), Kanzler (20-21)**

Some similarity was found in gliadin banding patterns among the samples studied. The electrophoretic pattern of gliadins from five wheat botanical types included in this study compared with Bezosztaja 1 (*Figure 6*), Jubilejnaja 50, Basalt, Marquis, Kanzler varieties (*Figure 7*), and Pannonhalma 1839 and Tiszavidéki 1934 landraces (*Figure 8*). From gliadins analysis is clear that var. *erythrospermum* type possess similarities with Bánkúti 5 variety (a selection of Tiszavidéki wheat landrace widely grown in Hungary in the 19th century) and unviable seeds from Pannonhalma collection of 1839 (*Figure 8*). The glutenins patterns of five wheat types showed high number of components (*Figure 9*). All the types analysed were characterized by high variation and three HMW-glutenin subunit patterns of var. *erythrospermum* were very similar to one another from Bánkúti 5 variety. Results indicate that HMW-glutenin subunits could be represent useful markers for the evaluation of genetic variability present in these botanical types.

## Conclusions

The current work indicate that the several components for each (gliadins and glutenins) proteins groups of the bread wheat population from the 19th century. These fractions present the highest variability in proteins components, which have a great importance for quality in old bread wheat landraces. In future, gliadin and glutenin compositions will be compared with other old bread wheat varieties.

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## References

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