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STUDY OF GLIADINS FRACTIONS AT SOME CULTIVARE OF WHEAT

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ABSTRACT
The effect of individual proteins (HMW-GS, LMW-GS, gliadins) on dough properties was evaluated by studying of electrophoresis spectrum.
The study was applied on an few romanian weath breeding.
KEYWORDS
gliadin fractions, wheat

1. INTRODUCTION

For most traditional uses, wheat quality derives mainly from two interrelated characteristics: grain hardness and protein content with each end-use requiring a particular protein quality. Quality is determined by the molecular structure of the storage proteins of wheat which, in turn, control the interactions of the proteins during the breadmaking process. While gliadins are single polypeptide chains (monomeric proteins), the glutenins are multichained structures of polypeptides that are held together by disulfide bonds. The very high molecular weight of these polymeric structures is responsible for their partial insolubility and for their distinct contribution to functionality compared with that of the gliadins.

Therefore, the classification of these proteins into monomeric and polymeric forms is a good indicator of dough functional properties. This classification also reflects the localization of the genes controlling the synthesis of the respective polypeptides.

The gliadins are monomeric molecules having disulphydric intramolecular bonds. The gliadins within the omega zone which do not have cysteinic residues are responsible for the viscosity and extensity of dough.

The genes wich control the gliadin synthesis are coded by the homologous group chromomosomes 1 and 6. The gliadins loci are placed on the short arm of the respective chromosomes and have been named Gli-A1, Gli-B1 şi Gli-D1 on 1A, 1B and 1D and Gli- A2, Gli-B2 and Gli-D2 on 6A, 6B si 6D.

Gliadins are heterogeneous mixtures of single-chained polypeptides which are, in their native state, soluble in 70% aqueous alcohol. Inaccordance with their mobility in A-PAGE (acid-PAGE), they are divided into four groups: a- (fastest mobility), β-, γ-, and ω-gliadins (slowest mobility). The molecular weight range is ≈30,000 to 75,000 Da.

Using one-dimensional electrophoresis, gliadins of a single wheat grain can be separated into 20–25 components. Two-dimensional electrophoresis allows better separation with a resolution of up to 50 components. Due to extensive polymorphism, these proteins have been widely used for cultivar identification in hexaploid
and tetraploid wheats.

The γ-gliadins differ from a- and β-gliadins in the amount of aspartic acid, proline, methionine, tyrosine, phenilalanine, and tryptophan. The ω-gliadins differ in amino acid composition from other gliadins and do not have cysteine. The ω-gliadins are characterized by high levels of glutamine (+glutamate) (40–50 mol%), proline (20–30 mol%), and phenylalanine (7–9 mol%), which represent >80% of the total amino acid residues.

2. MATERIAL and METHODS

We analysed electrophoretic spectrum of gliadins at 6 *Triticum aestivum* L. genotypes.

The material was obtained in the Wheat Improvement Laboratory, at Fundulea and consists of varieties cultivated on large areas in Romania (Fundulea 29, Dropia, Fundulea 4, Delia, Alex, Rapid).

The gliadins were extracted from the same seed using 70 % ethanol (v/v). The gliadinic subunits were separated in starch gel A-PAGE, after a method introduced by Sozinov, Propelia, 1974.

3. RESULTS and DISCUSSION

The gliadinic fractions highlighted through a seed extract analysins are presented in figure 1. We highlighted 12-22 electrphoretic bands. Part of them are double, as proved by the unequal quantity of protein distributed along the fraction. As regards the division of gliadinic fractions into α, β, γ and ω groups according to their electrophoretic mobility, we can point out that the zones ω and α are variable and, in general, we can distinguish the wheat varieties by the aspect of these fraction groups.

However, in Rapid and Fundulea 29 varieties, there is quite a pronounced resemblance between their gliadinic spectra, the differences being very small and hard to perceive; these differences are: the presence or absence of some very weak polypeptide fractions, a more firm duplication of other fractions, and different doses of protein in others.

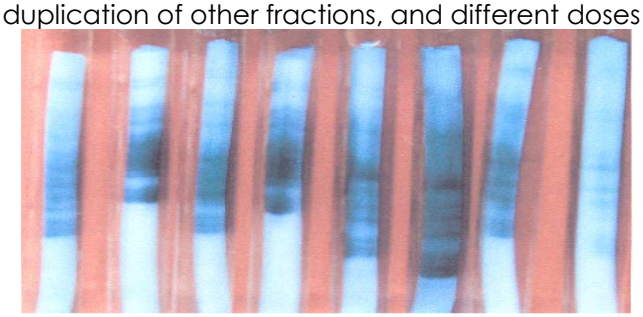

Fig. 1 Gliadins proteinogramă

4. CONCLUSIONS

Gliadins are generally considered to contribute to the viscosity and extensibility of gluten. Although some authors have associated specific gliadin alleles with breadmaking quality, it is now accepted that these proteins may not have a direct effect on wheat quality in terms of dough strength. This role may instead be due to the LMW-GS because of their tight genetic linkage to the gliadins. The low lysine content (0.5 mol%) of the gliadins is a major negative factor affecting the nutritional quality of the wheat proteins.

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