GENETIC VARIATION FOR GRAIN PROTEIN CONTENT IN A DIVERSE BREAD WHEAT POPULATION

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INTRODUCTION

Wheat is the main grain crop in the temperate climate zone, providing about 20 % of calories and 25 % of proteins in human diet. Given the growing consumers' awareness and demands for healthier food, programs are recently focusing not only on increasing productivity, but also on higher nutritional quality of derived products. Both nutritional value and end-use quality of wheat are largely determined by the grain protein content (GPC). In this study we surveyed new genetic variability for GPC (%) in a highly diverse bread wheat (*Triticum aestivum* L.) population.

Fig. 1

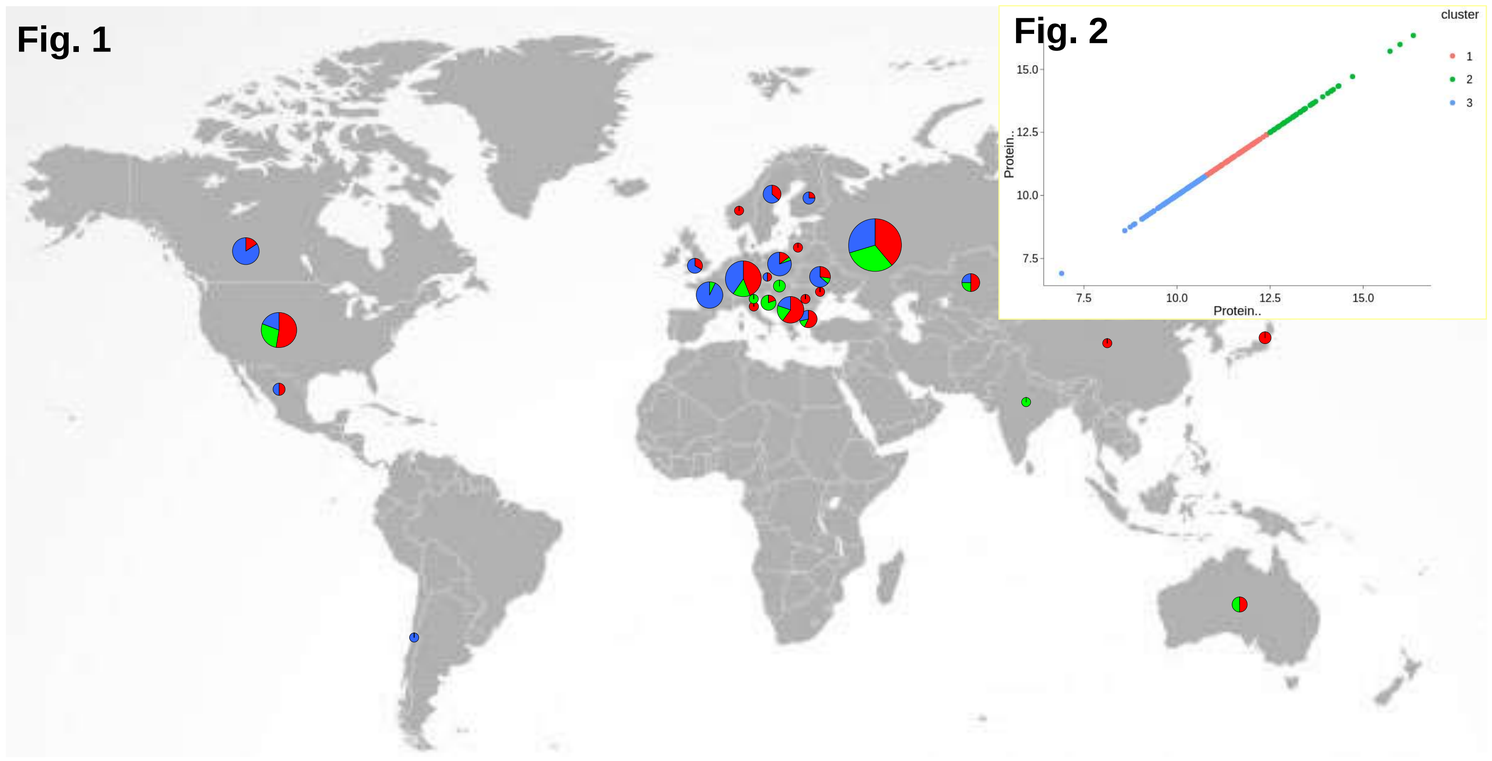


Fig. 2

Fig. 3

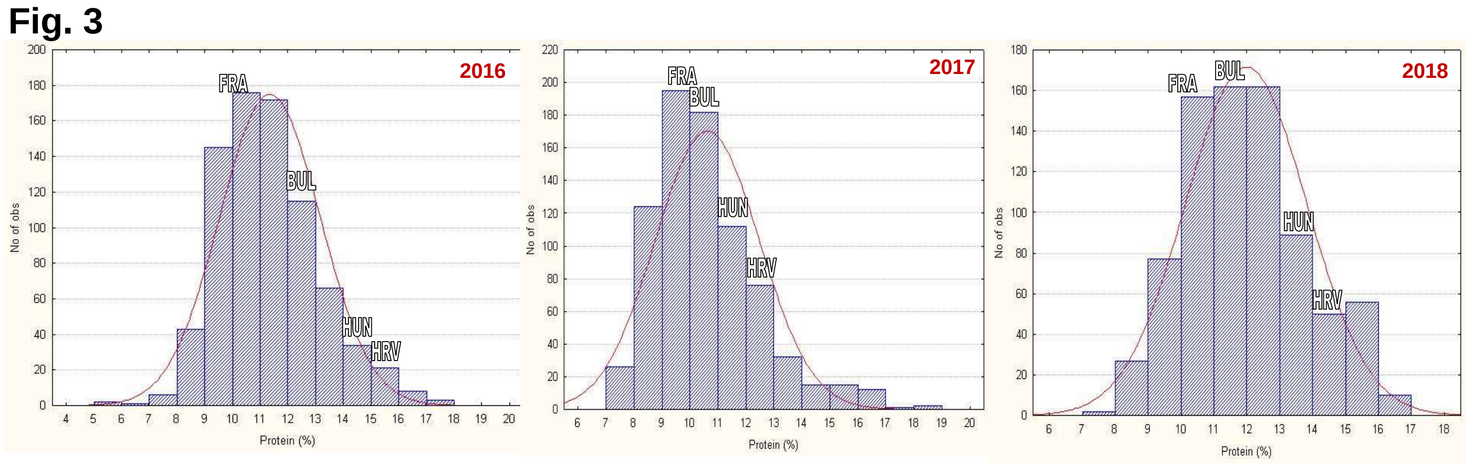


Fig. 4

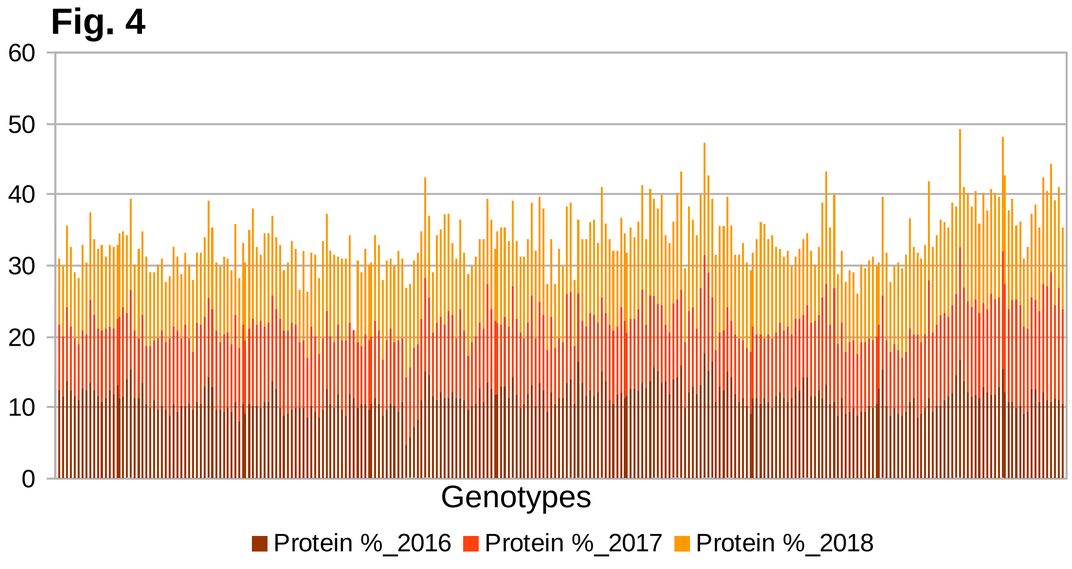
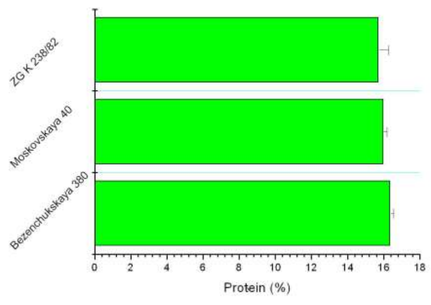


Fig. 5



PLANT MATERIAL AND METHODS

A diverse set of 264 bread wheat accessions consisting of elite cultivars, advanced breeding lines and double haploid lines originating from 28 countries from five continents was used (Fig. 1). Seed samples from 3 crop years were provided by the Seed Genebank in IPK, Gatersleben, Germany. Seeds were ground to a fine powder with IKA Tube Mill Control. Three powder samples (1.0 g each) per genotype per year were measured for GPC using UDK 159 automatic Kjeldahl analyzer (Velp Scientifica).

RESULTS

- On average over the years, the genotypes were grouped in 3 clusters according to the GPC (low, intermediate and high) (Fig. 1, 2).
- GPC values ranged from 5.54 to 18.42 % over the genotypes and the three harvest years; average 11.29 %, CV=17% (Fig. 3).
- ANOVA showed that the variation for the GPC was induced by the environmental factors, but was also attributed to genetic differences (Fig. 4). The mean square for genotype (G), harvest year (Y), and G x Y was highly significant ($p<0.05$) suggesting the differential performance of genotypes in different crop seasons.
- The highest average GPC was registered in the wheat pools from Croatia (13.61 %) and Hungary (13.43 %), and the lowest – in the genotypes from France (9.97 %) (Fig. 1, 3).
- The representatives of Bulgaria showed intermediate average GPC value (10.96 %) (Fig. 1, 3).
- Three accessions (two from Russia and one from Croatia) showed consistent high GPC ranking in all years (Fig. 5).

CONCLUSIONS

The information on the extent of genetic diversity obtained in this investigation will be helpful for generating novel variation for GPC in wheat, understanding the genetic basis of grain quality traits, and, in turn, for developing appropriate science-based breeding strategies to achieve further improvement in wheat end-use quality.

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