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Annual effect on grain quality of winter durum wheat (*Triticum turgidum* L. var. *durum*) in Szeged, Hungary

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SUMMARY – The value of durum wheat varieties depends on their grain yield and quality traits as well. In the present work the gluten and pigment content, gluten extensibility and semolina yield, of three popular Hungarian winter durum wheat varieties was studied. The trial was conducted between 1996-1999, on experimental plots under the same soil- and agronomic conditions. The crop-years, especially the rains, had a strong effect on the quality of durum wheat. In the studied years the semolina yield, yellow pigment content and gluten extensibility changed very much. The grain yield changed on only a small scale by the years studied.

Key words: Durum wheat, crop year, quality, semolina, yellow pigment, falling number, gluten, extensibility.

RESUME – *"Effet annuel de la qualité du grain sur le blé dur d'hiver (*Triticum turgidum *L. var.* durum*) à Szeged, Hongrie". La valeur des variétés de blé dur dépend du rendement en grain et des caractères de qualité. En 1996-1999 la teneur en gluten et en pigment, l'extensibilité du gluten, le rendement en semoule des trois variétés de blé dur hongroises étaient testés. Les essais ont été faits en plein champ dans les mêmes conditions agronomiques et de sol. Les campagnes céréalières, et surtout les pluies, ont influencé la qualité du blé dur. Pendant les trois années de l'expérimentation, le rendement en semoule, la teneur en pigment jaune et l'extensibilité du gluten ont subi des changements remarquables, mais le rendement en grain n'a subi que des modifications de moindre importance.*

Mots-clés : *Blé dur, campagne céréalière, qualité, semoule, pigment jaune, indice de chute, gluten, extensibilité.*

Introduction

The acreage of winter durum wheat production has significantly increased in the last years in Hungary (Beke and Matuz, 1998). Since the grain yield can be used practically only in the pasta industry, the quality is much more important than in case of bread wheat. If quality does not meet the demands of the pasta industry, the grain can be used only for feeding livestock. Moreover, in our region the durum wheat generally yields 15-25% less than bread wheat, which also affect the grower's income. The last years were extremely wet and rainy in Hungary, so it is very important to test the effect of the weather on our varieties' quality.

As the durum wheat cultivars' wet gluten content, gluten extensibility, semolina yield, the semolina's yellow pigment content, highly depends on the growing conditions (area, soil, weather, fertilizer, year, etc.), the aim of this work was to analyze the quality data of three winter-type durum wheat cultivars during the last four years.

Materials and methods

The field trials consisted of six lines of each durum wheat varieties with four replications in each year. The eight-row plots' size was 6.5 m^2. Field work and cleaning was done by Wintersteiger plot drills, combines, and Seedboy cleaners. Laboratory work was done at the technology lab of Cereal Research Non-Profit Company, Wheat Directory. Wet gluten content, gluten extensibility and semolina yield were determined according to standard MSZ 6369/5, and MSZ 6369/7.

Results and discussion

The effect of crop year on the different quality traits and grain yield can be seen in Table 1. The *grain yields* of the varieties studied proved to be quite stable, varied between 4.1 and 4.8 t/ha. The largest variation was found in the case of GK Bétadur whose yields varied between 3.4 and 6.0 t/ha. The average *semolina yield* was 72.7% among the varieties tested varied between 68.6 and 75.3%. The highest values were find in case of GK Bétadur. The *gluten content* was around 33.7%, and it proved to be steady. On the other hand *gluten extensibility* that characterizes the quality of the gluten changed significantly. Average value was 5.8 mm which varied between 4.4 (1998) and 8.1 mm (1997).

Table 1. Some quality parameters and grain yield of three popular winter durum wheat varieties between 1996-1999 (Szeged, Hungary)

Varieties/year	Quality parameters					Grain yield (t/ha)
	Semolina outcome (%)	Gluten content (%)	Gluten extensibility (mm)	Pigment content (mg/kg)	Falling number (sec)	
1996						
GK Minaret	72.0	37.6	7.7	10.2	236.2	4.7
GK Tiszadur	72.7	35.9	7.6	6.4	270.2	4.9
GK Bétadur	72.2	35.2	3.0	10.8	256.0	4.7
Average	*72.3*	*36.2*	*6.1*	*9.1*	*254.1*	*4.8*
1997						
GK Minaret	76.6	35.0	6.8	8.7	84.8	4.9
GK Tiszadur	74.7	35.3	15.9	7.3	97.0	3.9
GK Bétadur	74.6	32.4	1.7	10.4	127.5	3.4
Average	*75.3*	*34.2*	*8.1*	*8.8*	*103.1*	*4.1*
1998						
GK Minaret	75.0	35.0	5.1	8.9	332.0	4.1
GK Tiszadur	73.3	34.3	6.5	6.3	319.0	3.8
GK Bétadur	75.4	33.0	1.5	9.8	308.0	6.0
Average	*74.6*	*34.1*	*4.4*	*8.3*	*319.7*	*4.6*
1999						
GK Minaret	62.1	29.3	6.1	10.4	257.6	4.7
GK Tiszadur	71.6	30.0	6.2	7.0	247.0	4.9
GK Bétadur	72.0	31.0	1.1	9.6	223.1	4.9
Average	*68.6*	*30.1*	*4.5*	*9.0*	*242.6*	*4.8*
Mean Average	*72.7*	*33.7*	*5.8*	*8.8*	*229.9*	*4.6*

GK Bétadur showed the most stable gluten, the extensibility values varied between 1.1 and 3.0 mm, while GK Tiszadur varied between 6.2 and 15.9 mm. The *falling number* values also changed dramatically. Since the last four years (especially the last one) were extremely rainy in the summer months – much higher than the 30 years' average – (Fig. 1), the average value of varieties and years were as low as 229.9 sec and varied between 103.1 (1997) and 319.7 sec (without any sprouting). In the worst year (1997) the falling number value was under 100 sec in case of two varieties (GK Minaret and GK Tiszadur) while in the best year (1998) all the values were over 300. The *yellow pigment* content is a very stable characteristic. It changed only a very slight extent from year to year. In this case GK Minaret and GK Bétadur had the highest values. The results of the study showed that the crop year could have a strong effect on the quality of durum wheat varieties. In the years studied the semolina yield, yellow pigment content and gluten extensibility changed significantly. Whereas the grain yield changed only to a slight extent each year.

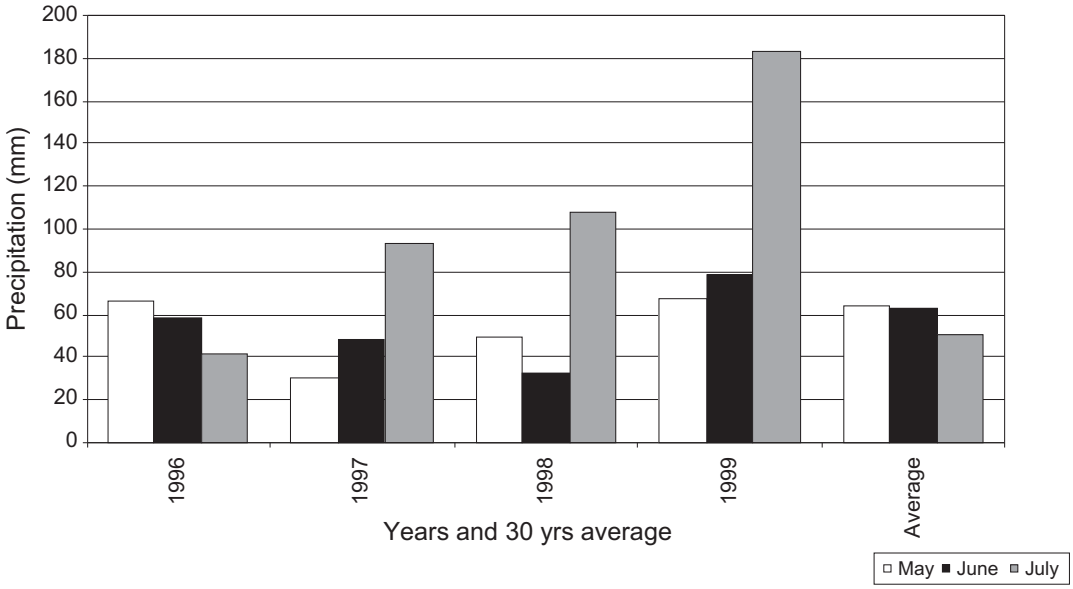

Fig. 1. Rainfall data in May, June and July between 1996-1999 (Szeged, Hungary).

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MSZ 6369/5. Hungarian Standard (gluten test).

MSZ 6369/7. Hungarian Standard (milling test).