in Veľké Ripňany. In year 1988 on the same stand there was the significant value determined at the end of shooting (r = 0.74+), in year 1989 at the end of tillering (r = 0.63+). In Báhoň this relationship was statistically significant in all year under review, from the beginning of shooting to full maturity.

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SOIL STRUCTURE AND FOOD WHEAT QUALITY

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Summary

In this contribution, changes in the quality of food wheat grown since 1994 in the tetraculture (barley - pea - wheat - corn) are shown in connection to the soil structure evolution. Significant positive changes emerged in the soil structural state and the food wheat quality, seven years from the start of the research (2000). The percentage of the water-resistant structural aggregates increased, whereas, in the same time the abundance of the microaggregates decreased. The gluten content, SDS-value, and valorigraphic value increased in both - grain and flour. The wheat quality improvement, compared to the initial state, was observed in the very same variants showing positive tendencies for the soil water-resistant structural aggregates as well.

***Keywords*:** food wheat, quality, soil structure, water-resistant soil aggregates

Introduction

The soil structure integrates all the basic physical characteristics of the soil system (Mamedov 1974, Jambor 1992, Morgan 1996, Mucha et al 2000). The agronomical importance of the soil structure, water-resistant in particular, manifestates itself in the creation of more aerated topsoil with favorable conditions in respect to the spring-up, further growth and evolution of cultivated crops. Compared to the soil far from the optimal structural state (high abundance of microaggregates), it (the soil in the good structural state) releases the water and nutrients reserves more economically.
Thus, we were interested, how the changes in the abundance of the water-resistant aggregates would exhibit themselves in the quality of food wheat.

Material and methods

The research was carried out during 1994 – 2000 via a stationary field trial in the experimental base of the SPU in Dolná Malanta. The soil in the locality of interest is Orthic Luvisol created from the preluvial sediments. The detailed description can be found in Hanes et al (1997).
The investigated variants included the one without fertilization (O), the tillage of all after-harvest-remnants (straw and root rests) under soil combined with NPK industrial fertilizers (PZ), and the tillage of stubble and root rests under soil + NPK (PH). The NPK-doses were determined by a balance method for the planed wheat yield of 6 t ha^{-1}. The C:N ratio in the straw was adjusted (0,5 kg N in 100 kg of straw). A conventional tillage to depth of 0,2 m (B1) and a treatment without soil turning (B2) were applied.
Observed parameters and methods covered: water-resistant structural aggregates and microaggregates (Dolgov 1958), flour yield, gluten content (STN 461011 part 9 1993), gluten quality after Berliner in modification of Horel, Hýža, and Prugar (Prugar et al 1959), ability of flour to sediment characterized by seditest (Axford et al 1979, STN 461021 1993), □amylases activity by falling number (STN/ISO 3039 1993), and rheologic properties of dough by valorigraphic value.

Results and Discussion

The content of the most valuable category of water-resistant structural aggregates (0,5–3 mm) was in the year 1994 unsatisfactory – only 16%. After seven years (2000), the measured amounts (~ 30%) signal more favorable situation. The increase was affected more by the fertilization and the time interval (all time-dependent effects) than by the soil treatment (statistically insignificant).

Year		1994					2000				
Parameter		I&II	G	SDS	FN	VV	I&II	G	SDS	FN	VV
Variant		[%]	[%]	[ml]	[s]	[points]	[%]	[%]	[ml]	[s]	[points]
B1	O	67,00	20,50	30,30	319,00	56,40	38,50	28,77	66,33	361,00	62,80
	PZ	70,00	26,20	37,20	365,00	65,90	42,00	27,70	61,00	358,00	63,50
	PH	68,00	26,20	34,20	387,00	61,30	41,50	29,77	63,33	374,33	67,60
Average for B1		68,33	24,30	33,90	357,00	61,20	40,67	28,75	63,55	364,44	64,63
B2	O	67,00	20,50	32,30	342,00	57,90	44,50	23,10	54,67	363,67	61,40
	PZ	67,00	23,90	37,20	369,00	63,30	45,00	24,93	56,67	356,33	62,70
	PH	67,00	22,80	34,20	387,00	56,20	42,00	26,17	58,00	381,67	60,80
Average for B2		67,00	22,40	34,57	366,00	59,13	43,83	24,73	56,45	367,22	61,63
Year Average		67,67	23,35	34,23	361,50	60,17	42,25	26,74	60,00	365,83	63,13

Tab. 1: Food wheat quality (I&II – flour yield, G – gluten content, SDS – SDS-test value, FN – falling number, VV – valorigraphic value).

In the initial year of the experiment (Tab. 1), the wheat quality can be characterized as average: flour yield was less than 68%, SDS-test below 35 ml, wet gluten content under 25% but with very good bulking (in excess of 16 ml). Seven years later (Tab. 1), all of the quality parameters improved significantly in grain and obtained flour as well. Solely the flour yield was lower – this can be connected to the low grain yield (7-years minimum) in this abnormally dry year 2000.
The wheat quality improvement, compared to the initial state, was observed in the very same variants showing positive tendencies for the soil water-resistant structural aggregates as well.

Acknowledgements: This work has been supported by the GP VEGA 1/5131/98.

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