THE EFFECT OF TWO FARMING SYSTEMS ON QUALITATIVE PARAMETERS OF SPRING BARLEY AND WINTER WHEAT

VPLYV PESTOVATEĽSKÉHO SYSTÉMU NA KVALITATÍVNE PARAMETRE JAČMEŇA JARNÉHO A PŠENICE LETNEJ

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Abstract. *Integrated and ecological arable farming systems were established on brown clay loamy soil in the fall of 1991 near Nitra, in South Slovakia region. The altitude of experimental field is 178 m, average year temperature is 9.6 °C and annual precipitation is 523 mm. In the 2003-2006 the effect of two different farming systems (ecological and integrated) and two levels of fertilization on qualitative parameters of spring barley and winter wheat were observed. System of farming and fertilization did influenced content of protein and extract of spring barley. Falling number of winter wheat was significantly influenced by all observation factors. Gluten index and wet gluten were depended on climatic conditions but gluten index was not statistically influenced by system of farming.*

Abstrakt*. Pestovateľské systémy boli založené na jeseň roku 1991 na lokalite Dolná Malanta. Pôdnym typom je hnedozem kultizemná, ročný úhrn zrážok je 523 mm a priemerná ročná teplota je 9,6 °C. Počas rokov 2003-2006 bol sledovaný vplyv pestovateľského systému, ročníka pestovania a úrovne hnojenia na kvalitatívne parametere jačmeňa jarného a pšenice letnej. Pestovateľský system a hnojenie preukazne ovplyvnili obsah bielkovín a extraktu jačmeňa jarného. Systém pestovania, hnojenia aj pestovateľský ročník signifikantne ovplyvnili pádové číslo pšenice letnej. Gluten index a mokrý lepok prukázali citlivosť na klimatické podmienky Gluten index nebol ovplyvnený systémom pestovania*

Keywords*: ecological, integrated farming system, qualitative parameters of winter wheat and spring barley*
Kľúčové slová: *ekologický a integrovaný system, kvalitatívne parameter pšenice letnej a jačmeňa jarného*

INTRODUCTION

Modern spring barley and winter wheat varieties have been developed with the aim of combining high productivity and standardised product quality under the high-input conditions using pesticides for weeds control, diseases, and insects as well as heavy application of nutrient-rich and water – soluble inorganic fertilizers. Organic growing system offers an alternative way how to be environment friendly and satisfy crops production at the same time. According to Vereijken (1994), multifunctional crop rotation is a basic and comprehensive method to preserve soil fertility in biological, physical and chemical terms and to sustain quality production. Kováč and Macák (2007) in their study express productivity of crop rotation affected by weather, cash crops rotation, and tillage and nitrogen rate. Lacko-Bartošová et al. (1999) compared effect of ecological and integrated crop rotation and they found out that the yield of winter wheat reflected on rotational effect clearly.

MATERIAL AND METHOD

Integrated and ecological long term field experiments were established in the fall of 1991 on brown clay – loamy soil. The experimental field altitude is 178m, average year temperature is 9.6°C and annual precipitation is 523mm. Basic soil cultivation were used in both systems. Natural regulation processes are supported by multifunctional crop rotations with cover crops, integrated crop nutrition and fertilization, optimal soil cultivation, integrated/ ecological

crop protection.

Crop structure:

Ecological system: perennial fodder crops 33.3%, cereals 33.3%, legumes 16.7%, row crops 16.7%

Integrated system: perennial fodder crops 16.7%, cereals 50%, legumes 16.7%, row crops 16.7%

Crop rotations:

Ecological system:
1. Field bean + lucerne
2. Lucerne
3. Winter wheat / cover crop
4. Common Pea / cover crop
5. Silage maize
6. Spring barley / cover crop

Integrated system:
1. Winter wheat / cover crop
2. Common Pea / cover crop
3. Winter wheat / cover crop
4. Silage maize
5. Spring barley
6. Lucerne

Factor	Variant under the factor	
System of farming	Ecological	
	Integrated	
Fertilization	Ecological system	Variant with farm yard manure (FYM)
		Variant without FYM
	Integrated system	Variant with fertilizers and FYM
		Variant without fertilizers and FYM
Year of farming	2003	
	2004	
	2005	

For statistical evaluation STATGRAPHICS.5 programme, ANOVA method was used.

RESULTS AND DISCUSSION

Protein content of spring barley was significantly influenced by the year of farming and fertilization. The lowest protein content was achieved under the variant without fertilization (9.51 %). The highest protein content was achieved under the fertilization variant (11.22 %).

Starch content of spring barley was not statistically influenced by any of evaluated factors. On the other hand, extract of spring barley was significantly influenced by all factors of experimentation (fertilization, system and year of farming). According to Muchová and Frančáková (2003) quality of malting barley had been significantly worse in ecological system. On the other way Petr (2003) is reporting better quality of malting barley cultivated in ecological farming, arterial are better parameters of β-glucans.

Years of farming influenced all qualitative parameters of winter wheat. These results correspond with Lacko-Bartošová (2006) findings, where 30 % differences in wet gluten caused by year of farming was achieved. According to Kováč and Macák (2004) the production parameters of winter wheat cultivated after leguminous crop are more depended on weather condition.

The lowest value of wet gluten was achieved under the variant without fertilization in integrated system of farming. The highest value of wet gluten was reached under the variant with FYM in ecological system. Our results don't correspond with results of Petr (2003) statistically worse qualitative parameters of winter wheat cultivated in ecological system of farming were reported.

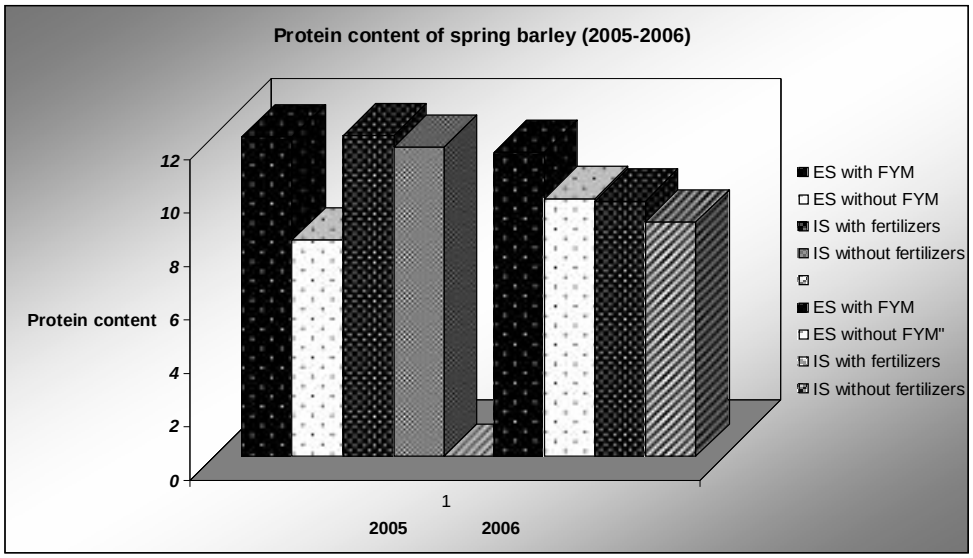

Figure1. Protein content of spring barley (2005-2006)

Table 1

Statistical evaluation of qualitative parameters of spring barley (2005-2006)

Parameters	System of farming		Fertilisation		Year	
	Ecological	Integrated	Fertilization	Without fertilization	2005	2006
Extract	73.06 **a**	81.86 **b**	77.12 **a**	77.7 **b**	71.86 **a**	83.06 **b**
Starch	62.78 **n.s.**	62.55	62.02 **n.s.**	63.22	62.88 **n.s.**	62.36
Protein	10.41 **n.s.**	10.26	11.22 **b**	9.51 **a**	10.9 **b**	9.83 **a**

CONCLUSIONS

According to the four years evaluation period during 2004 - 2006 we can suggest conclusion:

- starch content of spring barley is not sensitive for farming system, fertilization and year of experimentation;
- protein content and extract are more susceptible to fertilization and system of farming;
- wet gluten of winter wheat is depended on the meteorological characteristic of farming year and fertilization;
- gluten index is reliant to meteorological conditions;
- falling number is dependent of all factors.

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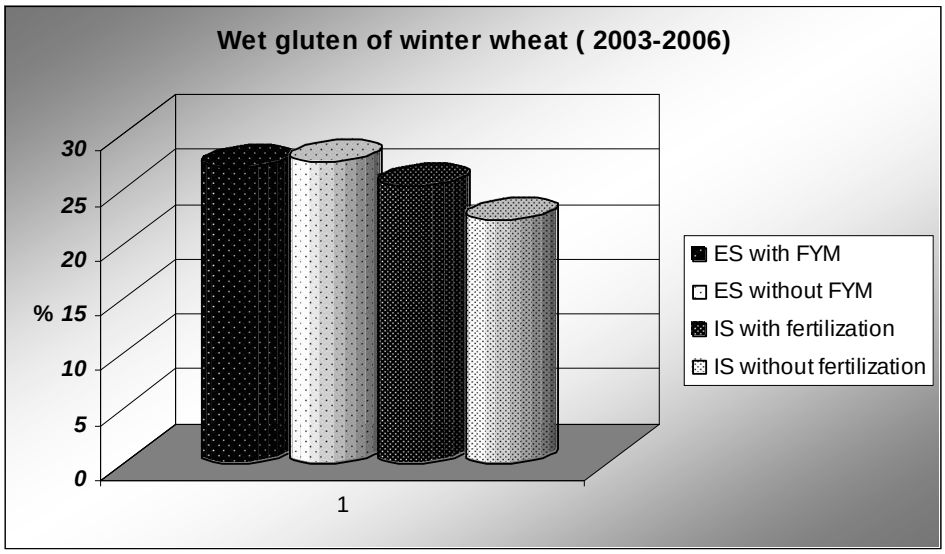

Figure 2. Wet gluten content of winter wheat (2005-2006)

Table 2

Statistical evaluation of qualitative parameters of winter wheat (2003-2006)

Parameters	*System of farming*		*Fertilization*		*Year*			
	ES	**IS**	**Fertilization**	**Without fertilization**	**2003**	**2004**	**2005**	**2006**
Wet gluten	26.06 **n.s**	24.77	27.18 **b**	23.65 **a**	34.66 **a**	24.32 **b**	16.2 **c**	26.5 **d**
Gluten Index	93 75 **n.s.**	95. 16	94.41 **n.s**.	94.50.		94.75 **b**	97.75 **c**	90.87 **a**
Falling number	309.82 **a**	317.63 **b**	310.32 **a**	317.13 **b**	344.75 **c**	379.25 **d**	231.00 **a**	299.8 8 **b**

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