

ECONOMIC EFFICIENCY OF TRITICALE AND POSSIBILITY OF GROWING IN REPUBLIC OF MACEDONIA

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Abstract

Triticale (*Triticosecale* sp.) is a first man-made cereal which has been bred by crossing between wheat and rye. The first hybrids were created 120 ago and the first cultivars have been grown by farmers 35 years ago. In this paper we discussed the beginning experiments and possibility of growing triticale varieties in R. of Macedonia, as well as its use for human consumption and animal feed. The economic efficiency of growing triticale is due to high yield per land unit, and possibility of growing on various types of soil.

The grain of triticale has higher protein and essential amino-acids content of lysine, valine, phenylalanine and arginine which are necessary for human body in an everyday consumption. In comparison to other varieties the new variety Malesh, besides satisfactory biological properties has shown satisfactory technological parameters (crude protein content 12.3 – 13.75%, Zeleny sedimentation 24 – 30 cm³, and farinograph quality number 46 – 51 v.u.).

Key words: triticale, yield, grain quality, nutritional value

Икономическа ефективност от тритикале и възможности за отглеждане в Република Македония

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Резюме

Тритикале (*Triticosecale* sp.) е първата зърнено-житна култура, създадена от човека чрез кръстосване между пшеница и ръж. Първите хибриди са създадени преди 120 години, а първите сортове са отгледани преди 35 години. Обект на изследване и обсъждане са проведените първи експерименти и възможността за отглеждане на сортове тритикале в Република Македония, както и за използването на зърното като храна на човека и фураж на животните. Икономическата ефективност от отглеждането на културата се дължи на високия добив от единица площ и невзискателността ѝ към почвения тип. Зърното на тритикале има по-високо съдържание на суров протеин и аминокиселините лизин, валин, аргинин, и фенилаланин, необходими в ежедневно хранене на човека. Установено е, че в сравнение с другите сортове новият сорт Malesh освен добри биологични свойства, притежава и добри технологични показатели (суров протеин 12,3 – 13,75%, седиментационно число по Zeleny 24 – 30 cm³ и число от фаринографа 46 – 51 v.u.)

INTRODUCTION

Triticale (*Triticosecale* sp.) is a first man-made cereal which has been bred by crossing wheat and rye, possessing inherited quality properties of wheat and rye (Schuladin, 1981). The economic efficiency of production triticale is due to its high yield per land unit, and the possibility of growing on various types of soil (Milovanovic et al., 1998). It gains an advantage over the other cereals is due to higher protein and amino acid contents (Tsvetkov, 1989; Mangova, Stankov, 1990; 2002).

The aim of this study was to present the beginning investigations of possibility to grow triticale in R. of Macedonia, in regard to its economic, nutritional and technological efficiency.

MATERIAL AND METHODS

The study was carried out with six triticale varieties at the experimental fields of the Agricultural Institute in

Skopje, during 2007 – 2008 h. In the group of varieties were new varieties *Males*, and *BT. 04-002*. As a standard was used variety *Triglav*.

Biological and grain yields of investigated triticale varieties were obtained using the method Analysis of variance and by LCD test. Test weight and 1000 kernel weight were determined according to БДС ISO 712:1997 and БДС ISO 520:2003 standards. The crude protein content was determined using Infratec 1241 Grain Analyzer – ICC standard 105/1 (Menkovska, 2003).

RESULTS AND DISCUSSION

Variations in biological and grain yields of triticale varieties were observed. The highest biological yield was obtained (upersoil part) by cultivars *BT-04-002* and *NS-triticale*, and the lowest by cultivar *Agrounja*. They had statistically significant biological yield than the standard variety (Table 1).

Table 1. Productive properties of triticale varieties

Variety	Biological yield		Grain yield	
	t/ha	Index %	t/ha	Index %
Malesh	15.8	108.2	4.1	132.2
Agrounija	13.7	94.0	3.8	122.6
Odisej	15.0	102.7	3.9	125.8
BT-04-002	16.2	110.9	3.4	109.6
NS-triticale	16.1	110.3	3.5	112.9
Triglav (St)	14.6	100.0	3.1	100.0
LSD 0.05	1.35		0.3	
LSD 0.01	2.05		0.65	

According to Ivanoski and Girazova (2009).

Table 2. Physical-chemical grain properties of triticale varieties

Variety	1000 kernel weight, g	Index %	Test weight, kg/hl	Index	Crude protein, %	
					Crude protein, %	Index
Malesh	43.0	102.1	69.0	99.3	11.5	111.6
Agrounija	41.1	97.6	65.0	93.5	9.8	95.1
Odisej	45.4	107.8	76.8	110.5	11.8	114.5
BT-04-002	41.6	98.8	74.0	106.5	11.8	114.5
NS-triticale	41.0	97.4	68.5	98.5	10.6	102.9
Triglav (St)	42.1	100.0	69.5	100.0	10.3	100.0

According to Ivanoski and Girazova (2009).

Table 3. Amino acids composition of some cereals*

Amino acids	Cereals			
	Triticale	Wheat	Corn	Sorgum
Arginine	0.96	0.63	0.46	0.38
Histidine	0.39	0.27	0.27	0.23
Valine	0.49	0.41	0.21	0.36
Leucine	1.05	0.84	1.10	1.22
Lysine	0.56	0.40	0.24	0.25
Treonine	0.23	0.17	0.15	0.12
Fenilalanine	0.75	0.51	0.45	0.57
Triptofan	0.24	0.21	0.06	0.12
Valin	0.76	0.54	0.42	0.48
Total	6.00	4.35	3.68	3.25
Index %	+63.0	+18.2	-13.2	-13.2

*According to Allae (1978) from Tsvetkov (1989).

The highest grain yield was obtained by new variety *Malesh*, compared with the standard, which showed the lowest grain yield (Ivanoski, Girazova, 2009) (Table 1).

There were also differences in physical-chemical quality of grain. The highest value of 1000 kernel weight was obtained by variety *Odisej*, and the lowest by variety *NS-triticale* (Table 2). The highest test

weight was obtained by variety *Odisej*, and the lowest by variety *NS-triticale*. Varieties *BT-04-002* and *Odisej* showed the highest crude protein content, and the lowest variety *Agrounija* (Table 2).

The total amino acids composition of triticale grain has shown to be better than of the other cereals (Tsvetkov, 1989), especially in arginine, lysine, fenilalanine and valine values (Table 3).

Besides economic efficiency of growing, satisfactory biological properties as well as satisfactory technological properties, nutrition value of triticale gains an advantage over the other cereals and showed that it is possible grain to be used in human consumption.

CONCLUSIONS

The investigated triticale varieties have shown satisfactory biological and good technological properties.

The economic efficiency of growing triticale varieties is due to their high yields per land unit.

The choice of triticale varieties for a particular production region depends of their quality characteristics and production potential.

On the basis of determined good technological properties of the investigated triticale varieties, as well as taking into account its good amino-acid composition, triticale could be used in human consumption.

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