

THE INFLUENCE OF THE CROP ROTATION AND NUTRITION REGIME ON THE TOTAL WET AND DRY GLUTEN CONTENT OF WINTER WHEAT SEEDS CULTIVATED ON BROWN LUVIC SOILS IN THE WESTERN PLAIN OF ROMANIA

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Abstract

The quality of the cultivated plants depends on the employed cultivar and hybrid, climatic characteristics during the cultivation year and not in the last order, on the applied technology. The influence of the crop rotation and irrigation on the protein and gluten content is presented in the paper.

Key words: rotation plant, nutrition regime, wet gluten, dry gluten, brown luvic soils.

INTRODUCTION

There are important references in scientific literature which emphasize the implication of different factors in influencing the quality of the obtained production. Hera (1986 a, b), Bandici et al., 2003, underlines the importance of nitrogen on the increase in protein content, on wet and dry mass gluten also on the amelioration of quality indices of gluten. The authors mention the role of the ameliorative plant (pea) on the wheat quality indices. Boldea, 1968, Bandici, 1997, Bandici, Guș, 2001), mention the important role of the regionalist wheat races on the quality of raw protein and gluten.

The role of the forerunner plant and fertilization, especially with nitrogen on the wheat quality (materialised in a higher protein and wet as well as dry gluten wheat content) regardless to the soil fertilisation level which supported the cultivation of the experimental race, is underlined by several authors: Dincă, 1971; Zăhan P.și Zăhan R., 1989; Oproiu, Cernescu, 1970; Muntean et al., 2008).

The production quality is a property connected to several physical and chemical characteristics of plants and confers a positive note to the applied agrotechnical measures, having in view the correlation of quality with the obtained production on a surface unit (Austin, 1978, Bingham, 1980, Schmidt, 1980, Obrațkov, 1981, Soltner, 1990).

MATERIALS AND METHODS

A multifactorial experiment (subdivided plots) was developed at Agricultural Researches and Development Station (A.R.D.S.) Oradea, Romania, on a brown luvisc soil with a loamy-clay texture (32,7 % clay in the 0-20 cm layer) with low fertility. The experiment took place during 2009 and 2010, years characterized by climatic differences.

Laboratory analysis of the obtained product's quality was performed taking in the account the total, wet and dry gluten content of winter wheat seeds cultivate *Delia*.

RESULTS AND DISCUSSIONS

The gluten content of wheat seeds was positively correlated to the crop rotation and nutrition regime (mineral or organo-mineral fertilizers). It is worth to mention that even if the wet gluten content (tables 1 and 2) was superior in the favorable 2009 year as compared to the less favorable, dry year 2010, the cultivation of the wheat after corn or pea (crop rotation of 3 and 4 years) as opposed to monoculture determines substantial increases of 12,11 – 17,06 g. /100 g d.w. in 2009 as compared to 4,90-7,90 g/100 g d.w. in 2010.

Table 1

The influence of the crop rotation and nutrition regime on the total wet gluten content of the seeds in wheat cultivated on brown luvisc soils, Oradea 2009

Observed factor	Wet gluten		Difference ±
	g / 100 g d.w.	%	
a. Crop rotation			
Wheat monoculture (Mt)	26,08	100	-
Corn (G - P)	38,19	146,4	+ 12,11
Pea (M - G - P)	43,14	161,0	+ 17,06
Pea (M - G - P - P)	40,66	155,9	+ 14,58
b. Nutrition regime			
N ₀ P ₀ (Mt)	31,93	100	-
N ₁₂₀ P ₈₀	39,04	122,3	+ 7,11
N ₁₀₀ P ₈₀ + 10 t/ha manure	40,09	125,5	+ 8,16

Table 3 shows the important influence of the crop rotation and nutrition regime on the gluten (dry) content in 2009. As compared to wheat monoculture (10,92 g/100 g d.w.) the cultivation of wheat after corn or pea determines substantial increases of this qualitative indicator which varied between 15,87-19,01 g/100 g d.w. Same table shows the positive role of mineral and organo-mineral fertilization on the dry gluten content. As compared to the unfertilized witness (1,68 g/100 g d.w.) the mineral and

organo-mineral fertilization determined increases up to 16,18 g/100 g d.w. in N₁₂₀P₈₀ and 16,80 g/100 g d.w. in N₁₀₀P₈₀ + 10 t/ha manure.

Table 2

The influence of the crop rotation and nutrition regime on the total wet gluten content of the seeds in wheat cultivated on brown luvic soils, Oradea 2010

Observed factor	Wet gluten		Difference ±
	g / 100 g d.w..	%	
a. Forerunner plant			
Wheat monoculture (Mt)	22,40	100	-
Corn (G - P)	27,30	121,9	+ 4,90
Pea (M - G - P)	28,90	129,0	+ 6,50
Pea (M - G - P - P)	30,30	135,3	+ 7,90
b. Fertilization level			
N ₀ P ₀ (Mt)	24,70	100	-
N ₁₂₀ P ₈₀	27,60	111,7	+ 2,90
N ₁₀₀ P ₈₀ + 10 t/ha manure	29,40	119,0	+ 4,70

Table 3

The influence of the crop rotation and nutrition regime on the total content of dry gluten in seeds in wheat cultivated on brown luvic soils, Oradea 2009

Observed factor	Dry gluten		Difference ±
	g / 100 g d.w.,	%	
a. Crop rotation			
Wheat monoculture (Mt)	10,92	100	-
Corn (G - P)	16,41	150,3	+ 5,49
Pea (M - G - P)	19,01	174,1	+ 8,09
Pea (M - G - P - P)	15,87	145,3	+ 4,95
b. Nutrition regime			
N ₀ P ₀ (Mt)	13,68	100	-
N ₁₂₀ P ₈₀	16,18	118,3	+ 2,50
N ₁₀₀ P ₈₀ + 10 t/ha manure	16,80	122,8	+ 3,12

Table 4

The influence of the crop rotation and nutrition regime on the total content of dry gluten in seeds in wheat cultivated on brown luvic soils, Oradea 2010

Observed factor	Dry gluten		Difference ±
	g / 100 g d.w..	%	
a. Crop rotation			
Wheat monoculture (Mt)	6,90	100	-
Corn (G - P)	8,60	124,6	+ 1,7
Pea (M - G - P)	9,40	136,2	+ 2,5
Pea (M - G - P - P)	9,60	139,1	+ 2,7
b. Nutrition regime			
N ₀ P ₀ (Mt)	7,80	100	-
N ₁₂₀ P ₈₀	8,70	111,5	+ 0,9
N ₁₀₀ P ₈₀ + 10 t/ha manure	9,40	120,5	+ 1,6

In the dry 2010 year, same influence were remarked concerning the analyzed factors (table 4) on the dry gluten content, even if the values of the quantitative indicator were diminished. Thus, the cultivation of wheat in crop rotation determined increases that oscillated between 24,6-39,1 %, as

compared with wheat monoculture where the values were around 6,90 g/100 g d.w. of dry gluten. The mineral or organo-mineral fertilization influenced the dry gluten content only with 11,5-20,0 % as compared to the unfertilized alternative.

CONCLUSIONS

One can conclude that there is a positive correlation of wet and dry gluten content and the analyzed factors.

The better the forerunner plant (pea) was together with a higher fertilization level (organo-mineral) the higher were the qualitative indicators of the wheat seeds.

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