THE INFLUENCE OF CULTURE ROTATION AND ITS FERTILIZATION UPON THE SEED PRODUCTION AND QUALITY OF THE "ARIESAN" AUTUMN WHEAT VARIETY

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Abstract. *One can influence directly soil fertilization by interfering directly into the agricultural production process. Each technical prevention that is applied will act upon the soil both separately and interacting, causing a longer or a shorter process. Several main technical preventions are used: two of them are major because of their influence upon the soil fertility and its perspective evolution. These prevensions are reprezented by rotation and fertilizes.*

Keywords: the culture rotation, rotation, nitrogen fertilizing, quality indicators: protein, wet gluten

INTRODUCTION

Autumn wheat join to the culture rotation with special requirements due to the species significant proportion within the structure of field crops in our country; and these special requirements are: soil preparation, planting dates, high sensitivity to weed, disease and pests. There are difficulties caused by the short period of time left between the pre-plant harvesting and the sowing time.

MATERIAL AND METHOD

The used biological material was the Ariesan autumn variety. One used a monoculture (R_1), the wheat-maize rotation (R_2) to compare the unilateral culture rotation. One used three variants of culture rotation and five variants of nitrogen fertilizing, on a constant background phosphorus (F factor) in order to study the interaction between the culture rotation and fertilizing within the seed production process.

RESULTS AND DISCUSSION

Culture rotation has a slow action manifested in the lapse of time, influencing fertility by its structure and by alternate crops, mainly through the effect of the pre-plant (Table 1). The obtained results point certainly to the huge effect of rotation upon production as compared to the wheat monoculture, achieving positive productions well certified from a statistical point of view (Table 2). Introducing one, two or more plants in the rotation, the content of wheat grain protein is raised as compared to the monoculture, with differences statistically certified (Table 3). A similar situation can be noticed in the content of wet gluten, the difference from control being statistically relevant in the wheat-maize-pea variant only (Table 4).

Table 1

The unilateral comparison of the R factor- crop rotation - on the seed yield of the "Ariesan" winter wheat cultivar, Cluj-Napoca (2001-2004)

No.	Crop rotation	Average yield (q/ha)	Relative yield (%)	Difference to the ctrl (q/ha)	Significance
1	R_1 - monoculture	27.0	100.0	-	-
2	R_2 - wheat-corn	46.3	171.5	19.3	×××
3	R_3 - wheat-corn-pea	55.4	205.2	28.4	×××

DL 5% = 6.1 q/ha DL 1% = 9.4 q/ha DL 0.1% = 13.1 q/ha

Table 2

The influence of the crop rotation on the protein content of the wheat grains in the "Ariesan" cultivar,Cluj-Napoca (2001-2004)

No	Crop rotation	2001-2002		2002-2003		2003-2004		2001-2004	
		Protein	%	Protein	%	Protein	%	Protein	%
1	R_1 - monoculture	13.6	100.0	13.8	100.0	13.6	100.0	13.7	100.0
2	R_2 - wheat-corn	14.6	107.4	14.5	105.1$^{\times}$	14.3	105.1	14.5	105.8
3	R_3 - wheat-corn-pea	15.4	113.3$^{\times}$	14.9	107.9$^{\times}$	15.1	111.0$^{\times}$	15.1	110.2
DL 5%			5.1		6.0		7.3		

Table 3

The influence of the crop rotation on the wet gluten content of the wheat grains in the "Ariesan" cultivar,Cluj-Napoca (2001-2004)

No	Crop rotation	2001-2002		2002-2003		2003-2004		2001-2004	
		Wet gluten	%	Wet gluten	%	Wet gluten	%	Wet gluten	%
1	R_1 - monoculture	26.9	100.0	26.5	100.0	27.0	100.0	26.8	100.0
2	R_2 - wheat-corn	27.9	103.7	27.7	104.5	28.1	104.6	27.9	105.2
3	R_3 - wheat-corn-pea	28.4	105.6$^{\times}$	28.5	107.6$^{\times}$	28.5	105.6$^{\times}$	28.5	106.3
DL 5%			5.6		5.5		5.3		

Table 4

Average values of the seed yield of the "Ariesan" winter wheat cultivar, under the influence of crop rotation and fertilization, Cluj-Napoca (2001-2004)

Variant		N_{30} P_{80}	N_{60} P_{80}	N_{90} P_{80}	N_{120} P_{80}	N_{150} P_{80}	Diff. rotation q/ha	Dif.± q/ha	Prod. %	Signifi cance
Monoculture	q/ha	27.1	28.3	28.9	30.6	31.7	29.3	-21.6	72.0	000
	dif. ± mt		+1.2	+1.8	+3.5	+4.6				
Rotation 2 years	q/ha	34.5	37.8	43.2	44.1	44.7	40.9	–	100.0	–
	dif. ± mt		+3.3	+8.7	+9.6	10.2				
Rotation 3 years	q/ha	38.3	42.7	48.7	50.2	50.7	46.1	+4.8	112.7	××
	dif. ± mt		+4.4	+10.4	11.9	12.4				
$\overline{X}$ fertilization	q/ha	33.3	36.3	40.3	41.6	42.4				
Dif.	dif. q/ha mt		+3.0	±7.0	±8.3	+9.1				
Rel. yield %	%	100.0	106.0	121.0	122.2	127.2				
Significance		–	–	××	××	××				

Crop rotation DL 5% 3.3 q/ha DL 1% 7.2 q/ha DL 0.1% 14.2 q/ha

Fertilization DL 5% 2.3 q/ha DL 1% 4.20 q/ha DL 0.1% 7.40 q/ha

As we study the influence of fertilization upon production, one notices that the achieved productions increase as well once with increasing nitrogen doses, the economic dose being 90 kg nitrogen/ha. The unilateral analysis of the two experimental factors only renders incompletely their action and doesn't visualize their possible interrelation. The interaction between fertilization and rotation has been established in order to correct this shortcoming. Increased nitrogen doses applied to any type of rotation bring about a progress of the production as soon as more plants have been introduced in rotation.

Table 5

Aspects of the interaction between fertilization and crop rotation in the seed production process in the "Ariesan" winter wheat cultivar, Cluj-Napoca (2001-2004)

Variants		Average yield q/ha	Relative yield %	Dif. ± q/ha	Significance
Monoculture	$N_{30}P_{80}$	27.1	78.6	-7.4	00
	$N_{60}P_{80}$	28.3	82.0	-6.2	00
	$N_{90}P_{80}$	28.9	84.9	-5.6	0
	$N_{120}P_{80}$	30.6	88.7	-3.9	0
	$N_{150}P_{80}$	31.7	91.9	-2.8	-
Rotation 2 years wheat-corn	$N_{30}P_{80}$	34.5	100.0	-	-
	$N_{60}P_{80}$	37.8	109.6	+2.9	-
	$N_{90}P_{80}$	43.2	122.3	+8.7	×××
	$N_{120}P_{80}$	44.1	127.8	+9.6	×××
	$N_{150}P_{80}$	44.7	129.6	+10.2	×××
Rotation 3 years wheat-pea-corn	$N_{30}P_{80}$	38.3	111.0	+3.8	×
	$N_{60}P_{80}$	42.7	123.8	+8.2	××
	$N_{90}P_{80}$	48.7	141.1	+14.2	×××
	$N_{120}P_{80}$	50.2	144.2	+15.7	×××
	$N_{150}P_{80}$	50.7	145.8	+16.2	×××

DL 5% = 3.8 q/ha DL 1.0% = 6.4 q/ha DL 0.1% = 8.7 q/ha

CONCLUSIONS

Whenever one introduces a rotation it acts favorably upon soil structure and fertility as well, beside its positive influence upon production quantity and quality, the individual effects and interaction of culture rotation and nitrogen doses being evident. Monoculture reflects a drastic drop of production while the three-year rotation leads to significant increases.

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