THE INFLUENCE OF IRRIGATION AND NITROGEN FERTILIZERS ON THE AUTUMN WHEAT PRODUCTION IN DOBROGEA CONDITIONS

INFLUENȚA REGIMULUI DE IRIGARE ŞI A ÎNGRĂŞĂMINTELOR CU AZOT ASUPRA PRODUCȚIEI LA GRÂUL DE TOAMNĂ ÎN CONDIȚIILE DIN DOBROGEA

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Abstract: *This paper presents the production results obtained in wheat fertilized with N doses of 50, 100 and 150kg/ha, compared to the control variant unfertilized with nitrogen, and the effect of two irrigation norms, 400 mm and 750 mm, respectively, compared to the non-irrigated control variant. During the experimentation years (an average of three years), the production of the N fertilized wheat (50 kg/ha) was higher by 6.67 q/ha compared to the unfertilized control variant. In the version fertilized with 100 kg/ha, the production was higher by 11.84 q/ha, compared to the unfertilized control variant. In the version fertilized with 150 kg/ha, the production was higher by 16.07 q/ha, compared to the unfertilized control variant. Regarding the irrigation norms, in the version irrigated with 750 mm water/ha, the production was higher by an average of 7.7 q/ha compared to the non-irrigated wheat, while in the version irrigated with 400 mm water/ha, the production obtained was higher by an average of 3.4 q/ha compared to the non-irrigate wheat.*

Rezumat: *În lucrare sunt prezentate rezultatele de producţie obţinute la cultura grâului fertilizat cu doze de 50, 100 şi 150 kg/ha N, faţă de martorul nefertilizat cu azot şi efectul a două norme de udare, respectiv 400 mm şi 750 mm, faţă de martorul neirigat. În anii de experimentare, în medie pe trei ani, la grâul fertilizat cu 50 kg/ha N, s-a obţinut o producţie mai mare cu 6,67 q/ha, faţă de martorul nefertilizat, la varianta fertilizată cu 100 kg/ha, o producţie mai mare cu 11,84 q/ha, faţă de martorul nefertilizat, iar la varianta fertilizată cu 150 kg/ha, o producţie mai mare cu 16,07 q/ha, faţă de martorul nefertilizat. Referitor la normele de udare, la varianta irigat cu 750 mm/ha apă, s-a obţinut o producţie mai mare, în medie, cu 7,7 q/ha decât la grâul neirigat, iar la grâul irigat cu 400 mm/ha apă, s-a obţinut o producţie mai mare, în medie, cu 3,4 q/ha decât la grâul neirigat.*

Key words**:** *wheat fertilized, irrigation norm, production, doses*
Cuvinte cheie: *grâu fertilizat, normă de irigare, producţie, doze*

INTRODUCTION

Wheat has moderate but balanced requirements over the entire vegetation period regarding the soil water (GH. V. ROMAN, 2006). Because of the low rain quantity that falls in Dobrogea and its uneven distribution over the vegetation period, irrigation is considered necessary in order to prevent the drought effects. An important problem that occurs in the irrigated culture, in the autumn wheat, is the balanced nourishment with nutritive elements, especially nitrogen. Alongside other elements such as the total nitrogen content in the soil and the mobile forms, the previous plant, and the cultivated type, etc, an important issue to be considered is water, originating either from rain or from the possibility of irrigation.

MATERIALS AND METHOD

The experiments were set in the experiment field belonging to the Phytotechny Laboratory within the Dobrogea Agricultural Development Station in Valu lui Traian (former "Dobrogea" Research Station for Irrigated Cultures). The experience had many factors, it was

established in the autumn of 1996 on the experimental field of the Phytotechny Laboratory and the following factors were followed: the irrigation regime: non-irrigated, irrigated with 400 m^3 water/ha in April, irrigated with 750 m^3 water/ha, applied in two sessions (in autumn and in spring, in April), and the nitrogen dose: unfertilized with nitrogen, fertilized with 50 kg N/ha; fertilized with 100 kg N/ha; fertilized with 150 kg N/ha.

In order to establish how the two factors are involved in the increase of productivity in wheat, if and how these technological links can be influenced in the Dobrogea conditions, the type chosen for the study was the Dropia variety, which is recommended for this area, was certified for culture in 1993 and generalized in culture in 1995, alongside a different variety, Flamura 85, certified in 1989.

RESULTS AND DISCUSSION

Research regarding the nitrogen fertilizer. In what regards the application of nitrogen fertilizers, it can be observed that, compared to the unfertilized control variant, the wheat fertilized with N (50 kg/ha) resulted in a productivity of 7.5 q/ha, the wheat fertilized with 100 kg N/ha resulted in a productivity of 14.4 q/ha and the wheat fertilized with 150 kg N/ha resulted in a productivity of 22.6 q/ha (Table 1).

Table 1

The influence of nitrogen fertilizers on the wheat production

Crt. no.	Nitrogen dose	Production q/ha	difference	
			q/ha	%
1.	unfertilized	45.2	Mt	100
2.	50 kg/ha N	52.7	7.5	116.6
3.	100 kg/ha N	59.6	14.4	132.0
4.	150 kg/ha N	64.7	22.6	143.2
	MEAN	55.6		

Research regarding the irrigation regime. While studying the effect of irrigations on autumn wheat for the conditions in Valu lui Traian between 1996-1997, it was observed that, compared to the non-irrigated control variant, which had (over the vegetation period) an irrigation norm of 400 mm and a productivity of 3.2 q/ha, the wheat which had an irrigation norm of 750 mm had a productivity of 5.4 q/ha (table 2).

Table 2

The influence of irrigations on the wheat production

Crt. no.	Irrigation norm	Production q/ha	difference	
			q/ha	%
1.	Non-irrigated	52.7	Mt	100
2.	Irrigated with 400 mm	55.9	3.2	106.1
3.	Irrigated with 750 mm	58.1	5.4	110.3
	MEAN	55.6		

The results obtained between 1997-1998. Research regarding fertilizations with nitrogen. Regarding the fertilization with nitrogen this year, it can be observed that, compared to the unfertilized control variant, the wheat fertilized with 50 kg N/ha gave a productivity of 6.48 q/ha, the wheat fertilized with 100 kg N/ha gave a productivity of 9.59 q/ha, while the wheat fertilized with 150 kg N/ha have a productivity of 13.01 q/ha (table 3).

Research regarding irrigation. By studying the irrigation application in autumn wheat for the Valu lui Traian conditions between 1997-1998, it was observed that, compared to the non-irrigated control variant, the wheat that was given a norm of 400 mm over the vegetation

period had a productivity of 4.7 q/ha, while the wheat that was given a norm of 750 mm had a productivity of 9.3 q/ha (table 4).

Table 3

The influence of nitrogen fertilizers on the wheat production

Crt. no.	Nitrogen dose	Production q/ha	difference	
			q/ha	%
1.	unfertilized	39.8	Mt	100
2.	50 kg/ha N	46.3	6.48	116.30
3.	100 kg/ha N	49.4	9.58	124.09
4.	150 kg/ha N	52.8	13.01	132.71
	MEDIA	47.05		

Table 4

The influence of irrigation on the wheat production

Crt. no.	Irrigation norm	Production q/ha	difference	
			q/ha	%
1.	Non-irrigated	42.4	Mt	100
2.	400 mm	47.1	4.7	111.07
3.	750 mm	51.6	9.3	121.82
	MEAN	47.05		

Results obtained between 1998-1999. Research regarding the fertilization with nitrogen. In what regards the nitrogen fertilizers, it was observed that, compared to the unfertilized control variant, the wheat fertilized with 50 kg N/ha gave a productivity of 6.0 q/ha, the wheat fertilized with 100 kg N/ha gave a productivity of 11.5 q/ha, while the wheat fertilized with 150 kg N/ha gave a productivity of 15.7 q/ha (table 5).

Table 5

The influence of nitrogen fertilizers on the wheat production

Crt. no.	Nitrogen dose	**Production** q/ha	difference	
			q/ha	%
1.	Unfertilized	41.3	Mt	100
2.	50 kg/ha N	47.3	6.0	114.52
3.	100 kg/ha N	52.8	11.5	127.84
4.	150 kg/ha N	57.0	15.7	138.01
	MEDIA	49.6		

Research regarding irrigation. By studying the irrigation application in autumn wheat for the Valu lui Traian conditions between 1998-1999, it was observed that, compared to the non-irrigated control variant, the wheat that was given a norm of 400 mm over the vegetation period had a productivity of 2.2 q/ha, while the wheat that was given a norm of 750 mm had a productivity of 8.3 q/ha (table 6).

Table 6

The influence of irrigation on the wheat production

Crt. no.	Irrigation norm	Production (q/ha)	difference	
			q/ha	%
1.	Non-irrigated	46.1	Mt	100
2.	400 mm	48.3	2.2	104.94
3.	750 mm	54.4	8.3	118.19
	MEDIA	49.6		

Results obtained between 1996-1999 (3-year-mean)

Research regarding the fertilization with nitrogen. Regarding the fertilization with nitrogen this year, it can be observed that, compared to the unfertilized control variant, the wheat fertilized with 50 kg N/ha gave a productivity of 6.67 q/ha, the wheat fertilized with 100 kg N/ha gave a productivity of 11.84 q/ha, while the wheat fertilized with 150 kg N/ha have a productivity of 16.07 q/ha (table 7).

Table 7

The influence of nitrogen fertilizers on the wheat production

Crt. no.	Nitrogen dose	Average production 1996-1999 (q/ha)	difference	
			q/ha	%
1.	unfertilized	42.1	Mt	100
2.	50 kg/ha N	48.8	6.67**	115.86
3.	100 kg/ha N	53.9	11.84***	128.13
4.	150 kg/ha N	58.2	16.07***	138.20
	MEAN	50.7		

DL 5 % = 3.11; DL 1 % = 4.71; DL 0.1 % = 7.56

Results regarding irrigation. By studying the irrigation application in autumn wheat for the Valu lui Traian conditions between 1996-1999, it was observed that, compared to the non-irrigated control variant, the wheat that was given a norm of 400 mm over the vegetation period had a productivity of 3.39 q/ha, while the wheat that was given a norm of 750 mm had a productivity of 7.69 q/ha (table 8).

Table 8

The influence of irrigation on the wheat production

Crt. no.	Irrigation norm	**Average production** 1996-1999 (q/ha)	difference	
			q/ha	%
1.	Non-irrigated	47.0	Mt	100
2.	400 mm	50.4	3.39*	107.21
3.	750 mm	54.7	7.69**	108.52
	MEAN	50.7		

DL 5 % = 2.8; DL 1 % = 4.64; DL 0.1 % = 8.68

CONCLUSIONS

Regarding the influence of nitrogen fertilizers, in the fertilized wheat the production was superior to the one obtained from the unfertilized wheat in all the three years of experiments.

Between 1996-1999 in the wheat fertilized with 150 kg N/ha, the production was higher by 16.1 q/ha than in the unfertilized wheat.

Irrigation had the following effects on the wheat production: in the irrigated wheat, the productions were superior, compared to the non-irrigated wheat in all three years of experiments;

Between 1996-1999, in the wheat irrigated with 750mm water/ha, the production was higher by 7.7 q/ha than the one in non-irrigated wheat, while in the wheat irrigated with 400 mm water/ha, the production was higher by 3.4 q/ha than in the non-irrigated wheat.

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