RESEARCHES ON THE REDUCTION OF THE WEEDINESS LEVEL IN WINTER WHEAT THROUGH THE FERTILIZER APPLICATION

CERCETĂRI PRIVIND NIVELUL DE REDUCERE A ÎMBURUIENĂRII DIN CULTURA DE GRÂU DE TOAMNĂ PRIN APLICAREA ÎNGRĂŞĂMINTELOR

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Abstract. *Our paper presents the result of the researches performed during 2003-2005 period at the experimental field Moara Domnească. Has been performed an experiment bifactorial, 4x2 (fertilizers x herbicide treatments). To establish the contribution of the chemical fertilizers on weediness and on herbicide treatments reduction in wheat crop has been the main objective of the research. It has been established that the level of the weediness reduction is increasing with the fertilizers doses, and during the vegetation. The report green/dry weeds' weight is reducing during the vegetation period.*

Rezumat. *Lucrarea noastră prezintă rezultatele cercetărilor executate în perioada 2003 – 2005 în câmpul experimental al Staţiunii Moara Domnească. Experienţa a fost bifactorială, 4x2 (fertilizare x tratamente erbicide). Obiectivul cercetărilor a fost de a stabili contribuţia fertilizanţilor chimici la reducerea îmburuienării şi reducerea tratamentelor cu erbicide la cultura de grâu. S-a stabilit că nivelul reducerii îmburuienării creşte odată cu doza de fertilizant şi de-a lungul perioadei de vegetaţie. Raportul greutăţii verde/uscate a buruienilor scade de-a lungul perioadei de vegetaţie.*

Key word: *weediness reduction, green and dry weights*
Cuvinte cheie: *reducerea îmburuienării, greutate verde şi uscată*

INTRODUCTION

Sustainable Agricultural System (SAS) as an alternative to Conventional Agriculture (C.A.) is a system of methods which conserve the soil, no degrading the environment, technically accepted, economically viable and accepted by the society. Herbicide treatments are not entirely excluded but their perturbations ought not to exceed the environment regeneration' threshold. Weed Management has to be developed and practiced. The accent has to be put on the traditionally or other methods which conduct to the weediness reduction until to the harmfulness threshold.

Many researchers from all over the world and from Romania also are engaged in experiments to establish the degree by which different cultural methods are determining the reduction of the crop weediness (LABRADA, 1995; MARIN ET AL. 1995; BUDOI, 1986 etc). This is also a part of our research presented in this paper which had the objective to establish the influence of applied fertilizers to the wheat crop yield and in the mean time to the reduction of crop weediness.

MATERIALS AND METHODS

A bifactorial experiment has been performed:

A – fertilizers with 4 doses $a_1=N_0P_0$; $a_2=N_{50}P_{30}$; $a_3=N_{100}P_{60}$; $a_4=N_{150}P_{70}$;

B – herbicide treatment with 2 graduations b_1= no treatment; b_2= Glean 20 g/ha. All were 8 combinations (treatments), and these are presented in tables 1, 2, 3, 4.

Phosphorus fertilizer has been applied in the autumn, before ploughing and the nitrogen fertilizer in the spring, the first days of March month. The herbicide treatment has been applied during the tillering wheat phase with 20 g/ha Glean 75 DF (s.a. = clorusulfuron 75.00%) and 250 l water/ha. Weediness has been determined by numerical and gravimetrical methods.

Researches have been performed at the experimental field of the faculty (at Moara Domneasca) on the red preluvosoil with 2.40% humus content, during 2003 – 2005 years. The 2003 year has been very draughty and for this reason the yields were not took in consideration.

RESULTS AND DISCUSSIONS

1. About the fertilizers influences on the growth of the wheat plants.

Determinations regarding the number and the weight of the plants were performed before the herbicide treatment. The average results are presented in table 1. The main conclusions are the following:

a) In the autumn, until the winter, there were not differences between the treatments regarding the plants density.

b) Nitrogen fertilizers applied at the beginning of March month, during a period of about 45 days, have influenced evidently the plants vegetation. So with the increase of the Nitrogen doses, the tillering process has been intensified, mainly the growth of wheat plants' weight. It is important to note that the plants wheat density increased with the increase of the Nitrogen doses, maximum being for $N_{150}P_{70}$, namely 35.00%. But for plants weight the increases were higher. Maximum has been for green weight, i.e. 136.00%, followed by dry weight, i.e. 97.00%. The size increase differs from one to another dose. But it has to note that for $N_{100}P_{60}$, compared to previous ($N_{50}P_{30}$), the increase has been about twice higher.

c) The level of the report g.w./d.w. it increases with the Nitrogen doses' increase.

2. About the fertilisers' influences on the crop weediness.

Determinations were performed during the tillering stage, before the herbicide treatment and before the crop harvest.

The results obtained in the tillering stage are presented in table 2. Examining these it is noting that the fertilization has influenced evidently the weediness but differently as it did for the wheat plants.

a) For the numerical point of view, the weediness reduced gradually with the increase of the fertilizers doses. The higher density increase and the more development of the wheat's plants the fewer weeds emerged and developed. Numerically, the weediness reduced for $N_{150}P_{70}$, in average, maximum with 22.00% compared to N_0P_0. But although less weeds the green weight remained almost unchanged from one to another treatment.

b) The weeds dry weight reduced gradually with the Nitrogen doses increase. Consequently, the values of the report g.w./d.w. increased. It varied between 5,1 – 6,0.

In the table 3 are presented data of the weediness determined before the wheat harvest. Theirs analyze conduct to the following conclusions:

a) Started from the treatment N_0P_0, the weediness reduced gradually with the increases of the fertilizers doses. For the treatment without herbicide the maximum level of reduction has been 24.00%, numerically and 53.00%, gravimetrically. Weed reduction means weed control.

b) Herbicide treatment has a more influence upon the weediness reduction. In our case for the N_0P_0 the herbicide treatment determined 74.00% numerically and 75.00% gravimetrically weed control.

c) Combination between fertilization and herbicide treatments increased the weed control efficacy: numerically it gets up to 86.00% and gravimetrically to 82.00%. Compared to

the level of the weed control determined by the herbicide treatment for the N_0P_0, the combination between the two kinds of treatments increased the weed control by 47.00% numerically and by 28.00% gravimetrically.

3. The wheat yields, averages 2004-2005 are presented in table 4 (2003 is not included, it has been very droughty)

a) Main conclusions regarding the fertilizer influences: a_1) Starting from the unfertilized, the yields for the fertilized treatments increased with the increase of the fertilizers doses. Maximum increase has been 59.00% and this has been for $N_{150}P_{70}$ that is the treatment with the higher weed control (47.00%).

So the fertilisers' influence is in two directions: supplying the wheat plants with nutritive elements and reducing the weediness and so eliminating the competition for the vegetative conditions.

b) The treatment only with herbicide has determined a weed control on 75.00% and consequently a yield increase on 33.00%. In combination with fertilization weed control increased by 81.00% a yield by 101.00%. It results that applying fertilizers can be associated with other cultural methods (crop rotation, variety, vigour etc) and this conducts to the reduction for herbicide treatment and so the reduction of the environment pollution.

Table 1

Density, green and dry weights of the winter wheat crop under fertilizers influence. Averages for 2003 and 2004 years.

Nr.	Fertilizers kg/ha a.i.	Autumn 17-20 Nov. Plants nr/m^2	Spring at tillering stage (20 – 22-th April)						
			plants		Green weight		Dry weight		Out-turn g.w./d.w
			nr./m^2	%	g/m^2	%	g/m^2	%	
1	N_0P_0	403	451	100	169	100	39	100	4.3
2	$N_{50}P_{30}$	404	525	117	207	123	46	118	4.5
3	$N_{100}P_{60}$	405	570	126	370	219	73	187	5.1
4	$N_{150}P_{70}$	405	608	135	399	236	77	197	5.2

Table 2

The weediness of winter wheat crop under the fertilisers' influence. Determinations in the wheat tillering stage. Averages 2003 and 2004 years.

Nr.	Fertilizers kg/ha a.i.	Spring at tillering stage (20 – 22-th April)						
		plants		Green weight		Dry weight		Out-turn g.w./d.w
		nr./m^2	%	g/m^2	%	g/m^2	%	
1	N_0P_0	119	100	29	100	5.6	100	5.1
2	$N_{50}P_{30}$	114	96	30	103	5.3	95	5.6
3	$N_{100}P_{60}$	102	86	30	103	5.1	91	5.9
4	$N_{150}P_{70}$	93	78	29	100	4.8	85	6.0

Table 3

Weediness' of the winter wheat crop under the influence of the applied fertilizers and of the herbicide treatment. Determinations at the crop's harvest. Averages 2003-2004 years.

Nr.	Treatments	Number of weeds			Dry weight				
		nr./m^2	%	Control %	g/m^2	% compared to		Control in compared to	
						Tr. 1	Tr. 5	Tr. 1	Tr. 5
1	N_0P_0	121	100	0	29.1	100		0	
2	$N_{50}P_{30}$	112	92	8	24.5	85		15	
3	$N_{100}P_{60}$	100	83	17	18.2	63		37	
4	N_{150} P_{70}	92	76	24	15.5	53		47	
5	N_0P_0 + Herbicide treat	32	26	74	7.4	25	100	75	0
6	$N_{50}P_{30}$ + Herbicide treat	26	21	79	6.5	22	88	78	12
7	$N_{100}P_{60}$ + Herbicide treat	22	18	82	5.8	20	78	80	20
8	N_{150} P_{70} + Herbicide treat	17	14	86	5.3	18	72	82	28

Table 4

Yields of the winter wheat crop under the influence of the applied fertilizers and of the herbicide treatment. Years 2004 and 2005.

Nr.	Treatments	2004 kg/ha	2005 kg/ha	Average 2004-20005				
				kg/ha	Differences kg	% compared to	% compared to	Signi-ficance
						V_1	V_5	
1	N_0P_0	3225	2950	3087	St.	100		St.
2	$N_{50}P_{30}$	4150	3775	3962	875	128		**
3	$N_{100}P_{60}$	4775	3970	4372	1285	142		***
4	N_{150} P_{70}	4950	4850	4900	1813	159		***
5	N_0P_0 + Herbicide treat	4250	4030	4110	1023	133	100	**
6	$N_{50}P_{30}$ + Herbicide treat	5025	5260	5142	1055	167	125	***
7	$N_{100}P_{60}$ + Herbicide treat	6200	5630	5915	2828	192	144	***
8	N_{150} P_{70} + Herbicide treat	6575	5810	6192	3105	201	151	***

DL 5% = 420; DL 1% = 735; DL 0.1% = 1045

CONCLUSIONS

1. Fertilizers applied correctly conduct to the increase of the tillering process of the wheat plants, the more development of the wheat plants and higher yields. In these conditions the density (number) of the weeds is reduced.

2. Started from the unfertilized, with the increase of the fertiliser' doses, the green weed weight. Compared to that of the wheat plants suffers insignificant changes, but theirs dry weight is reducing. The values of the reports weed green weight/ dry weight are increasing. In our experiment these were from 5.10 to 6.00.

3. Weediness reduction (weed control) by cultural methods conduct to the reduction of the necessity to use the herbicide treatments.

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