THE INFLUENCE OF FERTILIZATION AND HERBICIDES UPON THE PRODUCTION AND THE MTG OF AUTUMN WHEAT IN THE WEST PLAIN CONDITIONS

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Abstract

The mass of 1000 grains (MTG) is a Physical characteristic of the wheat that shows the size of the grains and their density. The biggest the mass the higher the wheat production and its quality.

In order to obtain a high production for a hectare with appropriate quality indexes optimum chemical fertilizers must be applied that would keep the wheat culture without weeds.

The research related to the influence of fertilization and herbicides for the Dropia and Alex type of wheat had been done at the Les agricultural farm, in Bihor county between the years 2008 and 2010. In order to analyze the wheat production and quality for the two above mentioned types of wheat, three levels of fertilizations had been used: $N_{60}P_{60}$, $N_{120}P_{60}$, $N_{180}P_{60}$, together with the non-fertilized variant.

The applied variants had been the following: SDMA 600 (acid 2.4 D from dimethyilamine salt 600g/l 1l/hectare, Tomigan (fluroxypyr 250g/l) + SDMA600 0,6+1 l/ha, Rival 75 PU (clorinesulfuron 75%) 15-20 g/hectare, in comparison to the non-herbicidated type.

The analyzed variants had been of a polifactorial type in four variants, done on a brown luvic soil and having corn as a preceding plant.

Key words: fertilization, herbicides, MTG, fertilization doses, average production

INTRODUCTION

Wheat represents one of the most important cereals and detains the biggest cultivated surface on earth. The importance of the wheat is determined by the high containt of carbohydrates and protein substances within the grain and it has an important role in the human body nourishment.

The mass of a thousand grains differs from one type of wheat to another, being influenced by weather conditions, by soil, by the applied agricultural technique, by the period of grain formation, by disease attack, by pests, etc.

The mass of a thousand grains is one of the physical features with the help of which one can interpret the resistance of the types to drought, to shrivel, to rust attack and the reaction to the applied sanitary and technical measures. Thus, the higher the mass of 1000 grains the bigger the production.

The assimilation surface of the wheat plants, the nutrition space and the soil's degree of fertility have got a major influence over the mass of 1000 grains. In order to obtain high quality wheat productions, in efficient

conditions, it is necesary to fertilize the culture with optimum doses of fertilizers and to efficiently destroy weeds.

In the period between October and March, from the seedling until spring, the wheat uses 8 up to 25% from the necessary nitrate quantity during vegetation, 12 up to 25 % from the total P_2O_5 quantity and 12 up to 15% from the total K_2O quantity. (W. Leonard şi J.Martin 1963).

The mass of 1000 grains is directly influenced by the soil and by the level of fertilization. The highest values of MTG are obtained if there is a moderate nitrate fertilization with doses of 60 up to 120 kg/hectare, having in view the preceding plant, as well.

MATERIAL AND METHODS

The research had been done for the autumn wheat, in the conditions existent in the West Plain at the Les - Bihor agricultural farm. The production analysis and mass determination for 1000 grains (aka MTG) had been done for the period 2008-2010.

The experimental analyzed factors had been:

-Factor A – the soil

a_1- Dropia

a_2- Alex

- Factorul B – fertilization with the following doses:

b_1- N_0P_0

b_2 - $N_{60}P_{60}$

b_3 – $N_{120}P_{60}$

b_4 – $N_{180}P_{60}$

- Factorul C- herbicide applied postemergently:

c_1 – non herbicidated

c_2 – SDMA 600 (acid 2.4 D from dimethylamine salt 600g/l) 1l/hectare

c_3 – Tomigan 250 EC(fluroxypyr 250g/l) + SDMA 600 0,6+1l/hectare

c_4 – Rival 75 PU(clorinesulfuron 75%) 15-20g/hectare

Through the technology applied to the two types of wheat we had in view to respect the culture requests specific to the wheat in the conditions existent in the West Plain, on a brown luvic soil:

- The seeding had took place in the optimum period between the 10th and the 20th of October;

- The chemical fertilizers had been applied fractionately: phosphorus fertilizers had been applied in autumn and also 1/3 of the nitrate dose and 2/3 from the nitrate dose had been applied in spring.

- The herbicides had been applied postemergently when the weeds are in the rosette stage and have 2 to 4 leaves and the wheat is from twinning to the formation of the first interknot.

The weather conditions during the three culture years have been different: the year 2007-2008 had been a normal year in what the rain falls and the temperature had been concerned, the year 2008-2009 had been a drought year with reduced quantities of rain and the year 2009-2010 had been a year with more quantities of rain falls which led to a prolonged period of vegetation and of harvesting, as well.

For the analysis of the interaction between the fertilization level (factor B) and the applied type of herbicides (factor C) for each of the two types (factor A) the non-herbicides b_1- N_0P_0 and c_1 variant had been chosen as a witness.

RESULTS AND DISCUSSIONS

During the three years of research between 2008-2010 the analysis of the herbicides and level of fertilization upon the production of the Dropia type of wheat presented in Table 2 emphasized the favorable effect of fertilization combined with herbicides treatments of the culture.

Table 1

The influence of the herbicides and fertilization level upon the production of the Dropia type of autumn wheat, Leş-Bihor (2008-2010)

Variants		Production 2008		Production 2009		Production 2010		Average roduction 2008-2010	
		Kg/ha	%	Kg/ha	%	Kg/ha	%	Kg/ha	%
Non-fetilized	Non-herbicides	3230	100	3150	100	3350	100	3243	100
	SDMA 600	3360	104.02	3225	102.38	3460	103.28	3348	103.23
	Tomigan + SDMA 600	3390	104.95	3240	102.85	3490	104.17	3373	104.00
	Rival 75 U	3450	106.81	3350	106.34	3510	104.77	3436	105.95
$N_{60}P_{60}$	Non-herbicides	3480	107.73	3420	108.57	3550	105.97	3483	107.40
	SDMA 600	3660	113.31	3630	115.23	3680	109.85	3656	112.73
	Tomigan + SDMA 600	3870	119.81	3750	119.04	3890	116.11	3836	118.28
	Rival 75 U	3890	120.43	3770	119.68	3920	117.01	3860	119.02
$N_{120}P_{60}$	Non-herbicides	3510	108.66	3420	108.57	3620	108.05	3516	108.41
	SDMA 600	3970	122.91	3880	123.17	3810	113.73	3886	119.82
	Tomigan + SDMA 600	4240	131.26	4150	131.74	4170	124.47	4186	129.07
	Rival 75 U	4160	128.79	3920	124.44	4120	122.98	4066	125.37
$N_{180}P_{60}$	Non-herbicides	3570	110.52	3450	109.52	3630	108.35	3550	109.46
	SDMA 600	4250	131.57	3920	124.44	4160	124.17	4110	126.73
	Tomigan + SDMA 600	4380	135.60	4350	138.09	4210	125.71	4313	132.99
	Rival 75PU	4250	131.57	4120	130.79	4130	123.28	4166	128.46

The wheat production for the Dropia type, obtained during the three years of study (2008-2010) for increasing doses of fertilization and for the same doses of herbicides applied in comparison to the witness (the witness type of wheat had not been fertilized and no herbicides had been used on it) shows that the differences are positive for all the three graduations of the B factor. The biggest production had beeen obtained when fertilization had been done with doses of $N_{180}P_{60}$ and when Tomigan + SDMA 600 herbicides had been used in 2008. Then 438 kg were obtained on a hectare.

The analysis of the average production for the Dropia type of autumn wheat, for all the three years of study, through the interaction between two factors, emphasizes the production increase of 32.99% when $N_{180}P_{60}$ – was used for fertilization and when Tomigan+SDMA 600 was used as a herbicide, in contrast with the production obtained in the case of the variants fertilized with the three levels of fertilizers, but with no herbicides, whose increase is less than 10%.

Table 2 presents the production obtained during those three years (2008-2010) for the Alex type of autumn wheat as well as the average of the three years when the soil had been fertilized with gradual doses of chemical fertilizers (factor B) and when three types of herbicides had been used on it (factor C), in comparison with the witness type of wheat which had not been fertilized nor had herbicides been used on it.

Table 2

The influenceof herbicides and fertilization level upon the Alex type of autumn wheat Leş-Bihor (2008-2010)

Variants		Production 2008		Production 2009		Production 2010		Average production 2008-2010	
		Kg/ha	%	Kg/ha	%	Kg/ha	%	Kg/ha	%
Non-fertilized	Non-herbicides	3420	100	3380	100	3560	100	3453	100
	SDMA 600	3550	103.80	3420	101.18	3750	105.33	3573	103.47
	Tomigan + SDMA 600	3610	105.55	3530	104.43	3790	106.46	3643	105.50
	Rival 75 U	3730	109.06	3660	108.28	3860	108.42	3750	108.60
$N_{60}P_{60}$	Non-herbicides	3620	105.84	3550	105.02	3710	104.21	3626	105.01
	SDMA 600	3880	113.45	3720	110.05	3920	110.11	3840	111.20
	Tomigan + SDMA 600	3910	114.32	3850	113.90	3970	111.51	3910	113.23
	Rival 75 U	3950	115.49	3860	114.20	4150	116.57	3986	115.43
$N_{120}P_{60}$	Non-herbicides	3780	110.52	3710	109.76	3820	107.30	3770	109.18
	SDMA 600	3920	114.61	3870	114.49	4180	117.41	3990	115.55
	Tomigan + SDMA 600	4360	127.48	3960	117.15	4460	125.28	4260	123.37
	Rival 75 U	4420	129.23	3990	118.04	4560	18.08	4323	125.19
$N_{180}P_{60}$	Non-herbicides	3810	114.40	3720	110.05	3850	108.14	3793	109.84
	SDMA 600	4210	123.09	3930	116.27	4130	116.01	4090	118.44
	Tomigan + SDMA 600	4550	133.04	4020	118.93	4580	128.65	4383	126.93
	Rival 75PU	4620	135.08	4220	124.85	4680	131.46	4506	130.49

For the Alex type of wheat the highest production is of 4680 kg/hectare, being obtained in the year 2010 when the soil had been fertilized with $N_{180}P_{60}$ and when Rival 75 PU herbicide had been used. The average obtained production shows an increase of 30.49% when the $N_{180}P_{60}$ was done and when the Rival 75 PU herbicide was used, in contrast with the witness, but superior to the other graduations of the fertilization level.

By applying a fertilization with nitrate in variable doses and with phosphorus in constant doses and using simple or combined herbicides, the study of the two types of wheat, Dropia and Alex emphasizes the favorable effect of the two factors over the MTG in comparison with the non-fertilized and non-herbicide variants.

Table 3 presents the MTG value for the Dropia type of wheat (factor A) through the interaction between the fertilization level (factor B) and herbicides (factor C) in which the b_1 - non- fertilized and c_1- non-herbicides had been used a switnesses.

Table 3

The influence of fertilization and of herbicides upon the MTG for the Dropia type of wheat(2008-2010)

Factor A	Factor B	Factor C	MTG		Difference	
			g	%	g	%
Dropia	Non-fertilized	Non-herbicides	41.40	100	-	-
		SDMA 600	43.54	105.16	2.14	5.16
		Tomigan + SDMA 600	43.92	106.08	2.52	6.08
		Rival 75 PU	44.32	107.05	2.92	7.05
	$N_{60}P_{60}$	Non-herbicides	46.25	111.71	4.85	11.71
		SDMA 600	46.64	112.65	5.24	12.65
		Tomigan + SDMA 600	47.14	113.76	5.74	13.76
		Rival 75 PU	46.75	112.92	5.35	12.92
	$N_{120}P_{60}$	Non-herbicides	47.74	115.31	6.34	115.31
		SDMA 600	48.65	117.51	7.25	17.51
		Tomigan + SDMA 600	49.53	119.63	8.13	19.63
		Rival 75 PU	49.06	118.50	7.66	18.50
	$N_{180}P_{60}$	Non-herbicides	46.65	112.68	5.25	12.68
		SDMA 600	47.68	115.16	6.28	15.16
		Tomigan + SDMA 600	48.74	117.72	7.34	17.72
		Rival 75 PU	47.76	115.36	6.36	15.36

By applying a chemical fertilization one can notice an inrease of the MGT in correlation with the applied doses of fertilizers and herbicides. In the case of the Dropia type of wheat, the MGT has values between 41.40g for the non-fertilized and non-herbicides variant and reaches the maximum value of 49.53 g by applying chemical fertilizers in doses of $N_{120}P_{60a}$ and herbicides like Tomigan + SDMA 600 0,6+1 l/hectare.

By increasing the fertilization doses to $N_{180}P_{60,}$ a decrease of the MGT can be noticed in comparison with the average dose of $N_{120}P_{60.}$

In what the MGT is concerned, differences might appear within the same type of fertilization. By applying treatments with combined herbicides, the MGT has got higher values when using Tomigan + SDMA 600 in comparison with the simple herbicides like SDMA 600 and Rival 75PU.

Thus, at the optimum doses of the fertilization, meaning $N_{120}P_{60}$, the MGT is 48.65g. When herbicides like SDMA 600 are used and the MGT is 49.06g. when Rival 75PU herbicide is used, in comparison with 49.53g. when it Tomigan +SDMA 600.

The influence of the interaction between the herbicides and fertilization level upon the MGT for the Alex type of soil is presented in table 4.

Table 4

The influence of herbicides and fertilization upon the MGT for the Alex type of wheat(2008-2010)

Factor A	Factor B	Factor C	MGT		Difference	
			g	%	g	%
Alex	Non-fertilized	Non- herbicides	36.22	100	-	-
		SDMA 600	36.76	101.49	0.54	1.49
		Tomigan + SDMA 600	36.93	101.96	0.71	1.96
		Rival 75 PU	36.98	102.04	0.76	2.04
	$N_{60}P_{60}$	Non-herbicides	37.12	102.48	0.90	2.48
		SDMA 600	41.55	114.71	5.33	14.71
		Tomigan + SDMA 600	41.96	115.84	5.74	15.84
		Rival 75 PU	41.72	115.18	5.50	15.18
	$N_{120}P_{60}$	Non-herbicides	41.52	114.63	5.30	14.63
		SDMA 600	41.88	115.62	5.66	15.62
		Tomigan + SDMA 600	42.44	117.17	6.22	17.17
		Rival 75 PU	41.76	115.29	5.54	15.29
	$N_{180}P_{60}$	Non-herbicides	40.33	111.34	4.11	11.34
		SDMA 600	40.65	112.23	4.43	12.23
		Tomigan + SDMA 600	40.86	112.81	4.64	12.81
		Rival 75 PU	40.71	112.39	4.49	12.39

For the Alex type of autumn wheat the MGT has got values of 36.22 g. for the non-fertilized and non-herbicide variant and of 42.44 g. for the variant fertilized with $N_{120}P_{60}$ and when Tomigan + SDMA 600 herbicide was used.

The MGT has got the highest values in case of fertilization with optimum doses of $N_{120}P_{60}$ and when Tomigan + SDMA 600 herbicides was used, these leading to a better destruction of the weeds and to a better development of the wheat grains.

CONCLUSIONS

The research done over a period of three years in the Leş-Bihor agricultural farm emphasizes the favorable effect of the fertilization in combination with herbicides upon the autumn wheat production and upon the MGT, the latter depending upon the cultivated type of wheat.

The average wheat production had been higher for the Alex type of wheat, 4506kg/hectare when using doses of $N_{180}P_{60}$ and Rival 75PU herbicides, in comparison with the Dropia type of wheat where the production was of 4166 kg/hectare when it had been fertilized with $N_{180}P_{60}$ and when Tomigan + SDMA 600 herbicide was used. This difference is due to a higher production potential for the Alex type of wheat.

The MGT has got higher values for both types of wheat when fertilization is done with moderate doses of $N_{120}P_{60}$ and when Tomigan + SDMA 600 herbicide is used. This fact is due to a better destruction of the weeds in case of using combined herbicides, a situation which allows a very good development of the wheat grain.

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