INFLUENCE OF FERTILIZERS AND HERBICIDES ON MASS OF 1000 GRAINS IN WINTER WHEAT, UNDER CONDITIONS OF BANAT AREA

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Abstract: *Mass of 1000 grains is a polygene determinism trait, highly influenced by enviroment. Therefore, establishing a soil background on wich mass of 1000 grains is the highest, has a special importance. Research was carried out in Didactic Station Timisoara in 2005-2007 period and aimed at improving fertiliser response with effect on quality features. The studied cultivars were Alex and Romulus. Fertilisation levels were $N_0P_0K_0$, $N_{45}P_{45}K_{45}$; $N_{100}P_{45}K_{45}$; $N_{150}P_{60}K_{60}$. We used the folowing herbicides: Icedin super RV(300 g/l acid 2,4 D+100 g/l dicamba) 1l/ha, Derby 175 SC (75g/l florasulam+100g/l flumetsulam) 0,07 l/ha and Aim Plus (5,75 % carfentrazon-ethyl + 64,7% acid 2,4 D) 0,35 kg/ha. Experiments were of the polyfactorial type and organised after the sub-divided plot method with 4 replications. The soil taxonomical unit was vertic strongly gleyied chernozem. Soy was the pre-emergent crop. As for the climatic characterisation (average monthly temperature and monthly precipitations recorded at the Meteorological Station in Timisoara) we can assess that the agricultural year 2004-2005 was a rainy year, the agricultural year 2005-2006 was a normal one, and the agricultural year 2006-2007 was a dry one. Analysing the results obtained, we can conclude that the variant $N_{100}P_{45}K_{45}$ is optimal in both winter wheat cultivars which can be explained by the fact that with the increase of the agri-fund from $N_{100}P_{45}K_{45}$ to $N_{150}P_{60}K_{60}$ there is also increase of yield ad particulary increase of the number of grains per spike, while grains size is smaller. The herbicides application has a positive impact on the mass of 1000 grains, the differences between the averages of the three herbicides being very small. The best influence of mineral fertilisation on the 1000 grain mass was in variant treated with Aim Plus 0,35 kg/ha, when the determination coefficient was maximal. Results contribute to the establishment fertilisation improvement with a view to obtain yields with superior bread-making features.*

Key words: *mass of 1000 grains, mineral fertilisation, herbicides, winter wheat cultivars*

INTRODUCTION

Triticum aestivum ssp. *Vulgare* (common wheat), also known as bread wheat is the most cultivated wheat specie.

The mass of 1000 grains (MTG) is the weight of air-dried and not damaged grains. It is used as one of the parameters for asessing the quality of grain. The mass of 1000 grains as a final component of grain yield depends on many components that develop in the previous phases of ontogenesis. It is possible to influence the mass of 1000 grains by agro-ecological conditions, agrothechnical measures such as date and quality of sowing, mineral fertilizers and irrigation.

Mass of 1000 grains is an important yield component, who depends on the many factors as: winter wheat cultivar, climate parameters and mineral fertilisation.

Vegetal production has never been possible without applying weed control methods. Treating winter wheat with herbicides is a necessary economic measure if we take into account that it eliminates the strong competition from weeds. The most successful method nowadays is

herbicide application. Its target is not only the crop in itself or the weeds, but maximizing yields in the presence of a controlled number of weeds (MORTIMER A.M., 1990).

The mass of 1000 grains is influenced by both the soil and fertilisation level. PROTIC et al. (2007) reached the conclusion that the highest values of the mass of 1000 grains can be reached when using moderate nitrogen rates of 60 and 90 kg/ha.

The results obtained by PARSAN et al. (2007) from 2004-2006 experimental cycle are pointing out the fact that MTG value has increased once with nitrogen dose with a difference at N_{50-100} of 1-3 g compared to N_0. Popa M. et al.(2008) obtained the highest values of MTG at the $N_{80}P_{70}$ fertilized.

MATERIAL AND METHOD

Determining the values of the mass of 1000 grains is part of a research carried out over a period of three years (2005-2007) on a vertic chernozem, strongly gleyed, salinised and alkalinised at the Didactic Station of the B.U.A.S.V.M. in Timisoara, each harvestable variant measuring $35m^2$ (7m x 5m).

Experimental factors were as follows:

Factor A – Cultivar:

a_1 – Alex;

a_2 – Romulus.

Factor B – Fertilisation, with the following graduations:

b_1 – not treated;

b_2 – $N_{45}P_{45}K_{45}$;

b_3 – $N_{100}P_{45}K_{45}$;

b_4 – $N_{150}P_{60}K_{60.}$

Factor C – Post-emergent herbicides:

c_1 – not treated;

c_2 – Icedin super RV(300 g/l acid 2,4 D+100 g/l dicamba) 1l/ha;

c_3 – Derby 175 SC (75g/l florasulam+100g/l flumetsulam) 0,07 l/ha;

c_4 – Aim Plus (5,75 % carfentrazon-ethyl + 64,7% acid 2,4 D) 0,35 kg/ha.

The technology we applied was specific to the chernozem area in the Western Plain with the following mentions:

- sowing was done in the second decade of October;
- herbicides were applied during vegetation starting from the three/leaves stage until the first inter-knot stage, when the weeds had 2-4 leaves;
- chemical fertilisers were applied fractionally, in two steps, upon preparation of the germination bed and early in the spring (March).

As for the climatic characterisation (average monthly temperature and monthly precipitations recorded at the Meteorological Station in Timisoara) we can assess that the agricultural year 2004-2005 was a rainy year, the agricultural year 2005-2006 was a normal one, and the agricultural year 2006-2007 was a dry one.

RESULTS AND DISCUSSIONS

After mineral fertilisation application, the MTG values increased, the corellation being positive in all the variants.

In Alex cultivar, MTG has values between 35,57g (not treated) and 42,55g in the variant $N_{100}P_{45}K_{45}$-Icedin super 1 l/ha. The variants treated with herbicides but not fertilised registered positives difference to the martor(Table 1).

We can observe that the variant treated with moderate N, P, K doses ($N_{100}P_{45}K_{45}$) obtained the highest values of the MTG.

Table 1

The influence of interaction between experimental factors on MTG in winter wheat (Alex cultivar), the average 2005-2007

A Fact.	B Factor	C Factor	MTG		Difference (g)	Significance
			g	%		
Alex	$N_0P_0K_0$	Not treated	35,57	100,00	-	-
		Icedin super1 l/ha	36,31	102,08	0,74	**
		Derby 175 SC 0,07 l/ha	36,25	101,91	0,68	**
		Aim Plus 0,35 kg/ha	36,30	102,05	0,73	**
	$N_{45}P_{45}K_{45}$	Not treated	41,84	117,64	6,27	***
		Icedin super1 l/ha	42,26	118,81	6,69	***
		Derby 175 SC 0,07 l/ha	42,34	119,03	6,77	***
		Aim Plus 0,35 kg/ha	42,29	118,89	6,72	***
	$N_{100}P_{45}K_{45}$	Not treated	42,04	118,18	6,47	***
		Icedin super 1 l/ha	42,55	119,61	6,98	***
		Derby 175 SC 0,07 l/ha	42,50	119,49	6,93	***
		Aim Plus 0,35 kg/ha	42,42	119,27	6,85	***
	$N_{150}P_{60}K_{60}$	Not treated	41,34	116,21	5,77	***
		Icedin super 1 l/ha	41,73	117,31	6,16	***
		Derby 175 SC 0,07 l/ha	41,58	116,89	6,01	***
		Aim Plus 0,35 kg/ha	41,44	116,50	5,87	***

$DL_{5\%}$=0,61g $DL_{1\%}$= 0,82g $DL_{0,1\%}$=1,07g

Table 2

The influence of interaction between experimental factors on MTG in winter wheat (Romulus cultivar), the average 2005-2007

A Fact.	B Factor	C Factor	MTG		Difference (g)	Significance
			g	%		
Romulus	$N_0P_0K_0$	Not treated	35,19	100,00	-	-
		Icedin super1 l/ha	35,54	101,00	0,35	-
		Derby 175 SC 0,07 l/ha	35,56	101,06	0,37	-
		Aim Plus 0,35 kg/ha	35,42	100,65	0,23	-
	$N_{45}P_{45}K_{45}$	Not treated	40,18	114,18	4,99	***
		Icedin super1 l/ha	40,84	116,06	5,65	***
		Derby 175 SC 0,07 l/ha	40,76	115,83	5,57	***
		Aim Plus 0,35 kg/ha	40,83	116,03	5,64	***
	$N_{100}P_{45}K_{45}$	Not treated	40,67	115,57	5,48	***
		Icedin super 1 l/ha	41,02	116,57	5,83	***
		Derby 175 SC 0,07 l/ha	40,75	115,80	5,56	***
		Aim Plus 0,35 kg/ha	40,83	116,02	5,64	***
	$N_{150}P_{60}K_{60}$	Not treated	39,73	112,90	4,54	***
		Icedin super 1 l/ha	40,41	114,85	5,23	***
		Derby 175 SC 0,07 l/ha	40,51	115,12	5,32	***
		Aim Plus 0,35 kg/ha	40,22	114,30	5,03	***

$DL_{5\%}$=0,84g $DL_{1\%}$=1,13g $DL_{0,1\%}$=1,48g

The influence of interaction between experimental factors on MTG in winter wheat (Romulus cultivar), is presented in Table 2. The MTG has values between 35,19 g (not treated variant) and 41,02 g (the variant $N_{100}P_{45}K_{45}$–Icedin super1 l/ha).

Studying the regresion between N, P, K doses and MTG values (the mean of 2005-2007) for Alex cultivar (Figure 1), we observe that the determination coefficient had values between 0,8972 (Icedin super 1l/ha) and 0,9148 (Aim Plus 0,35 kg/ha).

The highest influence of mineral fertilisation on MTG(g) in Alex cultivar was in the variant treated with Aim Plus 0,35 kg/ha, when we obtained the highest value of determination

coeficient. This result show that the quantity of N,P,K has a direct influence on MTG, in proportion to 91,48% .

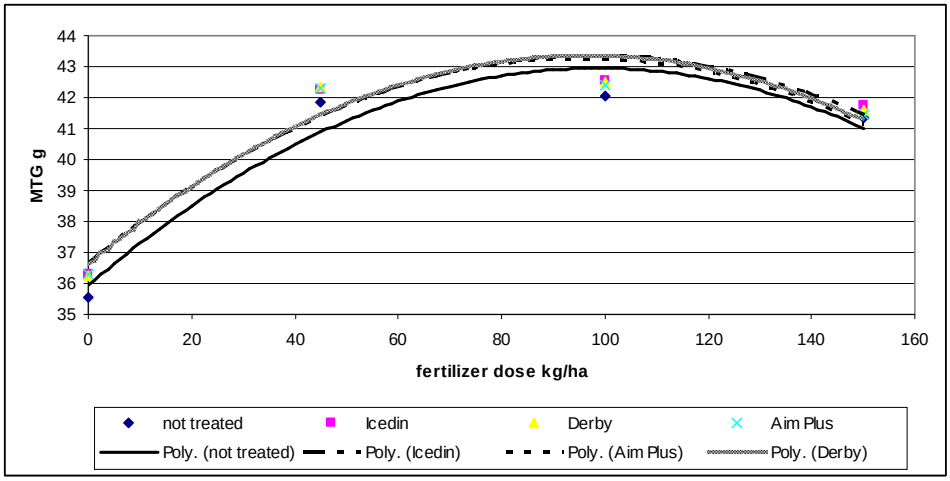

Figure 1.Correlation between MTG (g) and fertilizer doses, in winter wheat (Alex cultivar), the average 2005-2007

Not treated: $y = -0,0007x^2 + 0,1414x + 36,00$ $R^2 = 0,9032$
Icedin super: $y = -0,0007x^2 + 0,1357x + 36,74$ $R^2 = 0,8972$
Derby 175 SC: $y = -0,0007x^2 + 0,1392x + 36,654$ $R^2 = 0,9109$
Aim Plus: $y = -0,0007x^2 + 0,1376x + 36,686$ $R^2 = 0,9148$

In Figure 2 is presented the correlation between MTG(g), and fertilizer doses in Romulus cultivar. The N, P, K doses influence MTG in proportion to 93,26% (in variant treated with Icedin super 1l/ha) and 91,19% (in variant treated with Derby 175 SC).

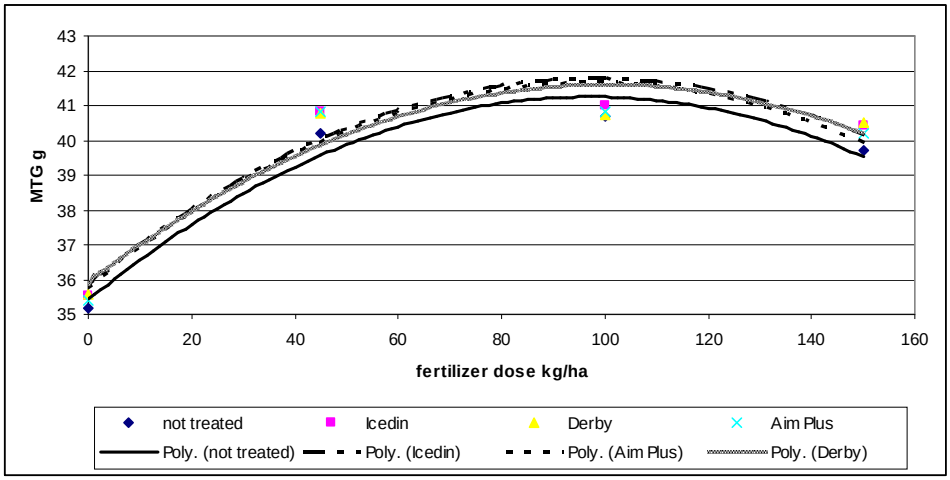

Figure 2. Correlation between MTG(g), and fertilizer doses, in winter wheat(Romulus cultivar), the average 2005-2007

Not treated: $y = -0,0006x^2 + 0,1171x + 35,585$ $R^2 = 0,8822$
Icedin super: $y = -0,0006x^2 + 0,1206x + 35,850$ $R^2 = 0,9326$
Derby 175 SC: $y = -0,0006x^2 + 0,1133x + 35,905$ $R^2 = 0,9119$
Aim Plus: $y = -0,0006x^2 + 0,1215x + 35,746$ $R^2 = 0,9249$

CONCLUSIONS

The researches made in Didactic Station of the B.U.A.S.V.M. in Timisoara during 2005-2007 for establishing the reaction to fertilization and herbicides application influence on mass of 1000 grains in two winter wheat cultivars lead to the following conclusions:

- the correlation between mass of 1000 grains, and fertilizer doses in both cultivars was positive, no matter the herbicide we used.
- analysing the average of trial factors, we can see that the variant $N_{100}P_{45}K_{45}$ is optimal in both winter wheat cultivars which can be explained by the fact that with the increase of the agri-fund from $N_{100}P_{45}K_{45}$ to $N_{150}P_{60}K_{60}$ there is also increase of yield ad particularly increase of the number of grains per spike, while winter wheat grain size is smaller.
- in Alex cultivar the highest value of determination coefficient was in variant treated with Aim Plus 0,35 kg/ha ($R^2 = 0,9148$) and in Romulus cultivar was in variant treated with Icedin super 1 l/ha ($R^2 = 0,9326$).
- regarding the herbicides, we can see that herbicide application has a positive impact on the mass of 1000 grains, the differences between the averages of the three herbicides being small.

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