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RESEARCH REGARDING FERTILIZATION AND WEED MANAGEMENT IN A PLUM TREE ORCHARD IN NORTH-EASTERN BUCHAREST

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Abstract

High and steady yields are a major objective for any agricultural holding and, in the case of fruit tree plantations, the specific market requirements are an additional goal.

The implementation of a sustainable agriculture system requires a smaller amount of pesticides, less environmental pollution, more efficient technologies, biodiversity and resource conservation by means of input reduction, output and holding lucrativity increase and resource redistribution.

The paper aims to find the best fertilization and weed control solution in a plum tree plantation in the pedoclimatic conditions of Moara Domneasca.

The findings were that the obtained yields varied greatly according to the fertilizer and herbicide treatments. Thus, the application of a total herbicide in fractionated doses resulted in more efficient weed control compared to a single dose application. Regarding fertilization, the best results were obtained in the treatments with both soil and leaf applications.

Concerning yield levels, they varied between 6.9 t/ha in the treatment with no herbicidation and no fertilization and a maximum level of 14.6 t/ha, where weed control was performed by applying two doses of herbicide and combined soil and leaf fertilization.

INTRODUCTION

The plum tree, one of the oldest fruit tree species, with a high adaptability to the climatic conditions, is grown in a territory extending from the plain to the mountains.

Plums have a high nutrient value, with a sugar content of 16-20%, potasium 170 mg%, Ca 12 mg%, Mg 10 mg%, P 18 mg%, Na 1mg%, Fe 0.5 mg%, Cl 1.5 mg% etc. According to the F.A.O. Annals vol. 51 (1997) the biggest plum producing countries are: China with 2700 thousand tones, U.S.A. with 830 thousand tones and Romania with 600 thousand tones. Spectacular increases in plum tree production have been recorded in the latest years in China, U.S.A., Turkey, Spain, Iran, Chile, Japan and Pakistan.

High and steady yields with low inputs are the goal of any farmer, but this goal needs to be consistent with the requirements of environmental protection, pollution reduction and biodiversity conservation. Weed control is a major problem for any agricultural holding because weeds use a part of the applied fertilizers and they are hosts to pests and diseases.

When setting up an optimal fertilization scheme in an orchard, one needs to take into account the planned yield and the quality of the obtained fruit.

Research aimed to identify the best fertilization and weed control treatments in a Stanley plum tree plantation in the pedoclimatic conditions in Moara Domneasca.

MATERIAL AND METHODS

In order to reach the objectives for 2008 şi 2009, a bifactorial experiment was set up in the Stanley plum tree plantation where:

Factor A ***weed control***

a_1 Unweeded unherbicided
a_2 Clean-up 2 l/ha Gliphosat 360 g/l
a_3 Clean-up 4 l/ha Gliphosat 360 g/l
a_4 Clean-up 2 + 2 l/ha Gliphosat 360 g/l

Factor B ***fertilization***

b_1 unfertilized
b_2 Complex N:P:K 500 g/pom 20:20:20
b_3 Complex N:P:K 500 g/tree 20:20:20 +
+Foliar Murtonik 2 kg/ha 20:20:20 + microelements
b_4 Complex N:P:K 500 g/tree 20:20:20 +
+Foliar Murtonik 2+2 kg/ha 20:20:20 + microelements
b_5 Complex N:P:K 500 g/tree + 20:20:20 +
Foliar Fertitel 2 kg/ha 6,6:6:4,1 + microelements
b_6 Complex N:P:K (500 g/tree) + 20:20:20 +
Foliar Fertitel 2+2 kg/ha 6,6:6:4.1 + microelements

The soil was reddish preluvosoil with a content in humus of 2.2%, loamy-clayey texture and pH 6.2.

The assessed indicators were weed expansion and weed control extent when harvesting and yield levels.

RESULTS AND DISCUSSION

The data analysis in Table 1 regarding the influence of weed control methods factor A on the biomass in the plum tree plantation in the unherbicided treatments indicates that the mean weed biomass in the unherbicided treatments was 1621

g/m^2, and the application of herbicides led to a very significant reduction in weed biomass in all treatments and the fractionated application of the same herbicide dose decreases weed biomass, but this decrease is not statistically assured.

The analysis of the influence of weed control method factor A on weed biomass for each fertilization method (the same graduation of factor B) reveals that, in all tested fertilization treatments, the application of herbicides reduces very significantly the weed biomass in comparison with the unherbicided treatments.

Table 1

Weed biomass in the plum tree plantation under weed control and fertilization methods, Moara Domneasca 2008-2009 (g/m^2)

	Factor A											
	a_1	a_1b_n - a_1b_1	a_2	a_2b_n - a_2b_1	a_3	a_3b_n - a_3b_1	a_4	a_4b_n - a_4b_1	a_2 - a_1	a_3 - a_1	a_4 - a_1	Mean b
Unfertilized	1552	Mt	556	Mt	398	Mt	340	Mt	-996	-1154	-1212	712
Complex N:P:K 500 g/tree	1627	75	581	25	407	8	365	25	-1046	-1220	-1262	745
Complex N:P:K 500 g/tree +Foliar Murtonik 2 kg/ha	1635	83	589	33	440	42	374	33	-1046	-1195	-1262	759
Complex N:P:K 500 g/tree +Foliar Murtonik 2+2 kg/ha	1652	100	623	66	457	58	398	58	-1029	-1195	-1253	782
Complex N:P:K 500 g/tree + Foliar Fertitel 2 kg/ha	1619	66	573	17	448	50	349	8	-1046	-1170	-1270	747
Complex N:P:K 500 g/tree Foliar Fertitel 2+2 kg/ha	1640	88	597	41	437	39	392	52	-1043	-1203	-1248	767
Mean a	1621		586		431		370		-1034	-1190	-1251	752

	A	B	AxB	BxA
DL5%	88	56	112	63
DL1%	145	91	181	95
DL0.1%	183	146	256	138

When analysing the influence of fertilization factor B on weed biomass there can be seen that the application of fertilization determined significant weed biomass increases only in b4 treatment fertilized with Complex and two leaf doses of Murtonik.

The analysis of the influence of factor B on weed biomass for each weed control method (the same graduation for factor A) shows that the application of different fertilization methods led to increases in weed biomass in all the tested weed control treatments in comparison with the unfertilized witness treatments. These increases are statistically assured as significant only in b4 (complex + 2xMurtonik).

The largest weed biomass was of 1652 g/m^2 recorded in the unherbicided treatment fertilized with complex fertilizer and two doses of Murtonik and the lowest in the unfertilized treatment herbicided in fractions.

Table 2 holds the data regarding weed control extent in the plum tree plantation under fertilization and different weed control methods.

When analysing the influence of weed control methods factor A on the weed control extent one can see that the mean weed control extent in the unherbicided treatments was of - 4.2% in comparison with the unfertilized and unherbicided treatment used as witness.

Table 2

Weed biomass in the plum tree plantation under weed control methods and fertilization, Moara Domneasca 2008-2009 (%)

	Factor A											
	a_1	a_1b_n - a_1b_1	a_2	a_2b_n - a_2b_1	a_3	a_3b_n - a_3b_1	a_4	a_4b_n - a_4b_1	a_2 - a_1	a_3 - a_1	a_4 - a_1	Mean b
Unfertilized	0.0	Mt	64.2	Mt	74.3	Mt	78.1	Mt	64.2	74.3	78.1	54.1
Complex N:P:K 500 g/tree	-4.8	-4.8	62.6	-1.6	73.8	-0.5	76.5	-1.6	67.4	78.6	81.3	52.0
Complex N:P:K 500 g/tree +Foliar Murtonik 2 kg/ha	-5.3	-5.3	62.0	-2.1	71.7	-2.7	75.9	-2.1	67.4	77.0	81.3	51.1
Complex N:P:K 500 g/tree +Foliar Murtonik 2+2 kg/ha	-6.4	-6.4	59.9	-4.3	70.6	-3.7	74.3	-3.7	66.3	77.0	80.7	49.6
Complex N:P:K 500 g/tree + Foliar Fertitel 2 kg/ha	-4.3	-4.3	63.1	-1.1	71.1	-3.2	77.5	-0.5	67.4	75.4	81.8	51.9
Complex N:P:K 500 g/tree Foliar Fertitel 2+2 kg/ha	-5.7	-5.7	61.5	-2.6	71.8	-2.5	74.7	-3.3	67.2	77.5	80.4	50.6
Mean a	-4.4		62.2		72.2		76.2					51.6

	A	B	AxB	BxA
DL5%	5.4	3.3	6.1	3.8
DL1%	8.8	5.6	9,6	6.3
DL0.1%	11.2	7.5	12,8	8.4

The application of herbicide doses led to a very significant weed control extent in all the studied treatments. There can also be seen that the application of the same fractionated dose of herbicide determined an increased weed control extent, but this increase was not statistically assured.

The analysis of the influence of weed control methods factor A on the weed control extent for each fertilization method (the same graduation of factor B) shows that, in all the tested fertilization treatments, the application of herbicides leads to very significant increases in weed control extent in comparison with the unherbicided treatments.

Regarding the influence of fertilization factor B on weed control extent, there can be seen that the application of fertilization determined reductions in weed control extent, but these reductions aren't statistically assured as significant except for the b4 treatment where complex fertilizers and two leaf doses with Murtonik were applied.

When assessing the influence of fertilization (factor B) on weed control extent for each weed control method (the same graduation of factor A), there can be seen that in all the tested weed control treatments the application of different fertilization methods was followed by a reduction in weed control extent in comparison with the unfertilized witness treatments. These reductions of the weed control extent are significant only in the treatment b4 (complex + 2xMurtonik).

The smallest weed control extent was recorded in the unherbicided treatment fertilized with complex fertilizer and two Murtonik doses.

The analysis of the influence of the weed control method factor A on plum yield (Table 3) shows that the mean yield in the unherbicided treatments was of 9.9 t/ha and it reached 12.8 t/ha when herbiciding with Clean-up in a dose of 2+2 l/ha.

Table 3

Yields obtained under weed control methods and fertilization in a Stanley plum tree plantation in Moara Domneasca Farm (t/ha)

	Factor A											
	a_1	a_1b_n - a_1b_1	a_2	a_2b_n - a_2b_1	a_3	a_3b_n - a_3b_1	a_4	a_4b_n - a_4b_1	a_2 - a_1	a_3 - a_1	a_4 - a_1	Mean b
Unfertilized	6.9	Mt	8.1	Mt	8.2	Mt	8.7	Mt	1.2	1.30	1.8	8.0
Complex N:P:K 500 g/pom	9.3	2.4	10.1	2	10.9	2.7	11.3	2.6	0.8	1.60	2.0	10.4
Complex N:P:K 500 g/pom +Foliar Murtonik 2 kg/ha	10.8	3.9	11.7	3.6	12.7	4.5	13.2	4.5	0.9	1.9	2.4	12.1
Complex N:P:K 500 g/pom +Foliar Murtonik 2+2 kg/ha	11.6	4.7	12.9	4.8	13.8	5.6	14.9	6.2	1.3	2.2	3.3	13.3
Complex N:P:K 500 g/pom + Foliar Fertitel 2 kg/ha	9.7	2.8	10.6	2.5	11.4	3.2	13.8	5.1	0.9	1.7	4.1	11.4
Complex N:P:K 500 g/pom Foliar Fertitel 2+2 kg/ha	11.3	4.4	12.1	4	13.2	5	14.6	5.9	0.8	1.9	3.3	12.8
Mean a	9.9		10.9		11.7		12.8					11.3

	A	B	AxB	BxA
DL5%	0.71	0.92	0.63	1.03
DL1%	0.93	1.31	1.02	1.67
DL0.1%	1.39	1.98	1.35	2.48

The influence of weed control method factor A on plum yield for each fertilization method (the same graduation of factor B).

The analysis of data regarding plum yield shows that in all tested fertilization treatments, the application of herbicide doses determines significant yield boosts. These boosts are very significant when herbiciding with a dose of 4 l/ha Clean-up.

The influence of fertilization factor B on plum yield

The mean data in Table 1 show that the application of fertilization led to very significant yield boosts in all the tested fertilization treatments in comparison with the unfertilized treatment.

The influence of fertilization factor B on plum yield for each weed control method (the same graduation of factor A)

When assessing the results fo the obtained plum yield, there can be seen that in all the tested weed control treatments the application of different fertilization methods was followed by a significant yield boost in comparison with the unfertilized witness treatments. The biggest yield was of 14.9 t/ha and it was recorded in the treatment herbicided with 4 l/ha Clean-up and fertilized with complex fertilizer and two doses of Murtonik.

CONCLUSIONS

The analysis of the presented data reveals the following conclusions:

1. The mean plum yield in the unherbicided treatments was of 9.9 t/ha and reached 12.8 t/ha when herbiciding with Clean-up 2+2 l/ha.
2. The application of weed control methods and fertilization led to significant increases in plum yields.
3. The application of weed control methods led to an increase in weed control extent and a reduction in weed biomass.

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