

SOIL MOISTURE STUDY AND ITS INFLUENCES ON BLACKBERRY CULTURE FOR NORTH EAST MOLDOVA COUNTY

STUDIU PRIVIND UMIDITATEA SOLULUI ȘI INFLUENȚA ACESTEIA PENTRU CULTURA MURULUI ÎN ZONA DE NE A MOLDOVEI

**DASCĂLU M.¹, ISTRATE M.¹, GRĂDINARIU G.¹, ZLATI Cristina¹,
BERNARDIS R.¹, PRODAN N.D.¹, SFICHI DUKE Liliana¹**
e-mail: mdascalu2000@yahoo.com

Abstract: Blackberry (*Rubus caesius*) has a large commercial potential but in the Northeastern Romania is currently in a status of low economic importance. The development of this crop depends on a range of factors including the cultivation limitations due to soil and water conditions. For this reason, the Department of Fruit Trees culture conducted a study to determine the most suitable growing conditions that would allow the expansion of blackberry production in the North-eastern Romania.

Key words: Blackberry, agro-technologies

Rezumat: Murul (*Rubus caesius*.) este o specie cu un potențial comercial crescut dar în nord-estul României are importanță economică scăzută. Dezvoltarea acestei culturi depinde de o serie de factori care include și limitarea cultivării datorită condițiilor de sol și apă. Din acest motiv, Departamentul de Cultura a pomilor fructiferi a efectuat un studiu pentru a determina condițiile de creștere cele mai potrivite, care ar permite extinderea culturii murului în nord-estul României.

Cuvinte cheie: mur, tehnologii agricole.

INTRODUCTION

Small fruits including blackberries and raspberries are a good source of natural antioxidant substances and act effectively as free radical inhibitors (Purgar et al., 2012). Blackberry (*Rubus caesius*.) is a soil moisture-sensitive species with commercial potential that in the North-eastern Romania is currently in a status of low economic importance. The development of this crop depends on a range of factors including the cultivation limitations due to soil and water conditions. Because the root system explores a small volume of soil, especially in the profile depth, this species is affected by drought during the summer, and therefore it needs irrigation (Marvin et al., 1999, McGhie et al., 2002).

In the „V.Adamache” horticol farm it was established an experimental plot with two varieties of blackberries (Thornfree and Lochness) in order to study the behavior of this species under water stress conditions. Plants were grown in soil and a mixture of soil : peat (1:1), under irrigation and without irrigation.

¹ University of Agricultural Sciences and Veterinary Medicine of Iași, Romania

Biometric measurements were made in order to establish the impact of water deficit on plant growth and development as well as the influence of growth substrate on plant response to soil moisture conditions.

MATERIAL AND METHOD

The experimental plot was established in the V Adamache field (Iasi, Romania) in 2011 as previously described (Dascalu et al., 2012). The blackberry cultivars used in this study were Thornfree and Lochness (3,5 x 0,5 m, 5714 plants/ha), cultured in both soil and soil:peat mixture (1:1). Half of the plants were supplementary irrigated and maintained in well watered conditions while the other half was not irrigated and exposed to water deficit. The field capacity was monitored at regular interval of time.

Biometric measurements such as the plant height, average number of leaves per plant, stem diameter, the average number of inflorescences per plant and fruit yield were made on both categories of plants in two consecutive years. Statistical analysis was also performed.

RESULTS AND DISCUSSIONS

Under irrigation conditions, the length of stem in both cultivars was smaller in plants cultured in soil than in those cultured in soil:peat. In the second year of culture the stem length reached 308 cm in Lochness and 357 cm in Thornfree. Water deficit decreased the stem length in both cultivars and this effect was stronger in soil:peat conditions than in soil (table 1).

Table 1

The average height of the blackberry plants (cm)

Variant		2011		2012	
		Soil	Soil - peat	Soil	Soil - peat
Lochness	V1 – non-irrigated	173.5**	181.3***	278.3	282.3***
	V2 - irrigated	180.3***	191.7***	284.6	308.0***
Thornfree	V1 – non-irrigated	128.4	133.7	260.5	262.3
	V2 - irrigated	178.5**	199.0	324.3	357.7***
DL 5%		6.10	7.07	9.03	8.84
DL 1%		9.83	10.71	15.76	13.39
DL 0,1%		15.2	17.19	27.15	21.50

From 2011 to 2012 the average number of leaves per plant in Lochness maintained under irrigation conditions increased about 50% in soil:peat while in soil the increase was smaller. In Thornfree there were slight differences between plants grown in soil:peat and those grown in soil, However, Lochness showed higher values than Thornfree in the second experimental year. Water deficit

strongly reduced the average number of leaves per plant and this effect was more pronounced in Lochness than in Thornfree, mainly in soil:peat (table 2).

Table 2

The average number of leaves per plant

Variant		2011		2012	
		Soil	Soil - peat	Soil	Soil - peat
Lochness	V1 - non-irrigated	63.2	66.0	87.2	104.7*
	V2 - irrigated	82.1*	94.7*	125.4*	146.0**
Thornfree	V1 – non-irrigated	45.3	50.3	69.5	78.0
	V2 - irrigated	87,3*	91.5*	89.2	91.3
DL 5%		6.02	7.39	7.21	7.06
DL 1%		9.98	11.20	10.64	10.55
DL 0,1%		14.65	17.95	17.86	17.02

The average diameter of stems was higher in Lochness than in Thornfree mainly in plants grown in soil:peat. Water deficit decreased this parameter in both varieties irrespective of substrat (table 3).

Table 3

The average diameter of stems (cm)

Variant		2011		2012	
		Soil	Soil - peat	Soil	Soil - peat
Lochness	V1 - non-irrigated	0.90*	0.93*	0.92*	0.94
	V2 - irrigated	0.98**	1.02**	1.49	1.54*
Thornfree	V1 – non-irrigated	0.47	0.52	0.63	0.74
	V2 - irrigated	0.91*	0.98*	1.03*	1.17*
DL 5%		0.42	0.51	0.55	0.62
DL 1%		0.59	0.72	0.87	0.82
DL 0,1%		1.01	1.10	1.79	1.52

In the second year the average number of inflorescences/plant was measured in both cultivars. Irrigated plants cultured in soil:peat showed higher values than those grown in soil. Water deficit decreased the number of inflorescences/plant. In Thornfree this effect was stronger in soil:peat conditions than in soil ones. However, Lochness showed slightly higher values than Thornfree, mainly in soil:peat (table 4).

The fruit yield was over 10 t/ha in Thornfree plants maintained under well watered conditions. In Lochness the yield was lower than in Thornfree in both irrigated and non-irrigated conditions. Water deficit decreased the fruit yield but this effect was stronger in Thornfree where plants cultured in soil:peat showed a half of the fruit yield of irrigated plants (table 4).

Table 4

The average number of inflorescences per plant and fruit yield (kg/plant, t/ha)

Variant		Number of inflorescences		Fruit yield	
		Soil	Soil - peat	Soil	Soil - peat
Lochness	V1 - non-irrigated	13.1	14.0	0.9 kg/plant (5.14 t/ha)	0.88 kg/plant (5.13 t/ha)
	V2 - irrigated	19.5	24.7	1.32 kg/ plant (7.54 t/ha)	1.44 kg/plant (8.23 t/ha)
Thornfree	V1 – non-irrigated	11.1	16.3	1.04 kg/plant (5.94 t/ha)	1.20 kg/plant (6.89 t/ha)
	V2 - irrigated	20.6	28.7	1.82 kg/plant (10.40 t/ha)	2.10 kg/plant (11.99 t/ha)

CONCLUSIONS

1. The cultivation of blackberry plants under irrigation gives results when the soil is more acid which can be done by the addition of peat.
2. The Lochness cultivar showed superior values than Thornfree for most biometric parameters taken under investigation
3. In terms of fruit yield Thornfree is more productive than Lochness.
4. Both cultivars are recommended for culturing in the northeastern region of Romania because they have the potential to adapt to the environmental conditions that characterize this region.

Acknowledgement: The present contribution was supported by the EU-funding grant POSCCE-A2-O2.1.2-2009-2, I.D. 524, cod SMIS-CSNR 11986.

REFERENCES

1. Dascălu M., Cauleț Raluca, Morariu Aliona, Negrea Roxana, Pascu D., Sfichi-Duke Liliana, 2012 - Shoot and leaf growth responses to light microenvironment and substrate in raspberry and blackberry cultivars, Lucr. șt., U.S.A.M.V. Iasi, seria Horticultură, vol. 54.
2. Marvin P. Pritts, Robert W. Langhans, Thomas H. Whitlow, Mary Jo Kelly. Aimee Roberts, 1999 - Winter Raspberry Production in Greenhouses, HortTechnology, January-March, 9, p. 13-154.
3. McGhie T.K., Hall H.K., Ainge G.D., Mowat A.D., 2002 - Breeding Rubus cultivars for high anthocyanin content and high antioxidant capacity. Acta Hort. 585, p. 495–499.