CHANGES IN LEAF AND FRUIT NUTRIENT CONCENTRATION OF NORTHERN HIGHBUSH BLUEBERRY ASSOCIATED WITH DIFFERENT NUTRIENT MANAGEMENT IN A SOILLESS GROWING SYSTEM

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INTRODUCTION

Northern highbush blueberry (*Vaccinium corymbosum* L.) is presently one of the very popular commercial crops in the Republic of Serbia covering the total area of around 2.000 ha. Majority of blueberries are soil grown, but a soilless growing system has also gained popularity in recent years. Some of advantages of soilless culture are related to easier control of irrigation and nutrient management; manipulation with plant growth to better control of shoot length, fruit to shoot ratio, and fruit quality. The initial focus in a soilless culture system is on balanced and precise fertilizer applications which can improve the nutrient status of the plants. Hence, we examined effect of different nutrient management practices on the content of macro- and micro- elements in the leaf and fruit of 'Bluecrop' highbush blueberry associated with pH value, electrical conductivity (EC) and nutrient content of the substrate.

MATERIAL AND METHODS

Field study was carried out during 2017 season on 5-year-old nursery plants grown in 50 l polypropylene pots at commercial orchard situated near Belgrade (44°45' N, 20°35' E, 112 m a.s.l.). Each pot filled with the mix of pine sawdust (60%), white peat (30%) and perlite (10%) was placed at distance of 0.8 m within the row and 3.0 m between the rows (4,170 bushes ha^{-1}).

The nutrient treatments were as follows: (Org) organic fertilizers application (64 kg N ha^{-1}, 42 kg P ha^{-1}, 52 kg K ha^{-1}); (Min) mineral fertilizers application (85 kg N ha^{-1}, 45 kg P ha^{-1}, 64 kg K ha^{-1}); and (Org-Min) combined application of organic and mineral fertilizers (72 kg N ha^{-1}, 48 kg P ha^{-1}, 68 kg K ha^{-1}).

The trial was set up in a completely randomized design with 3 replications and 10 bushes/pots per replication for each fertilizer treatment. The leaf and fruit samples for inorganic nutrient analysis were collected at the beginning of July, 2017.

'Bluecrop'

RESULTS

Table 1 – Effect of different fertilizers on leaf macronutrient content of the 'Bluecrop' highbush blueberry in a soilless growing system

Treatments	MACROELEMENTS (%)					
	N	P	K	Ca	Mg	Na
Org	1.95±0.036c	0.12±0.002c	0.42±0.002b	0.59±0.020	0.28±0.013	0.019±0.001b
Min	3.52±0.091a	0.16±0.006a	0.66±0.019a	0.41±0.053	0.26±0.035	0.036±0.001ab
Org-Min	2.27±0,118b	0.15±0.004b	0.75±0.042a	0.58±0.052	0.28±0.011	0.064±0.013a
Significance	***	**	***	*ns*	*ns*	*

Values within column followed by the different letter are significantly different at P ≤ 0.05 (LSD test). *Significant at P ≤ 0.05; ** Significant at P ≤ 0.01; *** Significant at P ≤ 0.001; ns – not significant.

Table 2 – Effect of different fertilizers on leaf micronutrient content of the 'Bluecrop' highbush blueberry in a soilless growing system

Treatments	MICROELEMENTS (mg/kg DW)				
	B	Cu	Fe	Mn	Zn
Org	10.84±0.536b	15.47±0.393	108.4±3.705a	112.13±1.583c	12.28±1.076
Min	9.76±1.115b	17.09±0.834	72.67±3.674b	192.02±8.443a	9.61±0.718
Org-Min	17.95±0.936a	15.80±0.606	97.41±2.030a	158.56±1.01b	12.22±0.734
Significance	***	*ns*	***	***	*ns*

Values within column followed by the different letter are significantly different at P ≤ 0.05 (LSD test). *** Significant at P ≤ 0.001; ns – not significant.

Table 3 – Effect of different fertilizers on fruit macronutrient content of the 'Bluecrop' highbush blueberry in a soilless growing system

Treatments	MACROELEMENTS (%)					
	N	P	K	Ca	Mg	Na
Org	0.60±0.023c	0.13±0.005	0.29±0065	0.04±0.001a	0.13±0.083	0.14±0.013
Min	0.91±0.020a	0.13±0.001	0.23±0.004	0.02±0.002c	0.23±0.002	0.12±0.002
Org-Min	0.81±0.024b	0.14±0.008	0.22±0.004	0.03±0.001b	0.24±0.001	0.13±0.008
Significance	***	*ns*	*ns*	***	*ns*	*ns*

Values within column followed by the different letter are significantly different at P ≤ 0.05 (LSD test).; *** Significant at P ≤ 0.001; ns – not significant.

Table 4 – Effect of different fertilizers on fruit micronutrient content of the 'Bluecrop' highbush blueberry in a soilless growing system

Treatments	MICROELEMENTS (%)					
	B	Cu	Fe	Mn	Zn	Mo
Org	5.34±0.860a	7.32±0.654a	68.04±2.654a	9.20±0.526b	4.44±0.629a	2.71±0.184a
Min	0.45±0.040b	2.19±0.180b	25.51±1.675b	11.39±0.540a	0.24±0.028b	0.80±0.039c
Org-Min	1.01±0.100b	2.02±0.173b	31.21±1.793b	8.91±0.556b	6.71±0.263a	1.36±0.043b
Significance	***	***	***	*	***	***

Values within column followed by the different letter are significantly different at P ≤ 0.05 (LSD test). *Significant at P ≤ 0.05, *** Significant at P ≤ 0.001.

CONCLUSION

Our research showed that fertilizer treatments had a significant effect on leaf nitrogen (N), phosphorus (P) and potassium (K) concentrations which tended to increase in Min and Org-Min treatments. N accounted for the largest proportion of nutrients in the fruit with the highest concentration recorded in Min treatment. Fruit micronutrients showed the highest concentrations of boron (B), copper (Cu), iron (Fe) and molybdenum (Mo) in Org treatment.