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RESEARCH REGARDING THE BEHAVIOR OF SOME BLUEBERRY PLANT VARIETIES IN THE CONDITIONS FROM THE BUCHAREST AREA

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Abstract

For the success of the blueberry culture, certain conditions are necessary to be fulfilled, especially the soil reaction which must be acid (pH=4,5-5,5), the soil must be properly drained, having a high content in organic material. In order to test the reaction of certain blueberry varieties to the Bucharest area conditions, where the soil is not totally suitable for this culture, an experiment was conducted with 6 varieties and 4 different methods of working the soil on the rows (bark, sawdust, agrotextile and grass) to ensure conditions as good as possible for the growth of the plants. For the planting, 10 liters of acid peat were used to correct the acidity of the soil. The biometric parameters analyzed for the plants highlighted, on one hand, differences among varieties, and on the other hand, differences among the soil maintenance variants. The varieties Pemberton and Bluecrop were more vigorous, while the varieties Delicia and Simultan proved to have a lower vigor. Also the fruit quality varied depending on the soil maintenance variants.

Key words*: blueberry plant, mulching, biometric parameters, production*

INTRODUCTION

In Romania, blueberry culture is not so spread, on one hand due to the lack of knowledge of the small fruit producers regarding the culture particularities and on the other hand due to difficulties in producing seedling material, which is obtained using special systems, on acid substrate [2].

Blueberry culture can represent an alternative for the small fruit producers and not only, being one of the shrub species that is very appreciated by the consumers, both for fresh fruit consumption and for the wide range of products resulting from processed fruit [3, 4]. Even though blueberry culture does not pose difficulties from a technological point of view, suitable regions for this species are limited due to the fact that the species is very pretentious regarding the reaction of the soil, which must be acid [1]. Extending the area of culture and capitalizing certain regions that are climatically favorable, but with some deviations for the soil reaction compared to the requirements of the species, can be done only after the reaction of the soil has been corrected with materials that acidify the soil or the culture can be created in containers.

For the purpose of extending the blueberry culture in Bucharest area, an experiment was organized to test the adaptation capacity of some blueberry varieties to the climatic and soil conditions from the respective area. Bucharest area would be a very good area from the point of view of capitalization due to the large population and its taste diversity.

MATERIAL AND METHOD

The experiment was conducted during 2009-2012, in the Teaching Field of the Faculty of Horticulture, in a culture founded in 2009, with six blueberry varieties: Augusta, Simultan, Delicia, Weymouth, Bluecrop and Pemberton, planted at the distance of 3 m between the rows and 1,5 m on the rows. At planting, 10 liters of acid peat were used for each plant in order to correct the reaction of the soil. The soil was maintained worked between the rows and with mulch on the rows,

with 3 materials that represented the experimental variants:
V1 – resinous sawdust;
V2 – pine bark;
V3 – black agrotextil
The plantation was provided with localized irrigation system, and the specific maintenance works for the shrub plantations were performed.
Biometric measurements were made related to the growth capacity, foliar surface, production capacity and production, quality through specific analyses using the HPLC device.

RESULTS AND DISCUSSIONS

The growth capacity of the analyzed varieties differed among varieties on one hand due to the biological characteristics and on the other hand due to soil maintenance variants. Thus, the ramification capacity of the strains was different, the average number of ramifications during 2009-2012 was between 15.59/plant for the Weimouth variety in case of mulching with sawdust and 23.78/plant for the Pemberton variety in case of mulching with agrotextil (table 1). The highest ramification capacity was recorded for the variety Pemberton, with an average of more than 21 ramifications per plant, followed by Bluecrop with 19.3 ramifications per plant. A lower ramification capacity was recorded for the varieties Weimouth with 15.8 ramifications per plant and Delicia with 16.76 ramifications per plant (table 1).

Table 1. Ramification capacity of some blueberry varieties (ramifications/plant, 2009-2012, Bucharest)

Variety	Mulching variant			Average
	Sawdust	Pine Bark	Agrotexil	
Augusta	17,16	19,42	20,06	18,88
Simultan	16,50	17,55	20,97	18,34
Delicia	14,98	18,12	17,17	16,76
Weymouth	15,59	15,61	16,20	15,80
Bluecrop	18,55	19,31	20,17	19,34
Pemberton	20,04	21,62	23,78	21,81
Average	17,14	18,61	19,73	18,49

The foliar surface of the plants is important through its size and heath degree in order to synthesize the organic substances necessary for the nutrition of the plant as a whole and in order to ensure a proper fructification. For the analyzed varieties, the foliar surface differed according to the variety and mulching material, the values obtained varying between 2561 cm^2/plant for the Weimouth variety in case of mulching with sawdust and 7679 cm^2/plant for the Pemberton variety in case of mulching with agrotextil (table 2). The values per mulching material were lower in case of plants mulched with sawdust and higher in case of plants mulched with agrotextil. Mong varieties, the average values for the three mulching materials showed higher values for the foliar surface for Pemberton variety, which exceeds the average by 49%, followed by Bluecrop, which exceeds the average by 12%, the remaining four varieties recording values under the average. These two varieties were more vigorous also from the point of view of the ramification capacity.

Table 2. Foliar surface for some blueberry varieties (cm^2/plant, 2009-2012, Bucharest)

Variety	Mulching variant			Average
	Sawdust	Pine Bark	Agrotextil	
Augusta	3438,00	4107,67	4397,25	3980,97
Simultan	3480,23	3819,81	4991,58	4097,21
Delicia	2586,97	3623,31	4071,30	3427,19
Weimouth	2561,98	3428,73	3852,64	3281,12
Bluecrop	3685,17	5170,89	5757,50	4871,19
Pemberton	5133,07	6802,70	7679,32	6538,36
Average	3480,90	4492,19	5124,93	4366,01

The fructification potential of the blueberry is lower in the first years of life of the plants due to the low growth capacity, and the formation of the inflorescences begins in the first two-three years from planting. During the experiment conducted, the first inflorescences appeared during the first year since planting because the plants were fortified and planted with bales of peat, but the production was insignificant; during the following three years, the production recorded a slight increase. The average production for the four years was relatively low, due to the slow growth of the plants, and recorded values between 813 g/plant for the Simultan variety mulched with sawdust and 2384 g/plant for the Bluecrop variety mulched with agrotextil (table 3).

If the production per mulching material was analyzed, it would be noticed that the agrotextil stimulated a better fructification than the organic materials, for which the production was relatively equal. Among varieties, Bluecrop proved to be more productive, with an average of 2099 g/plant, followed by Pemberton with 1695 g/plant. The smallest production was obtained from the Simultan variety, with approximately 750 g/plant.

Table .3Production capacity of some blueberry varieties (g/plant, 2009-2012, Bucharest)

Variety	**Mulching variant**			**Average**
	Sawdust	**Pine Bark**	**Agrotextil**	
Augusta	1009,23	1139,90	1228,37	1125,83
Simultan	813,31	694,70	734,72	747,58
Delicia	1658,94	1235,33	1318,58	1404,28
Weimouth	1062,55	1112,80	1307,47	1160,94
Bluecrop	1863,51	2051,40	2383,71	2099,54
Pemberton	1442,69	1723,94	1919,40	1695,34
Average	1308,37	1326,35	1482,04	1372,25

Fruit quality is very important both for a better capitalization of the production and for the role played by the fruit in the rational nutrition of humans. From this point of view, measurements were made regarding the content in dry substance and vitamin C. among varieties, differences were recorded, but without the possibility to identify any direct relationship with the mulching material, the values obtained probably being the result of the interaction between the varieties and the respective mulching materials.

The total content in dry substance was higher for the Simultan variety, 30,41%, for which the production was the lowest one, while the lowest content was recorded for the Bluecrop variety, 16,58%, for which the production was the largest, thus confirming once more the negative correlation between quantity and quality. The mulching materials did not uniformly influence all the varieties, reason for which no direct relationship between these two indicators can be found (table 4).

The soluble dry substance was slightly influenced by the mulching material in case of four out of six varieties; the values for the fruit produced by plants mulched with agrotextil were higher for this parameter. The variation limits for the values recorded among varieties were 11,70% for the Delicia variety and 13,1% for the Pemberton variety. The content in vitamin C was generally higher for the plants mulched with agrotextil. Among varieties, the values recorded differed, the variation limits being 12,53 mg/100 for the Delicia variety and 16,13 mg/100 for the Weymouth variety (Table 4).

Table 4. Some fruit quality indicators for blueberry (Bucharest)

Parameter	Mulching material	Augusta	Simultan	Delicia	Weymouth	Bluecrop	Pemberton
Water %	Sawdust	76,43	68,77	82,8	73,05	83,36	71,35
	Pine Bark	75,05	69,49	82,52	74,92	83,42	72,25
	Agrotextil	73,60	70,50	78,31	75,37	83,49	74,18
	Media	75,03	69,59	81,21	74,45	83,42	72,59
Total dry substance %	Sawdust	23,57	31,23	17,20	26,95	16,64	28,65
	Pine Bark	24,95	30,51	17,48	25,08	16,58	27,75
	Agrotextil	26,4	29,5	21,69	24,63	16,51	25,82
	Media	24,97	30,41	18,79	25,55	16,58	27,41
Soluble dry substance %	Sawdust	12,08	12,28	11,37	13,01	12,02	12,66
	Pine Bark	11,87	11,66	11,80	12,89	11,90	13,10
	Agrotextil	12,31	12,12	11,92	12,79	12,65	13,28
	Media	12,09	12,02	11,70	12,90	12,19	13,01
Vitamin C mg/100 g	Sawdust	14,92	14,43	11,78	16,33	13,45	14,72
	Pine Bark	14,51	14,18	12,60	15,74	13,73	15,22
	Agrotextil	15,37	14,58	13,21	16,31	15,35	15,48
	Media	14,93	14,40	12,53	16,13	14,18	15,14

CONCLUSIONS

From the present study the following conclusions can be drawn:

- The growth of the blueberry plants in the Bucharest area is rather slow; after four years, the plants failed in reaching a proper size of the bush according to the potential of the species;
- The behavior of the six varieties was different from the point of view of the vigor and fructification capacity;
- The varieties Pemberton and Bluecrop proved to be more vigorous, while the varieties Weymouth, Delicia and Simultan were less vigorous;
- The foliar surface was higher for Pemberton, a vigorous variety, and smaller for the Weymouth variety;
- The varieties Bluecrop and Perberton were more productive, while the varieties Simultan and Augusta recorded lower production values;

Due to the fact the plants are young, the research must continue in order to obtain precise data regarding the adaptation capacity of the blueberry plant to the conditions from Bucharest area.

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