

PRELIMINARY STUDY IN REGARDS TO THE CULTURE OF BLUEBERRY IN CONTAINERS

CERCETĂRI PRELIMINARE PRIVIND CULTURA AFINULUI ÎN CONTAINER

KOTROTSIOS I.¹, SLAV M.¹, HOZA D.¹

e-mail: dorel.hoza@gmail.com

Abstract. *The blueberry culture has presented a growing interest in the past years among fruit producers due to the constantly increasing demand on the market. However because of the specific pH requirements of the soil the culture can only be cropped where appropriate conditions are being met. To avoid restrictions of improper soil the focus has been shifted on containers. Thus, during a study of plant behaviour involving a 30 litres container and 4 blueberry varieties – Draper, Patriot, Brigitta and Elliot it has been observed that when they reach the age of 3 plants have a satisfactory growing response and start to form fruit. Among the four tested varieties differences have been registered in what regards the phenological progress of flowering, the growth and ramification capacity and the fruit forming capacity. The Patriot variety has been the most forward and Draper the most late flowering. Draper has presented a higher vigour represented by a higher growing and ramification capacity while Brigitta has had a lower vigour overall.*

Key words: culture substrate, growth, production,

Rezumat. *Cultura afinului este de mare interes în ultimii ani în rândul producătorilor de fructe, datorită cererii crescânde pe piață, dar din cauza pretențiilor desosebite față de pH-ul solului cultura nu poate fi înființată decât acolo unde solul permite. Pentru a evita restricțiile impuse de solul impropriu culturii, sunt încercări de cultură a afinului în conainer. Într-o experiență privind comportarea plantelor la cultura în container cu capacitatea de 30 litri, a 4 soiuri de afin: Draper, Patriot, Brigitta și Elliot s-a constatat că la vârsta de 3 ani plantele au avut o comportarea bună în ceea ce privește creșterea și au început să fructifice. Cele 4 soiuri testate au avut o comportare diferită din punct de vedere al derulării fenologiei înfloritului, a capacității de creștere și ramificare și a capacității de fructificare. Soiul Patriot a fost cel mai timpuriu, iar Draper cel mai târziu, Draper a avut o vigoare mai mare exprimată printr-o capacitate mai mare de creștere și ramificare, iar soiul Brigitta a avut o vigoare mai mică.*

Cuvinte cheie: creștere, producție, substrat de cultură

INTRODUCTION

The blueberry culture (*Vaccinium corymbosum L.*) has lately become more interesting for small fruit producers due to the nutraceutical and gustative quality

¹ University of Agronomical Science and Veterinary Medicine of Bucharest, Romania

of fruits (Giovanelli and Buratti, 2009; Wang *et al.*, 2017). Blueberries can be consumed fresh, they can be processed and frozen or they can be stored for a certain amount of time depending on variety and storing conditions (Yang *et al.*, 2014). During storing the quality of blueberry fruits can be affected by microbiological impairments caused by fungi (Chen *et al.*, 2015; Liato *et al.*, 2016). Although the specie is quite rustic it does require specific soil conditions especially an acid reaction and a good water-permeability as the pH is a limiting agent for the culture (Botez *et al.*, 1984). Because acid soils are limited, especially in the lower area of the culture, the possibility of container culture exists, through which the acidity of soil is better controlled. As a result, the blueberry can be cultivated in areas where soil conditions are not generally appropriate (Asanica *et al.*, 2017). The choice of area for blueberry culture is also determined by the minimum limit of winter temperature, -20°C and most of all by the late frosts during spring that can result in significant damage (Hoza, 2000). The present paper presents the reaction of some blueberry varieties cultivated in containers, highlighting growth and fructification capacity.

MATERIAL AND METHOD

The study was made in Kardits, Greece, in 2016, using 4 blueberry varieties: Draper, Patriot, Brigitta a (fig. 1). The containers were placed at 1 m distance from each other, in rows having 2 m in between them. The plants were conducted as a bush. The culture substratum was formed of: 40% black peat with a 5.5 pH, 40% blonde peat with a 3.5 pH and 20 % perlite. The culture was designed with a fertigation system, with 20 mm tubes and dripping devices with a capacity of watering 4l/hour. The irrigation was done daily with 2-3 l of water/plant depending on temperature and the fertigation was done with complex fertilizer, fortnightly, 20 g/plant until August. Measurements were made regarding: flowering phenology, growing capacity, ramification capacity, production capacity and the moment of fruit ripening.



Fig. 1 Aspect of experience

RESULTS AND DISCUSSIONS

The flowering phenology has shown the varieties studied are different in what regards the start of vegetation, flowering moments and ripening of fruits. Thus, the Draper variety budded on 25 of February, followed by Patriot 10 days later while Elliot only started the process a month after (tab. 1). The beginning of flowering was conditioned and dependent of bud sprouting and the differences between varieties maintained. Leaves formation took place roughly in the same time as flowering and the beginning of ripening happened in the last decade of May for the earliest variety, Patriot and a month later for the latest variety, Elliot. The duration of ripening was slightly different, 3 varieties: Draper, Patriot and Brigitta staggered on 20 days while Elliot on 25 days, the latter being also the latest.

Plant vigour was normal for 3 years old plants and the ramification capacity was dependent on variety. The bush height was slightly higher at the Draper variety, having 85 cm, followed by the Elliot variety with 75 cm and Brigitta and Patriot with roughly 62-65 cm (tab. 2).

Table 1

Development of flowering phenology of some blueberry varieties cultivated in containers Kardits, Greece, 2016

Variety	Bud sprouting	Start of flowering	First leave formation	Start of ripening	End of ripening
Elliot	25.03	5.04	5.04	20.06	15.07
Draper	25.02	5.03	7.03	20.05	10.06
Patriot	5.03	15.03	12.03	1.06	20.06
Brigitta	15.03	25.03	25.03	10.06	30.6

The best ramification capacity was noted at Draper, the bush had 13 ramifications and 3 new growths in the collet area. The weakest ramification capacity was registered at Brigitta and Patriot with approximately 10.5-10.8 ramifications and only 2 new growths in the collet area. The Elliot variety had intermediary values. The average length of annual growths was bigger at Draper, 26.5 cm, followed by Patriot with 24.3 cm, while the smallest values were observed at Brigitta, of only 21.2 cm. The sum of annual growths proved the difference in vigour for all varieties studied and it was influenced by the number of ramifications and the average length of fructification branches. The highest value was seen at Draper, 4.47 cm and the smallest at Brigitta 3.21 cm. The other two varieties had intermediary values.

Table 2

Biometrical parameters of plants for some blueberry varieties cultivated in containers Kardits, Greece, 2016

Variety	Height of the bush (m)	Number of ramifications in the bush (buc)	Number of annual stems in the collet (buc)	Average length of annual growths (cm)	Sum of annual growths (m)
Elliot	0.75	11.2	2.1	22.6	3.53
Draper	0.85	13.1	3.1	26.5	4.47
Patriot	0.65	10.8	2.0	24.3	4.12
Brigitta	0.62	10.5	1.9	21.2	3.21
Average	0.705	11.4	2.275	23.65	3.83

Although the plants were young they started to produce fruits and the results obtained registered differences in what regards the morphological parameters that influence the production. Thus, the number of inflorescences per plant was significantly influenced by variety, the values being of 11-11.5 at Elliot and Draper and 7.5-8 at Patriot and Brigitta (tab. 3, fig. 2). The number of fruits in one inflorescence is a characteristic of each variety and it was observed just from that year. Elliot produced an average of 8.1 fruits, registering the highest value and Brigitta produced 5 fruits having the lowest value. Patriot and Draper produced intermediary values, similar to each other.

Table 3

Productivity parameters of plants for some blueberry varieties cultivated in containers Kardits, Greece, 2016

Variety	Number of inflorescences per plant	Number of fruits per inflorescence	Average production per plant (g)	Production per hectare (kg)
Elliot	11.0	8.1	173.74	694.9
Draper	11.5	6.5	216.77	867.1
Patriot	7.5	5.5	86.62	346.5
Brigitta	8.0	5.0	80.00	320.0
Average	9.5	6.27	139.28	557.1

The average production per bush was different for all varieties but it is not a distinctiveness of them. It revealed however their precocity level. For the small fruit producer it is imperative to know the fructification capacity of plants grown in containers from when they are 3 years old. From the quantity point of view, Draper produced 216 g of fruits, 173 g roughly from Elliot and only half of this value was obtained from Patriot and Brigitta. If a calculus is made considering the area and the density of pots at 4000, the production resulted could be approximately 320-860 kg/ha for a culture in its third year of life.



Fig. 2 Detail of fructification, Draper variety

CONCLUSIONS

From this preliminary study that tackles the behaviour of some blueberry varieties cultivated in containers the following conclusions can be drawn:

1. The varieties studied reacted positively at container growth on peat substratum mixed with perlite. The plants grew normally considering their age;
2. The development of flowering phenology revealed a staggering of this process depending on variety. Draper was the earliest variety and Elliot the tardiest;
3. The ramification capacity and the length of fructification branches were different at each variety in part. Draper had the highest ramification capacity and Brigitta the lowest;
4. Fructification started in their third year of life and registered differences from one variety to the other. Draper proved to be more precocious and productive while Brigitta was registered as the less productive one.

REFERENCES

1. **Asănică A., Delian E., Tudor V., Teodorescu R.I., 2017** - *Physiological activity of some blueberry varieties in protected and out-side conditions*. Agrolife Scientific Journal, 6(1):31-39.
2. **Botez M., Bădescu Gh., Botar A., 1984** - *Cultura arbuștilor fructiferi*. Ceres Publishing, Bucharest.
3. **Chen H., Cao S., Fang X., Mu H., Yang H., Wang X., Xu Q., Gao H., 2015** - *Changes in fruit firmness cell wall composition and cell wall degrading enzymatic in postharvest blueberry during storage*. Scientia Horticulturae, 188:44-48.
4. **Giovanelli G., Buratti S., 2009** - Comparison of polyphenolic composition and antioxidant activity of wild Italian blueberries and some cultivated varieties. Food chemistry: 112, 4, pp 903-908.
5. **Hoza D., 2000** - *Cultura căpșunului, semiarbuștilor și arbuștilor fructiferi*. Elisavaros Publishing, Bucharest, pp 208-209.
6. **Liato V., Hammani R., Aider M., 2017** - *Influence of electro-actived solution o weak organic acid salts on microbial quality and overall appearance of blueberry during storage*. Food Microbiology 64, pp 56-64.
7. **Wang H, X. Guo, X. Hu, T. Li, X. Fu, R. H. Liu, 2017** - *Comparison of phytochemical profiles, antioxidant and cellular antioxidant activities of different varieties of blueberry (Vaccinium spp.)*. Food chemistry, Vol. 217, pp 773-781.
8. **Yang G., Yue J., Gong X., Qian B., Wang H., Deng Y., 2014** - *Blueberry leaf extracts incorporated chitosan coating for preserving postharvest quality of fresh blueberries*. Postharvest Biology and Technology, 92, pp 46-53.