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EFFECT OF ORGANIC FOLIAR FERTILIZERS ON YIELD AND FRUIT QUALITY OF SEVEN HIGHBUSH BLUEBERRY (*VACCINIUM CORYMBOSUM* L.) CULTIVARS

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Abstract

Consumer-valued blueberry fruits are increasingly sought after for consumption in fresh or processed form due to their beneficial effect on human health, as supported by extensive scientific evidence. In this study we looked at the effect of organic foliar fertilizers on production and on the quality parameters of fruit in seven blueberry varieties. The experiment was carried out at ICDP Pitești-Mărăcineni, over the course of the years 2020-2022, on a plantation established in 2018, and was presented in a randomized block design with three repetitions and three fertilization variants: control group (untreated), Codamix (0.25%), and Ecoaminoalga (0.25%). The treatment was repeated three times at an interval of 14 days, beginning with the formation of the bud until the start of fruit ripening. At the harvest time, production data and the following quality indicators were measured and recorded: fruit mass, firmness, color, soluble dry matter content, total titratable acidity, and total sugar content. The results showed that organic fertilizers had a positive effect on both the quantity and quality of blueberry fruits produced during this study.

Key words: *blueberry, organic fertilizer, production, fruit quality.*

INTRODUCTION

The blueberry *Vaccinium corymbosum*, originally from North America, a member of the *Ericaceae* family, has become an international crop, currently enjoying wide popularity (Retamales & Hancock, 2012). The interest in cultivating this species is due to its high profitability and special nutritional benefits. According to the opinion of many researchers, the consumption of blueberries contributes to the prevention of many cardiovascular and neurological diseases, cancers, osteoporosis, diabetes, due to the anti-inflammatory and antioxidant effect of the phenolic compounds found at a high level in the fruit (Curtis et al., 2019; Si, 2020). It has been mentioned the improvement of memory and cognitive performance at all ages (Miller et al., 2018; Bell & Williams, 2021), the delay of neurodegenerative disorders and brain aging (Youdim & Joseph, 2001) due to the regular consumption of these fruits. Previous studies have shown that growing blueberries without fertilizer produces almost negligible yields; therefore, fertilization is necessary to ensure adequate productivity (Albert et al., 2011). In recent decades, organic crop production has gained the attention of many farmers (Neilsen et al., 2009). Fruits obtained through organic cropping systems are valued due to their higher nutritional quality (Saba & Messina, 2003). Numerous researches have proven the beneficial effect of organic fertilizers on the physico-chemical and biological properties of soil and crops (Manea et al., 2019, Khan et al., 2020, Wajid et al., 2020). Blueberry fertilization has been the focus of many studies. The blueberry prefers acidic soils, well-drained, moist soils rich in humus and poorer in nutrients compared to other fruit species (Zydlik et al., 2019). The use of organic fertilizers in critical phases of plant development is of particular importance for improving yields (Kandil et al., 2017; Mahmood et al., 2020) and fruit quality (Al-Kharusi et al., 2009; Schoebitz et al., 2019). Fertilizing the plant's roots is the main way of providing the plant with nutrients. Organic fertilizers delivered directly to the soil require a long decomposition time and provide a lasting effect on crops (Sharma & Mittra, 1991). Foliar practice quickly replenishes the supply of minerals needed by plants (Wach & Błażewicz-Woźniak, 2012; Karlsons & Osvalde, 2019). Substances applied by spraying are absorbed much faster than those applied on the ground (Ciavatta & Benedetti, 2002).

Extraradicular administration of treatments early in the morning or in the evening when the stomata are open is recommended. The temperature of the environment must be a maximum of 27°C. Spray solutions should cover the entire surface of the leaves. For organic cropping systems, recommended products provide a lower input of phosphorus or potassium than chemical ones (Green, 2015). Foliar solutions generally contain free amino acids and peptides. They require a period of 3-7 days to be absorbed (Umemiya & Furuya, 2001). Applied nitrogen can influence fruit weight, soluble solids levels, and the amount of pigments in the fruit epidermis (Jiao et al., 2017). Sugar content can be influenced by culture systems, genetic background, environmental conditions, etc. (Gündoğdu, 2019). It is believed that seaweed extracts can improve the soluble solids content of blueberries (Loyola & Muñoz, 2008). However, Panicker et al. (2016) reported a similar soluble solids content to the untreated variant. In this study, we followed the effect of foliar fertilizers compatible with organic agriculture on the production and on some fruit quality parameters of seven blueberry varieties under Romanian conditions.

MATERIALS AND METHODS

The experiment was carried out at ICDP Pitesti-Mărăcineni, between the years 2020-2022, within the Genetics and Breeding Laboratory on a plantation established in 2018. From a geographical point of view, the Institute is located at 24°55' east longitude and 44°55' north latitude, the altitude of the land being between 200 and 290 m. The experiment was located on a flat, alluvial type, on a brown-clay soil with a clay-clay texture in the first 60-70 cm, and in depth the texture becomes sandy. The plants were placed on drums covered with black polyethylene. The soil was improved by adding acid peat along the plant rows (30 t/ha). The results of the agrochemical analyzes at the end of the fruit harvesting season are presented in Table 1.

Table 1. Soil chemical analyzes in the blueberry plot at fruit harvest(period 2020-2022)

Depth (cm)	pH in water	Acidity hydrolytic (me/100 g soil)	The sum of the bases (me/100 g soil)	Cation exchange capacity T (me/100 g soil)	The degree of saturation with bases V%	Potassium K ppm	Phosphorus P_2O_5 ppm	Total organic carbon %	Humus %	IN	Total nitrogen %
0-10	5.28	5.89	12.74	18.63	68.36	178.80	24.29	7.39	12.74	8.71	0.61
10-20	5.26	5.03	22.76	27.79	81.89	164.25	21.43	3.30	5.68	4.66	0.27
20-30	5.48	3.67	13.56	17.22	78.71	169.71	24.29	2.44	4.20	3.31	0.20
30-40	5.66	3.88	13.39	17.27	77.53	169.71	15.71	2.52	4.34	3.36	0.21

The experiment was carried out in a randomized block design with three repetitions and three variants of extraradicular fertilization: control (untreated), Codamix (0.25%) and Ecoaminoalga (0.25%). Codamix (V2) is a complex of trace elements chelated with citric, lignosulfonic acid, soluble in water specifically to supplement the NPK supply. Ecoaminoalga (V3) has as basic elements amino acids, gibberellins, marine algae and microelements: Mn, Cu, Fe, Zn, B. The treatments were repeated three times at an interval of 14 days during the time from bud formation to at the beginning of fruit ripening. Seven blueberry cultivars were analyzed ('Simultan', 'Safir', 'Delicia', 'Vital', 'Pastel', 'Elliott' and 'Duke'). Production data were recorded and the following quality parameters were determined: fruit weight, firmness, color, soluble dry matter content, total titratable acidity and total sugar content.

To determine the **productivity**, the fruit production on each plant was weighed (in g/plant).

The **fruit weight** was determined according to the ripening period of each variety by weighing all the fruits in a sample (20-25 fruits) and the average weight of the fruits was calculated, in g/fruit, using a Kern balance, precision 0.00.

Fruit firmness was expressed in HPE units and determined with the non-destructive Qualitest HPE penetrometer equipped with a 0.25 cm^2 diameter tip.

Skin color was determined using the Konica Minolta CR 400 colorimeter in the system (L, a*, b*). The CIELAB color space is organized in the form of a cube. The maximum for L* is 100, which represents the color white, and the minimum for L* is zero, which represents black. Axes a* and b* have no specific numerical limits. Positive values for a* show the color red and negative values show the color green. Positive values for b* show the color yellow, and negative values show the color blue.

Soluble solids content, expressed in % Brix, was determined with a digital Hanna refractometer.

Total acidity. The organic acid content of blueberry fruit was determined by the titrimetric method, using 25 ml of aqueous fruit extract neutralized with a 0.1N NaOH solution in the presence of phenolphthalein as an indicator. The total acid content was expressed as malic acid (%).

Total sugar content was estimated by the Fehling-Soxhlet method, 1968 (JAOAC, 1968). The principle of the method is based on the oxidation reaction between the copper in the copper alcoholate of sodium and potassium tartrate and the aldehyde and ketone grouping of the reducing sugars. This method determines the amount of reducing sugar which reduces a certain volume of Fehling's reagent. Total sugar content was expressed as a percentage (%).

All analytical determinations were performed on three replications, and the data were subjected to analysis of variance (ANOVA). The influence of experimental factors was analyzed by the Duncan test, with a significance level of $p \leq 0.05$. Correlations were also made between the biochemical quality indicators of the fruits. Statistical data analysis was performed using SPSS 14.0 for Windows software.

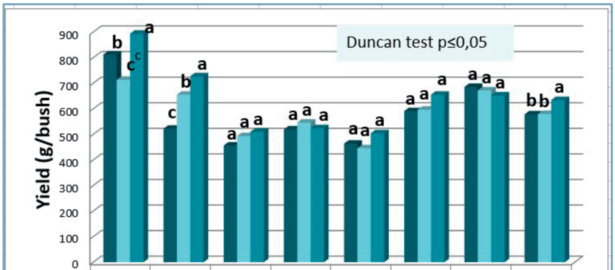
RESULTS AND DISCUSSION

Crop yield was significantly higher in the case of the variant fertilized with Ecoaminoalga - V3 (633.72 g/bush respectively 2.11 t/ha) compared to the untreated control variant - V1 (577.96 g/bush respectively 1.93 t /ha), on the average of the variants achieving an increase of 9.6% compared to the control variant (Figure 1). Koort et al. (2020) stated that organic fertilizers have a significant effect on crop yield, also.

The data of the present study show that the composition of fertilizers is also significant on plant productivity and the response of the variety may be different.

Among the varieties, Delicia stood out with an average production during 2020-2023 of 806.11 g/plant (2.69 t/ha), followed by the Vital varieties with 669.59 g/plant (2.23 t/ha) and Duke with 634.42 g/plant (2.11 t/ha).

During the experimental period it was observed that the Simultan variety had the lowest productivity 470.96 g/bush (1.57 t/ha).



	Delicia	Duke	Elliott	Safir	Simultan	Pastel	Vital	Average of the variants
V1	811.85	521.66	455.91	518.94	463.33	590.63	685.20	577.96
V2	713.04	654.67	493.07	545.77	445.66	596.09	671.56	579.48
V3	893.43	726.93	510.11	523.69	503.88	654.72	652.00	633.72

Figure 1. The effect of the fertilization option on blueberry fruit production according to variety in the Argeș area 2020-2022

ANOVA variance analysis data show that fruit production, in g/plant, was significantly influenced by the genetic background of the cultivar with 13.9%, environmental conditions

with 24.8% (p=0.000) and the fertilization variant with only 1.6%.
The differences in productivity between years are also due to the fact that the plants were growing and the harvest was just beginning. Once the crop reaches full maturity, yield may fluctuate from year to year due to weather conditions, crop maintenance practices (cutting), etc. (Ranganna, 1986).
Other researchers have mentioned that the production of this crop can be influenced by environmental conditions, agricultural practices, soil conditions (Ranganna, 1986; Schoebitz et al., 2019).
Fruit weight. The weight of the berries, expressed in grams, was higher in the case of variant 3 - Ecoaminoalga (2.15 g) (Figure 2) statistically not differentiated from the non-fertilized variant (2.09 g). In the case of the Codamix fertilizer, this was significantly lower (2.01 g). Differences in fruit weight are observed between varieties. The average upper weight was higher in the varieties Vital (2.33 g) and Simultan (2.32 g). In the Duke variety, the average weight of the fruit was only 1.71 g, being significantly higher in the case of the V3 variant (2.14 g). It can be said that the composition of the applied foliar fertilizer can have significant effects on the mass of berries. Some fertilizers may have a beneficial effect but without an obvious trend. This fact was also noted by Koort et al. (2020).

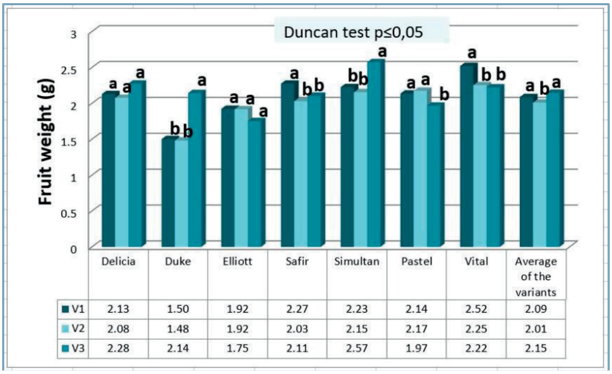


Figure 2. The effect of the fertilization option on the weight of the berries depending on the variety in the Argeș area 2020-2022

Fruit firmness. Evaluation of fruit firmness is important for assessing the quality of fruits in the marketing chain, especially those intended for fresh consumption, in breeding programs and for researchers in variety testing (Sekse et al., 2011). It is considered to be dependent on fruit water level, cell wall metabolism, and fruit cuticle structure (Paniagua et al., 2013). This can decrease as the berries reach the optimal ripeness for consumption.
In the present study, environmental conditions and genetic background had an important role on fruit firmness according to the results of the ANOVA analysis of variance test. It was observed that the composition of the treatments can have an effect on this quality indicator, however without an obvious trend. Foliar treatments increased the value of this parameter. The results being significant in the case of fertilization variant 2 - Codamix (32.38 HPE units) compared to the unfertilized variant (30.50 HPE units) (Figure 3). Analyzing the influence of the variety on the firmness of the fruit texture, the best results were recorded for the Duke variety (37.27 HPE units) followed by the Pastel variety (34.17 HPE units). The lowest value of fructo-textural firmness was registered by the varieties Simultan (27.35 HPE units) and Elliott (27.60 HPE units).
Fruit color plays a key role in the marketing plan (Cömert et al., 2020), with consumers preferring vivid, brighter shades of fruit. Consumer perception of fruit color can be an indicator of taste. According to Vangdal et al. (2010) fruits become lighter (L* brightness increases), redder (a* color feature increases) and bluer (b* color feature decreases) as they approach technical maturity (Vangdal et al., 2010). In blueberries, the blue color is due to the anthocyanin pigments in the epicarp and the

structure and quality of the wax on the skin (Saftner et al., 2008). The color brightness index L* between the fertilization variants there were significant differences on the numerical values of the brightness L* in the CIELa*b* color space, according to the Duncan test, presented in Table 2. In the unfertilized fruits (V1), the numerical

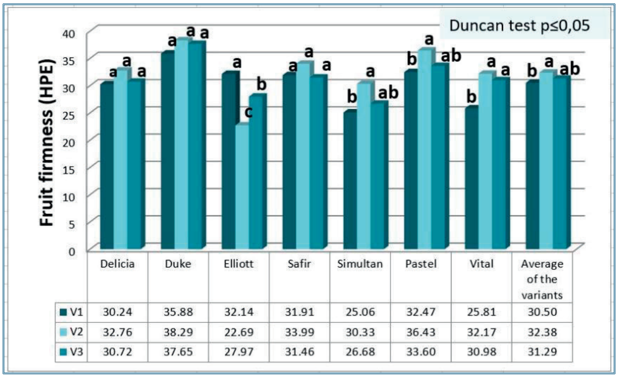


Figure 3. The effect of the fertilization option on the firmness of the berries according to the variety in the Argeș area 2020-2022

value of the brightness of the color being lower. It is found that the type of foliar fertilizers is significant on this characteristic. The mean of the variants indicates two series of homogeneous values. The brightness of the color of the fruit fertilized with organic products being higher. Among the varieties, Duke stands out with the higher average numerical value of brightness (32.64) significantly higher than the other varieties as can be seen from Table 2 (average of the varieties).

Table 2. The effect of the fertilization variant (V1-V3) on the lightness index L* of the color (from the CIELAB color space) of blueberries according to the variety

Variety/Variant	Delicia	Duke	Elliott	Safir
V1 - untreated	25.92 ± 1.49^{b}	31.55 ± 4.30^{b}	28.89 ± 2.56^{b}	26.05 ± 2.32^{b}
V2 - Codamix (0.25%)	27.53 ± 2.62^{ab}	34.76 ± 2.51^{a}	30.72 ± 1.35^{a}	29.28 ± 2.70^{a}
V3 - Ecoaminoalga (0.25%)	28.60 ± 1.77^{a}	31.61 ± 1.69^{b}	31.21 ± 1.86^{a}	27.01 ± 1.43^{b}
Average of the variety	27.40 ± 2.36^{c}	32.64 ± 3.30^{a}	30.27 ± 2.06^{b}	27.45 ± 2.53^{c}
Variety/Variant	**Simultan**	**Pastel**	**Vital**	**Average of the variants**
V1 - untreated	26.06 ± 2.38^{b}	27.70 ± 1.74^{a}	25.06 ± 1.23^{a}	27.32 ± 3.14^{b}
V2 - Codamix (0.25%)	28.84 ± 1.29^{a}	27.09 ± 3.37^{a}	25.11 ± 1.5^{3a}	29.00 ± 3.61^{a}
V3 - Ecoaminoalga (0.25%)	26.77 ± 2.79^{b}	26.43 ± 3.3^{2a}	26.35 ± 2.34^{a}	28.29 ± 3.01^{a}
Average of the variety	27.22 ± 2.47^{c}	27.07 ± 2.86^{c}	25.51 ± 1.81^{d}	28.21 ± 3.32

Color coordinate a*. The numerical values of the chromatic parameter a* in the color space CIELa*b*, were also significantly influenced by the fertilization system according to the Duncan test, presented in Table 3. The average values in the right column are grouped into two classes of homogeneous values (a and b). Organically fertilized fruits are redder. Among the varieties, Safir stands out with the higher numerical value of the red shade (3.70) as shown by the average of the variety.

Color coordinate b*. As can be seen with the other color indicators, the fruits obtained by organic fertilization had the chromatic parameter b* lower than the unfertilized ones (Table 4). Codamix organic fertilizer positively influencing this parameter significantly. It can be said that organic foliar fertilizers have a beneficial role on fruit color. Genetic background has a very significant role in determining fruit color.

The soluble dry matter content of the fruits is an important parameter that correlates with the texture and composition of the fruits (Kamiloglu, 2011).

Table 3. The effect of the fertilization variant (V1-V3) on the color coordinate a* (from the CIELAB color space) of the fruit epicarp according to the variety

Variety/Variant	Delicia	Duke	Elliott	Safir
V1 - untreated	0.56 ± 0.38ᵃ	0.47 ± 0.32ᶜ	0.19 ± 0.40ᵃ	0.85 ± 0.71ᵇ
V2 - Codamix (0.25%)	0.66 ± 0.31ᵃ	0.36 ± 0.03ᵈ	0.52 ± 0.44ᵃ	7.25 ± 5.31ᵃ
V3 - Ecoaminoalga (0.25%)	0.81 ± 0.32ᵃ	0.82 ± 0.54ᵃ	0.52 ± 0.01ᵃ	2.01 ± 1.41ᵇ
Average of the variety	0.69 ± 0.34ᶜ	0.55 ± 0.37ᶜ	0.41 ± 0.33ᶜ	3.70 ± 2.48ᵃ
Variety/Variant	**Simultan**	**Pastel**	**Vital**	**Average of the variants**
V1 - untreated	0.52 ± 0.16ᵃ	3.21 ± 1.69ᵃ	0.91 ± 0.82ᵇ	1.10 ± 0.64ᵃ
V2 - Codamix (0.25%)	0.80 ± 0.87ᵃ	1.37 ± 1.13ᶜ	1.75 ± 1.14ᵃᵇ	1.78 ± 1.32ᵃ
V3 - Ecoaminoalga (0.25%)	0.22 ± 0.20ᵃ	1.10 ± 0.71ᶜ	2.92 ± 2.16ᵃ	1.19 ± 0.76ᵃ
Average of the variety	0.51 ± 0.41ᶜ	1.89 ± 1.18ᵇ	1.86 ± 1.62ᵇ	1.36 ± 0.96

Table 4. The effect of the fertilization variant (V1-V3) and on the chromatic parameter b* (from the CIELAB color space) of blueberries according to the variety

Variety/Variant	Delicia	Duke	Elliott	Safir
V1 - untreated	-1.49 ± 1.39ᵃ	-3.30 ± 0.85ᵃ	-3.68 ± 1.13ᵇ	-1.59 ± 0.73ᵃ
V2 - Codamix (0.25%)	-1.69 ± 0.98ᵃ	-9.17 ± 7.51ᵇ	-4.32 ± 1.02ᵃ	-3.19 ± 1.61ᵇ
V3 - Ecoaminoalga (0.25%)	-2.20 ± 1.77ᵇ	-3.65 ± 0.57ᵃ	-4,11 ± 0.91ᵃ	-1.99 ± 0.59ᵃᵇ
Average of the variety	-1.80 ± 1.39ᵃ	-5.37 ± 2.98ᶜ	-4,03 ± 1.01ᶜ	-2.26 ± 1.18ᵇ
Variety/Variant	**Simultan**	**Pastel**	**Vital**	**Average of the variants**
V1 - untreated	-0.80 ± 1.30ᵃ	-2.09 ± 0.54ᵃ	-1.32 ± 0.43ᵃ	-2.04 ± 1.23ᵃ
V2 - Codamix (0.25%)	-2.78 ± 1.20ᵇ	-2.20 ± 1.69ᵃ	-0.76 ± 0.97ᵃ	-3.40 ± 2.14ᵇ
V3 - Ecoaminoalga (0.25%)	-1.38 ± 1.25ᵃᵇ	-2.94 ± 1.51ᵃ	-0.76 ± 1.69ᵃ	-2.43 ± 1.54ᵃ
Average of the variety	-1.65 ± 1.42ᵃ	-2.41 ± 1.32ᵇ	-0.95 ± 1.10ᵃ	-2.63 ± 1.64

Testing the influence of experimental factors on the content of soluble dry matter in all seven varieties studied, we emphasize the following (Figure 4): on the average of the variants, the highest content of soluble dry matter was observed in variant 2 - Codamix (12.55°Brix) closely followed by variant 3 - Ecoaminoalga (12.40°Brix).

On the average of the varieties, the Duke and Pastel varieties recorded the highest content of soluble solids from the fruits (12.86°Brix and 12.77°Brix respectively), with significant differences compared to the Safir and Vital varieties (11.75°Brix respectively 11.41°Brix). Koort et al. (2020) obtained a soluble dry matter content that varied between 9.6 and 11.9°Brix in the blueberry cultivars studied with a significant effect due to the organic treatments administered.

Ongoing research studies the influence of various cultivation technologies on the biochemical quality of blueberry fruits (Wang et al., 2008). Along with other phytochemical compounds, the soluble solids content contributes to fruit flavor.

Total titratable acidity. The influence of the three studied factors (genotypic differences, experimental fertilization models and environmental conditions) on the content of organic acids (expressed as malic acid) in the fruits was significant according to the ANOVA analysis of variance test. From this point of view, the effect of genetic factors was very significant, at a rate of 33.7%. The effect of crop practices was also highly significant at 16.0%. The 15.2% variation determined by environmental conditions in the three years of experimentation is highly significant (p=0.000). According to the Duncan multiple variation test, the tested fertilization models had a significant impact on the total acidity of the fruits, on the average of the variants (right column) two classes of homogeneous values (a and b) were observed (Figure 5).

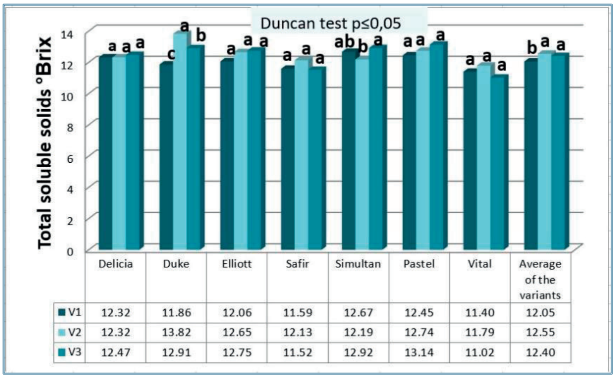


Figure 4. The effect of the fertilization option on the content of soluble solids in blueberries depending on the variety in the Argeș area 2020-2022

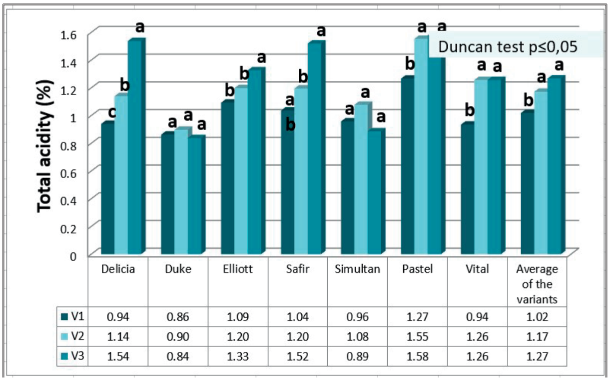


Figure 5. The effect of the fertilization option on the content of organic acids in blueberries depending on the variety in the Argeș area 2020-2022.

Both foliar fertilizers applied caused a significant increase in fruit acidity (1.17% and 1.27%) compared to the non-fertilized version (1.02%); although in the fruits of the Duke and Simultan varieties, no statistically guaranteed variations were observed on this fruit quality parameter.

From the point of view of the variety, the highest values of malic acid in blueberry fruits were obtained in the Pastel and Safir varieties (1.47% and 1.29%, respectively) and the lowest in the Duke variety (0.83%) and Simultan (0.97%), the differences being very significant. The data obtained are consistent with those in the specialized literature. Lee and Kader, (2000) mention that fruit acidity can also vary according to post-harvest handling procedures.

Total sugar content. Along with the level of organic acids, the content of sugars in fruits has an essential role on the organoleptic quality of fruits (Li et al., 2020). The metabolism of this compound can be influenced by cultivation technologies, climatic conditions, the genetic baggage of the variety, soil properties, the position of the fruits in the bush, etc. (Davidescu, 1999; Gündoğdu, 2019).

On average, over the three years of the study, the total sugar content of blueberries was significantly influenced by cropping systems. The organic fertilization variants had a beneficial effect on the value of this quality indicator compared to the non-fertilized variant (Figure 6), on the average of the variants, the appearance of two classes of homogeneous values (a and b) can be observed.

Among the varieties, Pastel had the richest content of total sugars (11.18%) and the Safir variety the lowest (7.73%). The beneficial effect of the accumulation of sugars in the biomass of horticultural products was also observed in other studies (Kirina et al., 2020; Paraschiv & Hoza, 2022).

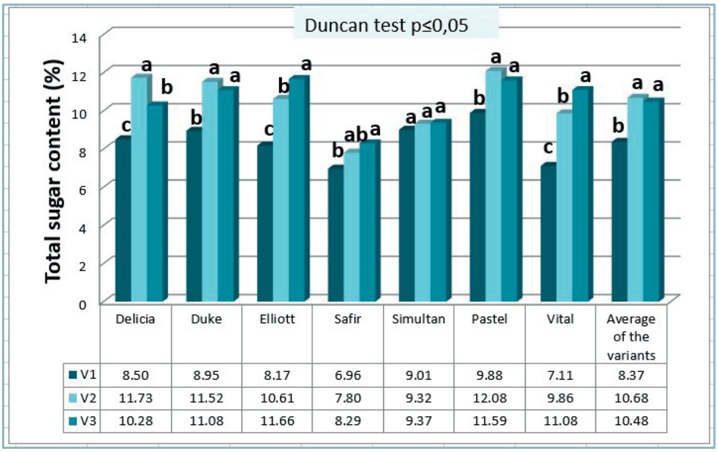


Figure 6. The effect of the fertilization option on the total sugar content of blueberries depending on the variety in the Argeș area 2020-2022

Tables 5 and 6 show the interdependence between the characteristics analyzed. Fruit production per plant correlated negatively, distinctly significantly with fruit firmness (Table 5), the correlation coefficient being r=- 0.208. There is a positive but insignificant correlation between fruit production per plant and average fruit mass, which means that production would be higher in plants with larger fruits. There is a significant correlation between fruit mass and color. Brighter fruits (L*) have greater mass (correlation coefficient r=0.397). Also, bluer fruits (the value of b* decreases) are larger (r=-0.178). The distinctly significant negative correlation between color brightness and the color coordinate b* indicates that bluer fruits are brighter, meaning that brightness increases as the fruit matures.

The content of soluble solid substance correlates significantly negatively with the value of the color coordinate b (Table 6) the correlation coefficient being r=-0.161 which means that the bluer fruits (the value of the coordinate b decreases) have more soluble solid substances.

Table 5. Pearson correlations coefficients for the productivity and the main biophysical parameters of the fruits (mass, firmness and color)

Pearson Correlation		Yield (g/bush)	Fruit weight (g)	Firmness (Hpe)	L*	a*	b*
Yield (g/bush)		1					
Fruit weight (g)		0.063	1				
Fruit firmness (HPE)		-0.208(**)	0.060	1			
L		-0.184(*)	0.397(**)	0.056	1		
a*		-0.009	0.053	0.023	0.017	1	
b*		0.075	-0.178(*)	0.012	-0.470(**)	0.072	1
	Sig.	0.309	0.010	0.869	0.000	0.297	
	N	213	213	213	213	213	213

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 6. Pearson correlations coefficients for the quality indicators for the studied blueberry varieties

Pearson Correlation		Total sugar content (%)	Total acidity (%)	Total soluble solids (°Brix)	L*	a*	b*
Total sugar content (%)		1					
Total acidity (%)		0.057	1				
Total soluble solids (°Brix)		0.249	0.206	1			
L*		0.231	-0.168	0.114	1		
a*		0.126	-0.195	-0.086	0.017	1	
b*		-0.049	-0.187	-0.161(*)	-0.470(**)	0.072	1
	Sig.	0.839	0.430	0.020	0.000	0.297	
	N	60	60	213	213	213	213

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

CONCLUSIONS

Different cultivation technologies significantly influence fruit production. Considering the positive effect of organic foliar fertilizers on productivity and fruit quality, this practice would be advisable.

Certain fruit quality parameters can be significantly improved by applied foliar fertilizers (mass, firmness, fruit color).

The variation in the content of organic substances in the fruits of the seven blueberry varieties ('Delicia', 'Duke', 'Elliott', 'Safir', 'Simultan', 'Pastel' and 'Vital') is dependent on the genetic background, on agronomic practices, the composition of applied foliar fertilizers and climatic conditions.

Of the two organic fertilizers used, Ecoaminoalga fertilizer is recommended for increasing crop yield, and both products are indicated for increasing quality.

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