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Studying some economic characters of the common garden strawberry varieties growing in western Georgia

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The article deals with major economic characters important when growing common garden strawberries. Using the example of strawberries growing in western Georgia, the structural components of productivity and yields of individual varieties were studied, and their resistance to diseases and pests was revealed. Research covered the day neutral strawberry varieties, such as Albion, Monterey and Murano, and the short-day varieties, such as Camarosa, Sweet Charlie and Elsanta of the 2017-2018 strawberry harvest, produced by LLC "ADINA". It was determined that the of the short-day strawberry varieties, the most productive in terms of the flower set and average weight of berries is Camarosa, and the Elsanta variety was the most sensitive to the temperature influence and, consequently low-productive.

In terms of the average weight of formed berries and their sizes, the Monterey variety has highest indicators, while the Murano variety has the lowest ones. For two years of fructification, the highest yields were obtained from the varieties of the day neutral variety of Monterey and the short-day variety of Camarosa. According to a 2-point evaluation system, under optimal conditions for the development of powdery mildew, a high resistance to this disease of the varieties Albion, Murano, Camaros, Sweet Charlie was revealed. It was shown that all studied varieties are highly resistant to brown patch disease. On the back of high temperature and low humidity, the Murano, Camarosa, Sweet Charlie varieties were the most resistant to red spider, and the Albion variety appeared to be very susceptible to this pest.

Key words: *strawberry; economic characters; fructification; diseases.*

Since ancient times, berries have been popular among the population. Among them, a special place belongs to strawberries: they are one of the most economically advantageous berries, because they are distinguished by high yields, early ripeness, and they open the season of consumption of fresh berries. The possibility to grow them in open ground and greenhouses distinguishes them favorably from other berries, so their cultivation profitability and marketability are very high. Strawberries are good for digestion and have high gustatory and therapeutic properties. They contain essential to the organism vitamins, micro and macro-elements, sugars, organic acids, and have the antioxidant properties.

The positive impact of strawberries on human health is due to their hematopoietic and diuretic



effects. Its use improves a neurological function, regulates the cholesterol content, and promotes osteoporosis prevention. Their use corrects the functioning of the nervous system, normalizes cholesterol, and helps prevent osteoporosis (8).

To date, in order to compete with the new introduced varieties of common garden strawberry, the domestic selection varieties must be no lower than the European parameters: the diameter of berries - 25-35 mm, the bright-red color of berries, keeping ability (1), the allowed yield from a bush is more than 600 g, the average weight of berry is 20-25 g (5), the density of berries is more than 380 g. However, many introduced varieties do not comply with the requirements for the variety of common garden strawberry, and a timely evaluation of the varieties by economic characters is therefore required for their further cultivation, which is an immediate problem today.

When cultivating common garden strawberries, there appear to be important economic characters such as the potential yield of strawberry bush, winterhardiness, drought tolerance, and susceptibility of strawberry varieties to major illnesses and pests (4).

The yield of common garden strawberry bush is due to varietal morphostructural components, such as: weight and size of berries, the number of flower-bearing stems, the number of flower buds, number of fruit-forming seed buds and so on.

Notwithstanding that common garden strawberry does not have high winterhardiness and frost tolerance, its bushes tolerate the cold winter temperatures under the snow or with an artificial cover. In the absence of snow or other type of cover, plants die partly, rarely completely, because of the severe winter frosts (2).

A great influence on the yields of strawberry is exerted by its drought tolerance: ability to retain water during moisture stress and the rate of recovery upon saturation with water. Since 95% of the root system of strawberries is located in the topsoil, and its height does not exceed 30 cm above the soil level, it is very sensitive to high temperature and the oxygen drought. Moisture deficit in the root habitable layer, high air temperature and low humidity contribute to fruit mass reduction, defects of pollination and the deformation of the fruits (7).

The yields of strawberry are impacted adversely by the diseases, such as white spot, brown patch, gray rot and verticillaceous wilt, as well as susceptibility to pests, such as nematodes, aphids, red and strawberry spiders, strawberry leaf beetles, and leafhoppers (3, 6).

Thus, the cultivation of highly productive strawberries must be carried out taking into consideration the above factors in relation to its growing location.

The aim of the work was to study the yields of the introduced varieties of strawberries and their susceptibility to major illnesses and pests.

Research covered the day neutral strawberry varieties such as Albion, Monterey and Murano, as well as the short-day strawberry varieties such as Camarosa, Sweet Charlie, Elsanta of the 2017-2018 strawberry harvest growing in western Georgia (LLC "ADINA").

Based on the aim of this work, the tasks were set to study the structural components of strawberry productivity, the yields of individual varieties, their resistance to diseases such as mildew, brown patch and the most common pest, such as red spider.

Data on major indicators of the structural components of productivity of the varieties under study are given in Table 1 and in Figures 1 and 2.

As can be seen from Table 1, all the day neutral strawberry varieties formed almost the same number of flower-bearing stems, however, the number of the formed seed buds in the Albion variety was the highest, indicating a higher resistance of the variety to adverse factors, such as high and low temperatures, and low air humidity.



Of the short-day strawberry varieties, the most productive in terms of the flower set and average weight of berries is Camarosa, and the Elsanta variety was the most sensitive to the temperature influence and, consequently low-productive.

In terms of the average mass of formed berries and their sizes, the Monterey variety has highest indicators, while the Murano variety has the lowest ones (Fig. 1.2)

The yields of strawberry varieties determine the number and average weight of berries formed (Table 2).

As can be seen from the data in the Table, in two years of fructification, the highest yields were obtained from the neutral day variety of Monterey and the short-day variety of Camarosa.

Table 1. The number of flower-bearing stems per bush, and the average weight of strawberries of 2017-2018 years planting.

Varieties	Indicators				The average weight of berries, g
	The average number of flowers per bush		The average number of berries per bush		
	Harvest years				
	2017	2018	2017	2018	
Day neutral fructification					
Monterey	36,4	39,1	28,7	29,8	21
Albion	31,5	31,3	28,5	29,0	19
Murano	33,6	33,9	28,1	28,5	17
Day short fructification					
Camarosa	37,3	38,2	29,1	29,3	20
Sweet Charlie	38,6	37,1	32,1	31,9	14
Elsanta	45,2	44,6	33,5	34,1	12

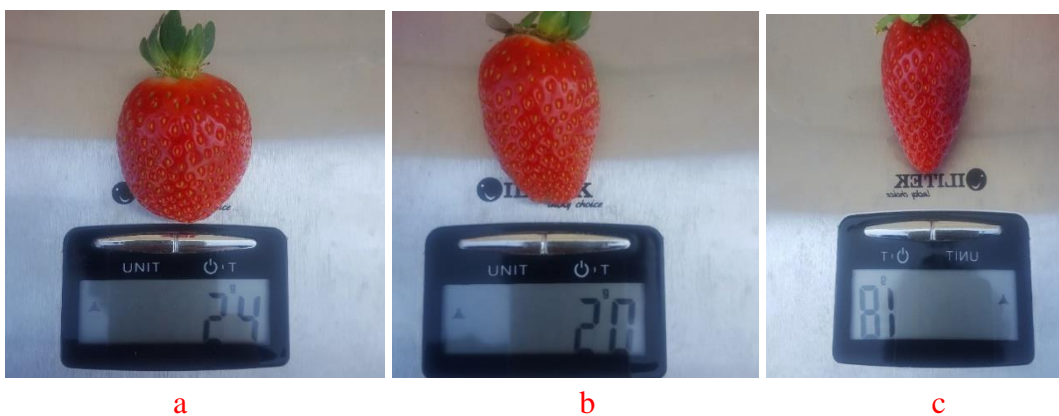


Fig. 1. The weight of berries of the day neutral varieties under study
a – Monterey variety; b – Albion variety; c – Murano variety

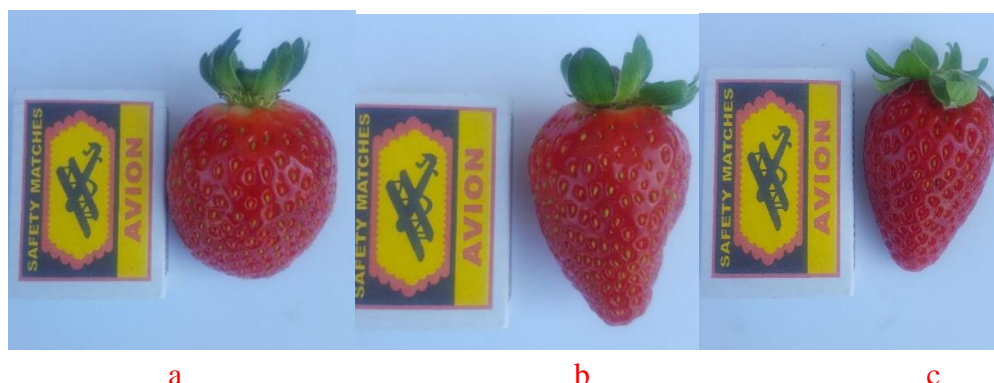


Fig. 2. Sizes of berries of the day neutral varieties under study
a – Monterey variety; b – Albion variety; c – Murano variety

Table 2. The yields of the common garden strawberry varieties

Varieties	Yields, g/per bush		The average yields, g/per bush
	2017	2018	
Neutral day			
Monterey	602,7	625,8	614,25
Albion	547,2	551,0	549,1
Murano	477,7	484,5	481,1
Short day			
Camarosa	582,0	586,0	584,0
Sweet Charlie	449,4	446,6	448,0
Elsanta	402,0	409,2	811,2

The most common diseases of common garden strawberries growing in western Georgia are powdery mildew and brown patch of leaves, and the most hazardous pest is strawberry spider.

Resistance of the strawberry varieties to major diseases and pests was determined by a 2-point system. The data obtained are shown in Table 3.

Table 3. Resistance of the common garden strawberry varieties to the diseases and pests

Year of fructification	Varieties					
	Monterey	Albion	Murano	Elsanta	Sweet Charlie	Camarosa
Powdery mildew						
2017	2	0	1	2	1	0
2018	2	0	1	2	1	1
Brown patch						
2017	0	0	0	0	0	0
2018	0	0	0	1	1	0
Red spider						
2017	1	1	0	1	0	0
2018	1	2	0	1	1	0

Under optimal conditions for the development of powdery mildew fungus (a temperature



close to 20 °C and air humidity of about 95%), we revealed high resistance to powdery mildew of the varieties of Albion, Murano, Camarosa, Sweet Charlie, while the varieties of Monterey and Elsanta were the least resistant to this disease.

With respect to brown patch, all varieties showed equally high resistance.

On the back of high temperature and low humidity, the Murano, Camarosa, Sweet Charlie varieties were the most resistant to red spider, the average resistance was shown by the Monterey and Elsanta varieties, and the Albion variety appeared to be very susceptible to this pest.

Thus, for cultivation in the intensive plantings, in terms of the set of economic characters, the most productive among the neutral day varieties are Albion and Monterey, while of the short day varieties, the most productive are Camaross and Sweet Charlie.

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