

Influence of Modern Technologies on the Formation of Cultivated Cherry Varieties, in Temperate Climates

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Abstract. The present article is devoted to the study of foreign cherry varieties on different rootstocks. Of all stone fruit crops, the most common is cherry. Cherry fruits are particularly valuable products, which have not only nutritional but also medicinal properties. The diversity of cherry varieties, determined by their morphological features, used as a means of production in certain natural and economic conditions. In this connection, in the ecological zone of our region, a comprehensive assessment of the biological features of different varieties of cherry trees of world selection is given. The influence of modern technologies on the formation of the crown and fruit, as well as the condition of the seedling as a whole, has been studied. The value of the studied traits lies in the characterization of biometric indicators affecting the aboveground elements of fruit trees and the general economic evaluation of cultivated varieties of sweet cherry, in temperate climatic conditions.

1 Introduction

In a world where the situation is only getting worse by the day, when we have to rebuild economic relations with many countries, a lot of attention is paid to agriculture. The development of agro-industrial complex, is one of the important strategic directions for the country, as it is necessary not only to meet the needs of the population, but also to promote import substitution. The territories of the North Caucasus and the south of Russia are rich in stone crops, and cherry is a favorite among them [1]. A cultivated cherry variety, characterized by sweet and juicy fruits. Fresh berries contain a complex of vitamins, antioxidants, rich in polyphenols, which prevent oxidation and cell damage. Neutral soils, sod-podzolic soils are characteristic for cherry seedlings, promoting better assimilation of nutrients from the soil, as well as the formation of the pit during fruit ripening.

The aim of our research is: the analysis of cultivated cherry varieties of different origin - Regina, Cordia and Carina.

The following objectives were set:

1. Renewal of industrial assortment of stone fruit crops.
2. Influence of modern technologies on the formation of crowns and fruits.
3. Study of economic potential of cultivated sweet cherry varieties.

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2 Research Methodology

The objects of research, are varieties of foreign selection, grafted on various rootstocks [12.C.164]. Variety Karina-(low-growing, dwarf rootstock-Gizella), variety Cordia-VSL-2 (cherry-plum hybrid, high-growing tree and rootstock F12/1), and (Regina variety - rootstock Gizella-5), resistant to viral and bacterial infections, early entering fruit bearing, giving good yields[3.C.145] The garden productivity is stable, starting from the 4th year. Up to the 20th year, yields average 45-50 t/ha per year. The Cordia variety is a moisture-loving crop, capable of withstanding low temperatures down to -25 degrees Celsius. This cherry variety is not suitable for dense plantings. It is adapted to the climatic conditions of the North Caucasus, Stavropol Territory, southern Russia, as well as Ukraine. The best pollinators for this cherry variety are considered Regina, Karina, Summit, Van, Burlat, Merkant varieties. The cultivar Cordia cherry variety is characterized by weak resistance to diseases and pests. The fruits of the Cordia variety are versatile. Suitable for fresh consumption as well as raw material for processing. Karina variety was selected by German scientists. Characteristic feature is a late maturity. Resistant to frost and infectious diseases [10.P.111]. It bears fruit at the end of July or in early August. The crown is neat, the tree is not tall. The harvest can be harvested on the 4th year after planting. Fruiting is uniform and constant. Karina cherry variety is sterile. Therefore, for pollination it is necessary to plant next to a cherry or cherry varieties Blanka, Sam. The tree is characterized by a fairly strong tree bark, due to which, well resists fungal lesions. Crowns form quickly and need regular pruning. The area of distribution is in southern areas, Stavropol Territory and North Caucasus [4.C.67] Fruits are very large, dark burgundy in color. They do not burst when ripe. The flesh is dense, firm and crispy. The skin is dense, the fruit can hang on the tree for a long time. The juice is a rich red color. The pit is large, well separated from the pulp. The shape of the fruit is in the form of a wide cone, similar to a heart. Regina cherry variety is bred by breeders in Germany. The tree of this variety is of medium height (about 3 m.), with bright, juicy fruit. Characterized by high resistance to diseases and pests. Variety weakly resistant to drought, but well tolerates cold. Range of distribution - the south of Russia and the Volga region. Fruits in the 3rd year of life. Yield is average, up to 40 kg per tree.

3 Results and Discussions

Biological characteristics of growth and development of the objects of research, are decisive for the varietal characteristics of cherry, corresponding to the zonal conditions of cultivation and applied agronomic techniques.

Indicators of crown size - its diameter and volume, in corresponding units, trunk diameter, tree height, indicators of crown width along and across the row, refer to biometric parameters. In this work, biometric parameters of the research objects were also determined under the influence of medium-growing, dwarf and strong-growing rootstock VSL-2 (cherry-plum hybrid, F12/1 rootstock, Gizella and Gizella-5 rootstocks), on which experimental sweet cherry varieties were grafted.

Table 1. Biometric indicators of the research objects are given

№	Indicators/ Variety	Regina	Cordia	Carina
1	Stem diameter, cm	3,0	6,5	2,5
	deviation, cm	x	-3,5	-0,5
2	Tree height, m	2,5	4,5-5,0	2,0
	deviation, m	x	-2,0-2,5	-0,5
3	Crown width along the	1,5	2,2	2,0

	row on both sides of the trunk, m			
4	clearance with distance between trees = 2 m	0,0	2,5	0,5
5	Crown width across the row on both sides of the trunk, m	2,5	4,7	3,0
6	clearance between the crowns of the trees at a distance of 5 m between the rows,	2,5	3,8	3,0
7	Crown diameter m	1,6	2,8	2,1
	deviation, m	x	-0,6	-0,5
8	Crown volume, cu.m.	3,3	4,7	3,8
	deviation, cu.m.	x	-1,4	-0,5
9	Angle of departure of skeletal branches of young trees, degrees	30,0	62,0	35,0
	deviation, degrees	x	-32,0	-5,0

Table 1. data of biometric parameters of research objects are given, where a positive value of deviation, means increase of value of indicator of research object, and a negative deviation - decrease. Hence, under the scheme of planting the orchard 3x4 m, the diameter of the trunk was 42,5 cm. In conditions of intensive horticulture, it is an important feature that sweet cherry varieties with a smaller diameter of the trunk were characterized by less active growth, as it is more convenient to harvest from lower trees. A huge influence of modern technology on the formation of the crown and fruits. The most important element of intensive horticultural technology, which depends on the technologicity of the variety, features of pruning of fruit-bearing trees, is the angle of departure, ranging from 40 to 60 degrees. Meeting modern requirements varieties, with crown formation on the type of “French axis”, “artificial spindle”, etc., which greatly increase the possibility of using them in intensive cultivation. One of the main elements in intensive horticultural technologies is: density of tree placement schemes, when selecting which, take into account the varietal specificity of shoots growth along and across the row, diameter, width and volume of the tree crown. Determine also, the activity of tree growth, the choice of the crown shape of a fruit tree, the type and nature of pruning work. The density of crowns should not hinder the growth of neighboring trees, with dense planting schemes. The distance between two trees of the same row, taking into account the gap between them, determines the index of crown width along the row. It was found that towards the less shaded space, the growth of tree branches is less active, and therefore, the distance between the row should be greater than the distance between trees along. In the experimental planting scheme of 3,0x4,0 between seedlings, there should be actually no gap. The gap between tree crowns at a certain distance between the rows, suggests the possibility of reducing the row spacing, to increase the intensity of plantings, taking into account the allowable value of the gap between tree crowns, equal to 2.6 m.

Biometric indicator of the cherry varieties under study (volume of leaf surface, number of leaves), involved in photosynthesis, is involved in the main process of formation of more than 90% of dry matter required for the life of the tree.

4 Conclusions

In the process of studying cultivated cherry varieties on various rootstocks, the following conclusions are drawn:

1. The rootstocks on which the seedlings were grafted had a direct influence on the biological characteristics of the fruit crops.

2. The restrained growth of the branches, contributed to the formation of the crown and fruits, which is very important in a compacted planting scheme.

3. The studied varieties of cherry trees of world selection were distinguished by good resistance, which is an important economic-valuable feature, when planting an orchard.

4. The objects of the study fructified in the third and fourth year of life, because, early entered the fruiting.

Taking into account the studies conducted, for the renewal of assortment and expansion of production orchards in the Chechen Republic, the North Caucasus, the Krasnodar region, Ukraine and the Middle Volga region, we recommend the cultivars of sweet cherry of world selection-Regina and Karina. The Cordia cherry variety is not suitable for dense planting schemes, but it is a good raw material for processing, rich in the complex of vitamins and, therefore, is also recommended for cultivation in temperate climates.

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