

# Cultivation of the Rootstocks of Cherry Lubskaya in Artificial Substrates with the Use of a Special Structure with a Regulated Microclimate Inside

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**Abstract:** The article contains experimental material devoted to the study and development of technology for intensive cultivation of the rootstocks of the Lubskaya cherry variety from green cuttings in artificial substrates, using for this purpose a special film greenhouse with a regulated microclimate inside. Studies have established that the optimal conditions for the microclimate in the construction are created by hiding the greenhouse frame with a polyethylene transparent film and a ligature cloth. In this case, the amplitude of air fluctuations in the daytime and at night in the greenhouse does not exceed 22-26°C, which is optimal for rooting the planted cherry cuttings. Good conditions for the development of cherry rootstocks are created by planting cuttings in an artificial substrate, consisting of such components as river sand and humus in proportions 1: 3.

**Keywords:** rootstock, cherry, microclimate, artificial, substrate, rooting, callus, rudiments, root, seedling

## 1. Introduction

Environmental conditions artificially created inside the film greenhouse have a great influence on the development of planted cherry cuttings. In the conditions of an artificial microclimate created inside the greenhouse, the formation of meristematic tissue in the basal part of the cuttings, the assimilation of the leaves, and the rooting of the cuttings are enhanced.

Scientific researches carried out in our country and abroad show that for a better rooting of cuttings of fruit plants, vegetative propagation requires certain growing conditions, the main ones, including temperature, air and soil moisture, and daylight illumination [1, 2, 3].

## 2. Methods of Research

The experience was laid down at the research and development station Tashkent State Agrarian University in 2014-2015. The object of the study was the Lubskaya cherry variety, the microclimate of the structure for growing rootstocks and seedlings, and various types of artificial substrates.

The study of the microclimate in the building for the cultivation of the cherry rootstocks was accompanied by the account of the humidity of the air, the temperature of the air and substrates, and also the illumination of the room. As artificial substrates, river sand, sawdust, rice husks, humus and their combination ratios [4,5,6] were used.

## 3. Results and discussion

The results of the research show that the optimal microclimate conditions can be created using spring film greenhouses covered with a transparent polyethylene film. To create the optimal microclimate conditions, a system of finely dispersed water spray was used in the greenhouse. In

such a structure, the amplitude of daytime temperature fluctuations of 2.7 - 5.3°C of soil and air in comparison with the open ground was small and amounted to 2.7-5.3°C.

An important environmental factor affecting the quality of rooting of the cuttings is the vertical temperature gradient and the relative humidity of the indoor air. These indicators inside the greenhouse were 3.2 - 3.3°C and 88.0 - 89.7%, respectively.

Level of light inside the building was 17,3% less than in an open the ground and was 91,0 of thousands of lux. Such a decrease in light be explained by physical properties transparent plastic film. Additional shelter greenhouses bunch cloth provided to reduce the light flow and dissemination sunlight inside the facilities that reduced the probability of Burns leaves (table 1).

**Table 1:** The microclimate conditions in a special structure for the cultivation of rootstocks of cherries from green cuttings in a special structure 2014-2015

Indicators	Outdoor ground	Film greenhouse
Average daily air temperature, °C	30.1	22.0
Daytime air temperature, °C	36.4	26.2
Night temperature, °C	15.2	17.4
Substrate temperature in the depth 5 cm, °C	21.9	20.2
Air temperature on substrate surface, °C	23.2	23.7
Air humidity, %	47.0	88.0
Temperature gradient of air, °C	+0.8	+3.2
Illumination inside the building, thousand lux	110.0	91.0

In natural conditions, plants usually develop in the mother substance, that is, in soil, which has a certain mechanical composition, physical, air-water properties, a certain amount of nutrients and an endemic world of microorganisms living in harmony with this substance.

Artificial substratum, unlike soil, is considered a secondary product formed as a result of processing of agricultural raw

materials or natural resources. In the production of seedlings this raw material is used in different ways.

However, they must meet the following requirements: to be firm, to have good aeration, to retain moisture well, to have enough nutrients in abundance, to be free from pathogens of fungal and bacterial diseases, and weed seeds.

At present, the following substrates are used for rooting green cuttings in fruit growing practice: sand, peat, sawdust,

perlite, expanded clay, etc.

In our studies, the testing of various artificial substrates showed that the appearance of the substrate on the formation of callus in the basal part of the cuttings did not have a significant effect. The appearance of callus on cuttings, in connection with the use of species of substrates, was noted approximately at the same time; on the 18th - 20th day after planting.

**Table 2:** The influence of substrates on the rooting and development of the root system of the rootstocks of cherry Lubskaya, 2014 – 2015

Substrates	Root of the cuttings, %	The order of branching of the roots	Roots of the first order		The volume of the root system, cm <sup>3</sup>
			quantity, PC	overall length, cm	
Sand (control)	72.3	3.1	12.8	169.7	8.5
Sand + humus 1: 3	89.0	4,5	16.7	231.2	13.5
Sand+sawdust 1: 2	83.8	4.4	14.3	161.4	11.9
Sand + rice husks, 1: 3	80.2	4.2	13.0	151.8	11.0
HCP 0,5	5.4	0.2	1.0	1.1	1.4

In the experiment, the formation of the root system intensively took place on cuttings planted in a substrate consisting of components such as rice husk and humus in proportions 1: 3, sawdust and humus 1: 2, sand and humus 1: 3. In these variants, a better development of the root system was observed, both in quantity and in quality. The volume of the root system of the plants growing in these substrates increased by 1.9 - 2.6 times, in comparison with the control plants of sand developing in the substrate.

The development of the aboveground part of the rootstocks of the Lubskaja cherry variety correlated with the morphological development from the root system of plants. The tallest ones - 69.8 - 74.2 cm and well - developed seedlings developed substrates consisting of a mixture of river sand, sawdust, rice husk in ratios of 1:3, 1:2 and 1:3. The plants of these variants of the experiment formed a more developed assimilation apparatus with a total area of 37.31 - 42.05 dm<sup>2</sup> (Table 3).

**Table 3:** The influence of artificial substrates on the development of the above-ground part of rooted cuttings of Cherry variety Lubskaya 2014-2015

Substrates	Growth of plant, cm	Shoots of the first order		Area of assimilative surface, cm <sup>2</sup>
		Pieces	length, cm	
Sand control	37.1	3.1	28.1	771.4
Sand + humus 1: 3	63.7	4.8	36.5	940.0
Sand + sawdust 1: 2	56.7	4.4	35.0	934.30
Sand + rice husks, 1: 3	56.3	4.0	33.7	878.6
HCP 0,5	0.8	0.3	0.5	20.3

#### 4. Conclusions

When cultivating the rootstocks of the Lubskaja cherry variety from green cuttings, good conditions are created when using a special structure with a regulated microclimate inside. In such a construction, the amplitude of the fluctuation of the night and day temperatures does not exceed 22-26°C, which is optimal for growing rootstocks in a vegetative manner.

To speed up the process of rhizogenesis of the root and ground parts of the planted cuttings, the cherry varieties of the Lubskaja variety are created under the condition, as components, using an artificial substrate as river sand and humus in a volume ratio of 1: 3. Under such conditions, by the end of the growing season, up to 86% of the grown rootstocks of cherries comply with the requirements of the state standard.

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