THE CHARACTERS OF GROWS CHERRY SEEDLINGS ON CLONAL ROOTSTOCK

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Abstract: The possibility of use in the winter grafting of rooted cuttings as clonal rootstocks for cherries. When growing branched annual cherries the techniques have been studied that allow to receive them, as well as modern fertilizer, including long-acting ones.

Key words: clonal rootstocks, seedlings of sweet and sour cherry, branched annual plant, growth regulators, seedlings with CRS, Osmocote Exact.

When growing planting material of sweet and sour cherry for industrial gardens as well as crofts the usage of clonal rootstocks, little affected by coccus mycosis, well compatible with most varieties, giving a 1,5-2 times greater yield then seed stocks, proved to be most promising. Some rootstocks (ЛЦ 52, ВСЛ 2) weaken the force of the growth of grafted varieties by 30-50% [2], which is especially important for sweet cherry. The use of clonal rootstocks promote earlier fruiting of trees.

Genetic uniformity of clonal rootstocks - the most important condition for the creation of homogeneous plant stands with respect to development. This is a prerequisite for the application of modem intensive and superintensive cultivation technologies of stone fruit. Reproduction of stone fruit in clonal rootstocks - the main method of production of seedlings in the advanced countries of the world. Using the protected soil, plant growth regulators during the growth of seedlings can reduce the period of cultivation and improve the quality of planting material.

The aim of our work was to develop elements of the production technology for planting cherries on the basis of winter grafting with clonal rootstocks in the condition of film greenhouses.

Materials and methods

Studies were conducted in the years 2003-2011 in the laboratory of Horticulture of the Russian State Agrarian University - Moscow Timiryazev Agricultural Academy. The objects of study were clonal rootstocks for cherries: ВСЛ 2, ЛЦ-52; sour cherry varieties: Anthracite, Apuhtinskaya, Assol, Bulatnikovskaya, Volochaevka, Zhukovsky, Dawn-Tartary, Early Yagunova, Vial pink Turgenevka; sweet cherry: pink Bryansk, Galochka, Tyutchevka.

Winter grafting was performed in February by enhanced copulation. Stratification of grafts were performed at a temperature of 21-22°C for 4-5 days. In assessing the effect of growth regulators on rooting of winter grafting an aqueous solution of IBA at concentrations of 250 and 500 mg/1 was used. Depending on the version, copulatory slices were treated by dipping or soaking the scion cuttings for 12 h. Also, the effect of ascorbic

acid and a-tocopherol acetate (vitamin E) as antioxidants in the treatment of cuts, on the survival and growth processes of winter grafting was studied. The tying of winter grafting were conducted with the use of photocleavable film. After storing the grafting were grown in film un heated greenhouses.

In experiments on the cultivation of seedlings with closed root system (CRS), the objects of research were Bulatnikovskaya sour cherry and sweet cherry - Tyutchevka. As a growth regulator the drugs "Tsitodef' at a concentration of 40 mg /1 and gibberellin-25 mg /1 were used. To stimulate branching in some variants the pinching of the upper leaves and removal of the parts of leaves with the regulators and separately were used. Containers 4 liters and 7.5 liters were used. After planting into containers, all plants were tied to bamboo supports. The scheme of planting: 26 x 26 cm 5 rows. Spraying of growth regulators was conducted once and twice, topping conducted singly, doubly and triply depending on the variant of the experiment when reaching plant height of 45-50 cm. In variations for the study of growth regulators substrate consisted of peat, perlite and Osmocote Exact. In the autumn revisions were taken into account the survival rate, diameter of the trunk at a height of 5 cm above the grafting was measured , plant height, trunk height, number of lateral shoots, their average length, angle of divergence of the branches.

Results and discussion

Preliminary experiments carried out by us showed that the rootstocks propagated by green cuttings with a diameter greater than 4 mm can be used for winter grafting cherries without additional rearing. Technology with the use of rootstocks for winter grafting of rooted cuttings has several advantages compared to grafting on standard rootstocks, as increased productivity, reduced consumption of material resources, etc. At the same time survival rate of vaccination is quite high (75-95%), and the quality of the material obtained is good.

A small portion of the experiments in 2003-2005 were carried out in open ground, but as shown by observation, obtaining a high yield of planting material is difficult. Due to the unstable conditions of the open ground there was a significant decrease in survival rate of winter grafting, and in rainy years they were severely affected by coccus mycosis and their growth had weakened. In this regard, the use of greenhouses for growing plants is rather promising, allowing you to get in one year the maximum amount of standard planting material.

The following from studied varieties of stocked combination stood out by quality of planting material - sour cherry Volochaevka and Turgenevka. In sweet cherry the differences between varieties weren't significant, except for survivability of Galochka.

According to some researchers a factor that reduces the survival rate of sour cherry is rapid oxidation of the sections with the formation of phenolic compounds. In stone fruit species, and especially in cherry products of decomposition of gallic acid at low temperatures hardly ever used and disintegrate. In our experiments we studied the effect of vitamin C and vitamin E as antioxidants in the treatment of copulatory sections on survival and growth of graftings cherries Zhukovskaya on a stock ЛЦ 52.

Studies have shown that treatment of sections with vitamins C and E resulted in a significant (especially when using vitamin E) reduced rooting and growth processes. Treatment sections with an aqueous solution of the IMC concentration of 250 mg /1 resulted in increased survival rate of grafts and a slight increase in growth rates. With stratification of grafts and after planting for rearing more intensive callus formation was observed. The most noticeable effect was in the first 40-50 days after planting in the ground. Winter grafts with the processing of copulatory sections by IMC had a strong increase in growth

Table 1

Survivability of winter graftings and growth of cherry seedlings on rooted cuttings of clonal rootstock ЛЦ 52, the average for 2006-2007

Grade	Survival rate of vaccination, %	The height of seedlings,sm	The diameter of trunk, мм
Apuhtinskaya	73,6	119,8±26,3	12,2
Anthracitjvay	90,0	120,5±15,5	13,0
Volochaevka	89,5	140,5± 13,4	13,6
Bulatnikovskaya	68,6	110,6±23,7	11,0
Zhukovskaya	86,3	135,6±9,8	13,3
Early Yagunova	79,5	138,8±18,5	13,0
Assol	82,3	133,5±10,5	13,2
Dawn Tatary	88,5	130,0±6,3	12,4
Vial of pink	67,7	116± 17,3	10,5
Turgenevka	88,8	137,8±7,6	13,9
Tyutchevka	90,5	170,5±20,0	16,9
Bryansk pink	95,3	175,6± 17,6	16,5
Galochka	76,6	160,3±15,2	15,5

Table 2

Effect of biologically active substances on the survival and growth of winter grafts of sour cherry Zhukovskaya on the rootstock ЛЦ 52 in the processing of copulatory sections

The active substance	Survival, %	Height of plants, sm	The diameter of trunk, sm	Number of roots	The diameter of the roots, мм
Water (control)	90,0	178,6	13,7	5,2	3,7
Vitamin E	43,5	78,5	8,8	6,3	2,7
Vitamin C	63,0	176,3	13,2	4,3	4,3
IBA 500 мд/l	90,0	180,1	13,9	4,7	4,6
IBA250 мд/l	100,0	182,8	14,3	5,5	4,5
$НСР_{05}$	8,5	12,3	2,4	0,9	0,7

(1.5-2 times). However, later plant height became almost equal. One of the variants was the experience of green grafting of the varieties of cherries on stalks of clonal rootstock and planting them on rooting in the greenhouse with a fogging unit. The following year, these grafts were planted in a greenhouse on the rearing. The better fusion of grafted components with the green grafting compared to winter, a good quality of the root system of rootstocks have contributed to a better development of seedlings (table 3).

Seedlings grown on such technology had more uniformity and the presence of lateral shoots.

Plants derived from the winter grafts, slightly, but conceded the basic indices of plants, obtained from green grafts. This was manifested in the reduction of survival rate (10-32%), a decrease in seedling height (20 cm), as well as an increase in variation. Despite this, the vast majority of the plants complied with the requirements of the standard for the annual plants.

Table 3

Survival and growth of seedlings of the cherries grown from cuttings of green grafts on clonal rootstock ЛЦ 52

Grade	Survival, %	The height of seedlings, sm	The diameter of trunk, мм	The number of lateral shoots
Volochaevka	100	160,5± 10,3	12,6	3,7
Bulatnikovskaya	100	167,2± 13,7	13,0	4,5
Bryansk pink	100	185,6± 19,3	16,8	0
Tyutchevka	100	190,5± 14,0	17,6	0
$НСР_{05}$		7,6	1,9	0,8

Table 4

Survival and growth of seedlings of cherries from the winter grafts on the rooted cuttings of clonal rootstock ЛЦ 52

Grade	Survival, %	The height of seedlings, sm	The diameter oftrunk, мм	The number of lateral shoots
Volochaevka	89,5	140,5± 13,4	13,6	2,7
Apuhtinskaya	73,6	109,8±26,3	12,2	3,2
Assol	82,3	133,5± 10,5	13,2	3,6
Bulatnikovskaya	68,6	110,6±23,7	11,0	2,5
Bryansk pink	95,3	175,6±17,6	16,5	0
Tyutchevka	90,5	170,5±20,0	16,9	0
$НСР_{05}$	8,6	14,2	2,2	0,4

With the rearing of winter grafts of cherries in protected soil the consistent results on the survival rate and the output of a standard planting material were obtained. Despite the relatively high survival rate, it is worth noting the difficulties associated with obtaining a standard planting material in a year of grafting because of the weak root system development. The yield of standard annual plants can be increased by using the standard stock. Despite the positive aspects of this technology and its use, there are difficulties associated with the need to pre-rearing stocks, their digging and storing. At the same time because of the size of stocks (especially at high farming practices) and the horizontal location of the roots inconveniences arise at grafting, stratification, packaging, transporting winter grafts, compared with rooted cuttings. However, the quality of seedlings is better in this case.

Growing of planting material in protected soil is necessarily predecesed by quenching of plants 1,5-2 months before digging them out. The very best results in our experiments were obtained when keeping the film over the plants till the end of the season and removing it from the edges of greenhouses, the same for the lower parts of the sidewalls 2-2,5 months before digging. It allowed to control the humidity of the soil, so as to affect growth processes, degree of maturing of the shoots. Plant leaves weren't affected by rain, or coccus mycosis, unlike the unprotected soil, staying functional till the end of the season. Also, there were better working conditions during the digging of the seedlings.

Lately, planting material with closed root system becomes more and more popular, because it can be planted on its permanent spot any time of the year with guaranteed

Table 5

Survival and development of seedlings of cherries from the winter grafts in the film greenhouse on standard clonal rootstock ЛЦ-52. Height of grafting 40 cm, average for 2008-2009

Grade	Survival, %	The height of seedlings, sm	The diameter of trunk, мм	The number of lateral shoots
Volochaevka	88,5	180,5±15,4	16,8	6,5
Apuhtinskaya	88,4	170,8±13,3	17,4	5,8
Assol	92,3	175,5±10,2	17,8	8,3
Bulatnikovskaya	87,5	168,6±16,7	18,2	6,1
Bryansk pink	98,0	212,6±22,6	21,5	0
Tyutchevka	92,5	206,5±21,0	20,9	0

survival. But this technology still has a few unresolved issues, such as a volume of the container for different cultures, substrates, fertilizers.

In modem gardens on the West the planting of apple seedlings, being grown by technology "branched annual" is very popular, because such seedlings, with angles between shoots and the tree itself close to 90°, often lay flower buds in the nursery and yield crop on the first second year as they get planted in the garden. As a mle, such seedlings being obtained by technology "kneep-bum" using growth regulators (arbolin, promalin, poturil etc.) and pinching the toppings of the shoots, which stimulates the awakening of the flower buds and branching of the seedlings. This technology hardly used on other cultures. Stone fruit differ from seed by quicker maturing flower buds, and annual shoots are often branching without any additional actions. Still, the character of branching and growth force of shoots are hard to control, and such culture as sweet cherry have strong growth and isn't inclined to branching. With regard to that we were first to experience on obtaining branched annual seedlings of sweet and sour cherry from winter grafting.

As a result of carried out experiments on sweet cherry Tutchevka 3-times pinching with 1-time spraying of cytodef 40mg/l + gybberelin 25 mg/1 turned out to be the best option (stulk diameter - 12,6 mm, height 187,3 cm, 70% of seedlings branched, average amount of shoots 2, length of side shoots 80,1 cm).

For sour cherry Bulatnikovskaya the option was - times pinching with 2-time spraying (stulk diameter - 11.3 mm, height 153.3 cm, 100% of seedlings branched, average amount of shoots 4.8, length of side shoots 48.2 cm), in comparison to controlled subjects. In all variants of experiments plants in 7.5 1 containers exceeded the ones in 4 1 by height, stulk diameter and number of branching. The only exception was sour cherry, for which height in 4 1 were 12 cm more then in 7.5 1 with weaker branching. "Osmocotc Exactc" turned out to be the best option for fertilizers. Despite its high cost, the 1-time use allowed to obtain higher quality planting material, without using extra feeding by fertilizers during the vegetation season.

Conclusion

Growing of grafted seedlings of cherries possible not only on standard stocks, but also on rooted cuttings of clonal wood stocks, while using green grafting.

For better survival of winter grafts of cherries, the diameter of grafted components isn't supposed to be less then 4 mm.

For heightening of survival of winter grafts, grafted components are to be treated with aqueous solution of IMC 250 mg/1.

Rearing of cherries grafts in greenhouse in comparison with unprotected soil provides its high survival, good growth, and shortens the time of obtaining standard seedlings by one year.

Quenching of seedlings by uncovering the greenhouses ends and sidewalls allows to control the humidity of the soil, provides security of leaves and good preparation of plants for winter.

For sweet cherry Tutchevka the best option is to apply 3-times pinching with 1-time spraying of cytodef 40mg/l + gybberelin 25 mg/1.

The usage of fertilizer "Osmocote Exact" with prolonged action in growing seedling in containers allows to obtain high quality seedlings without applying any extra fertilizers during vegetation season.

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ОСОБЕННОСТИ ВЫРАЩИВАНИЯ САЖЕНЦЕВ ВИШНИ И ЧЕРЕШНИ НА КЛОНОВЫХ ПОДВОЯХ

Аннотация: в работе представлены результаты разработки элементов технологии производства посадочного материала вишни и черешни на основе зимней прививки с использованием клоповых подвоев в условии пленочных теплиц. Установлена возможность использования при зимней прививке в качестве клоповых подвоев для вишни и черешни укорененных черенков. Изучены приемы, современные регуляторы роста и удобрения, в том числе пролонгированного действия, позволяющие выращивать разветвленные однолетки черешни с закрытой корневой системой.

Ключевые слова: клоповые подвои, саженцы вишни и черешни, разветвленная однолетка, регуляторы роста, саженцы с ЗКС, Osmocote Exact.

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