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Improvement of Reproduction of Weakly Growing Clone Grafts of Cherry in the Conditions of Surkhandarya Region

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Abstract: the article presents the results of research carried out in order to improve the reproduction of weakly growing clone grafts of cherry in the conditions of Surkhandarya region. Also, the article presents valuable information about the dynamics of the formation of branching branches and their rootability in vegetatively propagated grafts of cherry.

Keywords: pruning, cherry cuttings, branch, root, green shoot.

Introduction

Today, the demand for cherry fruits both in our country and abroad is increasing day by day, and therefore the main part of it, especially early-ripening and easy-to-transport varieties, is exported from our republic to foreign countries. However, the gross harvest from cherry trees, especially its early-early and easy-to-transport varieties, cannot fully satisfy this demand. The area of orchards consisting of early and promising cherry varieties is not so large, therefore, the cherry trees in these orchards, regardless of their age, are very sparse, and the number of errors in them is 25-30%.

It is known that intensive orchards are today's modern form of growing fruit plants, which has a number of advantages and high efficiency. These main advantages are that a high quality and abundant crop is grown per unit of area, the orchards are provided with a quick full harvest, maintenance (shaping and pruning of branches and bushes, treatment against diseases and pests, drip irrigation, crop care, etc.) .k.) and harvesting will be convenient, the costs of garden establishment and maintenance will be fully covered in a short period of time.

Surkhandarya region is distinguished by its warm climate. It is urgent to improve the cultivation of grafts in the conditions of the region's climate. After all, grown cuttings must be of good quality for grafting. For this purpose, vertical scattering was first tested in the experiment. This method is one of the main methods in the cultivation of many fruit and berry plants [1, 2].

Rooting plants by spraying is the cheapest and easiest way to grow seedlings. According to the literature, some grafts of cherry can be successfully propagated by vertical propagation.

Materials and Methods

Research on the topic was conducted in 2021-2022 at the Department of Fruit, Vegetable and Viticulture of Tashkent State Agrarian University, and field experiments were conducted at the experimental field of the Surkhandarya Scientific Experimental Station of the Research Institute of Plant Genetic Resources of Uzbekistan.

In the experiment, clonal grafts were propagated by vertical grafting and green grafting methods. Colt, VSL-2 (Krimsky-5), Gizella-5, Maxma Delbard-14 clone grafts of cherry were used for this

purpose.

In the experiment, in the late fall of 2013, mother plants of grafts planted in 150 x 70 cm plots in one-row rows of 15 meters were used. Experiments were performed in 4 repetitions. In early spring, the branches of the mother plants were cut and shortened, leaving 2-3 buds, and soil was piled on the upper part of the bushes. The sprigs that have sprouted were inoculated three times. At the end of the growing season, the cuttings were separated and the number of rooted plants and their quality were evaluated.

An artificial substrate and an unheated building with a film equipped with an automatic device (creating artificial fog) that ensures comfortable conditions of humidity and temperature inside the building were used for the cultivation of grafts from green cuttings.

To conduct the experiment, cuttings 8-10 cm long were prepared from the branches of mother bushes of cherry grafts. To prepare cuttings, newly formed branches during the growing season were cut in the morning. Prepared cuttings were treated in 20, 40, 60, 80 and 100 mg/l water concentration solutions of indolyl butyric acid for 14-16 hours before planting. These treated cuttings were rinsed with clean water before planting.

A pre-prepared artificial substrate for transplanting treated cuttings has the following composition: the upper part of the substrate consists of 5 cm of pure large-particle sand and the lower part is a specially prepared mixture of river sand and humus in a ratio of 1:1. Cherry cuttings were planted in this substrate at a depth of 3-4 cm. In each experimental variant, 100 cuttings of grafted species were planted.

Scheme of planting cuttings 10x7 cm. The experiment was replicated four times. The operation procedure of the artificial fog generating equipment is as follows. During the first days (20-25 days) of cuttings, during the daylight hours (from 8 am to 6 pm) every 6 minutes for 15 seconds, fine particle water was sprayed in the form of a mist. Watering was carried out every 15 minutes after the first root buds appeared on the cuttings.

Phenological observations, biometric calculations and laboratory theoretical and practical analyzes carried out during the research were based on Kh.Ch. Buriev and others' "Methodology of calculations and phenological observations during experiments with fruit and berry-fruit plants" [3], mathematical-statistical processing of experimental data B It was conducted according to the method recommended by A. Dospekhov [4].

Results and Discussion

For propagating in the propagation method, one-year-old seedlings of the mother graft were transplanted in the late autumn in a generally accepted manner on a plot of land with fertile soil. In early spring, the branches of the mother bushes were shortened by cutting them 3-5 cm above the soil level, and they were left with a pile of soil 5 cm thick. Watering and fertilizing the mother bushes, as well as inter-row processing, were carried out in a generally accepted manner.

In our experiments, the study of the ability of cherry grafts to reproduce by budding showed that the Colt graft stood out with the formation of budding branches on the mother bushes, the total number of budding branches formed on this graft was up to 20 pieces.

The least formation of split branches was observed in grafts Gizella-5 and Maxma Delbard-14. In these grafted mother plants, the total number of branches did not exceed 9-11 pieces. In the case of VSL-2 (Krimsky-5) graft, intermediate, that is, average results were observed in terms of the ability to form a branch, and it was noted that up to 13 branches were formed.

Studying the dynamics of the formation of branching branches in vertically propagated mother bushes showed that in almost all types of grafts, branching branches were formed in the first half of the growing season. As a result of these experimental observations, it was found that after June, there were almost no shoots of the grafted species.

It can be seen that the period of formation of vertical patches in cherry grafts propagated by vegetative means corresponds to the months of April-June. Their most intensive production is

observed in April and May.

It is worth noting that, along with the formation of branches in vertical propagation, their rooting is one of the decisive factors. At the end of the growing season, the Colt graft stood out with the highest rooting capacity, and the total number of rooted shoots was 17.

Almost no rooting was observed in the grafts of Gizella-5 and Maxma Delbard-14 grafts. It was noted that only 2 branches took root in the Maxma Delbard-14 graft (Table 1).

The table data shows that good rooting of sprouts was also observed in grafting VSL-2 (Krimsky-5). Rooting was noted in 11 out of 13 branches produced in this grafting (84.6% rate of rooting).

In our next experiment, we also studied the ability to multiply these grafts from green cuttings.

Table 1 The dynamics of the formation of branching branches and their rooting ability in vegetatively propagated grafts of cherry, 2021-2022 years

Varieties	The number of sprigs formed, pcs						
	by months					total	from which it took root
	April	May	June	July	August		
VSL-2 (Krimskiy-5)	5	6	2	-	-	13	11
Maxma Delbard-14	4	5	2	-	-	11	2
Gizella-5	3	5	1	-	-	9	-
Colt	7	8	5	-	-	20	17

Propagation of clonal grafts of fruit plants from green cuttings has been successfully used in fruit growing in recent years. In this case, especially the sensitivity of these plants to treatment with growing substances ensures a higher efficiency of propagation by green grafting. The sensitivity of several fruit plants, which do not tend to reproduce vegetatively, to treatment with growth regulators has been proven in the experiments of many scientists in recent years. Under the influence of these substances, the hydrolysis of starch, as well as the acceleration of the arrival of sugar and nitrogenous substances from the leaves to the lower parts of the pen are observed. As a result of this, there is an abundant accumulation of nutrients in the lower part of the cutting and, as a result, the activation of meristem cells. This causes the regeneration of additional roots in green cuttings.

As such substances, growth regulators such as indolyl butyric acid (IMC), indolyl acetic acid (ISC), alpha and beta-naphthyl acetic acid (NUC) have been widely used in recent years. In addition to these, there is also information that mival, cherkaz, germatranol and other substances were tested on fruit plants and good results were obtained.

Based on these, we also conducted research on the propagation of cherry cuttings from green cuttings in the experimental field of the Surkhandarya Research Station (Zharkorgan District) of the Research Institute of Plant Genetic Resources of Uzbekistan.

For this purpose, experiments to determine the appropriate rate of treatment with a growing agent - IMK were carried out on different grafts of cherry according to the following scheme: water treatment of cuttings before planting - control and experimental cuttings were treated with IMK solution of 20, 40, 60, 80, 100 mg/l of water Processing in concentrations.

In the experiment, 8-12 cm long green cuttings of cherry grafts were prepared and treated in solutions of a certain fixed concentration of IMK for 16-18 hours. After treatment in the growth agent solution, the cuttings were rinsed with clean water before planting. The treated cuttings were planted at a depth of 3-4 cm in a substrate consisting of the upper part of 5 cm of pure coarse-grained sand and the lower part of a specially prepared 1:1 mixture of river sand and humus. Cultivation of grafts was carried out inside microclimate-controlled film enclosures. Treatment with an aqueous solution of indoleic acid of different concentrations before planting on the green cuttings of cherry

plant grafts accelerated the regeneration processes (Table 2).

The experiments showed that the rhizogenesis of the green cuttings of grafts and the recovery (regeneration) of their ground level part were noted to be somewhat faster in the variants treated with the growth control substance compared to the control. For example, the formation of callus in the phloem part of the treated cuttings took place on average 9-12 days earlier in the Colt graft, the formation of branches on average 18-22 days, and the gross formation of the root on average 6-10 days earlier than in the control. In this case, the catching quality of green cuttings was on average 14-25% higher than that of untreated cuttings.

A similar situation as in Colt welding was observed in VSL-2 (Krimsky-5) welding. Analyzing the data in this table, it was admitted that the concentration of the growth-regulating substance depends on the rapid and abundant formation of additional roots in all cuttings of the cherry plant.

Table 2 Effect of IMK treatment on green cuttings of cherry grafts on rhizogenesis processes 2021-2022

Options	After planting cuttings:			Number of cuttings that took root, %
	until the beginning of callus formation, day	until the formation of a gross root, day	until the branches begin to grow, day	
Colt				
Untreated (control)	33	48	54	47
IMK -20 mg/l	24	42	36	61
IMK -40 mg/l	23	41	32	70
IMK -60 mg/l	21	38	31	72
IMK -80 mg/l	20	37	29	78
IMK -100 mg/l	22	38	29	79
VSL-2 (Krimskiy-5)				
Untreated (control)	34	48	52	49
IMK -20 mg/l	25	42	34	63
IMK -40 mg/l	24	41	31	75
IMK -60 mg/l	23	39	30	86
IMK -80 mg/l	21	31	29	91
IMK -100 mg/l	22	32	30	88
Maxma Delbard-14				
Untreated (control)	32	46	46	8
IMK -20 mg/l	22	39	30	12
IMK -40 mg/l	21	38	29	16
IMK -60 mg/l	20	37	28	17

IMK -80 mg/l	20	37	27	19
IMK -100 mg/l	20	37	27	20

The most rapid regeneration was observed in all experimental options treated with a concentration of IMK solution of 80 mg/l. In these concentration options, the highest indicators of the total formation of roots at the last observation date were 26% higher in the Colt graft, and 24% higher in the VSL-2 (Krimsky-5) graft.

It is also worth noting that root development in untreated cuttings was around 47-56% depending on the types of grafts. This indicates that indolyl fatty acid enhances the regeneration process. Taking into account the different course of rhizogenesis in cuttings with different concentrations, it is possible to set the standard of indolyl fatty acid concentration of 80 mg per 1 l of water as acceptable for processing green cuttings. However, it is worth noting that rootability also depends on the direct biological condition of the plant. When treated with a growth agent, regeneration properties may not occur in some plants. This situation was noted in the Maxma Delbard-14 graft studied in the experiment. In this graft type, the highest rate of rooting did not exceed 21% even when treated with growth medium at any concentration. In general, the total formation of the root system took place in the period of 31-37 days in all studied grafts in the variant where the water concentration of 80 mg/l was used.

Although gross rhizogenesis in green cuttings begins almost at the same time, not all cuttings have a strong root system that can ensure the further growth of plants. This condition can vary dramatically depending on the morpho-biological characteristics of the cuttings, i.e. the thickness of the cuttings obtained, the size of the remaining leaf surface, the length of the cuttings, the amount of complex carbohydrates accumulated in its semi-woody part, the depth in the substrate and a number of other factors.

But in any case, the biological property of the grafted species to reproduce by vegetative means plays a decisive role. Consequently, observation of root development in the cuttings treated with the most moderate concentration of the growing substance showed that during all the years of the study, the cuttings of the VSL-2 (Krimsky-5) graft were distinguished by the best rooting index (Table 3).

Table 3 Effect of treatment with 80 mg/l concentration solution of IMK on rooting of green cuttings of cherry grafts

Varieties	Number of cuttings that took root, %		
	2021	2022	average
Colt	66	71	70
VSL-2 (Krimskiy-5)	87	85	86
Gizella-5	-	-	-
Maxma Delbard-14	14	15	15

Table data shows that the complete death of green cuttings was observed in grafting Gisella-5. This confirmed that this graft does not multiply from the green pen.

The concentration of the working solutions of the growing substance used in cutting cuttings had a different effect on the regeneration phases and the speed of plant development. Observation of the further development phases of the rooted cuttings showed that in all variants of the experiment (except for the Maxma Delbard-14 graft), IMK was recorded in cases where the water concentration was 80 mg/l (Table 4).

Table 4 The effect of different concentrations of growth factor (IMK) on the development of rooted green cuttings of cherry grafts (2017-2019)

Options	Indicators of development of a rooted cutting				
	number of roots of the first order, pcs	volume of the root system, cm^3	plant height, cm	diameter of plant stem, mm	leaf area, cm2
Colt					
Water treatment of cuttings (control)	14	4,0	33	4,9	322,7
IMK -20 mg/l	16	4,2	36	5,1	328,5
IMK -40 mg/l	18	4,9	41	5,7	336,4
IMK -60 mg/l	20	5,3	43	5,9	340,6
IMK -80 mg/l	23	5,9	49	6,5	345,7
IMK -100 mg/l	24	6,0	48	6,4	344,9
VSL-2 (Krimskiy-5)					
Water treatment of cuttings (control)	18	4,3	35	4,9	326,4
IMK -20 mg/l	19	4,8	38	5,1	329,5
IMK -40 mg/l	21	5,3	41	6,5	338,3
IMK -60 mg/l	23	5,9	49	6,8	340,1
IMK -80 mg/l	25	6,9	58	7,1	343,6
IMK -100 mg/l	25	6,9	59	7,2	343,7

The characteristics of the development of the root system of cherry grafts directly depended on the speed of initiation of rhizogenesis. In particular, it was observed that a strong root system was formed in experimental variants where the development of the root system started the earliest. At the end of the growing season, the root system with the highest values was formed in the types of cherry grafts with high regeneration properties. Therefore, in the VSL-2 (Krimsky-5) graft with the highest degree of rooting, depending on the concentration of the growing substance, a root system was formed in the volume of 4.8 to 6.9 cm3, which compared to the control by 0.5-2.6 cm3 is high.

The data in the table shows that along with the effect of the growth factor concentration on the rate of development of the above-ground cuttings of cherry grafts, the regeneration indicators of the plant and its genetic characteristics are also directly related to it. In this case, the most rapid growth of the above-ground part of the plant was recorded in the VSL-2 (Krimsky-5) graft. The overall average height of plants rooted from green cuttings of these grafts ranged from 38 to 59 cm, depending on the concentration of the growth medium. The superiority of the above-ground development compared to the control was 3-24 cm, respectively.

The dependence of the development indicators of the above-ground part of the plant on the genotype of the graft was clearly expressed, especially in the calculation of the leaf area. From the data in the table above, it can be seen that although the VSL-2 (Krimsky-5) graft has advantages over other grafts with good rooting and growth, due to the thinness of its leaves (elongate peach leaves), the total leaf area was the smallest in this type of graft - 231.4-251.1 cm2.

Conclusion

Colt and VSL-2 (Krimsky-5) grafts of cherry are considered species that are prone to reproduction by vertical grafting, from each mother bush one can get an average of 13-17 rooted standard grafts per growing season.

Cherry VSL-2 (Krimsky-5) grafting takes root very well when grown in a green pen style on an artificial substrate consisting of a mixture of sand and humus in a ratio of 1:1 in a special facility with controlled indoor microclimate and allows to obtain 8,200 standard grafts from 0.1 ha of facility area.

References

1. Абдикаюмов З.А. Морфобиологические особенности роста и развития подвоев черешни в условиях центральной зоны Узбекистана. // Научные основы современных технологий выращивания и повышения эффективности хранения сельскохозяйственной продукции. Материалы IV Международной научно-практической конференции молодых ученых, аспирантов и студентов. – Харьков, 2016. – С. 11-14.
2. Abdikayumov Z.A., Buriev Kh.Ch., Khojakulov U. Morphobiological features of growth and development of cherry grafts // Agro science - Uzbekistan agriculture. - Tashkent, 2017. - #1 (45). - 45-47 p.
3. Buriev H.Ch., Enileev N.Sh. and b. Methods of calculations and phenological observations in conducting experiments with fruit and berry-bearing plants. - T., 2014. - 64 p.
4. Доспехов Б.А. Методика полевого опита. – М.: Колос, 1985. – С.131-140.
5. Islamov S.Ya., Buriev Kh.Ch., Abdikayumov Z.A. The role of growth regulators in the propagation of plant grafts by the green pen method. // The current state and development prospects of the field of selection and breeding of agricultural crops. - Tashkent, 2015. - 464-467 p.
6. Трачев Д.К., Мондешка П.К. Производственное значение вегетативно-размножаемих подвоев в ҲП Болгарии. // Достижения в плодовом питомниководстве ҲП Болгарии и Молдавской ССР. – Кишинев: Картя Молдовеняски. – Пловдив: Христо Г.Данов., 1978. – С. 101-111.