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THE APPLICATION OF MICRO GRAFTING TECHNIQUE IN MICRO PROPAGATION OF CHERRY ROOT STOCK CULTIVAR

Saimnazarov Yuldash Bekmirzayevich*; Abduramanova Salomat Khudaybergenovna**

*Professor,
Doctor of Biological Sciences,
Tashkent State Agrarian University,
UZBEKISTAN

**Doctor of Philosophy (PhD) on agricultural sciences,
Scientific-Research institute of Horticulture,
viticulture and winemakingnamed after academician Makhmud Mirzaev,
UZBEKISTAN
Email id: abduramanova28@mail.ru

ABSTRACT

The in vitro propagation techniques of cherry rootstock cultivars, micro grafting virus free elite cultivars on the compatible rootstocks and cultivating within a year are revealed in the article. These techniques serve for the development of intensive horticulture.

KEYWORDS: *Cherry, Rootstock, Variety, Micro propagation, Growth Regulators, Micro grafting.*

1. INTRODUCTION

About 200 species of micropropagation of cherry plants are well studied and developed in the world.

But even so, the correct application of the types and amounts of cytokine, the propagation of high-quality and productive plants on an industrial scale, is still a very controversial issue and still has its own problems.

Nowadays, in vitro micropropagation of fruit trees is well established not only for propagation of grafting but also for varieties.

Using in vitro micrografting technology of fruit trees allows for an unlimited number of grafting throughout the year as well as a highly effective product through a unique combination of

grafting [1,2,3].

In order to be successful grafting of micropropagation of rootstock in vitro method grafted seedlings, the location on the graft, the size of the shoot tip, light, temperature, the composition of the nutrient medium, the effect of plant hormoneswas studied[5,6].

The micropropagation branches were detected as the best sources of grafting which propagated *in vitro*.The dormant buds harvested in November took the next place in terms of advantage.

Most of the grafts stopped developing after the initial growth.

2. MATERIALS AND METHODS.

The researches were conducted in the "Biotechnology" laboratory of the Research institute of horticulture, viticulture and winemaking named after Academician Mahmud Mirzaev in the rootstock of cherries Krymsk-5andReversh on.

In the laboratory, the method of micrografting of citrus fruits by L.Navarro's was used in our experiments[4].

The used stages in the introduction of the Reversion variety:

Buds in dormant state, collected from November to February;

New vegetative branches of plants growing in the field;

The tip of the vegetative branches grown *in vitro* was selected;

Cherries from the mother garden were cut from branches of the Reversh on variety of 2-5 mm in length.

The accuracy of all experiments was achieved by a radical comparison of the control variants.

3. RESULTS AND DISCUSSIONS.

The success of micrograftingin order to obtain disease-free plant material depends on a variety of factors.

Among other factors, treatment with plant hormones accelerated tissue regeneration at the joints of grafted parts and increased the viability of grafts.

Pre-treated shoottips grafting not only increase grafting efficiency, but also eliminate the blackening and drying of shoots encountered during *in vitro*micrografting.The combination of auxin and cytokine stimulates the growth of the shoot tip and the formation of conductive bonds, as well as the adhesion of rootstock and insert.Cytokines rejuvenate plant cells and together with auxin, stimulate tissue proliferation (proliferation) in the connective tissue of the graft.

Various initial treatments on the grafted shoots, the grafting method and the post graft lighting conditions influenced the success of the grafting.

Prior to grafting, the upper part of the rootstock and lower part of the insert (cutting side shoots, shoot) were soaked in a mixture of various antioxidants and plant hormones for 1 minute.

When grafting by this method, no blackening was observed on the cut surfaces of the rootstock (shoot, cutting side shoots) and the insert. High grafting efficiency was achieved when treated

with a combination of 150mg/lGA_3, 0,5mg/lIBA. The experiments studied the introduction and rooting of cherries in Krymsk-5graft and Revershon cultivar in MS (Murasige and Skoog,1962), MS_{imp} (Murasige and Skoogmodified) DKW (Driver and Kuniyuki, 1984) and WPM (Woody plant medium) nutrient media.

In grafting cherry plants, the concentration of sucrose in the liquid nutrient medium affected the efficiency, and the best result was observed when using a sucrose nutrient medium of 30 g/l.

By studying the effect of different composition nutrient media on the grafting efficiency was achieved when using a sequence of semi-solid MS medium, liquid MS medium, vermiculite liquid MS medium (Fig.1).

When micrografting was grown in a semi-solid MS medium that containing 3% of sucrose, the efficiency was 75.6% and in a semi-solid MS medium containing 5% of sucrose, the efficiency was 82.7%.

The success of micro grafting technology, in order to obtain disease- free plant material, depends on a variety of factors.

Among these factors, as a result of treatment with plant hormones, the acceleration at the tissue regeneration at the joints of grafted parts and the survival of grafts increased.

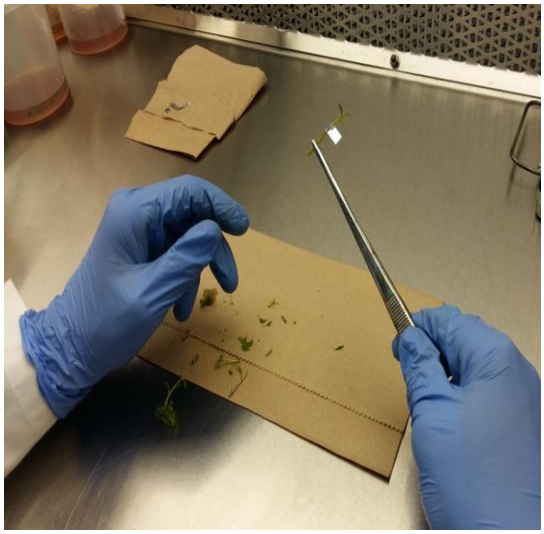
a  b 

Figure 1.*preparation of cherry plant for micrografting (a) and the process of micrografting(b)*

Initially treated shoottips not only increase grafting efficiency, but also eliminate situations such as blackening and drying of the shoottips encountered during micrografting*in vitro*.

Assessment of incompatibleness of the grafted parts.

Incompatibleness is the inability of two different plants to form a successful combination when grafted together and not to grow well together as a single plant.

The incompatibleness of grafted parts in fruit plants is divided into two classifications: Transferable and local incompatibleness.

Thetransferable incompatibleness is due to the variation of some variable factors between the grafted parts and cannot be eliminated even when mutually compatiblegrafted parts are inserted.

The local incompatibleness is due to the formation of a junction between the rootstock and the insert.Mutually compatible grafted parts can be eliminated by insertion.Predicting combinations of incompatible grafted parts prevents economic losses.If signs of incompatibleness of grafted parts in the field are detected after several years, they can be detected early with the help of micrografting and callus accumulation technologies *in vitro*.

The use of micrografting technologies in the assessment of compatibleness and incompatibleness between the grafting pairs gave good results.

Micrografted plants were usually difficult to take root.

For rooting purposes, the IBA growers have proven to have a positive effect on the micrografting of cherries.At the same time, growersubstances enhance the cell division and accelerate callus formation, which in turn leads to an increase in the number of successful micrografting compounds.

The micrografted plants were grown in incubators at the temperature of 21-23^{0}C relative humidity 50-60% and 6200 lux light.

In vitro conditions of cherry grafts for 2018-2020 MS, DKW, $MS_m$and WPM studied the rooting, number and length of roots under the influence of IBA 2,3,3,5 and 4 mg/l of nutrients in nutrient media. (table -1).

TABLE 1 THE INFLUENCE OF DIFFERENT CONCENTRATIONS OF IBA GROWER MATERIAL ON ROOTING OF REVERSHON VARIETY OF MICROGRAFTED CHERRIES, 2018-2020 YEARS

Nutrient media	Concentration, mg/l	Date of first rooting	Full rooting, date	Roots		
				Num, pieces	Length,cm	Rooting, %
MS control	2	13/IV	26/IV	2,5	2,8	24,9
	3	12/IV	25/IV	3,3	4,0	38,6
	3,5	10/IV	25/IV	3,8	4,2	42,4
	4	10/IV	23/IV	3,8	4,2	48,1
DKW	2	16/IV	22/IV	2,2	1,7	20,8
	3	15/IV	22/IV	3,4	3,8	45,6
	3,5	12/IV	16/IV	4,3	5,2	76,9
	4	12/IV	16/IV	4,4	5,3	84,7
MS_{imp}	2	16/IV	25/IV	2,1	2,4	20,3
	3	16/IV	21/IV	4,1	3,8	51,6
	3,5	15/IV	20/IV	4,3	4,0	81,3
	4	15/IV	20/IV	4,6	4,0	75,6
WPM	2	20/IV	3/V	1,4	2,0	8,4
	3	19/IV	30/IV	2,0	3,4	15,0
	3,5	18/IV	29/IV	2,7	3,4	17,3

	4	18/IV	28/IV	2,7	3,6	18,4
	$CD_{00,5}$	-	-	0,1	0,2	-

Values in parenthesis are arc sine transformed values.

CD = Critical difference

According to the results of the experiments, the Revershon variety under the influence of IBA 3,5 mg/l took fully root in 15 days, the pieces of roots were 3.8, the length of roots were 4.2 cm and root rate was 42.8%, while IBA in a controlled nutrient medium, 4mg/l under the influence of IBA grower material it took full root in 13 days, the roots were 3.8 pieces, the root length was 4.2cm and the root rate was 48.1%.

Growing agent in DKW nutrient medium under the influence of 3.5mg/l IBA Revershon variety took full root in 4 days, the number of roots was 4.3, the root length was 5.2cm, the root rate was 76.9%, which is higher than the control variant, rooting took place in 9 days earlier, the number of roots increased by 0.5 pieces, the length of the roots was 1cm, the rate of rooting was 37.2% higher.

By the growing agent of 4 mg/l IBA rootstock fully rooted in 4 days, the number of roots was 4.4, the length of the roots was 5.3 cm, the root rate was 84.7%, the full rooting of the variety was in 9 days earlier than the control option, the length of the roots was 1.1 cm, the root rate was 36.6% higher.

Growing agent inMS_m nutrient medium under the 3.5mg/l IBA Revershon variety took full root in 5 days, the number of roots was 4.3, the length of the roots was 4.0 cm, the root rate was 81.3%, compared to the control variant, full rooting is 8 days early, the number of roots is 0.5, the length of the roots is less than 0.2 cm, the rate of rooting is higher by 27.5%.

Revershon variety under WPM nutrient medium 3.5 mg/l IBA fully rooted in 11 days, the number of roots was 2.7, the root length was 3.4 cm, the root rate was 17.3%, which is higher than the control variant 4 days before rooting, the number of roots was 1.1, the length of the roots was 0.8 cm, the rate of rooting was low by 25.1%.The highest root formation rate in the Revershon variety was 84.7% of the variety under DKW nutrient medium 4 mg/l IBA.

The most ineffective indicator for rooting of the Revershon variety was 8.4% of the variety's rooting under the influence of 2 mg/l IBA, a grower medium in the WPM nutrient medium.

4. CONCLUSION.

In conclusion, we can grow half-dwarf thousands of cherry seedlings in a short period of time using micro grafting technology.

Micropropagation provides high opportunities in the improvement of plant seedlings and can be used in the propagation of fruit seedlings without viruses and without the use of harmful pesticides.

Also, micro grafting should also be used to predict imbalances between graft pairs, histological studies, detection of viral plants, reproduction of healthy plants free from soil-borne diseases, harmless gene pool exchange between countries, propagation of plants that are difficult to root.

This technology makes a great contribution to the year - round propagation of micrografted plants, consisting of virus- free elite varieties and appropriate grafts, as well as the development of intensive horticulture. The demand for finished products is higher than the semi-finished products. According to the principles of the market economy, high demand leads to an increase in price.

The field grafted seedlings are transferred to a portable pots and stored in greenhouses. When grafted seedlings are stored in a greenhouse, there is an additional expense for self-disease protection, fertilizers and heat energy.

In the laboratory, the grafted seedlings become the finished product and are transferred directly to the farm field. This eliminates the extra cost of the field grafting.

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