International Journal of Agriculture Innovations and Research
Volume 12, Issue 6, ISSN (Online) 2319-1473
Manuscript Processing Details (dd/mm/yyyy):
Received: 09/04/2024 | Accepted on: 01/05/2024 | Published: 15/05/2024

Study on the Assessment of Variety/Rootstock Compatibility Expression in Cherry Species with a view to Obtaining Some Varieties Tolerant to Plum Pox Virus

Florentina Dobrinescu[1*], Ligia Ion[2] and Viorel Catalin Oltenacu[3]
[1,2,3]Orchard Development Research Station Baneasa Bucharest, Romania.
*Corresponding author email id: florentina_dobrinescu@yahoo.com

Abstract **– Obtaining a valuable fruit tree planting material, authenticated in terms of phytosanitary status and suitability for different culture systems is a major objective of researchers in the field of fruit growing. Grafted trees represent a new organism, the two components being in a permanent interdependence. The influence of the rootstock is predominant, it leaves its mark not only on the growth and development of the scion, but also on the formation of its morpho-anatomical structure. The scion is characterized by a high stability of its own metabolism and exerts physiological and biochemical influences on the rootstock. The genetic characteristics of the varieties have a decisive role on the intensity of the manifestation of some diseases and not only that. Under the conditions of the Baneasa Fruit Culture Research Station Bucharest, we are studying the influence of rootstocks (mirobolan, mahaleb and adaptable) on ten autochthonous varieties of cherry in terms of evaluating the adaptability, tolerance and/or resistance of the plants to the plum pox virus.**

Keywords **– Variety, Rootstocks, Compatibility, Catch Percentage.**

I. INTRODUCTION

In the improvement of horticultural plants, the history of the development of knowledge and achievements in the field were specific to the level of knowledge and the concrete possibilities of each era [14].

On a global level, there is an intense and continuous concern for the genetic improvement of cherry varieties as the main way to improve agricultural performance, the quality of the harvest, to increase the commercial value of the fruit and the only possibility of increasing disease resistance, with implications in reducing production costs and the level of pollution of the agroecosystem [6].

The main aim of the work was to study the behavior of some autochthonous varieties of cherry when grafted onto three rootstocks, in order to find variants that are resistant or tolerant to plum-pox, in the context of climate changes that have left their mark on the growth and cherry development.

The evaluation of the differences in growth and fruiting of combinations of cherry varieties grafted on different rootstocks will allow the identification and evaluation of the agribiological potential of the studied material, in relation to the ecological factors [10].

In the relationship between grafts and rootstocks, a series of factors intervene with immediate or delayed influence regarding the phenotypic reaction of the grafted plant. Compliance with the general principles for establishing cherry orchards as well as with current culture technologies does not ensure and cannot guarantee the maximum percentage absence of delayed incompatibility phenomena in the young orchard.

The grafting of cherry varieties from the species Prunus avium L. on rootstocks other than frank, referring in particular to interspecific rootstocks, creates the premises for the appearance of these delayed incompatibility

phenomena. The causes are generated on the one hand by genetic, biochemical, morpho-anatomical or physiological factors and on the other hand by external factors such as climate (temperature, water), soil, pathogens that, above a certain threshold of intensity in a negative sense, trigger irreversible imbalances in the plant [2]. In some situations, for the appearance of symptoms of incompatibility, it is enough that only one of the factors is involved, but most of the time, the decline of the tree is caused by a combination of several factors in a greater or lesser weight.

The success of grafting depends to a large extent on placing the graft cambium and the rootstock as close as possible to make the weld as fast as possible. Environmental conditions during the grafting period are very important [11].

The grafting of a variety belonging to one species can be done on a rootstock of the same species, on a rootstock belonging to another species, or on a hybrid rootstock between two or more species.

In practice in our country, cherry varieties are grafted on cherry rootstocks, sour cherry rootstocks, mahaleb rootstocks and interspecific rootstocks with vegetative propagation.

II. Materials and Methods

10 varieties of cherry (Boambe de Cotnari, Daria, Izverna, Superb, Severin, Sublim, Spectral, Cerna, Colina and Tentant) from SCDP Baneasa were studied.

The following rootstocks were used:

- Mahaleb. Trees grafted on this rootstock have vigorous growth, a well-developed, deep root system, are resistant to drought and winter. It is resistant to aphids and Coccomices hiemalis, also to bacterial canker. It is indicated for relatively light, well-drained, loose soils. The trees develop normally in areas with annual rainfall below 550 mm, being sensitive to root asphyxiation. Comes into economic fruit early, in 3-4 years after planting, productivity is good, longevity average. It shows 6-8 days earlier flowering and fruit ripening for the same variety compared to trees grafted on wild cherry and reduced tree vigor by about 20% [12].
- Mirobolan C5 is a generative rootstock, approved in 1999, characterized by the following characteristics: vigorous as a seed, productive and tolerance to Plum-pox. The yellow fruits ripen very late (end of September). In the seedling school, emergence is very good, as is growth and resistance to foliar diseases. In the orchard, grafted varieties give great vigor, fruiting starts from the 4th year, but economic productions are obtained from the 5th year after planting. It is a rootstock recommended for poorer soils or in the case of replanting, as well as for orchards where harvesting is done mechanized [11].
- The Adaptabil rootstock is a vegetative one, being approved in 2000. It is propagated both by green cuttings and by woody cuttings. Print in the orchard medium vigor and an appreciable longevity. The roots adapt to a varied range of soils. It is resistant to excess humidity and lower temperatures. It is also resistant to plum-pox [11].

The grafting took place on September 8, 2023. The preliminary results refer, for now, to the success of the process of joining the two symbionts.

The method used was grafting into the eye while sleeping. It is one of the most widespread methods of grafting fruit trees.

This method allows grafting in full vegetation and the use of rootstocks with a smaller diameter, one year old. Regarding the grafts, the essential conditions that the branch from which I chose the buds met were: size, 40 cm; thickness (diameter), 7 mm; to have been lignified (developed in the current year); to have had well-developed buds; to have been uniformly raised; to have come from a healthy cherry variety.

III. Results and Discussions

The grafting of the ten cherry varieties was carried out at the beginning of September, 2023. The percentage of grafting was 100% for the Mirobolan C5 rootstock (table no. 2), 90% for the Mahaleb rootstock (table 1) and 60% for the Adaptabil rootstock (table 3).

Mirobolan C5 and Mahaleb rootstocks positively influenced the grafting percentage, the recorded values being comparable to those recorded for other drupaceous species.

Compared to the peach and the nectarine, the Adaptabil rootstock determines a much lower percentage of grafting in the cherry species, an aspect also confirmed by the study carried out.

The main phenological stages monitored during 2024-2025 for the mentioned cherry varieties, grafted on Mahaleb, Mirobolan C5 and Adaptabil rootstocks, will be: bud break, white button, beginning of flowering, end of flowering, fruit setting and fruit ripening.

Table 1. Grafting results on mahaleb rootstock.

The Variety/Rootstock Combination	Grafting Success	Total Catch Percentage
Boambe de Cotnari/Mahaleb	+	**90%**
Daria/Mahaleb	+	
Izverna/Mahaleb	+	
Superb/Mahaleb	+	
Severin/Mahaleb	+	
Sublim/Mahaleb	+	
Spectral/Mahaleb90 %	+	
Cerna/Mahaleb	+	
Colina/Mahaleb	+	
Tentant/Mahaleb	**x**	

Table 2. Grafting results on mirobolan C5 rootstock.

The Variety/Rootstock Combination	Grafting Success	Total Catch Percentage
Boambe de Cotnari/Mirobolan C5	+	**100 %**
Daria/Mirobolan C5	+	
Izverna/Mirobolan C5	+	
Superb/Mirobolan C5	+	
Severin/Mirobolan C5	+	
Sublim/Mirobolan C5	+	

The Variety/Rootstock Combination	Grafting Success	Total Catch Percentage
Spectral/Mirobolan C5	+	
Cerna/Mirobolan C5	+	
Colina/Mirobolan C5	+	
Tentant/Mirobolan C5	+	

Table 3. Grafting results on adaptabil rootstock.

The Variety/Rootstock Combination	Grafting Success	Total Catch Percentage
Boambe de Cotnari/Adaptabil	+	60 %
Daria/Adaptabil	+	
Izverna/Adaptabil	+	
Superb/Adaptabil	+	
Severin/Adaptabil	+	
Sublim/Adaptabil	x	
Spectral/Adaptabil	x	
Cerna/Adaptabil	x	
Colina/Adaptabil	+	
Tentant/Adaptabil	x	

Fig. 1. Grafting the Sublim variety on the Mahaleb rootstock.

Fig. 2. Grafting the Daria variety on the Mahaleb rootstock.

Fig. 4. Grafting the Daria variety on the Adaptabil rootstock.

IV. CONCLUSIONS

The grafted tree is a new organism resulting from the coexistence of two symbionts: the variety and the rootstock.

Between the two symbionts there is a series of mutual interactions that can benefit certain agronomic characteristics of the tree taken as a whole.

The success of grafting depends to a large extent on placing the graft cambium and the rootstock as close as possible to make the weld as fast as possible.

In the variants studied, the total percentage of attachment, after grafting, varied between 60% for the Adaptabil rootstock and 100% for the Mirobolan C5 rootstock.

REFERENCES

[1] Ardeleanu, M., Sestras, R., Ghidra, V. The precocity of entry on fruit of hybrids on their own roots, Bulletin CASCH, year 46/2, page 21-23
[2] Asanica, A. (2011). Integrated model for evaluation of the expression of compatibility and incompatibility of variety/rootstock for cherry in the orchard, Bucharest, UEFISCDI Project code PD-85.
[3] Blazek, J. (1992). Definition and general evaluation of spur type or compact growth habits in apples, Acta Horticultural no. 317. pp. 89-95
[4] Branişte, N., Popescu, I. (1986). Looks morpho-anatomical aspects of variety-rootstock compatibility in some combinations of grafting to hair, Scientific Papers of I.C.P.P. Pitesti-Maracineni, vol. XI, Technical Publishing House Agriculture, Bucharest, p. 237-243.
[5] Burza, I. et al. (1999) Physiology of cultivated plants. Vol.I, Poligrafica Publishing House, Chisinau, 1999.
[6] Cepoiu, N. (2001). Applied horticulture, Bucharest, RO: Stiintelor Agricole Publishing House.
[7] Chira, A., (2005). Fruit trees. Plantation establishment and maintenance work, Chisinau, RO: M.A.S.T. Publishing House.
[8] Chira, L., Asanica, A. (2010). The cherry and sour cherry, Chisinau, RO: M.A.S.T. Publishing House.
[9] Cociu, V., Oprea, St. (1989). Research methods in plant breedingfruit trees Docea Publishing House, ClujNapoca.
[10] Ion, L. (2007). Fruit growing, Bucharest, RO: Ceres Publishing House.
[11] Mazilu, C., Dutu I. (2014). The orchardist's guide, Bucharest, RO: Invel Multimedia Publishing House.
[12] Mitre V. (2008). Pomology, Cluj-Napoca, RO: Todesco Publishing House.
[13] Oancea I., (2003). High-performance agricultural technologies. Bucharest, RO: Ceres Publishing House.
[14] Sestras, R. (2004). Plant improvement, Cluj-Napoca, RO: Academicpress Publishing House.
[15] Vladianu, D. (1991). Grafting compatibility of hair varieties with quince BN 70 evaluated according to laboratory indices, Scientific Papers of I.C.P.P. Pitesti-Mărăcineni, vol. XIV, Agricultural Technical Publishing House, Ministry of Agriculture and Food, Academy of Agricultural and Forestry Sciences, Bucharest, p. 199-203.

AUTHOR'S PROFILE

First Author
Florentina Dobrinescu, She was born in 1977. He graduated from the Faculty of Agrotourism Management and works at Orchard Development Research Station Baneasa Bucharest, Romania.

Second Author
Ligia Ion, Orchard Development Research Station Baneasa Bucharest, Romania.

Third Author
Viorel Catalin Oltenacu, Orchard Development Research Station Baneasa Bucharest, Romania.