

*Genetics and Selection*

## New Malseco-Resistant Variety of Lemon “Dioskuria”

Petre Naskidashvili\*, Tristan Jobava\*\*, Julieta Sanikidze\*\*,  
Givi Getsadze\*\*

\* Academy Member, Agricultural University, Tbilisi

\*\* Georgian State University of Subtropical Agriculture, Kutaisi

**ABSTRACT.** The results of multi-year selection work are presented relating to the new variety of lemon “Dioskuria” obtained by remote hybridization. Research in both natural and laboratory environment has shown that this kind of lemon is resistant to Malseco disease, at the same time relatively frost-resistant and yields fruit of high quality. © 2008 Bull. Georg. Natl. Acad. Sci.

**Key words:** Malseco, “Dioskuria”, frost-resistance, hybrid.

Citrus cultures, including lemon, are less frost-resistant and periodically damaged by frost in winter, resulting in a great economic loss.

Apart from the problem of frost-resistance, during the last century a problem arose in connection with the spread of the disease Malseco, doing much harm to citrus plantations, causing their withering and destruction. In this case too the lemon culture is most vulnerable in comparison with the other citrus plants.

In the second half of the 20<sup>th</sup> century, Malseco became widely spread in the subtropics of Georgia and lemon plantations were almost destroyed. Owing to this, breeders faced the problem of selecting a frost- and Malseco resistant variety of lemon. Most of them considered that this problem should be solved by hybridization with the wild forms of cultigens (*Citrus jonos Ton*), relative genera of citrus, micro-citrus (Micro-citrus SW), kumquat (*Fortunella SW*) and hardy orange (*Poncirus trifoliata*). The mentioned initial components were used for selection works all over the world. As a result, a number of distant hybrids were selected. As a result of multi-year selection work, by the remote hybridization relatively frost- and Malseco-resistant variety of lemon – “Dioskuria” was selected. Lemon “Kartuli” (“Georgian”) was used as a mother-component in this

combination. In comparison with the other local varieties, it is characterized by higher economic index and equal frost-resistance, but extremely low Malseco-resistance. Because of this, the valuable variety of lemon has almost been exterminated in the subtropics of Georgia. As for the pollinator, *Poncirus trifoliata* was used during the cross-breeding. The distant hybrid, received in such a way, is of nucellar origin, analogous to the mother component, but with certain differences, in particular, it is distinguished for Malseco-resistance and relatively high frost-resistance. These factors are due to the influence of the pollinator – trifoliata. Practically, the received hybrid cannot be damaged by Malseco.

In addition to the above mentioned, “Dioskuria” has some morpho-biological peculiarities, different from the other varieties of lemon, including the mother plant. The diameter of its crown is much bigger than the height. The branching and leafage are extremely dense. “Dioskuria” flowers twice a year, in May and August. The flowers are white, without an anthocyanin coloring. The flowers, as well as fruits are formed inside the crown and are less visible due to the dense leaf covering. In comparison with the other varieties “Dioskuria” has higher yield. The fruit is of good quality. Fruit bearing

of “Dioskuria” begins from the third year. An average yield of the plant is 120 kg.

Biochemical analysis showed that the fruit contains 10% of dry substance, 44.3% of vitamin “C”, 3.8% of total sugar, 5.2% of acidity. As a result of multi-year experiments with “Dioskuria” in natural and artificial environment, it was determined that the frost-resistance of “Dioskuria” is higher than that of “Kartuli” and other famous varieties of lemon.

It should be noted that because of the wide spread of Malseco in Georgia, valuable local and foreign varieties have been almost totally destroyed, while this disease has not been noticed with “Dioskuria”.

Researches in laboratory conditions (e.g. putting the cut branches in culture filtrate, artificial infection, the influence of leaf and fruit marc on germination of *Tracheifila pycnospores*, study of anatomical cuts) con-

firmed the high resistance of “Dioskuria”.

Based on the high economic index and resistance to Malseco and frost of “Dioskuria” it has been implemented as the main industrial variety in Georgia; it is not ruled out that it may become a prospective variety in countries where lemon is cultivated.

At present, the biological characteristics of this variety are being studied successfully in the laboratory. Cytological studies have shown that the number of its body cells is equal to the number of chromosomes in the initial component:  $2n=18$ .

Embryological study of “Dioskuria” showed a pronounced polyembryony of this variety. Along with a sex hybrid, it yields a large number of nucellar seedlings that are identical with the mother plant.

Reproduction of “Dioskuria” by vegetation (grafting) and with nucellar seedlings can successfully be used for obtaining saplings and planting industrial plantations.

## გენეტიკა და სელექცია

# მალსეკოსადმი გამძლე ლიმონის ახალი ჯიშის “დიოსკურია”

პ. ნასყიდაშვილი\*, ტ. ჯობაჯა\*\*, ჯ. სანიკიძე\*\*, გ. გეწაძე\*\*

\* აკადემიის წევრი, სასოფლო-სამეურნეო უნივერსიტეტი, თბილისი

\*\* საქართველოს სუბტროპიკული მეურნეობის სახელმწიფო უნივერსიტეტი, ქუთაისი

ლიმონი “დიოსკურია” მიღებულია შორეული ჰიბრიდიზაციის მეთოდის გამოყენებით ლიმონ „ქართულის“ *P. trifoliata*-სთან შეჯვარების გზით. როგორც საუფლე, ისე ლაბორატორიულ პირობებში გამოკვლევის შედეგად დადგენილია, რომ ის არის დააუადება მალსეკოსადმი გამძლე, ამავე დროს შედარებით ყინვაგამძლე, უხემოსაგულიანი და კარგი ხარისხის ნაყოფის მომცემი ჯიში.

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