

Research Note

Breeding for Ukrainian table grape varieties

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Introduction: Early ripening grape varieties with high fruit quality could considerably improve the Ukrainian viticulture. For this purpose, early large-berried varieties should be crossed with frost resistant ones to produce varieties of high commercial value at northern latitudes (CARRENO *et al.* 2009). Furthermore, the rational introduction of new early ripening grape varieties would improve the continuity in the supply of table grapes and extend the length of the fresh consumption period up to 3.5 months (MAHMOUDZADEH *et al.* 2010).

The breeding program of the National Institute for Vine and Wine Magarach aims to obtain new high quality grapes (comparable to *Vitis vinifera* L. varieties) with stable yields and better resistance to fungal diseases, phylloxera and frost damages. Effective grapevine breeding programs should be based on genetic knowledge (CANCELLIER *et al.* 1990, BESLIC *et al.* 2009, IBÁÑEZ *et al.* 2009). This paper reports results of an inheritance study of ripening time and berry weight in the hybrid progeny of table grapes.

Material and Methods: The study was done on 3704 hybrid seedlings obtained from 10 cross-combinations.

Hybridization was made as follows: each female parent was crossed with different male parents, and each male parent was crossed with different female parents. The varieties 'Podarok Zaporozh'iu', 'Talisman', 'Flamingo' and 'Flora' were used as female parents. The varieties 'Arcadia', 'Richelieu', 'Novyi Podarok Zaporozh'iu', 'Tomaiskii', 'Cardinal', 'Nakhodka Mariupolia' and 'Elegant super early' were used as male parents. Most of these varieties are complex interspecific hybrids with a percentage of *V. vinifera* derived from different eco-geographical groups (NEGRUL 1946). For each progeny, the breeding effect was assessed as the percentage of seedlings with early ripening time and average berry weight higher than 6 grams. Ripening time and berry weight of the studied seedlings were described according to the OIV Official List (O.I.V. 2001).

For data processing Microsoft Office Package processor with Excel standard functions was used.

Results and Discussion: The inheritance of desired traits and their expression in the progenies characterize the genetic potential of parent varieties. The viability of seeds, the percentage of seedlings with early ripening time and large berry weight and the breeding effect of the studied cross-combinations are shown in the Table. The medium-season ripening variety 'Podarok Zaporozh'iu' gave the highest percentage of full-viable seeds (more than 90 %), followed by the early to mid-ripening variety 'Talisman' and the medium-late variety 'Flamingo' (ranging from 80 to 90 % of full-viable seeds). The lowest percentage of viable seeds (58-61%) was given by the early ripening variety 'Flora'. In general, very early ripening female parents did not provide a high germination of seeds. On the other hand, the highest percentage of viable seeds was found in progenies of mid-ripening male parents. Thus, crossings of early ripening female parents with middle-season ripening male parents are considered the optimal combinations.

The combining ability of the parents affected the percentage of seedlings with early ripening time. The percent-

Table

Formation of early ripening time and large berry weight in 10 grapevine F₁ progenies

Cross-combination	Ripening time of parents		Full-viable seeds	Early ripening genotype	Genotypes with berry weight higher than 6 g (%)	Breeding effect of progeny
	♀	♂				
Podarok Zaporozh'iu x Arcadia	mid-season	early	90.4	1.4	100.0	1.4
Podarok Zaporozh'iu x Richelieu	mid-season	very early	92.1	63.9	84.8	14.6
Talisman x Arcadia	early to mid	early	82.6	5.7	100.0	5.7
Talisman x Novyi Podarok Zaporozh'iu	early to mid	early	83.4	0.0	100.0	0.0
Talisman x Tomaiskii	early to mid	very early	81.7	36.4	76.1	12.7
Flamingo x Arcadia	medium-late	early	87.1	9.8	75.0	2.4
Flora x Cardinal	early	early	60.2	12.4	0.0	0.0
Flora x Nakhodka Mariupolia	early	early	58.4	28.4	3.1	1.1
Flora x Richelieu	early	very early	59.7	43.9	0.0	0.0
Flora x Elegant super early	early	very early	61.0	0.0	44.4	0.0

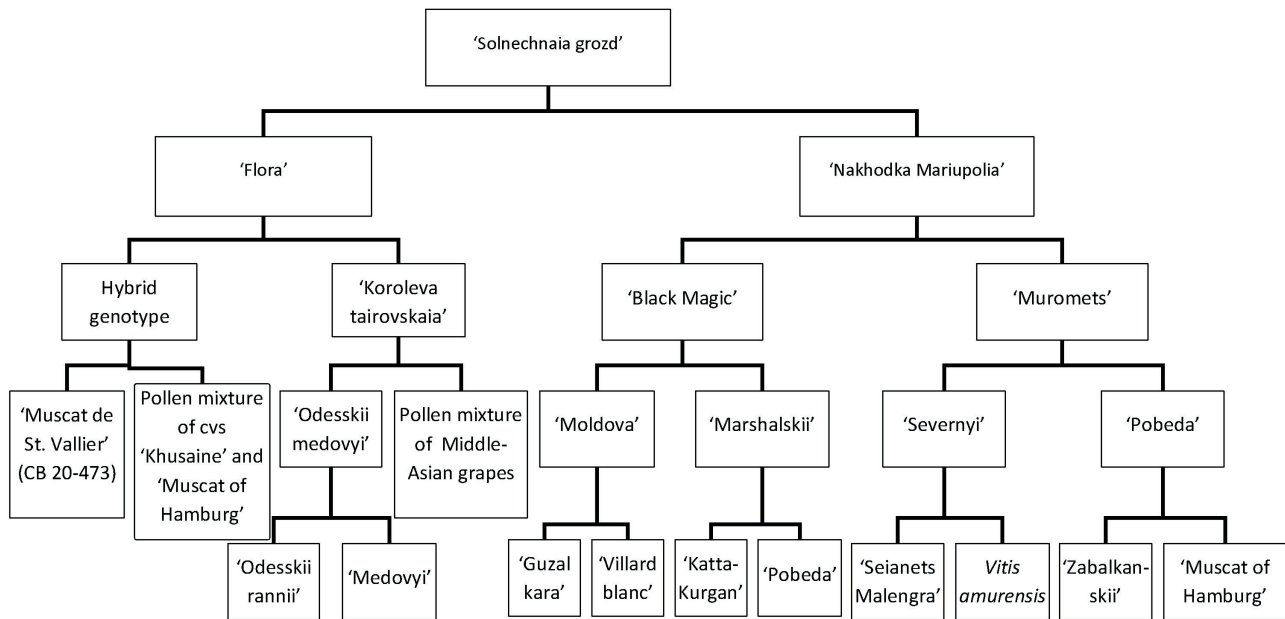


Figure: Breeding scheme of the new early table grapevine variety 'Solnechnaia grozd'.

age of seedlings with early ripening time in the progenies obtained by crossing different male parents with the female parents 'Podarok Zaporozh'iu', 'Talisman' and 'Flora' varied from 1.4 to 63.9 %, 0 to 36.4 %, and 0 to 43.9 %, respectively. Both male and female parents of seedlings determined their ripening time.

All varieties used in the crossings have berries of medium, large and very large weight. 'Podarok Zaporozh'iu' and 'Talisman' have berries with 20 g of weight. All 'Talisman' x 'Arcadia' and 'Talisman' x 'Novyi Podarok Zaporozh'iu' seedlings have large and very large berries, indicating that these two female parents may be used as donors of large berry weight. The percentage of large-berried seedlings with 'Flamingo' as female parent was up to 75 %, while the transmission of this trait by 'Flora' was never high irrespective of the male parents used.

The highest breeding effect was seen in the cross-combinations 'Podarok Zaporozh'iu' x 'Richelieu' and 'Talisman' x 'Tomaiskii' where the percentage of seedlings with both early ripening time and large berry weight was 14.6 % and 12.7 %, respectively. The cross-combinations with 'Flora' as female parent had zero breeding effect as this variety produced only mid- or late-ripening large-berried seedlings or early-ripening seedlings with berries of small or medium weight.

Thus, in order to obtain progenies with early ripening time and large berry weight, early to mid-ripening and mid-season ripening donors of large berry weight enabling high percentage of viable seeds, should be used as female parents, and donors of super early ripening time should be used as male parents.

Another result of our study was an outstanding early large-berried hybrid genotype selected in the progeny 'Flora' x 'Nakhodka Mariupolia' and released as a table variety under the name of 'Solnechnaia grozd'. The Figure shows the scheme of breeding of this variety. An application form

for submitting the variety, for its subsequent registration in the State Register of Plants to be distributed in Ukraine, was filled in 2013.

Conclusions: As a result of this study, table grape varieties with early ripening time, up to less than 105 d, and berry weight higher than 6.0 g were obtained by using suitable parents. 'Flora', 'Richelieu' and 'Tomaiskii' were the best donors of early ripening time while 'Talisman', 'Podarok Zaporozh'iu' and 'Arcadia' were the best donors for high berry weight. The breeding effect for early ripening time and large berry weight is determined by the suitability of parents and their combining ability and was shown in the 'Podarok Zaporozh'iu' x 'Richelieu' and 'Talisman' x 'Tomaiskii' cross-combinations.

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