

RIESLING ITALICO SUBCLONES

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Clone selection in viticulture represents a way of eliminating the negative influence of mutation changes in the future vineyard, as well as preventing the virus-infected plants and plants infected with virus-related diseases from further propagation. Riesling Italico variety is an old variety. It has been grown in Vojvodina for centuries. The clone selection of Riesling Italico variety in Sremski Karlovci was started in 1975. In January 1991 three clones were recognized. Shortly after, the subclone selection of these three clones was initiated. This paper presents the resultants of subclone selection of Riesling Italico. Subclones SK 54-4 and SK 54-10 are characterized by good quality and the grapes of these subclones can be used for the production of high quality wines in most of the years.

Key words: clonal selection, Riesling Italico, wine grape

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INTRODUCTION

The clone selection in viticulture represents a way of eliminating negative influence of mutation changes in the future vineyard, as well as preventing the virus-infected plants and plants infected with virus-related diseases from further propagation (RUHL *et al.* 2004). Therefore, the clone selection comprises genetic and sanitary selection which should both precede the production of the planting material. Various selection methods are used in grapevine growing: mass negative selection, mass positive selection, selection by type and individual selection. The best results are obtained by the individual clone selection made from individual, best grapevines.

The clone selection of large number of varieties has been made and highly productive clones are obtained (HAJDU 1990; HUBERT *et al.* 2002; MAIGRE 2002; MATTHEW *et al.* 2009), while the clone selection of other varieties is still in the process (RAKONJAC *et al.* 2010).

The old grape cultivars have important place in viticulture even today, although the significant number of new cultivars have been created with good production characteristics globally (KORAĆ *et al.* 2006; KORAĆ *et al.* 2008, IVANIŠEVIĆ *et al.* 2011). The Italian Riesling variety is an old variety. It has been grown in Vojvodina for centuries (CINDRIĆ *et al.* 2000). During such a long period this variety has become quite heterogeneous. Regarding the facts that Riesling Italico is the most common variety in Vojvodina and that it will remain as such for a long time, it is necessary to carry out the clone selection with the aim of preserving the quality of this variety, or to discover the clones that are more productive than those of the population. It is also necessary to create mother seedlings of the clone based selection of the material of this variety according to the certification pattern enacted by the Law on Planting Material for Fruit Trees and Grapevine of the Republic of Serbia, since the new vineyards are to be grown solely with this material.

Clone selection of Riesling Italico variety in Sremski Karlovci

The clone selection of Riesling Italico variety in Sremski Karlovci was started in 1975 based on the method of individual clone selection carried out in 4 phases, lasting from 15 to 20 years (CINDRIĆ 2003).

The first phase of the selection (CINDRIĆ *et al.* 2006) started in the production vineyard with 12000 grapevines planted in the experimental field in Sremski Karlovci. The grapevines were in good condition with abundant crops. Ninety-six grapevines, that were the healthiest and most fruitful, were chosen on the basis of visual estimation. At the time of the harvest each grapevine was chosen separately and the basic quality indicators were determined.

It was concluded that this variety was highly heterogeneous. The best thirty-six grapevines were singled out.

The first vegetation offsprings, 36 grapevines that were singled out, were planted in Palić in 1977. Every candidate had 10 grapevines. After five years of the investigation, the number of candidates was reduced to 15.

The second vegetation offsprings of the chosen candidates were planted in Sremski Karlovci in 1986 according to the experimental design of 'Latin square 5x5' with 12 grapevines in repetition. In January 1991, former SFRY Federal Commission for Recognition of New Cultivars chose three clones: SK-13, SK-54 and SK-61.

SK-13 clone had considerably high yield, but regarding its sugar level it was at the population level. As for the botrytis resistance, this clone was slightly in advance in comparison to the other clones.

SK-54 clone had the highest level of sugar in the grape juice, almost 3% higher than the variety population did. It also had slightly higher level of acid compared to the population. The yield was the same as the one of the population. Its wine surpassed the wine of the population and other clones.

SK-61 clone had considerably higher yield and levels of sugar and acid than the variety population. Its wine surpassed the population wine.

In all selection phases the health of grapevines was visually estimated regarding the common symptoms of the most important virus diseases (BOVEY *et al.* 1980). Upon accepting the clones, serological investigation on virus presence was performed by ELISA test, as well as the indexation by variety indicators. Serological testing showed that all offsprings of the clones SK-13 and SK-54 were negative, that is, they showed no virus symptoms, while some grapevines of the SK-61 clone showed the nepovirus symptoms.

Shortly after, the subclone selection of these three clones started. Fifteen grapevines of each clone were chosen, and they were thoroughly analyzed in the period of 9 years, from 1993 to 2001. Several subclones that entered the second phase of the selection were chosen on the basis of these investigations.

The aim of this paper is to assess the usability value and sanitary status of the 6 subclones of the Riesling Italico variety, as well as to determine which of them should enter the third phase of individual clone selection.

MATERIALS AND METHODS

All the researches were conducted during 2006, 2007, 2008 and 2009, in the experimental field of Faculty of Agriculture in Novi Sad, Department of Fruit Science, Viticulture, Horticulture and Landscape Architecture in Sremski Karlovci. The experimental vineyard was planted in 1997 at the location of Bocka. The distance between the grapevines was 3.0 x 1.6 m, with two grapevines at every planting location, which means that a single grapevine nutrition area was 2.4 m². The training system of each grapevine was "single gijo". During the pruning one arch with 12 buds and one shoot with 2 buds were left per grapevine. Every subclone and the control had 24 grapevines (3 repetitions with 8 grapevines in every repetition).

The researches were conducted on the following subclones of the Riesling Italico variety: SK 13-13, SK 13-14, SK 54-4, SK 54-10, SK 61-1 and SK 61-6. The Riesling Italico clone SK 54 was chosen as the standard.

Several researches were conducted during the last four years. Upon harvesting all the grapes the yield was determined. The level of sugar in grape juice was

determined by Xlov grape juice measure. The level of acid was determined by the neutralization method with n/10 NaOH solution. Grey mould infection was determined by the visual estimation and it was represented in percent. The sensory analysis of wine produced by microvinification process was carried out. The process of creation of mother seedlings of pre-basic category was started by adding and resuscitating the subclone spurs in the greenhouse. In 2007, in Bari, Italy, the material added in the network was tested for the following viruses: GFLV, GLRaV-1, GLRaV-2, GLRaV-3, GFkV, GVA and GVB. The investigations were conducted by PCR method. The presence of GFLV, GLRaV-1, GLRaV-2 and GLRaV-3 viruses was tested by ELISA test at the Institute for Agriculture "Smederevo" in Kolari, in 2007 and 2008. This laboratory was accredited by the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia.

All the experimental results were analyzed according to the ANOVA and LSD test using the Statistica 9.0 program.

RESULTS AND DISCUSSION

Product characteristics

During the harvests on 03.10.2006, 03.09.2007, 11.09.2008 and 10.09.2009, the data were gathered on the realized yield, sugar and acid levels, mass of a grape and grape damages caused by grey mould (Table 1.).

In the observed period all the subclones realized the yields higher than those of the control. The Riesling Italico variety SK 13-14 realized the highest yield in the observed period, which was, statistically, considerably higher than the yield of the control and the subclones 54-4, SK 54-10 and SK 61-1.

The sugar level in almost all subclones was over 20 g/l. During the observed period the highest sugar level was determined in the subclones SK 54-10, SK 54-4 and SK 61-6. The lowest sugar level was determined in the R.I. SK 13-13. The climatic conditions in that year greatly affected sugar accumulation in the grapes. Different climatic conditions over the years affected the sugar level in grapes, which was why the statistically considerable differences between subclones were not determined.

All the subclones had higher acid level than the control. The Riesling Italico SK 13-13 had the highest acid level. According to this, there were no statistically considerable differences between the subclones. The subclone SK 54-10 had relatively high acid level and it also accumulated the highest level of sugar which can generally be seen as its positive characteristic.

In the observed period, grape damages caused by grey mould were not considered, partly due to the favorable climatic conditions and partly to the well conducted protection measures against this disease. Minor damages were observed in 2006.

The obtained results are in accordance with the expected results and previous researches (CINDRIĆ 2003; CINDRIĆ *et al.* 2006).

Tab. 1. Grape yield and quality (Sremski Karlovci)

Subclone	Rep.	Grape yield (kg/m ²)	Sugar in grape juice (%)	Acid in grape juice (g/l)	Grape mass (g)	Botrytis (%)
R.I. SK 13-13	2006	2.11	18.0	9.4	178	3.5
	2007	2.51	18.9	6.9	195	0.0
	2008	2.61	21.9	6.6	223	0.0
	2009	3.19	19.7	6.8	263	0.0
	Average	2.61 ab	19.7	7.4	215	0.9
R.I. SK 13-14	2006	2.23	20.5	7.6	162	1.0
	2007	2.68	17.9	6.4	145	0.0
	2008	2.89	23.1	5.9	183	0.0
	2009	3.27	21.2	5.9	197	0.0
	Average	2.77 a*	20.8	6.5	172	0.3
R.I. SK 54-4	2006	1.99	20.6	8.3	154	2.0
	2007	2.28	18.7	6.9	169	0.0
	2008	1.9	24.8	5.4	158	0.0
	2009	2.41	21.2	5.3	233	0.0
	Average	2.15 b	21.2	6.5	179	0.5
R.I. SK 54-10	2006	1.76	21.4	8.3	152	2.0
	2007	2.14	19.3	6.9	169	0.0
	2008	2.01	23.9	6.1	181	0.0
	2009	2.74	21.5	6.1	263	0.0
	Average	2.16 b	21.5	6.9	191	0.5
R.I. SK 61-1	2006	1.84	19.9	7.7	167	2.0
	2007	2.33	18.6	6.6	207	0.0
	2008	2.28	22.4	5.5	172	0.0
	2009	2.11	21.5	6.0	340	0.0
	Average	2.14 b	20.6	6.5	222	0.5
R.I. SK 61-6	2006	2.10	20.4	7.9	154	3.0
	2007	2.41	20.1	6.4	213	0.0
	2008	2.59	21.4	6.2	250	0.0
	2009	2.54	21.8	5.8	243	0.0
	Average	2.41 ab	21.0	6.6	215	0.8
R.I. SK 54-K	2006	2.00	20.3	7.6	149	2.3
	2007	2.46	18.6	6.7	174	0.0
	2008	1.87	23.4	5.3	167	0.0
	2009	2.18	21.3	5.8	217	0.0
	Average	2.13 b	20.7	6.4	177	0.6

ab Values marked with different letters are statistically significantly different for significance threshold of **0.05** (LSD test).

Wine quality

The evaluation of all tasted wines from the subclones was high (Table 2.), while the control wine received slightly higher evaluation. Wine of the subclone R.I. SK 54-10 was distinguished by fine scent. Wine tasters classified the wines of Italian Riesling subclones into the category of quality and high quality wines.

Tab. 2. Wine quality (Sremski Karlovci)

Subclone	Tasting evaluation				
	2006.	2007.	2008.	2009.	average
R.I. SK 13-13	17.5	18.3	17.7	17.4	17.7
R.I. SK 13-14	18.3	18.1	18.0	17.5	18.0
R.I. SK 54-4	18.6	18.0	18.3	18.2	18.3
R.I. SK 54-10	17.7	18.8	18.5	18.4	18.4
R.I. SK 61-1	18.0	18.2	18.6	18.1	18.2
R.I. SK 61-6	18.1	17.9	17.9	17.7	17.9
R.I. SK 54-K	18.6	18.8	18.6	18.2	18.6

Sanitary status

The results of serological testing showed the presence of GFkV virus in R.I. SK 61-1 and R.I. SK 61-6 and these subclones were removed from the greenhouse. The other subclones did not show the presence of any viruses.

CONCLUSION

The subclone selection of Riesling Italico variety in Sremski Karlovci resulted in several interesting genotypes. The subclones SK 54-4 and SK 54-10 are characterized by good quality and the grapes of these subclones can be used for the production of high quality wines in most of the years. The subclones SK 13-13 and SK 13-14 are characterized by high yield and quality of the entire variety population. Serological testing of these subclones did not show the presence of any significant viruses. The above mentioned subclones should enter the third phase of individual clone selection. The presence of the GFkV virus enabled the subclones SK 61-1 and SK 61-6 to enter the next phase of the selection. Favorable productivity characteristics of the subclone SK 61-6 were also observed. However, its further propagation is recommended after the sanitation.

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SUBKLONOVI RIZLINGA ITALIJANSKOG

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Klonska selekcija je način da se eliminiše negativni uticaj mutacionih promena u budućem vinogradu, kao i da se spreči razmnožavanje biljaka koje su zaražene virusima ili virusima sličnim bolestima. Sorta Rizling italijanski je stara sorta. U Vojvodini se gaji već više vekova. Klonska selekcija sorte Rizling italijanski u Sremskim Karlovcima je otpočela 1975. godine. U januaru 1991. priznata su tri klona ove sorte. Ubrzo nakon toga je otpočeo rad na subklonskoj selekciji ova tri klona. Ovaj rad predstavlja rezultate subklonske selekcije sorte Rizling italijanski. Subklonovi SK 54-4 i SK 54-10 se karakterišu dobrim kvalitetom, i njihovo grožđe se, u većini godina, može koristiti za proizvodnju vrhunskih vina.

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