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YIELD AND QUALITY OF NEW WINE-GRAPE VARIETIES AND CLONES IN THE BELGRADE AREA

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Abstract: Comparative studies on new wine-grape varieties and clones developed at Sremski Karlovci, on the Experimental estate of Agricultural Faculty, Novi Sad, were conducted in the 1997-1999 period.

The studies comprised varieties Neoplanta (Smederevka x Traminer), Petra (Kunbarat x Pinot noir), Early Riesling (Riesling italico x Kunbarat) and clones of the variety Riesling italico: SK13, SK54, SK61. The population of the variety Riesling italico was used as a standard.

During the first three years of vineyard growing fertility, basic biological features of fertility and grape quality in studied varieties and clones were manifested. Highest grape yield was achieved in the variety Neoplanta, whilst best grape quality in the variety Petra. Clones of Riesling italico had higher fertility than the variety population, and clone SK54 produced highest yield and best grape quality.

Key words: variety, clone, fertility, grape yield, sugar, acids.

Introduction

Grapevine has been grown from times immemorial on the insolated rolling hills of Belgrade Danubian area, as evidenced by fossil remains discovered in Vinča and Grocka. The Danube waters provide specific, favorable climatic conditions for growing a great number of grapevine varieties. However, the

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assortment is still poor in number. The varieties grown most widely are Smederevka, Plovdina, Prokupac, Muscat Hamburg and Afuz Ali. Over the past few years varieties such as Riesling italico, Vranac, Župljanka, Cardinal, Queen of the vineyard, Gročanka, Demir Kapija, Muscat Italy etc. have been increasingly grown. But, the number of wine- and table-grape varieties is by far higher in the vineyard of "Radmilovac" Experimental school estate that belongs to Agricultural Faculty, Belgrade. Over the past fifty years the "Radmilovac" ampelographic collections have been employed for studying several hundred varieties, of which over fifty were zoned for growing in Serbian vineyards. The results were reported by Avramov et al. (1991, 1992), Tadijanović et al. (1995), B. Sivčev (1996), Vujović (1997), Žunić et al. (1998, 1999).

The vineyard renewed in 1994, studies on new domestic and introduced varieties and clones were carried on. Nakalamić et al. (1996, 1997, 1998, 1999, 2000) reported the results in their papers. The present paper gives the results of studies on fertility and grape quality in white wine-grape varieties and clones developed at Sremski Karlovci – Neoplanta, Petra, Early Riesling, clones of Riesling italico SK13, SK54 and SK61 as well as on those in standard populations of the variety Riesling italico. Cindrić et al. (1990, 1994, 1998) provided highest number of data on the said varieties.

Material and Method

Experimental vineyard was planted in 1994 at the »Radmilovac« site. »Radmilovac« is an experimental school estate that belongs to Agricultural Faculty, Belgrade. Row spacing was 3 x 1m, with two-row support, the training system was »two-sided asymmetrical cordon« (Nakalamić, 1991), and the trunk height was 90 cm. Mixed type pruning system with 8 –10 bud canes and two-bud spurs was applied.

Studies were conducted from 1997-1999, comprising the period of growing fertility of the studied varieties and clones and vineyard's age from 4-6 years.

During the experiment climate conditions were favorable for grapevine varieties growth and development, as can be seen from the data below:

	1951/99	1996	1997	1998	1999
- mean annual temperature, C°	10.8	10.9	10.6	11.6	12.0
- mean vegetative temperature, C°	16.5	17.1	16.1	17.6	17.9
- annual sum of precipitation, mm	659	732	769	627	1016.2
- precipitation in vegetative period, mm	428	459	569	441	658

Frost was the most severe in December 1996 (-16.3°C). On the experimental plot the soil is of brown forest type (cambisol) characterized by favorable physical

and chemical properties. During study years standard ampelotechnic practices were applied.

All studied varieties were planted on the same plot, represented by 15-50 vines each. Varieties were grafted on rootstock Kober 5BB.

Fertility and grape quality were tested for the parameters as follows:
- number of buds left on vine after pruning,
- number of developed and fertile shoots,
- number of bunches per bud left, developed and fertile shoot, and vine,
- bunch weight,
- grape yield per bud, shoot, vine, and hectare,
- contents of sugars and total acids of must.

Standard ampelographic methods were employed. Data were processed by the variance analysis and LSD test was used for evaluating the significance of differences manifested.

Results and Discussion

Shoot growth and development

The number of buds left on vine after pruning varied, depending on variety and vine's vegetative performance during study years. It took five years for the training system of »two-sided asymmetrical cordon« to develop i.e. to vineyard's five years of age (1994-1998). Year after year the number of buds left increased. In 1997 the number of buds ranged from 19.8 (Early Riesling) to 21.6 (clone SK54). In 1999 the number of buds reached standard bud load value and varied from 26.6 (Early Riesling) to 30.2 (clone SK13). During the 1997-1999 period, on average, bud load ranged from 23.57 in Early Riesling to 26.13 in Italian Riesling. The number of developed shoots depended on that of buds left. Mean number of developed shoots varied from 22.3 - 25.4 i.e. from 94.5 – 97.3% of the number of buds left. The share of fertile shoots was 90.2 – 94.8% within the structure of developed shoots. Highest percent of fertile shoots was found in clones SK13 and SK54 and lowest in the variety Early Riesling. Weather conditions did not have any significant effects on values of the said parameters since there had not been severe frosts and frost killing of buds (Tab. 1).

Fertility and bunch weight

Bud fertility, expressed by the number of bunches per bud, shoot, and vine, varied between varieties and per study year. On average, the number of bunches which developed ranged from 1.27 (Early Riesling) to 1.39 (clone SK54 and Neoplanta) per bud left, from 1.35 (Early Riesling) to 1.47 (clone SK54) per shoot, and from 1.45 (clone SK13) to 1.55 (clone SK54) per fertile shoot.

Accordingly, clone SK54 stands out for bud and shoot fertility. Highest mean number of bunches per vine was found in clone SK54 (35.57) and lowest in the variety Early Riesling (30.0). Lowest bunch weight was achieved in the variety Riesling italico (83.01 g), and highest in the variety Neoplanta (109,4 g).

Grape yield

On average, grape yield per vine was within the 2.66 kg (Early Riesling) to 3.75 kg (Neoplanta) range. Calculated per m^2, mean grape yield ranged from 0.88 – 1.25 kg, which can be considered satisfactory yield in the first three years of these varieties' growing fertility. Yield variations between study years were very pronounced, which is the result of gradual increase of the number of buds left per vine after pruning, year after year, to build the particular shape of the trunk. In the 1997-1999 period, grape yield was increased along with the increase of the number of buds left after pruning, as evidenced by Fig.1. All studied clones produced higher grape yield, SK54 in particular (1.16 kg/m^2), compared with the population of the variety Italian Riesling. Results obtained in this research are in accordance with the results given by C i n d r i ć et al. (2000). Highest average grape yield per m^2 was produced by the variety Neoplanta (1.25 kg/m^2) and lowest by the variety Early Riesling (0.88 kg/m^2). The difference achieved is statistically significant. Considering the obtained grape yield per bud, the most productive buds are those of the variety Neoplanta (152.4 g/bud) and the least productive ones are those of the population Riesling italico (113.4 g/bud) and Early Riesling (112.8 g/bud).

T a b. 1.- Grape yield and quality (1997 – 1999)

Index	Riesling Italico	SK13	SK54	SK63	Early Riesling	Neoplanta	Petra
Number buds/grape vine	26.13	25.50	25.50	25.07	23.57	24.6	25.03
Number shoots/grape vine	25.40	24.37	24.21	22.8	22.27	23.97	24.17
% of developed shoots/grape vine	97.2	95.6	94.9	90.9	94.5	97.4	96.6
Fertile shoots/grape vine	23.17	23.10	22.93	21.43	20.10	22.23	22.27
% of fertile shoots/grape vine	91.2	94.8	94.7	94.0	90.2	92.7	92.1
Number of bunches/bud	1.35	1.32	1.39	1.31	1.27	1.39	1.33
Number of bunches /shoot	1.,39	1.38	1.47	1.44	1.35	1.42	1.38
Number of bunches /fertile shoot	1.53	1.45	1.55	1.53	1.49	1.54	1.50
Number of bunches /grape vine	35.,37	33.57	35.57	32.77	30.0	34.17	33.33
Average bunch weight	83.01	99.01	97.41	93.21	90.91	109.4	91.10
Yield per bud (g)	113.4	129.8	136.1	120.9	112.8	152.4	120.6
Yield per grape vine (kg)	2.91	3.31	3.47	3.03	2.66	3.75	3.02
Yield per m^2 (kg)	0.97	1.1	1.16	1.01	0.,88	1.25	1.01
Cv (%)	25.2	14.22	18.35	18.37	17.36	17.67	18.61
$LSD_{0.05-0.01}$				*0.2740 – 0.3890*			
Sugar in must %	19.7	19.07	20.67	19.3	20.63	21.8	24.6
Cv(%)	16.2	18.7	20.17	19.81	7.74	12.34	18.74
$LSD_{0.05-0.01}$				*4.6182 – 6.1128*			
Acids g/ll	5.77	5.32	6.41	6.24	6.51	6.59	5.42

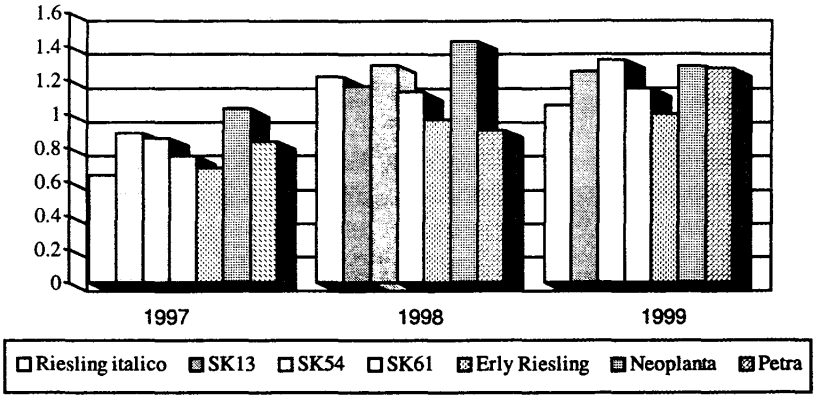

Fig. 1.- Grape yield of the tested varieties and clones (kg/m^2)

Grape quality

Grape quality was assessed according to the contents of sugars and total acids of must (Tab.1, Fig.2). Sugar contents of must varied significantly between studied varieties and clones, and ranged from 19.07% (SK13) to 24.6% (Petra). Highest sugar contents of must were obtained in 1999 (21.6 – 25.8%) and lowest in 1997 (16.6 – 22.8%).

Content of total acids of must varied, on average, from 5.1 g/l (Petra) to 6.6 g/l (Neoplanta).

On the basis of the results obtained for grape quality, varieties Neoplanta and Petra and clone SK54 stand out, mean sugar contents of must being from 20.67 – 24.6% and content of total acids from 5.1 – 6.6 g/l (Fig. 2).

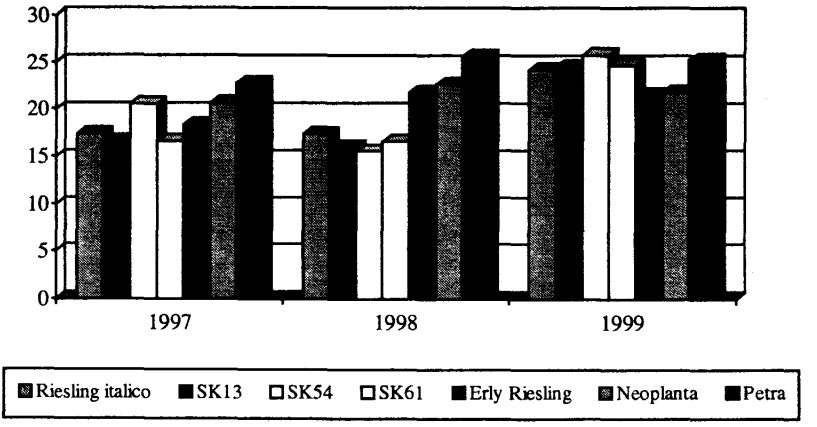

Fig. 2. - Sugar contents in must of the tested varieties and clones (%)

Conclusion

The analysis of the results obtained for yield and quality, with reference to the period of growing fertility of the studied varieties – Neoplanta, Petra, Early Riesling, Riesling italico clones SK13, SK54 and SK61 as well as of standard population of Riesling italico variety, leads to the conclusions as follows:

In the study period (1997-1999) the »Radmilovac« site had favorable climate conditions for growth and development of the studied grapevine varieties and clones. Among adverse weather factors, the following can be singled out: occasional dry periods during some study years as well as occassional high moisture content in the period of grape ripening, which supported gray decay development.

The studied varieties and clones manifested normal growth and development of new shoots. Their development from buds left after pruning fell within the 90.9 (SK63) to 97.4% (Neoplanta) range. Highest percent of fertile shoots was found in clones SK13 and SK54 (94.8% and 94.7%) and lowest in the variety Early Riesling (90.7%).

Fertility and grape quality in the studied varieties and clones corresponded their biological features. Highest fertility was manifested by the variety Neoplanta (12.5 t/ha), and lowest by the variety Early Riesling (8.8 t/ha). Highest mean content of sugars of must was found in the variety Petra (24.6%), and lowest in clone SK13 (19.07%). Clones manifested higher fertility than the population of the variety Italian Riesling. Highest yield and sugar contents of must were achieved in clone SK54.

REFERENCES

1. Avramov, L., Nakalamić, A., Korać Nada, Pavlović Ksenija, Todorović Natalija, Žunić, D., Gašić, N. (1991): Investigation of the most important agrobiological and uvological properties of 10 Yugoslav new table varieties of grapevine planted under different agroecological condition. Proceeding of the "Internationale Symposio sulla uve de mensa", 79-87, Bari – Palermo, Italija.
2. Cindrić, P, Korać Nada, Kovač, V. (1998): 50 godina rada na stvaranju novih sorti vinove loze u Vojvodini. XIII savetovanje vinogradara i vinara Srbije sa medjunarodnim učešćem u Niškoj Banji. Zbornik preglednih, naučnih i stručnih radova, Poljoprivreda, 193-198, 11 - 16, Beograd.
3. Cindrić, P., Korać Nada, Kovač, V. (2000): Sorte vinove loze. Novi Sad.
4. Nakalamić, A. (1991): Modifikovana dvokraka "asimetrična" kordunica. Jugoslovensko vinogradarstvo i vinarstvo, 4, 7-10, Beograd.
5. Nakalamić, A., Todić Slavica, Marković, N., Ivanović, M. (1998): Uticaj loznih podloga na agrobiološka svojstva nekih vinskih sorti u uslovima gročanskog vinogorja. XIII savetovanje vinogradara i vinara Srbije sa medjunarodnim učešćem u Niškoj Banji. Zbornik preglednih naučnih i stručnih radova, Poljoprivreda, 388-389, 193 -198. Beograd .

6. S i v č e v B r a n i s l a v a (1996): Ampelografska istraživanja kao osnova za izbor belih vinskih sorti u gročanskom vinogorju. Doktorska disertacija. Beograd.

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PRINOS I KVALITET GROŽĐA NOVIH VINSKIH SORTI I KLONOVA U PODRUČJU BEOGRADA

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R e z i m e

U periodu 1997 - 1999. godine obavljena su uporedna ispitivanja sorti za bela vina - neoplanta, petra, rani rizling, rizling italijanski, kao i klonovi sorte rizling italijanski - SK13, SK54 i SK61, u periodu njihove rastuće rodnosti, odnosno od četvrte do šeste godine starosti vinograda.

Eksperimentalni zasad, na kome su obavljena istraživanja, je podignut 1994. godine na Oglednom školskom dobru "Radmilovac", Poljoprivrednog fakulteta u Zemunu. Razmak sadnje iznosi 3 x 1 m, naslon je špalirski, a uzgojni oblik je "dvokraka asimetrična kordunica" (N a k a l a m i ć, 1991), visina stabla 90 cm.

Na osnovu analize dobijenih rezultata o prinosu i kvalitetu, koji se odnose na period rastuće rodnosti istraživanih sorti - neoplanta, petra, rani rizling, klonova rizlinga italijanskog SK13, SK54 i SK61, kao i standardne populacije sorte rizling italijanski, mogu se izvesti sledeći zaključci:

- U periodu istraživanja (1997 -1999. godina) u području Radmilovca su vladali povoljni klimatski uslovi za rastenje i razviće ispitivanih sorti i klonova. Kao nepovoljni vremenski činioci mogu se istaći: povremeni sušni periodi u pojedinim godinama, kao i povremena velika vlažnost u periodu sazrevanja grožđa koja je potencirala razvoj sive truleži na grozdovima.

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- Istraživane sorte i klonovi ispoljile su normalno kretanje i razvoj novih lastara. Iz okaca koja su ostavljena prilikom rezidbe, razvilo se od 90,9% u klona SK63 do 97,4% u sorte neoplanta. Najveći udeo rodnih lastara imali su klonovi SK13 i SK54 (94,8% i 94,7%), a najmanji sorta rani rizling (90,7%).

- Rodnost i kvalitet grožđa ispitivanih sorti i klonova je bila u skladu sa njihovim biološkim osobenostima. Najveću plodnost ispoljila je sorta neoplanta (12,5 t/ha), a najmanju sorta rani rizling (8,8 t/ha). Najveći prosečan sadržaj šećera u širi imala je sorta petra (24,6%), a najmanji klon SK13 (19,07%). U odnosu na populaciju sorte rizling italijanski, klonovi su ispoljili veću rodnost. Najveći prinos i sadržaj šećera u širi ostvaren je u klona SK54.

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