

## POSSIBILITIES OF PRODUCING GRAPE-BASED ALCOHOLIC DRINKS FROM NEWLY CREATED GRAPEVINE VARIETIES

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**Abstract:** The paper is concerned with investigations on the possibility of producing grape-based alcoholic drinks from newly created grapevine varieties, such as Riesling Italian, Seedling 14660, Muscat Hamburg and Godominka. All chemical parameters for produced grape brandies, marc brandies and wine distillates complied with standards of quality as prescribed by the Regulations for quality of alcoholic drinks. Organoleptic evaluation proved that Seedling 14660 produced best scored wine distillate (17.85), Muscat Hamburg and Godominka gave best scored grape brandy (18.25) and Godominka yielded best scored marc brandy (18.40). Sensory properties of assessed brandies and wine distillate indicate that aroma and quality are gaining in intensity and level of improvement, starting from wine distillate to marc brandies. Also, intensive fruity-floral aroma reminding of lily-of-the-valley and iris fragrance is evident.

**Key words:** grape brandy, newly created varieties, wine distillate, Riesling Italian, Seedling 14660, Muscat Hamburg, Godominka, sensory quality.

### I n t r o d u c t i o n

Yugoslavia, being a fruit and grapevine-producing country, possesses raw material resources to produce strong alcoholic drinks from grape. Grape brandy is manufactured by distilling fermented crushed whole grape fruit (where stalks were removed) of cultivated grapevine *Vitis vinifera*. As distinguished from grape brandy, marc brandy has been manufactured from times immemorial in grapevine-producing countries as well as in all grapevine-growing regions in our country. Marc brandy is a distillate deriving from fermented grape pomace of cultivated grapevine or a piquet of sweet and fermented pomace (Paunović et

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al., 1983). Marc brandy possesses intensive, harsh aroma and distinct impressive flavor. Grape and marc brandies differ in chemical composition due to different manufacturing conditions. Wine distillate is a product of wine distillation, with or without precipitate. It is a basic semifinished product for vinjak manufacturing. A small number of works available in research and professional literature deal with the issue of how much suitable newly created grapevine varieties are for manufacturing quality grape brandies and of good sensory properties.

### Material and Methods

The quality of grape brandies is affected by a range of factors. Of the most prominent are certainly grapevine variety properties, primary aromatics being the most important (Paunović, 1987; Paunović and Nikićević, 1988; Paunović, Nikićević and Tešević, 1992; Nikićević et al., 1996). They are for the most part found in berry skin and considerably lesser in fruit juice (Wilson et al., 1986; Cordonnier et al., 1986). Principal aromatics of grape and fermented crushed fruit of muscat varieties are terpenic alcohols. Those alcohols are partly in a free (aromatic) volatile form, and partly in a bound non-aromatic precursory form (glycoside and polyol) (Cordonnier et al., 1981, 1986; Gunata et al., 1985, 1986). Today, on the market, apart from grape brandy, you can also encounter marc brandies with slight muscat aroma that appreciably contributes to delicacy of this otherwise harsh drink.

Experimental investigations presented in this work comprised healthy and mature grape of the varieties as follows: Riesling Italian, Seedling 14660, Muscat Hamburg and Godominka. Tab. 1 displays their more prominent characteristics based on 3-year studies.

Table 1.

Variety	Crossing combination	Yield (t/ha)	Weight (g)	Sugar (%)	Acid contents (g/l)
Riesling Italian		18.70	119	20.3	7.7
14660	Cabernet Sauvignon x 1909 1909 Alicant Bouchet x Game Crni	16.35	172	23.7	6.9
Muscat Hamburg		16.69	133	17.8	6.9
Godominka	Smederevka Self-fertilization	12.90	159	21.3	6.9

*Riesling Italian* is a variety-population. Its bunch is low-weight (119g), compact, with characteristic side shoot and green-yellow skin. Throughout September, some years, secondary maximum amount of precipitation does not occur in Grocka grapevine- growing region, which favors ripening of this variety. It ripens late and, on average, accumulates 20.3% sugar in must. The yield produced is comparatively high, which is confirmed by the results of Avramov et al., 1988; Avramov et al., 1994; Sivčev, 1998.

*Seedling 14660* was obtained by crossing Cabernet Sauvignon to Župski bojadiser (Alicante Busche x Game crni). The aim of selection was to produce a high yielding seedling like a new variety Župski bojadiser, but of improved qualitative properties. The chosen Seedling 14660 does not possess those properties; however, it is characterized by extreme fruitfulness and quality. On its own root, this seedling produced slightly lower yield (14.28t/ha), larger bunch (175g) with better quality grape, 25% sugar and 6.6g/l total acids in must. Since varieties having black and colored skin took part in creating this seedling, the ratio of aromatics is not typical in this variety intended for wine making.

*Muscat Hamburg* is a variety of unknown origin. We know that it was first grown in the greenhouses of Hamburg, then in those of England, where it was named Black Muscat of Alexandria. Today it is grown in Europe and elsewhere. This variety was widespread in Greece (3800ha), Rumania (2900ha), Portugal ((800ha), lesser in Italy, Egypt, Argentina and China. It is assumed to have developed by spontaneous crossing of black wine variety Trollinger and white table variety Muscat of Alexandria. It is characterized by medium large to large grape (150-400g) of conical shape. Berry is oval, large with dark blue skin of medium thickness. Pulp is medium firm to firm with markedly expressed Muscat aroma. In pulp consistency, it is much closer to its mother variety – Trollinger (although it possesses table variety characteristics). According to maturing conditions of our country, it belongs to the third epoch – it is late-maturing variety. This variety is one of the most widely distributed varieties among the late-maturing variety groups.

*Godominka* is a new variety created on Experiment Station “Radmilovac”. It was obtained by variety Smederevka’s self-fertilization. Phenetic coefficient, based on 39 characteristics between Smederevka and Godominka, amounts to 0.8087, which indicates their relationship. Differences came to the fore in grape maturing season: Godominka ripens at the end of the second and Smederevka in the fourth epoch. It accumulates more sugar in must compared to mother-variety, and in our investigations it amounted, on average, to 21.2%. The process of shoot developing by the end of growth period enables Godominka to be low-temperature tolerant throughout maturing season (Avramov et al., 1992; Sivčev, B., 1996).

The technological scheme for wine distillate manufacturing was as follows: After grape was harvested in full technological maturity and crushed, stalks being previously removed, a liquid fraction (must) was transferred to boiling containers (glass balloons) to ferment with autochthonous microflora without using SO<sub>2</sub>.

On accomplishment of fermentation, which lasted 10-15 days, on average, and production of wines from each examined variety, a two-stage distillation was carried out in a laboratory copper still. Wine distillation did not include first-made wine fraction, and the strength of the obtained raw wine distillate was cca 20-25%

vol. Redistillation of raw wine distillate was carried out in the same still, where separation of 1% first-made wine and middle fraction was conducted until average distillate strength in contents reached 60% vol.

The technological scheme for grape brandy manufacturing was as follows: Technologically mature grape of examined varieties was crushed in a laboratory grape crusher (stalks being previously removed) and the obtained crushed grape was left to ferment. After 7-10 days fermentation was finished, and thereafter a two-stage distillation was carried out in a laboratory copper still according to identical scheme as described for wine distillate production.

The technological scheme for marc brandy manufacturing was as follows: Technologically mature grape of examined varieties was crushed in a laboratory grape crusher (stalks being previously removed) and after crushing a slight straining was done. The obtained pomace was left to ferment for 7-10 days, on average. On completed fermentation, a two-stage distillation was carried out in a laboratory copper still according to identical scheme as described before.

Chemical composition of produced grape brandies, marc brandies and wine distillates per examined grape variety is presented in Tab. 2.

It is evident that grape brandies, marc brandies and wine distillates produced from all investigated varieties complied with standards of quality as prescribed by the Regulations, Official Gazette of SFRY No 16/88.

Content of total acids ranged from 0.12-0.57 g/l, where lowest content was found in the group of grape brandies (Riesling Italian and Seedling 14660) and marc brandy produced from variety Godominka – 0.12 g/l each, while highest content was in marc brandy sample produced from Seedling 14660 – 0.57 g/l. Lowest ester contents were found in the group of wine distillates obtained from variety Godominka (524 mg/laa) and highest in the group of marc brandies produced from Seedling 14660 (4007 mg/laa). Furfural was found in all samples, average contents being cca 8.0 mg/laa, while aldehydes fell within the 65-206 mg/laa range. Lowest aldehyde content was in wine distillates and highest in marc brandies. Lowest amount was registered in wine distillate of variety Godominka (65.72 mg/laa) and highest in marc brandy of Seedling 14660 (206.86 mg/laa). Content of higher alcohols ranged from 1760-2540 mg/laa, wine distillates containing lowest and marc brandies highest contents as a group. Lowest content was found in wine distillate of Riesling Italian (1760 mg/laa) and highest in marc brandy of variety Godominka (2540 mg/laa).

Methanol ranged from 0.17 – 0.67% vol, where wine distillates had lowest and marc brandies highest content as a group of examined distillates. Lowest methanol content was registered in a wine distillate sample of Muscat Hamburg (0.17% vol/aa) and highest in marc brandy of Seedling 14660 (0.67% vol/aa). Total SO<sub>2</sub> content was between 5.12 and 38.40 mg/l. Grape brandies had its

lowest content and wine distillates highest. Several samples contained cca 5 mg/l, while highest content was found in wine distillate of Riesling Italian (38.40 mg/l).

Table 2.

No.	Grape varietas	Ethanol (vol%)	Total acids (g/l)	Esters(mg/laa)	Furfural mg/laa	Aldehydes (mg/laa)	Higher alcohols (mg/laa)	Methanol (vol%/aa)	Total SO <sub>2</sub> (mg/l)
1.	Riesling Italian Wine distillate	45.5	0.14	696	7.50	67.89	1760	0.22	38.40
2.	Riesling Italian Grape brandy	47.3	0.12	1711	8.50	83.97	1920	0.26	7.68
3.	Riesling Italian Marc brandy	44.5	0.14	711	8.50	109.09	2240	0.59	5.12
4.	14660 Wine distillate	44.5	0.19	632	8.50	69.42	1900	0.21	35.84
5.	14660 Grape brandy	47.5	0.12	889	8.75	83.61	2100	0.29	5.12
6.	14660 Marc brandy	44.8	0.57	4007	8.50	206.86	2360	0.67	8.96
7.	Muscat Hamburg Wine distillate	44.7	0.17	1023	7.50	78.98	18.40	0.17	26.88
8.	Muscat Hamburg Grape brandy	46.2	0.17	990	8.50	76.41	2040	0.24	7.68
9.	Muscat Hamburg Marc brandy	47.7	0.17	885	8.75	101.77	2160	0.52	12.80
10.	Godominka Wine distillate	47.0	0.19	524	7.00	65.72	1840	0.19	23.04
11.	Godominka Grape brandy	44.7	0.24	2047	7.75	118.47	2200	0.25	6.40
12.	Godominka Marc brandy	45.8	0.12	1613	7.50	115.62	2540	0.61	5.12

Since man is the last who decides on quality of some product, it was inevitable to subject the obtained experimental samples to sensory evaluation of quality. Therefore, a three-member sensory panel was formed, experts in the

related field, who assessed sensory quality. Evaluation was anonymous and was done on a positive point-based scale system.

#### **Wine distillate**

Variety: *Riesling Italian*, 45.5% vol, average score: 17.5

Characteristics: Clear and colorless. Aroma is of medium intensity, not fully clear, reminds of grass, herb or stalk smell. Present are nuances of hay or dried vine and slightly of pomace. Alcohol is coming a little to the fore. Flavor is medium harmonious, astringent, moderately drinkable, clear at the start but with weak brandy nuances later on. Retronasal flavor contains metal tones.

Variety: *Seedling 14660*, 44.5% vol, average score: 17.85

Characteristics: Clear and colorless. Aroma is more tender, without harsh fruity-floral nature, with a lot of freshness. Aroma is full, harmonious, drinkable, slightly sweetish, balanced, with pleasing acid structure. Retronasal flavor is correct, with mild weak brandy tone and additional flavor of hay, which decreases general quality a little, but is better than preceding sample.

Variety: *Muscat Hamburg*, 44.7% vol, average score: 17.50

Characteristics: Clear and colorless. Aroma is typical, muscat, pleasing and matches the variety. Alcohol is penetrating a bit. Aroma, however, does not match wine distillate that would be ageing in an oak cask to obtain cognac type drink. Flavor is full, medium harmonious, discretely astringent, sweetish at times. Retronasal flavor is pleasing and pure muscat.

Variety: *Godominka*, 47.0% vol, average score: 17.60

Characteristics: Clear and colorless. Aroma is conspicuous, muscat but slightly less intensive than in a preceding sample. Along with muscat, hay, vine and even date aroma is present. Flavor is full, discretely astringent, medium harmonious. Retronasal flavor contains weak brandy additional taste, however, general impression is slightly better compared to Muscat Hamburg.

#### **Grape brandy**

Variety: *Riesling Italian*, 47.3% vol, average score: 17.70

Characteristics: Clear and colorless. Aroma is pure, lavish, pleasing, reminds of plants, camomile, meadow in blossom, acquires a terpenic tone. Flavor is full, harmonious, drinkable; retronasal flavor is of dry hay and dry vine. A certain amount of bitterness is present.

Variety: *Seedling 14660*, 47.5% vol, average score: 17.95

Characteristics: Clear and colorless. Aroma is not so harsh and is less neutral than in a preceding sample, but is nice, of fruity character, discretely disguised by marclike tone, smells of dry hay but anyway subtle. Flavor is a little bitterish, medium full, rounded off, drinkable. Retronasal flavor is good.

Variety: *Muscat Hamburg*, 46.5% vol, average score: 18.25

Characteristics: Clear and colorless. Aroma is pure, typical muscat, subtle, terpenic compounds being dominant. It reminds a little of dry hay or dry vine smell. Flavor is fresh, harmonious, medium full to full, very pleasing, with nice aromatic stability. Flavor is better than in Godominka, clearer and reminds of sweet-smelling lilly-of-the-valley. Dominating retronasal flavor is floral-muscat.

Variety: *Godominka*, 44.7% vol, average score: 18.25

Characteristics: Clear and colorless. Aroma is typical muscat, but harsher and less developed compared with Muscat hamburg, less intensive but satisfactory. Flavor is full, harmonious, discretely astringent. In retronasal flavor, floral tones are present reminding of lilly-of-the-valley or iris fragrance. Also, pleasing freshness is present during consumption. A very good raw material for ageing in an oak cask.

#### **Marc brandy**

Variety: *Riesling Italian*, 44.5% vol, average score: 17.90

Characteristics: Clear and colorless. Aroma is pure, typical of marc brandy of a less harsh type, pleasing and not so aggressive. Tones of plant, camomile or hay smelling are present. Flavor is full, rounded off, sweetish and drinkable. Retronasal flavor is also pure, pleasing and good.

Variety: *Seedling 14660*, 44.8% vol, average score: 18.10

Characteristics: Clear and colorless. Aroma is not fully pure, presence of ethyl acetate can be felt, covering up aroma of citrus character. Flavor is full, fresh, drinkable, pleasing and rounded off with marked abundance.

Variety: *Muscat Hamburg*, 47.7% vol, average score: 18.10

Characteristics: Clear and colorless. Aroma is typical muscat, however, less intensive, with tones of dry hay smell, a bit unilateral and more aromatic than grape brandy produced from the variety of the same name. Flavor is full, harmonious, drinkable but somehow without freshness. Retronasal flavor is pleasing, stable and uniform.

Variety: *Godominka*, 45.0% vol, average score 18.40

Characteristics: Clear and colorless. Aroma is pure, typical muscat, more pleasing than marc brandy produced from Muscat Hamburg, reminds of lilly-of-the-valley fragrance. Flavor is full, harmonious, rounded off, and very drinkable. Retronasal flavor is pure and very pleasing. An excellent sample.

#### **C o n c l u s i o n**

The paper presents investigations on the possibilities of manufacturing grape-based alcoholic drinks from newly created grapevine varieties, such as Riesling Italian, Seedling 14660, Muscat Hamburg and Godominka.

All chemical parameters for quality of the obtained experimental brandies and wine distillates complied with standards of quality as prescribed by the Regulations for alcoholic drinks quality, Official Gazette of SFRY No 16/88.

Organoleptic evaluation of basic sensory quality parameters showed as follows: best scored wine distillate was produced from Seedling 14660 (17.85), best grape brandies were produced from varieties Muscat Hamburg and Godominka (18.25) and best marc brandy was produced from variety Godominka (18.40).

Sensory qualities of assessed grape brandies and wine distillates indicate that quality is improved and cultivated, going from wine distillate to marc brandies. Also, the presence of cultivated, intensive fruity-floral and terpenic character of aroma is evident, reminding a lot of lilly-of-the-valley and iris fragrance.

The investigations will go on and will certainly include some interesting newly developed varieties.

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## MOGUĆNOSTI PROIZVODNJE ALKOHOLNIH PIĆA NA BAZI GROŽDJA OD NEKIH NOVOSTVORENIH SORTI VINOVE LOZE

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### R e z i m e

U radu su obavljena istraživanja vezana za mogućnost proizvodnje alkoholnih pića na bazi groždja od nekih novostvorenih sorti vinove loze, i to: Rizling italijanski, Sejanac 1466, Muskat hamburg i Godominka.

Kvantitativna hemijska analiza dobijenih lozovača, komovica i vinskih destilata pokazala je uklapanje svih parametara u norme kvaliteta, koje su predviđene i propisane Pravilnikom o kvalitetu i drugim zahtevima za alkoholnih pića, Sl.list SCG br.4/2003.

Najbolje ocenjeni vinski destilat dao je sejanac 1466 (17,85), najbolju lozovaču sorte Muskat hamburg i Godominka (18,25), a najbolju komovicu sorta

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Godominka (18,40). Senzorne karakteristike ocenjenih rakija i vinskog destilata ukazuju na pojavu intenziviranja i oplemenjivanja mirisa i kvaliteta u smeru od vinskog destilata ka komovicama, kao i pojavu prisustva jednog intenzivnog voćno-cvetnog karaktera mirisa, koji je dosta podsećao na miris djurdjevka i irisa.

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