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## **Agrobiological and technological characteristics of variety pinot gris clone B10 and pinot gris clone rulander 2/54 in the Niš subregion**

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**Abstract:** In the period 2010-2011 years were studied agrobiološka and technological properties of clones of Pinot Gris (B-10 and Rulander 2/54) in Niš vineyard sub-region. Tests were conducted at the Center for Viticulture and Enology in Niš. Varying heights yield of grapes per year indicate a high and stable cropping investigated clones. Must sugar content varied from 21,31 to 22,79%, and total acid content ranged from 7,66 to 8,09 g l<sup>-1</sup>. Chemical Two-Analysis wines showed that the resulting wines of good quality. The research results justify the growing clones of Pinot Gris in Niš vineyard sub-region.

**Key words:** Clones, the yield of grapes, grape and wine quality.

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### **Introduction**

Variety Pinot Gris is an old French variety. Most are grown in France, in northern Italy, Romania, Hungary, Germany, Switzerland and many other countries in terms of continental climate. In Serbia, the most cultivated in Vojvodina and quite sporadically in other wine regions. The different environmental growing conditions in this cultivar were separated numerous clones in countries where this variety has a greater significance, primarily in Germany, France and Hungary. Studying of clones and getting it a more realistic understanding of their agro-biological and technological characteristics are of great importance for the legitimacy of their breeding and further spread. Clones of one variety different from population in better features of the grape and better quality of wines obtained (Michael et al., 2008). Thus, clones different in some properties, such as, yield, mass of the cluster, sugar content, total acids, which are mostly the result of varieties specificity, and less of the impact of cultivation conditions (Entav et al, 1995). Selected clones of the Chardonnay variety that are characterized by higher yield and clusters with greater mass, give lower quality of wine compared to the lower-yield clones of Chardonnay (Cowham, 1999). From a great number of Chardonnay clones, wines with distinctive of fruit aroma, higher content of extract, etc. produced in France (Entav et al, 1995), Italy (Calò et al 1990), Australia (Michael et al., 2008) and other countries.

The aim of our study was to comparatively examine significant agro properties clones of Pinot Gris B-10 (which was selected in Hungary) and Rulander 2/54 (who was selected in Germany) in terms very similar to the Niš Viticulture sub-region.

### **Materials and methods**

Investigations were carried out at the experimental farm of the Institute "Serbia" Center for Viticulture and Enology in Niš.

Vineyard where they were conducted tests planted in 1997. Growing form of vine is "Karlovački farming", planting space 3 x 1.2 m. On each vine pruning were left two arcs of 8 buds and 2-3 spur with 2-3 buds, which amounts to 22 buds per grapevine or 6.1 buds per m<sup>2</sup>.

We followed next indicators:

- Phenological observations;
- Movement, development and fruitfulness of buds and canes;
- Yield per bud, developed and productive shoot and per grapevine and per hectare.
- The quality of grapes and wine.

Data were statistically analyzed using analysis of variance and LSD test for assessing the significance of the examined differences.

On the experimental plot of land is brown forest soil. Humus content varies from 2.87 to 3.11%, of the total N of 0.14 to 0.16%, a 13.40 mg P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O 36.30 mg per 100 g of air dry soil. Content PH value is 5.59 to 6.47, which indicates that it is slightly acidic to neutral soil. It may be noted that the physical and chemical properties of the soil are favorable for growing vines.

Table 1 - Values of basic climatic indicator

No	Indicator	Year		
		2010	2011	Average
1.	The mean annual air temperature (°C)	13.04	10.98	12.01
2.	Mean temperature of the vegetation period (°C)	18.97	17.08	18.02.
3.	The annual amount of precipitation (mm)	910.2	538.8	724,5
4.	Rainfall during the growing season (mm)	484.3	424.2	454.2
5.	Absolute minimum air temperature (°C)	- 12.1	- 18.8	-15.4

During the research period the mean annual air temperature was 12.01 and the mean vegetation 18.02 °C. The period of the growing season lasted an average of 181 days. During this period, approximately 454 mm drop of rainfall. Winter frosts were lowered to - 15.4 °C and did not cause damage to buds and shoots tested varieties.

## Results and Discussion

### a) Phenological observations

The duration of the individual phenophases clones of Pinot Gris (B- 10 and Rulander 2/54) in terms of Niš-viticulture subregion, can be seen from the data presented in Table 2 and 2a.

Table 2 - Phenology stages of development of the tested varieties

Variety / clone	Swelling of buds			Flowering			Start of ripening			Full ripeness		
	2010	2011	Aver.	2010	2011	Aver.	2010	2011	Aver.	2010	2011	Aver.
Pinot Gris standard	27.04	25.04	26.04	10.06	12.06	11.06	<b>18.08</b>	19.08	18.08	28.09	26.09	27.09
B-10	29.04	27.04	28.04	10.06	12.06	11.06	18.08	19.08	18.08	28.09	26.09	27.09
Rulander 2/54	29.04	27.04	28.04	10.06	12.06	11.06	<b>18.08</b>	<b>19.08</b>	<b>18.08</b>	28.09	26.09	27.09

Table 3 - Descriptors O.I.V. for individual growth stages

<u>Code O.I.V.</u>	Elements of the description	Evaluation
301	Swelling of buds	<b>5</b>
302	Flowering	5
303	Start of ripening	5
304	Harvest	5

The swelling of buds took place in the period 26 to 28 April. Pinot Gris clone B-10 and Rulander 2/54 were later started vegetation in relation to the vegetation Pinot Gris standard.

Flowering occurred on average on 11 June, which is a little later than the date stated in terms of Fruska (Gora Cindrić et al. 1992).

Start of ripening on average occurred on August 18, while the full ripeness grapes were registered on average 27 September, which corresponds to II epoch ripening (Avramov 1991). Table 3 shows the descriptors and O.I.V. for individual growth stages.

#### b) Fertility of buds and shoots

Fertility of varieties Pinot Gris and clones (B-10 and Rulander 2/54) can be estimated from the data presented in Table 3.

Table 4 - Basic indicators of fertility tested varieties

Indikators	Pinot Gris standard			Pinot Gris B-10			Pinot Gris Rulander 2/54		
	2010	2011	Average	2010	2011	Average	2010	2011	Average
Buds per grapevine	22,0	22,0	22,0	22,0	22,0	22,0	22,0	22,0	22,0
Canes per grapevine	19,30	20,0	19,65	19,53	19,73	19,63	19,37	20,86	20,1
LSD 0,05-0,01						0,24 - 0,61			
Fruit canes per grapevine	16,46	18,14	17,3	16,76	15,56	16,16	16,43	16,66	16,54
LSD 0,05-0,01						0,41-1,01			
Clusters per fruit bud	1,38	1,43	1,40	1,54	1,59	1,56	1,65	1,69	1,67
Clusters per cane	1,58	1,57	1,57	1,74	1,77	1,75	1,87	1,78	1,82
Clusters per fruit canes	1,85	1,73	1,79	2,03	2,25	2,14	2,21	2,23	2,22
Clusters per grapevine	30,5	31,5	31,0	34,07	35,05	34,56	36,4	37,2	36,8
LSD 0,05-0,01						0,90-2,11			
Cluster mass (g)	74,68	72,20	73,44	97,23	93,18	95,20	119,75	110,50	115,12

Pruning is left on the vine to 22 buds. The percentage of developed and gender shoots was high because, on average only 10 - 15% of buds remained inactivated. Between the number of remaining of buds per grapevine and the number of shoots developed is expressed positive dependence. Among the varieties showed no statistically significant difference.

Bunch weight varied depending on weather conditions in some years. Clusters were heaviest in clone Rulander 2/54 (115,12g), a minimum mass of the cluster had grapes varieties Pinot Gris standard 73,44g. Bunch weight was within

the limits provided for this variety and clones allegations and (Cindrić et al. 2000).

### c) Chemical composition and wine quality

Based on the data obtained by chemical analysis of wines tested varieties can be performed following conclusions:

The alcohol in wine varies depending on the sugar content of must and ranged from 12.01 to 14.14 vol. %. Total extract averaged 19.4 g / l.

Table 5 - Chemical composition of the resulting wine tasting and rating

Parameter	Measure unit	Pinot Gris standard	Pinot Gris B-10	Pinot Gris Rulander 2/54
Relative density 20/20 ° C		0.98979	0.99047	0,99023
Alcohol	Vol %	14.14	12,01	13,42
The total extract	g l <sup>-1</sup>	20,9	17,2	20,1
The reducing substances	g l <sup>-1</sup>	1,2	1,0	 1,2
The extract without sugar	g l <sup>-1</sup>	20,7	17,2	19,9
Titrate acidity	g l <sup>-1</sup>	6,4	6,1	6,2
Volatile acid	g l <sup>-1</sup>	0,52	0,50	0,58
Total SO <sub>2</sub>	mg l <sup>-1</sup>	107	102	91
Free SO <sub>2</sub>	Mg l <sup>-1</sup>	14	15	15
Ashes	g l <sup>-1</sup>	1,95	1,71	1,91
Phenolic substances	g l <sup>-1</sup>	0,29	0,29	0,25
Tasting mark of wine		17.18	17,82	7,60

The extract without sugar ranged from 17.2 to 20.7g l<sup>-1</sup>. The volatile acids in the years of research have varied in the range of 0.50 to 0.58 g l<sup>-1</sup>.

In terms of organoleptic evaluation of the resulting of wine, it can be concluded that the Pinot Gris clone B-10 and Pinot Gris Rulander 2/54 had a fine, gentle, harmonious, dry wine. Pinot Gris standard in respect of them was slightly less fine.

### Conclusion

Analyzing results of the important properties agrbiological clones of Pinot Gris B- 10 and Rulander 2/54, the following can be concluded: In the study period (2010-2011) in Niš vineyard sub-region was ruled by the favorable conditions for the normal development of the tested varieties. Phenological observations indicate that among the cultivars were no significant differences in the performance of growing stages. Productivity, yield, quality grapes and vegetative potential of the cultivars varied significantly influenced by weather conditions. The differences in the values of the examined parameters, in most cases have not been confirmed as a significant and very significant. Number of developed and gender shoots on the vine was in direct positive depending on the number of remaining buds during pruning. From the total number of buds left after pruning, developed in canes 85 – 90 %.The quality of the grapes is estimated on the basis of sugar and total acid in the must as well as the health status of grapes can be evaluated as very good. The yield of grapes per grapevine and per hectare was satisfying. Top results gave clone Rulander 2/54 (11,763 kg $ha^{-1}$ ), and the lowest yield was achieved in the grape varieties Pinot Gris standard (6.320 kg $ha^{-1}$ ). Quality of wine was satisfying in all the cultivars. Wines obtained from clone B-10 and Rulander 2/54 are fine, gentle, harmonious, dry, while wine made from Pinot Gris standard has slightly less finesse.

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**AGROBIOLOŠKA I TEHNOLOŠKA SVOJSTVA KLONOVA SORTE  
BURGUNDAC SIVI B – 10 I RULANDER 2/ 54 U NIŠKOM  
PODREJONU**

- originalni naučni rad -

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**Rezime**

U periodu od 2010 do 2011 godine izučavana su agrobioioška i tehnološka svojstva klonova sorte burgundac sivi (B-10 i Rulander 2/54) u niškom vinogradarskom podrejonu. Ispitivanja su obavljena u eksperimentalnim vinogradima Centra za vinogradarstvo i vinarstvo u Nišu. U periodu ispitivanja vladali su povoljni usiovi za ispoljavanje bioloških i tehnoloških osobnosti sorte. Visina prinosa grožđa i njegovo variranje po godinama ukazuju na visoku i stabilnu rodnost ispitivanih klonova. Sadržaj šećera u širi varirao je od 21.31 do 22.79%, a sadržaj ukupnih kiselina kretao se od 7.66 do 8.09 g<sup>l</sup><sup>-1</sup>. Hemijskom analizom vina utvrđeno je da su dobijena vina dobrog kvaliteta. Rezultati istraživanja potvrđuju opravdanost gajenja klonova sorte burgundac sivi u niškom vinogradarskom podrejonu.

**Ključne reči:** klonovi, prinos grožđa, kvalitet grožđa i vina.