

Medna bijela (*Vitis vinifera* L.) – Ampelographic properties

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Summary

Medna bijela is an autochthonous cultivar of the third Adriatic vine-growing subregion. Its synonyms in use are: Bubo, Bumba, Medna, Rizavac, Zložder etc. No detailed ampelographic study has been made to date; based on our research this cultivar is classified in the ecological-geographical group of *Convarietas Pontica*, *Negr. Subconvarietas Balcanica*, *Provarietas Mesocarpa*, *Nem.*, *Subprovarietas Dalmatica Nem.* It is a medium lush wine cultivar with some 16-17 % of sugar and 6.0-7.0 g/l of total acidity, with a yield of 2.5-3.5 kg of grapes per grapevine and a load of 16 buds per grapevine. The wines are light, acidulous, with a specific fine aroma of honey, which is implied in the very name of the cultivar. It is recommended that the research should be continued, particularly on clonal selection.

Key words

ampelographic research; Medna bijela cultivar; autochthonous cultivar

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Introduction

In the vine-growing regions of Pannonian and Adriatic Croatia, an assortment mostly autochthonous, rather old, vine cultivars have been grown to date. Many have never been ampelographically described in detail, and some have even never been bibliographically recorded. It can be assumed that many were abandoned because of low resistance to the oidium (*Uncinula necator*) and mildew (*Plasmopara viticola*) when such diseases struck, whereas only those with higher resistance have been retained. One of the cultivars which have not been ampelographically researched is Medna bijela, grown in the Vrgorac area in the third Adriatic subregion.

Several authors have made detailed ampelographic research of autochthonous vine cultivars in Croatia. Thus Maleš (1981, 1993) described Plavac mali crni; Mirošević did the same with Moslavac bijeli (1981), Škrlet bijeli (1986), Plavac sivi (1988), Zelenika bijela, etc. Maletić (1993) researched and ampelographically described Maraština bijela, Bogdanuša bijela, Pošip bijeli and Vugava bijela; Pezo et al. (1998, 2002) did it with Okatica bijela and Okatac crni.

Recently many autochthonous cultivars have been determined by means of DNA, along with ampelographic description. Thus Mirošević and Meredith (2000) made a comparative research of Plavac mali, Zinfandel and Primitivo, after which followed the studies by Pejić et al. (2000 and 2001), covering the same topic, as well as by Piljac et al. (2002), who worked on determination and origin of Pošip bijeli.

However, no extensive ampelographic research of Medna bijela has been performed. The only bibliographical record was made by Bulić (1949). Therefore, during the period of 1996-1998 we carried out ampelographic research of the cultivar with the aim to determine its biological, agroecological, and economic and technological properties in order to valorize its specifics.

Material and methods

Ampelographic research was made according to the method of the International Ampelographic Registry (Registre ampélographique international, 1957) and the descriptor list of ampelographic characteristics (Codes des caracteres des descriptifs des varietes et especes de vitis – O.I.V. 2001.). Each year there were 25 vines under research. Philometric elements were determined by use of the SUMMASKETCH Professional tablet.

Uvometric research was carried out on 10 bunches, according to methods of Prostoserdov (1946), and Galet (1958 and 1976), while the dimensions of berries and seeds were measured by a micrometer.

The annual biological cycle was monitored according to methods of Lazarevski, (1946) from the beginning of weeping. The start of each phase was marked when 5% of vines were within a given phase, while the full phase was at 50%, and the end of phase was at 95%.

The amount of sugar in must was determined acc. to Babo (1909), and the total acidity by the n/4 NaOH titration. The quality of wine was determined by standard analyses and evaluated organoleptically.

The study was conducted on a plantation that had been established in 1989, in region of Vrgorac with the 1.40 x 1.10 m spacing and on the P 1103 rootstock during the period of three years (1996-1998). The vine trees were 70 cm high, with bifurcated growth. The average mean annual temperature during the research was 13.9°C, while during vegetation it was 18.4°C. December was the coldest (5.8°C), and July the warmest (24.8°C). The sun shone for the average of 2652 hours *per annum* while during the vegetation period the insolation was 1736 hours. The sum of active temperatures was 3814°C. There was 1800 mm of precipitation *per annum* while during the vegetation period there was 656 mm.

The soils were terra rossa (Škorić, 1977), evolved on Mesozoic limestones, skeletal to poorly skeletal, of medium water- and high air-capacity. As such, they are very favorable for vine-growing.

All data were processed by standard statistical methods.

Results and discussion

Description of the cultivar

Synonyms: Bubo, Bumba, Medena, Medva, Rizavac, Zložder.

Origin and distribution: Comparing a number of sources, we can assume that Medna bijela (white) is an autochthonous cultivar of the region, spreading in a confined area of the subregion (Vrgorac, Pelješac, Dubrovnik).

Botanical properties

Young shoot: well-developed; with closed tip (OIV 001-3); medium intensity of anthocyanin colouration (OIV 003-5); medium thickness of hairs on the tip (OIV 005-5).

Annual sprout: horizontal growth (OIV 006-5); with long, reddish-coloured OIV 007-2) internodes with somewhat more marked reddish (OIV 009-3) nodes, sparsely covered with woolly hairs (OIV 013-3). Buds are well-developed, conical, weakly coloured (OIV 015-3), while tendrils are discontinued (OIV 016-1), tough and long (OIV 017-7).

Table 1.
Average statistical indicators of philometric values for the Medna bijela cultivar (1996-1998)

Symbol of element	n	x	min-max	Vc	Symbol of element	n	x	min-max	Vc
P cm ²	100	221.2	163.2-291.3	15.0	R ₂	100	0.83	0.69-0.93	7.24
L cm	100	20.41	17.4-23.7	7.2	R ₂ '	100	0.84	0.71-0.91	5.38
l cm	100	19.7	6.1-26.6	19.2	R ₃	100	0.60	0.49-0.75	10.33
p cm	100	12.7	9.3-17.2	14.5	R ₃ '	100	0.59	0.51-0.72	8.52
s	100	14.2	12.1-16.8	9.11	R ₄	100	0.46	0.38-0.55	9.80
B	100	11.7	9.8-13.9	8.6	R ₄ '	100	0.44	0.31-0.53	11.67
B'	100	11.9	10.1-14.0	9.35	R ₅	100	0.76	0.50-0.93	11.99
C	100	8.5	7.4-10.2	9.4	R ₅ '	100	0.71	0.54-0.90	13.29
C'	100	8.4	6.8-11.0	11.2	R ₆	100	0.84	0.66-0.94	17.12
D	100	6.5	5.6-7.5	8.1	R ₆ '	100	0.86	0.70-1.05	8.49
D'	100	6.2	4.7-7.7	13.0	AL	100	55.1	30.4-33.5	9.68
OS	100	8.9	5.9-11.0	13.1	BE	100	62.3	27.2-351.8	92.02
OS'	100	8.4	6.4-10.8	15.6	TA	100	50.7	36.2-91.7	19.66
OT	100	7.1	6.1-8.6	7.9	GA	100	75.1	29.8-306.8	84.9
OT'	100	7.2	5.4-9.9	14.3	DE	100	102.4	79.2-266.7	32.2
RLL	100	1.1	0.73-3.4	40.1	HB	100	0.90	0.50-1.49	26.72
R ₁	100	0.90	0.71-1.11	12.0	SP	100	1.43	0.36-3.98	59.44

Young leaves: greenish, with bronzed margins (OIV 051-2), and very weak anthocyanin colouring (OIV 052-1). The thickness of woolly hairs between veins is medium (OIV 053-5), as is the case at the main vein (OIV 055-5).

Grown leaf: fleshy, leathery, medium large, with the average surface area of 221.2 cm² (OIV 065-5), the main nerve average length of 14,22 cm (OIV 066-5), heart-shaped (OIV 067-2), tripartite (OIV 068-2), of medium green front (OIV 069-5), while the main nerves are either very weakly coloured or not at all (OIV 070-1). The leaf blade is bubblingly creased (OIV 075-7). The teeth are concave at both sides (OIV 076-1), of medium length (OIV 077-5). The stem sinus is deep, not quite open (OIV 079-3), while the lateral sinuses are shallow and open (OIV 082-1). The upper side of the leaf is bare (OIV 084-1), while the lower side is sparsely covered with woolly hairs (OIV 086-3).

Leaf stem: bare (OIV 090-1) and of medium length (OIV 092-5).

Vine shoot: medium thick, elliptical in cross-section (OIV 101-2), grooved (OIV 102-3), of light-brown colour, with insufficient lenticels (OIV 104-1) and thickened dark-tinted nodes.

The results of the philometric research are shown in Table 1.

Blossom: hermaphrodite (OIV 151-3).

Inflorescence: large, pyramidal, developed at the 1st or 2nd joint (152-1), with one or two winglets.

Bunch: medium large (OIV 202-5); average length 15.6 cm; short (OIV 203-3); average breadth 11.87 cm;

compact (OIV 204-7); cylindrically winged with one or two winglets (OIV 209-2). The stem is 2.2 cm long in average to the first winglet, so it is rather short lengthwise (OIV 206-1) and medium stiff (OIV 207-5). Table 2 contains values pertaining to the length and breadth of the Medna bijela bunch.

Berry: medium large (OIV 220-5); average length 17.67 mm (OIV 221-5); balanced (OIV 222-2); round in shape (OIV 223-3), and circular in cross-section (OIV 224-2). The skin colour is green-yellow (OIV 225-1), with a marked amber colouring on the sunny side (OIV 226-1). It is profusely pollinated (OIV 227-7), with a marked umbilical point (OIV 229-2). The skin is thick and tough; the juice is colourless (OIV 230-1); the flesh is juicy (OIV 232-2) and firm (OIV 234-2), with a particular odour, specific for this variety (OIV 236-4), in slight degrees (OIV 237-2). The pedicel is short, 4.5 mm in average (OIV 238-3), and is hard to detach from the berry (OIV 239-1).

Table 2. Average statistical indicators of philometric values for the Medna bijela cultivar (1996-1998)

Category	n	x	min-max	Vc
length in cm	30	15.60	12.7-18.8	10.57
breadth in cm	30	11.87	9.7-14.5	11.06

Table 3. Average length and breadth of the Medna bijela cultivar berry (1996-1998)

Category	n	x	min-max	Vc
length in mm	300	17.67	9.5-23.0	8.90
breadth in mm	300	16.93	9.2-23.5	10.15

Table 4. Average length and breadth of the Medna bijela cultivar seed (1996-1998)

Category	n	x	min-max	Vc
length in mm	300	5.59	5.00-6.63	5.08
breadth in mm	300	3.70	3.02-4.7	8.40

Table 3 contains values pertaining to the length and breadth of the Medna bijela cultivar berry.

Seed: The berry contains (OIV 241-3) medium large, dark-brown seeds with short nebs, 5.59 mm long (OIV 242-3) and 3.7 mm wide. The average seeds weigh 3.04 g, and are thus classified as light (OIV 242-3).

Table 4 contains values pertaining to the length and breadth of the Medna bijela cultivar seed.

Based on the research of botanical properties, it can be asserted that the Medna bijela cultivar belongs to the ecological-geographical group of the Convarietas *Pontica*, Negr. Subconvarietas *Balcanica*, Provarietas *Mesocarpa*, Nem., Subprovarietas *Dalmatica* Nem.

Agrobiological properties of the Medna bijela cultivar

Technological observations, the beginning, duration and end of respective phases of annual growth cycles of the Medna bijela cultivar during the research depended on the year. Since there were no major variances, we shall indicate average dates of the beginning, the climax and the end of respective vegetational succession phases. Thus weeping commenced on Mar 22, and the opening of buds on Apr 21. Inflorescence started on Jun 7; its height was on Jun 11; the phase ended Jun 16. Berries started ripening on Aug 8; physiological ripening commenced Sep 29; the end of vegetation was on Nov 11 – leaf-fall.

It should be pointed out that the full bloom occurred somewhat late (OIV 302-5), while the berries started

Table 6. Average results of the Medna bijela cultivar vegetation growth (n = 75 bunches)

Year	Weight of topped shoots in kg	Weight of vine shoot in kg	Total length of vine shoot per vine in kg
1996	0.48	0.66	4.63
1997	0.40	0.71	5.50
1998	0.47	0.75	6.27
Average	0.45	0.71	5.47

ripening in early September, which can be regarded as late (OIV 303-7).

Table 5 indicates duration of respective annual cycle phases for the Medna bijela cultivar in days.

According to data in 5, a full annual cycle takes 237 days in average (I through VII), i.e. 207 days from germination to leaf-fall. The interval from germination to physiological ripeness lasts for 164 days, so, acc. to Pulliat (1897), the Medna bijela cultivar belongs to the 3rd ripening period. The period of rest under the research conditions was 130 days.

Economic and technological properties of the Medna bijela cultivar

Lushness of vegetation

In order to determine the vegetation growth, we used the method of weighing the topped sprouts, as well as the vine shoot. The average results of the research are shown in Table 6.

The data indicate there were no significant differences during the years of research in the average weight of topped sprouts, nor in the vine shoot weight. The average triennial weight of the green mass is 0.45 kg, and of the vine shoots 0.71 kg.

The mean total length of the vine shoot per vine varied in the course of the years from 4.63 m to 6.27 m, whereas the average length was 5.47 m.

Table 5. Duration of the Medna bijela cultivar growth phases in days

Growth stage		No. of days of each growth stage per years			Average no. of days
from	to	1996	1997	1998	1996-1998
I. Beginning of weeping	Bud burst	29	31	30	30
II. Bud burst	Beginning of inflorescence	47	47	49	48
III. Beginning of inflorescence	End of inflorescence	10	11	9	10
IV. End of inflorescence	Beginning of ripening	53	54	54	54
V. Beginning of ripening	Technological ripening	52	51	54	52
VI. Technological ripening	Leaf-fall	40	49	42	44
VII. Leaf-fall	Beginning of weeping	127	132	130	130
Duration of vegetation	Phases I through VI	231	243	236	237
Duration of vegetation	Phases II through VI	202	212	208	207

Table 7: Average values of the Medna bijela cultivar basic elements of fertility (n = 20 bunches)

Year	No. of buds / vine	No. of fertile shoots / vine	No. of shoots / vine	No. of bunches / vine	No. of bunches / bud	No. of bunches / shoot	No. of bunches / fertile shoot	Bunch weight in g	Grape weight / vine in kg
1996	16.40	9.33	13.08	10.76	0.65	0.82	1.15	341.4	3.67
1997	16.35	9.87	13.86	11.34	0.69	0.82	1.15	329.2	3.73
1998	16.60	10.11	14.18	11.82	0.71	0.83	1.17	337.4	3.99
Average	16.45	9.77	13.71	11.30	0.68	0.82	1.16	336.0	3.80

Based on the presented indicators of lushness, it can be deduced that the Medna bijela cultivar is medium lush.

Elements of fertility

The basic fertility indicators are shown in Table 7.

The research results reveal that the basic fertility elements exhibited low variability. The data obtained are significant for calculations of fertility coefficients. Thus the Medna bijela cultivar is characterized by the following:

1. AFC – absolute fertility coefficient (total number of bunches/total number of fertile shoots) is $11.30/9.77 = 1.16$
2. RFC – relative fertility coefficient (total number of bunches/total number of shoots) is $11.30/13.08 = 0.86$
3. BFC – bud fertility coefficient (total number of bunches/total number of buds) is $11.30/16.45 = 0.69$

Mechanical composition of the bunch and berries

Table 8 shows average values of composition of the bunch and berries and structural indicators in percentages.

The data concerning the bunch composition in Table 8 indicate that its average weight was 375.6 g, of which the berry weighed 363.25 g or 96.71%, while that of the peduncle was 12.44 g or 3.31%. The data regarding the berry composition and the bunch structure reveal that the flesh weight in berries and the bunch was 298.48 g, i.e. 79.47%, and that the weight of the solid residue (peduncle, skin, seeds) was 20.55 g, i.e. 5.47%. Based on all relevant indicators, and the structural indicators (flesh/solid residue) Medna bijela can be classified in the group of typical wine cultivars, with a pretty high utilisation.

Quantity of sugar and total acid in must

The average values of sugar concentration and total acid in the must are shown in Table 9.

Table 8: Average research results of the Medna White cultivar bunch and berry composition and the berry structure (1996/1998)

Bunch composition	Average
Bunch weight in g	375.6
Weight of berries in g	363.25
No. of berries in bunch	126.4
Weight of peduncle in g	12.44
% of berries in bunch	96.71
% of peduncle in the bunch	3.31
Composition indicator (weight of berries / weight of stem)	29.25
Berry indicator (No. of berries / 100 g of bunch)	33.53
Berry composition	
Weight of skin in bunch in g	55.18
Weight of seeds in bunch in g	9.62
Weight of flesh in bunch in g	298.48
No. of seeds in bunch	316.7
Weight of 100 berries in g	287.40
Weight of 100 seeds in g	3.04
Weight of skin of 100 berries in g	43.65
Weight of flesh of 100 berries in g	236.14
No. of seeds in 100 berries	250.55
Weight of seeds in 100 berries in g	7.08
Weight of 1 seed in g	0.03
Average No. of seeds in 1 berry	2.3
Composition indicator	4.6
Bunch structure in %	
Peduncle	3.3
Skin	14.69
Seeds	2.57
Flesh	79.47
Skeleton (stem + skin)	17.99
Solid residue (peduncle + skin + seeds)	20.55
Composition indicator (flesh + solid residue)	3.87

Table 9: Average values of sugar concentration and total acidity in the Medna bijela cultivar must (1996-1998)

Category	n	x	min-max	Vc
Sugar, Babo	75	16.0	14.31-17.81	5.81
Acids, g/L	75	6.29	4.63-7.94	13.09

The data shown in Table 9 reveal that the average values of sugar concentration ranged from 14.31% to 17.81%, with the variance coefficient of 5.81. The total acidity was within the range from 4.63 g/l to 7.94 g/l, with the average value of 6.29 g/l, and the variance coefficient of 13.09.

Minivinification was performed in every year of research; the wines had an average alcohol content of 10.43 vol%, the total acidity of 6.06 g/l, with the total extract of 16.9 g/l and 2.29 g/l of ash.

Conclusions

Based on the ampelographic research of the Medna bijela cultivar (*Vitis vinifera* L.) we can conclude the following:

- the Medna bijela cultivar probably originates from the area of the third Adriatic vine-growing subregion; its synonyms are Bubo, Bumba, Medena, Rizavac, Zložder etc.
- all botanical properties revealed exceptional stability, so, according to the classification of ecological-geographical groups, Medna bijela can be classed within Convarietas *Pontica*, Negr. Subconvarietas *Balkanica*, Provarietas *Mesocarpa*, Nem., Subprovarietas *Dalmatica* Nem.
- with respect to the quantity of the cut-off green (0.45 kg) and ripe (0.71 kg) masses per grapevine, it belongs to medium lush cultivars
- the basic fertility indicators are within the range specific for this group of cultivars, viz. AFC = 1.17, RFC = 0.86, BFC = 0.69; the yield per one grapevine is 3.73 kg
- the sugar concentration of 16.0% and the total acidity of 6.29 g/l in the must reveal that it is a cultivar that renders light table wines, with a pleasant varietal aroma, the alcohol content of 10.43 vol% and 6.06 g/l of total acidity

Finally, we can conclude that this cultivar deserves more attention, due to its specific features, and that research should be continued, primarily in the selection process.

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