White technical variety of Platovsky grapes for quality ecological winemaking

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Abstract. The agrobiological characteristic of Platovsky grape variety has been given. The variety was bred in ARRIV&W - a branch of the FSBSI FRARC as a result of crossbreeding of varieties Zala dyondye (Villar Blank × Csaba dyondye )× Podarok Magarach (Rkatsiteli × Magarach 2-57-72). The variety was included in the State Register of Breeding Achievements for Use in 2003. The technical purpose of use, very early maturation, the duration of the production period is on average 110 days with the sum of active temperatures of 2499 °C. The variety is characterized by high winter hardiness and frost resistance. At the sum of negative temperatures 586 °C the opening of the buds was 86%, the fruit shoots - from 70 to 97. m The harvest of 1 bush is on average for 11 years 5,7 kg with the planting scheme of 3 × 1,5. Platovsky is distinguished by a good sugar-accumulation (up to 300 g/dm3) with moderate acidity and used for high quality dry and liquor wines. Resistance to mildew and oidium is very high, which allows to cultivate the variety with minimal protection from fungal diseases and use grapes for the production of bio wine.

1 Introduction

The world's vitivinicultural business has undergone significant transformations in recent years. There has been a clear increase in wine consumption in the United States, Canada, Japan, China, India. The popularity of the wine business is steadily growing in Russia. Such a high interest in grapes and wine is mainly achieved by the promotion of beneficial properties of grape wine.

Scientists in many countries of the world note the impact of climate variability on the vine, changes in the phenological timing of the onset of the vegetation phases, the accumulation of sugars, the quality of the final product (wine). The need to translate viticulture into a new generation is due to the increasing instability of the climate, in which it is increasingly difficult to survive the pampered varieties of Vitis vinifera L., and the receipt of ecologically clean products [1, 2, 3, 4, 5].

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Climate change, the increase of stressful climatic phenomena (autumn-spring frosts, icing, drought) determine the direction of scientific research to study the reaction of varieties to extreme growth conditions. In the world, Vitis vinifera L. grapes are used to produce wine, traditionally providing high quality finished products. Research is underway to study the adaptive potential of introduced varieties to new growing conditions [5, 8, 9, 10, 11], breeding work continues within the species Vitis vinifera L. [9].

One of the main advantages of new interspecies varieties is their higher adaptive ability, based on the richness of the genotype, expanded interspecies hybridization, the ability to fruit even in extreme conditions. In recent years, breeders have created varieties whose quality of wine has not only reached the level of varieties of the European species, but also in a number of biologically - useful chemical indicators surpasses them: in Germany created a variety Regent interspecies origin, in Korea the variety Cheongsan, in China the variety Beibinghong, based on the interbreeding of the genetic resources of the native species Vitis amurensis Rupr. [12, 13, 14].

The viticulture in the northern industrial zone of the Russian Federation, to which the Rostov region also belongs, is particularly affected by climatic conditions. Therefore, breeding work to create economically more profitable non-covered varieties with genetically conditioned resistance to abiotic and biotic conditions are very relevant and are carried out on different scales in almost all specialized institutions of the world. The introduction of new high-yielding, winter hardiness varieties is crucial in improving the profitability of grape plantations [15, 16, 17, 18].

In the conditions of changing climate, the work aimed at changing the domestic grape assortment, to create and include new varieties with increased resistance to frost, fungal diseases, with a fairly high quality of wine production are relevant all over the world. Therefore, the selection of technical grape varieties should be carried out simultaneously with a focused study of the components of juice and wine, positively affecting the aroma, taste and dietary qualities. The need for joint research of breeders and technologists is determined by the wide possibilities of identification and selection in a huge variety of old and newly created varieties of those that contain the largest amount of substances with expressed antimicrobial, antiviral, antioxidant activity and cardioprotective effect.

2 Methodology

The study of agrobiological and phenotypic indicators of Platovsky grape variety was conducted on the territory of the Experimental Field of ARRIW&W - a branch of the FSBSI FRARC, Novocherkassk Rostov region. The variety is grafted on the stock of Berlandieri × Riparia Cober 5BB. The study was conducted according to the conventional methods in viticulture.

Phenological observations, determination of the load indicators of bushes with eyes, shoots and harvest, fruiting of bushes, ripening of berries were carried out according to the method of M.A. Lazarevsky "Study of grape varieties", 1963.

Assessment of winter hardiness and frost resistance was carried out according to the number of break buds, developed on the bushes of full value shoots.

The quality of the crop is assessed by determining the content of sugars and acids in the juice of the berries as they mature. Sugar content of the juice of berries was determined by the refractometric method, acidity by titration 0,1 N solution NaOH on bromtimol blue.

 Experienced samples of dry and liqueur wines were prepared in the laboratory of winemaking technology ARRIW&W - a branch of the FSBSI FRARC in micro-winemaking conditions. The technology of production of table wine includes: stem removal, crushing of berries, pressing, sedimentation clarification, fermentation, racking. After self-clarification, their analytical and organoleptic studies were carried out. Liquor wine was prepared ac-
cording to the following scheme: stem removal, crushing of berries, fermentation, alcohola-

2 Research results

Platovsky's variety was bred in ARRIV&W - a branch of the FSBSI FRARC. Authors of the variety: I.A. Kostrikin, A.N. Maistrenko, S.I. Krasokhina, L.A. Lycheva. The variety was included in the State Register of Breeding Achievements admitted for use in 2003, patent No. 2133 of 03.02.2004. Platovsky obtained as a result of crossbreeding of varieties Zala dyondye × Podarok Magarach, the origin of the variety is shown in the figure 1.

![Fig. 1. Origin of Platovsky grape variety.](image)

Platovsky refers to the varieties of technical purpose, very early maturation, the duration of the production period varies by years from 100 to 123 days, the average for 11 years studied is 110 days. The amount of active temperatures to the full maturity of berries on average 2499 °C. In Novocherkassk matures in the first half of August, the latest date is August 22 (table 1).

The early ripening of grape berries reduces working load on processing wineries, as the peak of grape processing is reached in September, and recommend the variety for cultivation in the northern regions up to the Tver region, where the Platovsky variety is cultivated in the monastery of Nilo-Stoloben hermitage (Island Stolobny, Ostashkov city district, Tver region, Russia).

The crown of the young shoot is wide open, tomentose of the middle density, with a strong anthocyanin coloration. Young leaves are yellow-green, the reverse of the leaf has a rare spider's tomentose. The young shoot is semi-straight standing, the coloration of the dorsal and abdominal sides of the internode is completely red, the tendrils are short, their number on the shoot more than three.
Table 1. The date of the phase of vegetation of the Platovsky grape variety in 2009-2019.

| Indicators of development               | 2019  | 2018  | 2017  | 2016  | 2015  | 2014  | 2013  | 2012  | 2011  | 2010  | 2009  | Сред- нее | 2006  |
|-----------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|
| The beginning of the bud break          | 22.04 | 22.04 | 30.04 | 16.04 | 3.05  | 23.04 | 27.04 | 22.04 | 2.05  | 26.04 | 3.05  | 29.04   | 25.04 |
| The beginning of flowering              | 24.05 | 23.05 | 7.06  | 30.05 | 4.06  | 27.05 | 21.05 | 25.05 | 5.06  | 1.06  | 5.06  | 29.05   | 24.06 |
| The beginning of ripening of berries    | 27.07 | 27.07 | 18.07 | 7.07  | 8.07  | 25.07 | 4.07  | 10.07 | 11.07 | 7.07  | 17.07 | 15.07   | 17.07 |
| Full maturity of berries                | 17.08 | 20.08 | 22.08 | 17.08 | 11.08 | 12.08 | 6.08  | 8.08  | 15.08 | 10.08 | 17.08 | 14.08   | 12.08 |
| Production period:                      |       |       |       |       |       |       |       |       |       |       |       |         |       |
| number of days                          | 113   | 121   | 114   | 123   | 100   | 111   | 101   | 108   | 105   | 106   | 106   | 110     | 109   |
| amount of active temperatures, °C       | 2498  | 2794  | 2559  | 2606  | 2250  | 2510  | 2370  | 2597  | 2449  | 2496  | 2362  | 2499    | 2254  |

Leaves of pentagonal shape, medium size, leaf’s plate strongly bubbled, edges bent upwards. Leaves are faintly cleft, three-bladed, bottom medium or rare spider’s tomentose. The coloration of the main veins on top and bottom is light green. The top clippings are small, opened in the form of an incoming angle. The lower clippings are small, barely marked, open, slit-shaped. The butt sinus is usually closed with highly overlapping blades. The teeth at the ends of the blades are short, dome-shaped. The teeth on the edge of the leaf are small, dome-shaped with convex sides. The main veins on the top side of the leaf with a weak anthocyanin color. The main veins on the underside of the leaf with thick brushy tomentose. The butt are equal to the middle vein, wine-red color (figure 2).

Fig. 2. Ampelographic photo of Platovsky grape variety.
The flower is half-polished with five stamens. The length of the stamen's threads is longer than the length of the pistil. The average weight of the bunch is 177 g, cylindroconic, medium density, sometimes friable. The stalk is medium. The peduncle is short. The berry is small, weight of 20 g, easily separated from the peduncle, rounded, yellow-white, in the sun with a pinkish flank. The skin is thin but sturdy. Pulp is slightly dense, moderately juicy. The taste is simple, harmonious. Two or three seeds. The matured shoot is red-brown, fluted. The growth strength of the bushes is average. Shoot ripening are good (more than 80%). Fruity shoots 86%. Fruitfulness ratio 1.2 and fertility 1.4. Shoot productivity is high - 235 g, the harvest from the bush 5.9 kg, the potential yield for an average of 10 years was 131 cents per hectare. Platovsky grape variety is winter hardiness. In 2006, at minus 28 °C, at non-covered grape culture it had 52% live eyes, which ensured a yield of 29 cents per hectare. During the dormant period of 2011-2012, the accumulated negative temperatures was minus 586 °C (the highest in 11 years), which did not significantly affect the safety of the eyes (break 86%) and the yield of the variety (160 c/ha).

Table 2. Agrobiological indicators of Platovsky grape variety, 2009-2019.

| Indicators of development | Years | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | average | 2006 |
|--------------------------|-------|------|------|------|------|------|------|------|------|------|------|------|---------|------|
| Absolute minimum t air, minus °C | 11.5 | 13.6 | 18.9 | 20.5 | 24.5 | 24.6 | 18.5 | 24.0 | 20.5 | 22.0 | 16.0 | 19.5 | 28.0 |
| Amount of negative t, minus °C | 197 | 244 | 389 | 200 | 284 | 325 | 293 | 586 | 450 | 418 | 108 | 318 | 339 |
| Bud break, % | 92 | 100 | 90 | 68 | 80 | 85 | 96 | 86 | 77 | 86 | 51 | 83 | 52 |
| Normally developed shoots by 1 bush | 25 | 30 | 18 | 14 | 12 | 56 | 28 | 22 | 36 | 41 | 21 | 27 | 7.0 |
| Fruiting shoots, % | 81 | 98 | 85 | 97 | 97 | 75 | 84 | 91 | 72 | 94 | 70 | 86 | 86 |
| Fruitfulness ratio | 1.2 | 1.5 | 1.2 | 1.6 | 1.1 | 1.0 | 1.4 | 1.4 | 0.9 | 1.5 | 0.9 | 1.2 | 1.2 |
| Fertility ratio | 1.4 | 1.5 | 1.5 | 1.6 | 1.1 | 1.3 | 1.6 | 1.6 | 1.3 | 1.6 | 1.3 | 1.4 | 1.4 |
| Average mass of a bunch, g | 135 | 190 | 190 | 170 | 108 | 236 | 218 | 195 | 166 | 183 | 161 | 177 | 150 |
| Productivity of shoot, g | 162 | 285 | 228 | 272 | 119 | 236 | 305 | 413 | 149 | 275 | 145 | 235 | 180 |
| Harvest from 1 bush, kg | 3.5 | 5.5 | 4.1 | 3.8 | 1.4 | 13 | 8.5 | 7.2 | 4.9 | 8.2 | 2.2 | 5.7 | 1.3 |
| Potential yield, c/ha | 78 | 122 | 98 | 84 | 31 | 293 | 189 | 160 | 109 | 182 | 98 | 131 | 29 |

The weather conditions of 2015 and 2016 were unfavorable. Between 10 and 22 March 2015, the temperature of the air increased to 18 °C, and the grape plants began to emerge from dormancy. March 23 - a sharp drop in air temperature to -5 °C, with strong icing conditions.
shoots, which contributed to partial buds death and damage to the cambium of annual shoots. In such conditions, the yield of the Platovsky variety was only 31 cents per hectare. Within 24 hours there was a sharp decrease in air temperature from plus 20°C to minus 3.5°C. Many varieties had significant damage, especially V. vinifera L. and interspecific hybrids of late maturation and in 2016 were without harvest. At the same time, the yield of the Platovsky variety was 84 cents per hectare, as the harvest of the variety matured early, the wood of annual shoots is well matured and the bushes have time to prepare for wintering (table 2).

The variety is singled out as a donor of resistance to the mild mildew and oidium, the maximum defeat of the leaves was marked at 2.0 points, the average defeat was 0.5 points. The most epiphytotic was 2015. This year, the leaves maximum defeat was 2.0 points, with an average point of defeat 0.8.

The technological characteristics of the variety are also high. Sugar content of the juice of berries for an average of 10 years was 220 g/dm³ with titratable acidity of 7.5 g/dm³. The variety is characterized by a high output of juice (on average 72.5 % with manual pressing), table 3. The index of the structure of the Platovsky variety bunch is on average 49.7.

All dry wine samples had ethyl alcohol content by volume 11.0 - 13.2 %, titratable acids 5.4-7.9 g/dm³, volatile acids no more 0.72 g/dm³, total sulphur dioxide 123.4 – 198.3 mg/dm³, extract 21.9 – 25.8 g/dm³, that meets the requirements of the Russian Standard (table 4).

### Table 3. Mechanical analysis of the structure of the bunch of technical grape variety Platovsky

| Indicators                  | Years          |
|-----------------------------|----------------|
|                             | 2019 | 2018 | 2017 | 2016 | 2015 | 2014 | 2013 | 2012 | 2011 | 2010 | 2009 | average |
| Average berry mass. g       | 2.3  | 2.0  | 2.2  | 2.4  | 2.2  | 1.3  | 2.1  | 1.9  | 1.6  | 1.5   | 1.5   | 1.9   |
| Stems. %                    | 4.1  | 4.5  | 4.2  | 4.8  | 3.6  | 2.4  | 2.5  | 3.2  | 2.8  | 2.9   | 3.0   | 3.4   |
| Skin with pulp. %           | 19.9 | 22.4 | 22.0 | 19.9 | 24.0 | 22.2 | 17.4 | 19.3 | 19.7 | 19.9  | 33.8  | 21.9  |
| Seeds. %                    | 4.0  | 2.2  | 2.5  | 2.3  | 2.8  | 4.9  | 2.2  | 2.9  | 3.7  | 5.1   | 5.1   | 3.4   |
| Juice. %                    | 72.0 | 70.9 | 71.3 | 73.0 | 69.6 | 69.5 | 77.9 | 74.6 | 73.8 | 72.1  | 59.5  | 71.3  |
| Analysis date. August       | 13   | 26   | 24   | 17   | 19   | 25   | 06   | 08   | 31   | 18    | 25    | 19    |
| Sugar content. g/dm³        | 192  | 261  | 212  | 181  | 233  | 298  | 203  | 188  | 205  | 262   | 220   | 223   |
| Acid content. g/dm³         | 9.2  | 7.1  | 5.9  | 10.7 | 5.3  | 5.8  | 8.2  | 12.5 | 5.2  | 6.0   | 7.5   | 7.6   |
| Glucoacidimetric (GAI)      | 21   | 37   | 36   | 17   | 44   | 51   | 25   | 15   | 39   | 44    | 29    | 33    |

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The climatic conditions of 2010-2014 contributed to the accumulation of the optimal concentration of sugars 245 -260 g/dm³, which allowed to conduct a technological evaluation of the variety for the preparation of liqueur wines. All samples of liqueur wines by chemical indicators corresponded to State standard 32715-2014 "Interstate Standard: liquor wines, liqueur protected geographical indications, wines are liquor protected names of place of origin." General technical conditions: alcohol 16% vol., sugars content 16.0 g/dm³ (table 5).

Organoleptic evaluation is the main indicator of quality. The wine of the studied variety in the dry version was bright, well-formed aroma, full taste and pleasant aftertaste: fine aroma with tones of wild herbs and flowers, the taste is full, slightly alcoholic, piquant bitterness. Wine from the studied variety in the liqueur version: amber color, a complex aroma with tones of dried fruits, honey and flowers, a taste full, buttery, pleasant aftertaste (figure 3).
3 Conclusion

Platovsky grape variety is a promising variety for cultivation in 6 regions of industrial viticulture and in northern regions for farms. High resistance to fungal diseases allows to cultivate a variety with a minimum fungicide load in the form of preventive treatments (2-3 treatments), high frost resistance and winter hardiness of the variety allows to recommend the variety for cultivation in non-covered grape culture, even in the zone of earth-covered grape culture industrial viticulture.

The variety is suitable for the preparation of dry and special (liqueur) wines of high quality. At present, classical grape varieties are well studied and technologies have been developed to produce quality wines that take into account their varietal characteristics. Years of work with complexly sustainable technical grape varieties have shown that along with the general features of the technology of wine preparation in the white way, there is a differentiated approach to each variety.

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