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SCHOLARENA

Journal of Advancements in Plant Science

RESEARCH ARTICLE

ISSN: 2639-1368

Fruit Characteristics of the Merlot Clones in Belgrade Wine Growing Region, Serbia

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Citation: Sivcev B, Rankovic-Vasic Z, Petrovic A, Rancic R, Milisic K (2018) Fruit Characteristics of the Merlot Clones in Belgrade Wine Growing Region, Serbia. J Adv Plant Sci 1: 203

Article history: Received: 13 June 2018, **Accepted:** 20 September 2018, **Published:** 25 September 2018

Abstract

The clonal selection has contributed more variety and adaptability improved quantitative and qualitative characteristics and many of the best-known wine cultivars are ancient. Merlot is a typical example. In Bordeaux keeps about 300 potential clones, 13 were approved and wide diverse in the world. And in other countries were selected clones of variety Merlot, in our experiment we included clones R12, R5 and I-ISV-F-V4 from Italy, as we include two clones 181 and 348 originated from Bordeaux. In addition to the yield and quality, we were interested indicators supplied the composition of the cluster and berries. The bigger cluster with low seeds in berry and low total acid is clone characteristic of the I-ISV-F-V4, while the per share of sugar in close clones 348 and R-12 chargers.

Keywords: Merlot; Clone; Yield; Quality; Composition of grape and berry

Introduction

Cultivated the grapevine *Vitis vinifera* subsp. *vinifera* is one of the leading horticultural plants in the world. Today, cultivated grapevines are known to manifest a greater diversity and heterozygous in comparing with wild vines [1,2]. The selection process through further and closer history took place in two directions: spontaneous in nature and with the active participation of men in order to increase productivity grape and berries, sugar content and total acids [3]. Vegetative propagation, expressed hermaphroditism with spontaneous hybridization have contributed significantly to the diversity of varieties.

Variety Merlot is dominant red grapevine variety in Bordeaux and is grown on an area of 64416 ha or 65% [4]. Data from 2017 indicate that Merlot is the fourth widespread variety in the world with 266,000 ha (http://www.oiv.int) [5]. Less common are Merlot synonyms, which are most commonly found as French regional synonyms which include Merlau rouge, Crabutet noir, or Plant Medoc (Bazadais); Alicante (Podensac); Seme dou flube (Graves); Seme de la Canau (Portes); Semilhoun rouge (Medoc); and Bordeleze belcha (Basque country); and it is Medoc noir in Hungary [6,7]. The first description of the variety Merlo gave Odar (1850) and Rendu (1857). The origin of Merlot seems relatively recent, as its name is only seen in the literature for the first time at the end of the 18th century, just before the French Revolution [8]. Merlot was not an important cultivar until the last decades when it saw a large expansion not only in Bordeaux but worldwide. Today, Merlot is, along with Cabernet Sauvignon, one of the two most important red varieties in the world. Merlo exhibited less sensitivity to powdery mildew and thus explains the rapid expansion of the late nineteenth century, not only in France but also in other wine-growing countries. Quality manifested in a soft and easy recognizable red wine is another important factor. Reviewing application of DNA with 20 SSR markers was found that a variety Merlo obtained by spontaneous crossing varieties Magdeleine Noire des Charentes (mother) and Cabernet Franc (father) in Bordeaux [8,9]. Mother's provenance is not completely confirmed, and therefore further research. The fact is that the ancient-old variety was created from a population where individual cannot be identified at the genetic level. Therefore, there is diversity within the varieties manifested in, for example. the size of the berries, sugar accumulation capacity during ripening. Beginning in the sixties of the twentieth-century clonal selection was aimed at creating a virus-free planting maerjala, increased productivity, high class and quality [10,11]. Clonal selection of cultivars of *Vitis vinifera* L. has led to significant improvements in viticulture, especially in terms of quality and quantity of grapes [12]. The variation in phenology is conditioned by Jones and Davis, genotype,

climatic conditions and geographical location [13]. To date, these climate changes have had a relatively positive impact on the quality of grapes and wine, which was reflected in the earlier maturation of grapes, sugar and richer in polyphenols, with a smaller proportion of "plant" character and the whole high fertility [14]. Versatile consideration of viticulture in the world imposes and the fact that the clonal selection was focused primarily on widespread varieties that have led to the impoverishment of the election of new clones. This impoverishment in fact cancelled out any possibility of selection of new clones in the future [15]. Therefore, the preservation of genetic resources of primary task and incorporates institutional clonal selection, mass selection, and private clonal selection. Today a high level of production is not the primary producer requirements, adaptability clone to external factors and/or tolerance to the disease are the new essential requirements [16,17].

The quality of the grapes at harvest is an essential element of quality wines. Studies have shown that different clones of the variety may show significant differences in the chemical composition of berries [18]. Some clones have the capacity to produce a wine with pronounced colour, or the aromatic profile and content of phenol [19]. Simplified procedure for the introduction of new varieties/clones in Serbia does not negate the research work that includes new and indigenous varieties/clones [20].

Because winemakers have strong preferences for certain clones, it has become increasingly important to be able to identify them. Morphological differences between clones are slight at best and are often obscured by environmental variables and cultural practices. An objective means by which to distinguish them has long been sought. The aim of this study was to evaluate and determine the basic production features three clones created in Italy (R-12, R-5 and ISV-4) and two originating from France 181 and 348.

Materials and Methods

Studies have been conducted on the experimental field in Belgrade grape growing region (Experimental field 'Radmilovac'- Faculty of Agriculture, University of Belgrade λ=44º 45´ N, ϕ=20º 35´ E, H=135 m) in the period between 2013 and 2015 year. So far, vineyard established between 2005 and 2006, with the planting space 3 x 1 m and this grapevine is in the form of asymmetric cordon with a trunk of 0.8 m and loaded with 24 buds on average. The investigated clones were grafted at rootstock Kober 5BB. They differ by origin: Clones R12 and R3 came from Viva Cooperativa Rauchedo, clone I-ISV-F-4 from Friuli Venezia Giulia both from Italy. Clones 181 and 348 came from France. Among the first admit clones in the year 1975 is clone 181 which it is grown and widely disseminate a total of 15 clones (www.oeno.tm.fr ETAV) [21]. The experiment included ten vines for each clone. In the vineyard were applied standard agricultural practices. The grape harvest was carried out at the stage of full ripening, is determined by the total number of bunches per vine, the yield of grapes per vine, sugar content, total acids in grape juice and weight of berries. The quality of grapes was determined on the basis of sugar content by Oechsle scale and total acid content was measured by a titration method with n/4 NaOH in the must.

The measured data were statistically analyzed using the software package Statistica (StatSoft, Inc., Tulsa, OK, USA).

Results and Discussion

Variability in crop yield and quality in every situation on the ground and breeders have been trying to understand for centuries. Perhaps one of the most common examples of these problems is the production of wine grape varieties Merlot why was started with the clonal selection just in the second half of the twentieth century [3]. The objectives of breeding and selection are to correct fertility varieties to eliminate negative characteristics of grape bunches and maintain quality [17]. Clonal selection contributes to preserving the biodiversity, where there are two options to choose first the dominant clone and several supporting, time is maintained yield and quality in approximately the same level, without major variations from year to year. Another option is to take on a given plot combines several related by boat feature, or with different characteristics [22].

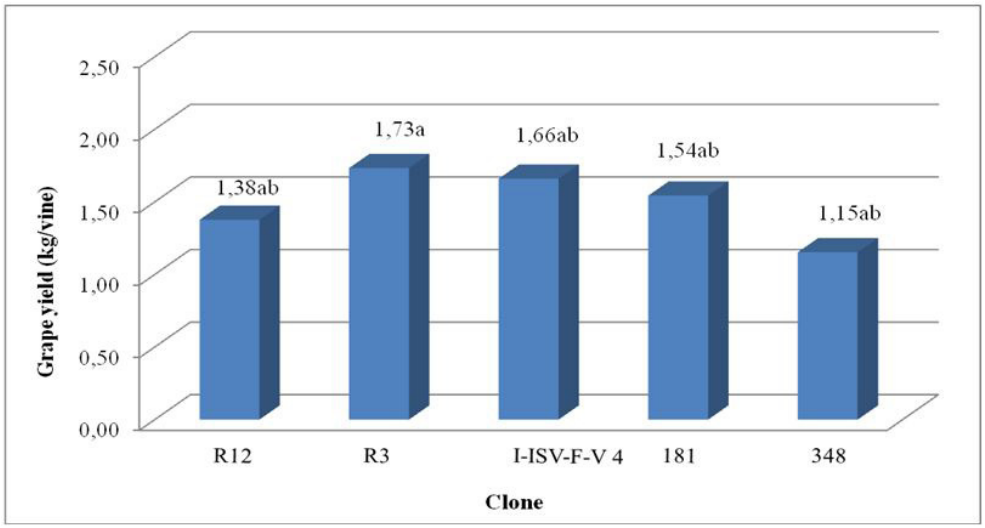

Figure 1: Mean values of grape yield per vine of the investigated Merlot clones (*average* 2013-2015)

In the Figure 1, the results show the tested clones of Merlo. In three years the highest yield is achieved as a clone R3 per unit area of one hectare is 5700 kg. At the same time, this clone showed the least variability in the examined period. Close the specified value of the clones I-ISV-F-V4 and 181. After the number of clusters allocated to clone 348 with extremely low values, only 9.73 per vine. The average number of bunches per vine was uniform clones R12, R3 I-ISV-F and 181 and was about 19.

The results Dimovska, *et al.,* realized in the period of full fruiting are about the same compared with the clones R12, R3 I-ISV-F-V4 and 181, or clone with the lowest yield of the clone 348 [23].

Comparing bunches noted that no major differences ie that the values in the range from 95-107 g (Table 1). Merlot variety population as to the scores themselves Banjnain and Kulina has a small cluster of an average of 95.5 g of Trebinje (Bosnia and Herzegovina) (Figure 2) [24]. Comparative results Pajović, *et al.,* where they have involved Skopje vineyard and the vineyard of Montenegro indicate that there is no variation in the thickness of the cluster variety Merlot [25].

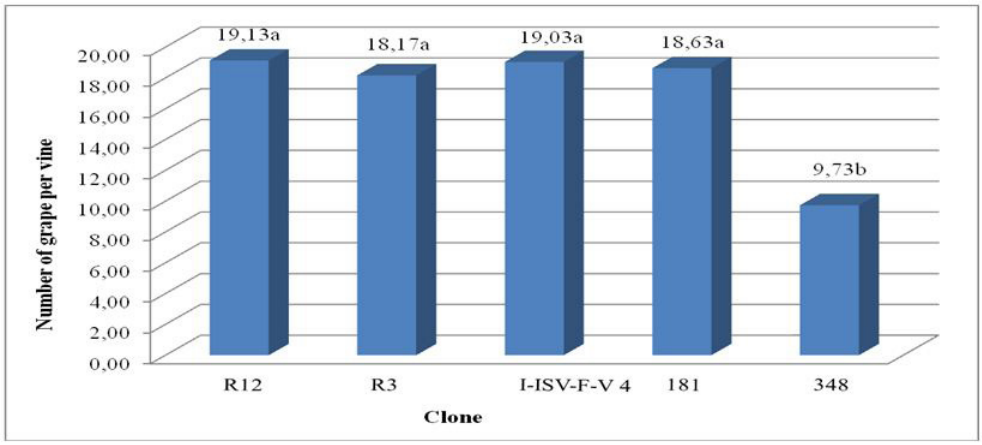

Figure 2: Mean values of the number of grape per vine of the investigated Merlot clones (average 2013-2015)

Characteristic						
Clone	**Grape yield (kg·vine^{-1})**	**Number of grape per vine**	**Grape weight (g)**	**Berry weight (g)**	**Sugar content (%)**	**Titr. acidity (g·L^{-1})**
R12	1.38 ab	19.13 a	95.33 b	1.03	22.20	6.40
R3	1.73 a	18.17 a	99.67 ab	1.17	21.47	7.00
I-ISV-F-V 4	1.66 ab	19.03 a	103.00 ab	1.03	21.87	5.77
181	1.54 ab	18.63 a	111.33 a	1.24	21.30	5.87
348	1.15 b	9.73 b	107.00 ab	0.91	21.70	6.17

Table 1: Mean values of yield components and grape quality of the investigated Merlot clones (*average* 2013-2015)

The larger cluster with larger berries, which is observed in clones 181, while all three clones originating in Italy with regard to this value is very similar [26]. The grape bunches, sometimes winged, are packed with blue-black spherical grapes that have moderately thick skin and juicy, pleasant-testing pulp [6]. Wine from Merlot has a remarkable quality that is expressed after two to three years of ageing. This is another reason why this variety with several clones meet in the wine-growing region of the Balkans from Slovenia, Istria, Croatian in the continental part, through Bosnia and Herzegovina, Montenegro, Serbia and Macedonia [27].

Mean values followed by the same letter do not differ significantly according to LSD test at P = 0.05. The high sugar content must was found in all clones and their differences are lower than one per cent [22]. Insignificant better quality grape clones which originated in Italy in comparing from France. Van Leeuven highlights that in the six-year period in several locations in Bordeaux value of Merlot's quality is 223 g/L [16]. Acidity expressed in tartrate in the region from Belgrade the tested clones is within the limits of 5.77 and 7 g/L. Slightly in excess cause, the contents of total acids are in clone R3 in comparison with clones I-ISV-F-v4i 181. In Skopje region clones 181, 348, R 12, and R 3 are accumulated more sugars as compared with the Belgrade region [23]. Temperature conditions during the ripening grapes have a dominant influence on the quality [13]. In the first and third year of tests achieved better quality grapes compared to another year. In Belgrade Wine Growing Region, Serbia year 2014 was extremely rainy, cold, and caused a lower sugar content in the must. By choosing the place at least two to three clones within each variety in the same locality achieved the continuity in the quality of planting proven health clones provides the longevity yet [28,29].

Summary and Conclusion

Our results were given new information on growing clones of Merlo originating from France and Italy in Belgrade vineyard area.

Data show that the clones R3 and I-ISV-F-V4 are the most desirable in terms of the amount yield. The combination of clone R12 with the highest sugar content in expanding and clone R3 with the highest and the clone I-ISV-F-V4 with the lowest share of total

acid will significantly contribute to the harmonious relationship between that two features. Clones 181 and 348 differ in size berries and confirm the differences in yield that they should be equal treatment.

Acknowledgement

This paper was realized as a part of the project "Studying climate change and its influence on the environment: impacts, adaptation and mitigation" (43007) and "Application of new genotypes and technological innovation in order to improve fruit and grape production" (31006) financed by the Ministry of Education and Science of the Republic of Serbia within the framework of integrated and interdisciplinary research for the period 2011-2018.

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