

(*Vitis vinifera* L.)

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Comparative ampelographic study of table grape cultivars (*Vitis vinifera* L.)

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SUMMARY

- A relative ampelographic study has been made of table grape cultivars and an elite hybrid form. It has been proven that there is a statistical diversity in phenotypic expression of many indicators of the mechanical analysis of the cluster and the berry. The elite form excels the known varieties in a number of economically valuable agro-biological and technological characteristics. Depending on their genetic proximity and relative weight, in the individual identity of varieties Brestovitsa-Palieri and Armira-Bolgar-Hybrid 10, significant similarity has been noticed. Super ran Bolgar has the lowest degree of similarity with the other varieties. The terms of the external environment least affect the productivity of the variety Bolgar and most strongly - Super early Bolgar.

Key words: table grape cultivars, relative ampelographic study, cluster analysis, environmental plasticity

INTRODUCTION

- The favourable climate and soil conditions of Bulgaria allow the cultivation of table grape cultivars for the production

(Zankov, 1984; Colapietra et al., 1995; Ivanov, 2009; Simeonov et al., 2012).

(Krumov, 2014; Simeonov et al., 2015).

et al., 2007).

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of quality grapes for fresh consumption. A number of countries have produced new table grape cultivars with valuable business properties. Their agro-biological and technological features are always of interest for comparison with the old and famous varieties in this direction (Zankov 1984; Colapietra et al., 1995; Ivanov, 2009; Simeonov et al., 2012).

The relative share of foreign varieties in the structure of the vineyards in our country excels that of the local varieties. Over the last few decades, by introduction and the method of sexual hybridization, a large number of new early high-quality, middle and late ripening varieties of large-fruited table grape cultivars have been selected and tested (Krumov 2014; Simeonov et al., 2015). Depending on region, traditions and experience, the selection work in the field of viticulture is aimed at creating or introduction of table grape cultivars that ripen from the second half of July to late October (Nakov al., 2007). After studying the biological characteristics and the productive capacity of individual table grape cultivars, their most valuable ampelographic properties can be identified and the necessary information for their proper spatial distribution can be obtained.

The aim of this study is to compare important economic agro-biological characteristics of several seeded table grape cultivars and the identification of the most economically significant of them.

MATERIAL AND METHODS

The ampelographic study includes five table grape cultivars – Armira, Super ran Bolgar Brestovitsa, Bolgar, Palieri and a newly created elite hybrid form - Hybrid 10, grown in the Educational and experimental base of the Department of Viticulture at the Agricultural University in Plovdiv. This terroir is characterized by extremely favourable conditions for

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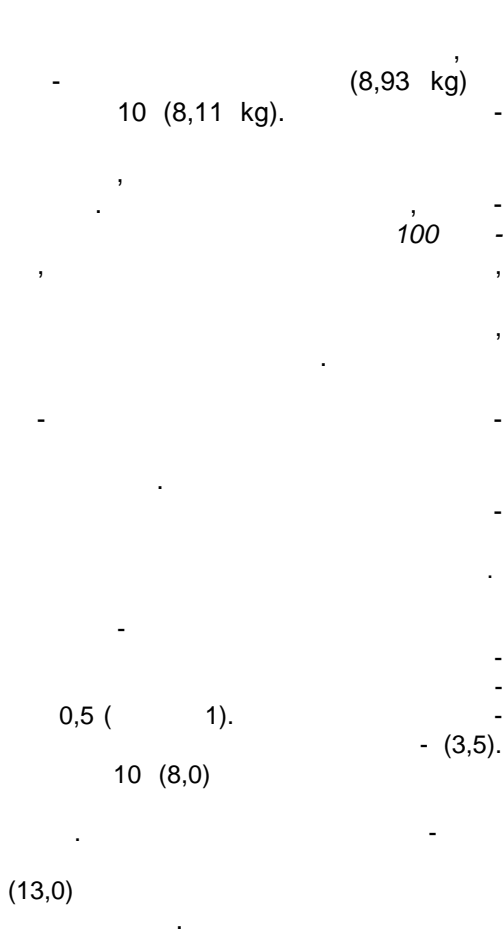
Table 1. Comparative analysis of parameters of fruitfulness and mechanical analysis in the grape varieties studied

	Varieties	Fruitfulness coefficient of leading shoot	Millerandage berries %	Average weight of cluster g	Length of cluster cm	Width of cluster cm	100 Seeds in 100 grape berries /number	100 Seed weight in 100 grains g
1	Hybrid 10	0,86	3,99	487,88	22,41	15,16	192,14	13,47
2	Armira	0,86 ^{n.s.}	9,49 *	402,79 *	19,32 ^{n.s.}	12,02 *	242,79 *	21,83 *
3	Super ran Bolgar	0,84 ^{n.s.}	18,22 *	302,15 *	18,60 ^{n.s.}	11,38 *	176,38 *	10,09 ^{n.s.}
4	Brestovitsa	0,78 ^{n.s.}	3,31 ^{n.s.}	323,46 *	18,29 ^{n.s.}	11,68 *	201,54 *	11,44 ^{n.s.}
5	Bolgar	1,00 ^{n.s.}	4,26 ^{n.s.}	370,43 *	39,21 ^{n.s.}	13,17 *	146,47 *	11,03 ^{n.s.}
6	Palieri	0,86 ^{n.s.}	4,00 ^{n.s.}	351,55 *	19,51 ^{n.s.}	11,19 *	150,51 *	10,66 ^{n.s.}
	Varieties	Yield per grape vine kg	100 Average weight of 100 grape berries g	Length of a grape berry mm	Width of a grape berry mm	Sugars %	Acids g/dm ³	
1	Hybrid 10	8,11	602,66	25,81	22,01	16,96	5,05	
2	Armira	8,93 *	532,67 *	22,18 *	18,66 *	15,46 *	4,49	
3	Super ran Bolgar	5,63 *	464,22 *	24,65 *	19,59 *	14,85 *	4,24	
4	Brestovitsa	7,06 *	756,51 *	28,65 *	21,55 ^{n.s.}	17,52 *	4,99	
5	Bolgar	5,90 *	552,97 *	23,27 *	19,56 *	16,32 *	5,05	
6	Palieri	6,55 *	747,65 *	23,49 *	21,30 ^{n.s.}	15,90 *	5,21	

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Table 2. Multidirectional comparative analysis of the parameters of fruitfulness and mechanical analysis in the grape varieties studied

	Varieties	Fruitfulness coefficient of leading shoot	Millerandage berries %	Average weight of cluster g	Length of cluster cm	Width of cluster cm	100 Seeds in 100 grape berries /number	100 Seed weight in 100 grains g
1	<i>Hybrid 10</i>	0,86 ^a	3,99 ^c	487,88 ^a	22,41 ^a	15,16 ^a	192,14 ^c	13,47 ^b
2	Armira	0,86 ^a	9,49 ^b	402,79 ^b	19,32 ^a	12,02 ^c	242,79 ^a	21,83 ^a
3	Super ran Bolgar	0,84 ^a	18,22 ^a	302,15 ^f	18,60 ^a	11,38 ^{cd}	176,38 ^d	10,09 ^b
4	Brestovitsa	0,78 ^a	3,31 ^c	323,46 ^e	18,29 ^a	11,68 ^{cd}	201,54 ^b	11,44 ^b
5	Bolgar	1,00 ^a	4,26 ^c	370,43 ^c	39,21 ^a	13,17 ^b	146,47 ^e	11,03 ^b
6	Palieri	0,86 ^a	4,00 ^c	351,55 ^d	19,51 ^a	11,19 ^d	150,51 ^e	10,66 ^b
	Varieties	Yield per grape vine kg	100 Average weight of 100 grape berries g	Length of a grape berry mm	Width of a grape berry mm	Sugars %	Acids g/dm ³	
1	<i>Hybrid 10</i>	8,11 ^b	602,66 ^b	25,81 ^b	22,01 ^a	16,96 ^b	5,05 ^a	
2	Armira	8,93 ^a	532,67 ^c	22,18 ^e	18,66 ^c	15,46 ^d	4,49 ^b	
3	Super ran Bolgar	5,63 ^d	464,22 ^d	24,65 ^c	19,59 ^{bc}	14,85 ^e	4,24 ^b	
4	Brestovitsa	7,06 ^c	756,51 ^a	28,65 ^a	21,55 ^{ab}	17,52 ^a	4,99 ^a	
5	Bolgar	5,90 ^d	552,97 ^c	23,27 ^d	19,56 ^{bc}	16,32 ^c	5,05 ^a	
6	Palieri	6,55 ^c	747,65 ^a	23,49 ^d	21,30 ^{ab}	15,90 ^{cd}	5,21 ^a	



All varieties are characterized by relatively *high yield per vine*, but the varieties with the greatest yields are Armira (8.93 kg) and Hybrid 10 (8.11 kg). With similar values of yields are Brestovitsa and Palieri, as well as Bolgar and Super ran Bolgar. The size of the berry, expressed through the *average weight of 100 berries*, also shows significant differences, as one group by this indicator includes the varieties Brestovitsa and Palieri, as well as Bolgar and Armina. In *length and width of berries* less statistical groups of proof have been formed and the observed diversity is not great. The amount of sugars and acids is within the requirements of table grape cultivars for their normal tasting characteristics.

The varieties Brestovitsa and Palieri have the highest degree of similarity in terms of the values of studied indicators with Euclidean distance of 0.5 (Figure 1). The second group includes the varieties Armira and Bolgar - (3.5). Hybrid 10 (8.0) joins the group formed by the previous two varieties. Super ran Bolgar has the lowest degree of similarity with the other varieties (13.0) and can be considered as a separate group.

Dendrogram using Average Linkage (Between Groups)

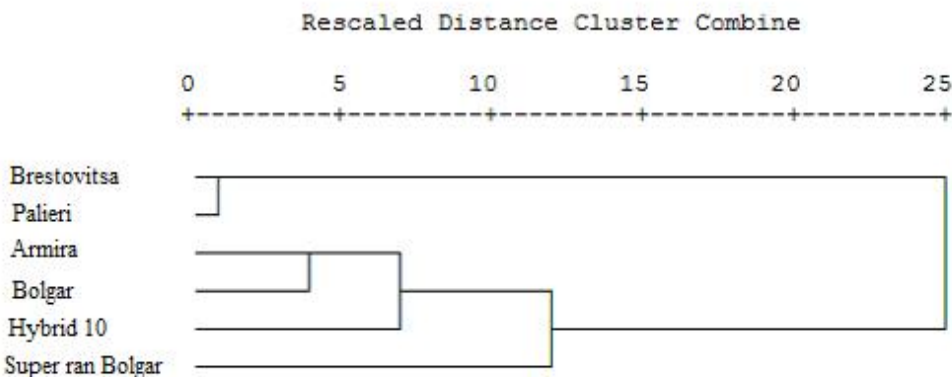
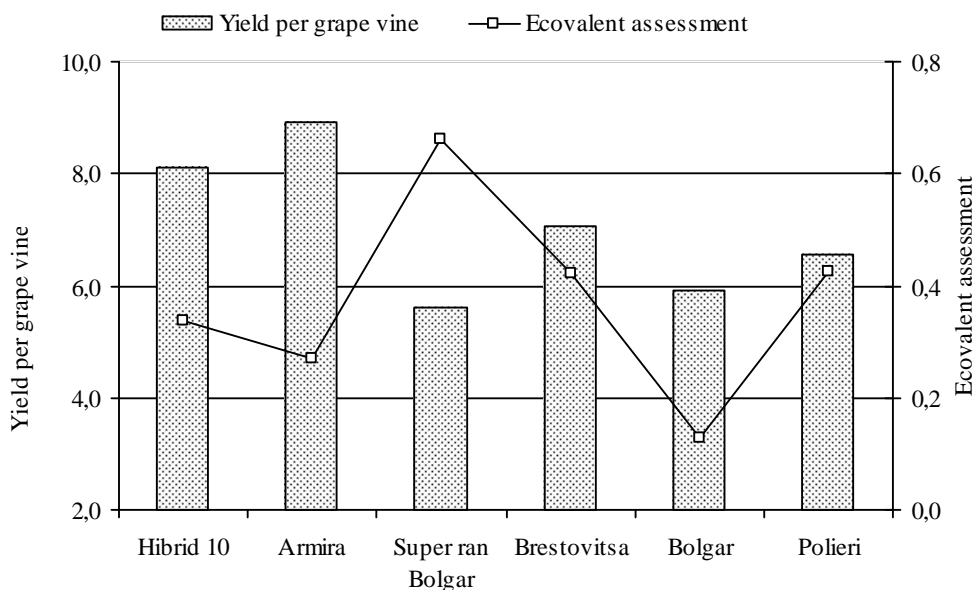


Fig. 1. Dendrogram - clustering of the table grape cultivars studied

(0,66) (2).

(0,13),

The variety Bolgar has the lowest values of eco coefficient in the indicator *yield per vine* - (0.13) which means that the conditions of the external environment least affect the change of its productivity and most unstable is Super ran Bolgar (0.66) (Figure 2). Other varieties occupy an intermediate position in terms of plasticity demonstrated compared to the impacts of the environment.



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Fig. 2. Graphic interpretation of the results from the environmental assessment of the table grape cultivars studied

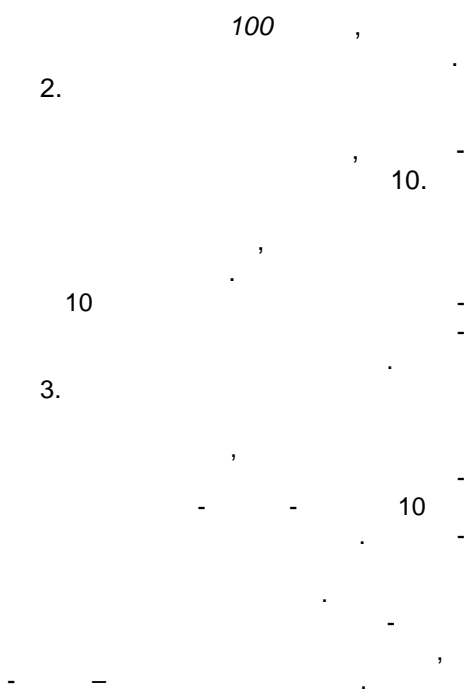
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CONCLUSIONS

1. There is a proven statistical diversity in the phenotypic expression of the indicators of the mechanical analysis *mean weight of cluster, width of cluster, number of seeds in 100 berries, yield per vine, average weight of 100 berries, length of berry and sugar content* in the studied varieties and the hybrid form. With some exceptions, unessential are the differences between Hybrid 10 and the approved varieties in *length of cluster, seed weight in 100 berries, width of berry*



and quantity of acids.

2.

2. All studied varieties are distinguished by a relatively high yield of grapes per vine, but the varieties with the highest yields are Armira and Hybrid 10. With similar values of yields are Brestovitsa and Palieri, as well as Bolgar and Super ran Bolgar. The elite form Hybrid 10 excels the known varieties in a number of economically valuable agrobiological and technological indicators.

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3. Depending on their genetic proximity and relative weight of the various indicators, in the individual identity of the varieties Brestovita-Palieri and Armira-Bolgar-Hybrid 10, significant similarity has been noticed. Super ran Bolgar has the lowest degree of similarity with the other varieties. The terms of the external environment least affect the productivity of the variety Bolgar and most strongly - Super early Bolgar.

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