

On the new very early table varieties obtained by crossing different varieties of grapevine

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Summary:

1. In order to obtain new table grape varieties which ripen before or at the same time as variety Pearl of Csaba, we performed many intervarietal crossings at our experimental station, using the following parents: Pearl of Csaba, Chasselas Bouvier, Muscat Ottonel, Queen of Vineyard, Cardinal, Dattier de Beyrouth, Ribier.
2. The Government Commission acknowledged five very early varieties, three of which have also better agrobiological and technological characteristics than the variety Pearl of Csaba.
3. The new variety Demir Door ripens on average 6 d, the new variety Early of Belgrade 3-5 d earlier, and the new variety Grochanka ripens at the same time or 1-3 d later as the control variety Pearl of Csaba.
4. Due to multiple regression analysis, biological characteristics as yield, cluster and berry weights and sugar content strongly depend on meteorological conditions (temperature, rainfall and solar radiation); this is valid for all the new varieties and the variety Pearl of Csaba at all locations investigated.
5. Analysis of variance (level of 0.05 and 0.01) shows that compared to the control variety we obtained with new varieties significantly greater yields, very significant large cluster and berry weights and very significantly better uvological characteristics of berry. The average yields for all investigated locations were increased in comparison to the control variety Pearl of Csaba: Demir Door +3.004 kg/ha, Early of Belgrade +6.259 kg/ha, Grochanka +7.065 kg/ha.
6. Organoleptic characteristics are much improved with all new varieties which is illustrated by increased indexes.
7. All investigated varieties are acknowledged genotypes of *Vitis vinifera* L., and all of these new varieties exhibited better biological and technological parameters than Pearl of Csaba.

Key words: table grape, variety of vine, early ripening, ecology, Yugoslavia, crossing, growth, yield, berry, must quality, sensory rating, physical properties, disease resistance, cold resistance.

Introduction

After acknowledgement of some very early varieties and after testing their behaviour under different agroecological conditions (AVRAMOV *et al.* 1978, 1982, 1988; AVRAMOV 1987, 1988; PAVLOVIC 1983; KORAC 1989), we can discuss now the advantages of these varieties which ripen before or at the same time as variety Pearl of Csaba.

Materials and methods

Crossing was performed using the varieties Pearl of Csaba, Chasselas Bouvier, Muscat Ottonel, Queen of Vineyard, Cardinal, Dattier de Beyrouth, Ribier etc. Crossing and propagation were done at the Fruit-Grape Experimental Station 'Radmilovatz' of the Faculty of Agriculture, Zemun.

The evaluation of the selected genotypes was carried out by the Commission for Variety Acknowledgement under production conditions similar to those of some ampelographic collections in our and foreign countries. Special attention was paid to changes of varietal characteristics on dependence of mesoclimatic conditions taking into account locations and years.

We used the following statistical methods: trend analysis, multiple regression analysis and analysis of variance.

In this paper we will show the data only for three most successful varieties which ripen before or at the same time as Pearl of Csaba.

Results

From the results obtained during the production of grapes in different agroecological areas of our country, the varieties Demir Door, Early of Belgrade and Grochanka were the most successful and economically most interesting ones. Control variety was Pearl of Csaba.

Variety Demir Door (Table 1)

This variety resulted from the crossing Muscat Ottonel x Queen of Vineyard.

The most important morphological and physiological characteristics are: vigorous growth, flower physiologically hermaphroditic, medium-sized cluster, large berries, yellow-green berry colour, semi-firm berry texture, muscat-like taste. The time of ripening is on average 6 d earlier than Pearl of Csaba.

Compared with the control variety, Demir Door is more resistant to *Botrytis cinerea*, to oidium and to low winter temperatures.

Analysis of the data given in Table 1 shows that compared to Pearl of Csaba the variety Demir Door exhibited significant quantitative differences which under index points reach the next limits: average yield (kg/ha) 134 IP; average cluster weight 110 IP; average berry weight 152 IP; average cluster length 123 IP; average sugar content 105 IP; berry skin crush resistance 208 IP; organoleptic characteristics value 138 IP.

Table 1 shows that we have obtained a new genotype which in comparison with the variety Pearl of Csaba exhibits better agrobiological and technological characteristics, including very early ripening, on average 6 d before Pearl of Csaba.

The analysis of variance (0.05-0.01 level) showed that compared with control variety Demir Door exhibited significantly greater yields, very significantly larger average cluster and berry weights, a very significant increase in berry skin crush resistance and also very significant increase of the resistance of berry to separation from pedicel. Yield, cluster weight, berry weight and sugar content showed very high correlations with temperature, rainfall and solar radiation.

Variety Early of Belgrade (Table 2)

This variety was obtained from a crossing of the varieties Chasselas Bouvier x Dattier de Beyrouth.

Most important morphological and physiological characteristics are: vigorous growth, flower functionally hermaphroditic, large cluster, large berries, yellow-green skin, berry texture semi-firm, taste very pleasant. Ripening occurs 3-5 d earlier than with Pearl of Csaba.

Compared with Pearl of Csaba, Early of Belgrade is much more resistant to diseases, to drought and to low winter temperatures.

Multiple regression analysis indicates that yield is poorly correlated with temperature, rainfall and solar radiation. However, cluster weight, sugar content and acid content are strongly correlated with these meteorological factors.

The data in Table 2 show that the variety Early of Belgrade exhibits significant differences in comparison to Pearl of Csaba and the values in index points reach the next limit: average yield 168 IP; average cluster weight 287 IP; average berry weight 125 IP; average cluster length 177 IP; average sugar content 125 IP; berry skin crush resistance 163 IP; resistance of berry to separation from pedicel 121 IP; organoleptic characteristics value 145 IP.

Table 2 also shows that we have obtained with variety Early of Belgrade a new genotype which in comparison with the variety Pearl of Csaba exhibits better agrobiological and technological characteristics including very early ripening.

The analysis of variance (0.05-0.01 level) showed that compared to Pearl of Csaba Early of Belgrade exhibits significantly very greater yields, cluster and berry weights and sugar content.

Table 1: Average values of major characters for varieties Pearl of Csaba and Demi Door investigated under different ecological conditions

C h a r a c t e r s	Pearl of Csaba (Control)	Demir Door (New variety)	Difference	Index of increase (Points)
1. Yield (kg/ha)	8,687	11,691	3,004	134,50
2. Cluster weight (g)	131,80	144,80	13,00	110,00
3. Cluster length (cm)	8,50	10,50	2,00	123,00
4. Berry weight (g)	2,21	3,36	1,15	152,00
5. Sugar content (%)	16,80	17,60	0,80	105,00
6. Total acid content (g/l)	6,60	6,70	0,10	101,00
7. Berry skin crush resistance (g/cm ²)	489,00	1022,60	533,60	208,00
8. Resistance of berry to separation from pedicel (g)	375,40	715,40	340,00	190,00
9. Organoleptic characteristics value (points 1 - 10)	6,30	8,70	2,40	138,00
10. Time of ripening	24.07.	18.07.	6 days	---

Table 2: Average values of major characters for varieties Pearl of Csaba and Early of Belgrade investigated under different ecological conditions

C h a r a c t e r s	Pearl of Csaba (Control)	Early of Belgrade (New variety)	Difference	Index of increase (Points)
1. Yield (kg/ha)	9.206	15.456	6.259	168,00
2. Cluster weight (g)	137,90	396,20	258,30	287,00
3. Cluster length (cm)	8,50	15,10	6,60	177,00
4. Bery weight (g)	2,08	2,55	0,47	122,00
5. Sugar content (%)	14,00	17,50	3,50	125,00
6. Total acid content (g/l)	7,20	7,40	0,20	102,00
7. Berry skin crush resistance (g/cm ²)	324,80	531,70	206,90	163,00
8. Resistance of berry to separation from pedicel (g)	463,70	980,80	517,10	211,00
9. Organoleptic characteristics value (points 1 - 10)	5,96	8,66	2,70	145,00
10. Time of ripening	3.08.	29.07.	5 days	---

Table 3: Average values of major characters for varieties Pearl of Csaba and Grochanka investigated under different ecological conditions

C h a r a c t e r s	Pearl of Csaba (Control)	Groschanka (New variety)	Difference	Index of increase (Points)
1. Yield (kg/ha)	9,206	16,271	7,065	176,00
2. Cluster weight (g)	137,90	302,10	164,20	219,00
3. Cluster length (cm)	8,50	16,72	8,22	196,00
4. Berry weight (g)	2,08	3,03	0,99	145,00
5. Sugar content (%)	14,00	18,10	4,10	129,00
6. Total acid content (g/l)	7,20	6,70	0,50	0,93
7. Berry skin crush resistance (g/cm ²)	324,80	567,30	242,50	174,00
8. Resistance of berry to separation from pedicel (g)	463,70	644,60	180,90	139,00
9. Organoleptic characteristics value (points 1 - 10)	5,96	8,16	2,20	137,00
10. Time of ripening	3.08.	5.08.	2 days	---

Variety Grochanka (Table 3)

The variety Grochanka resulted from the crossing Pearl of Csaba x Dattier de Beyrouth.

The most important morphological and physiological characteristics are: vigorous growth, flower functionally hermaphroditic, medium-sized cluster, large berry, firm berry texture, very pleasant wine taste. Variety Grochanka ripens at the same time or 1-3 d later than variety Pearl of Csaba.

The variety is more resistant to diseases and to low winter temperatures than the control.

Multiple regression analysis shows that yield was poorly correlated with temperature, rainfall and solar radiation. The cluster weight was strongly correlated and the sugar and acid contents were very strongly correlated with these factors.

The data in Table 3 show that in comparison with Pearl of Csaba the new variety Grochanka exhibits significant differences and the values in index points reach the next limit: average yield 176 IP; average cluster weight 219 IP; average berry weight 145 IP; average cluster length 196 IP; average sugar content 129 IP; berry skin crush resistance 174 IP; resistance of berry to separation from pedicel 139 IP; organoleptic characteristics value 137 IP.

Analysis of variance (0.05-0.01 level) showed that in comparison to variety Pearl of Csaba the variety Grochanka has very significantly greater yield, cluster weight, sugar content and a very significant increase in berry skin crush resistance.

Table 3 shows that we have obtained with variety Grochanka also a new genotype which in comparison with Pearl of Csaba exhibits better agrobiological and technological characteristics including very early ripening.

Discussion

The results obtained show that from crossings where one of parents or both were very early ripening we attained F_1 seedlings which had characteristics of earlier maturation than the parents.

From many populations and after a large number of crossings we obtained many interesting seedlings with very early maturation. After acknowledgement of the varieties, in our praxis the best results exhibited the three varieties Demir Door, Early of Belgrade and Grochanka.

The fundamental idea was to create varieties which mature earlier or at the same time as variety Pearl of Csaba. Our varieties obtained exhibited under different ecological conditions very early maturation, namely:

- The variety Demir Door ripens on average 6 d before Pearl of Csaba.
- The variety Early of Belgrade ripens 3-5 d before Pearl of Csaba.
- The variety Grochanka ripens at the same time or 1-3 d after Pearl of Csaba.

From the genetical point of view we can assume that the donors for the early maturation were the varieties Pearl of Csaba, Chasselas Bouvier and Queen of Vineyard.

Our results also show that new varieties have significantly or very significantly better agrobiological and technological characteristics than Pearl of Csaba taking into account wide geographical areas. The data given in Tables 1, 2 and 3 demonstrate greater yields, larger cluster and berry weights, higher sugar contents, better uvological characteristics of berry and greater resistance to cryptogamic diseases and to low winter temperature.

Coefficients of multiple regression analysis show that the new varieties exhibited low, strong and very strong dependence on mesoclimatic conditions of location and of years of the investigations.

The new very early ripening varieties do not have very large berries as varieties Cardinal, Dattier de Beyrouth, Ribier, etc. Future crossings to improve berry size are necessary to meet the requirements of our own and of foreign markets.

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