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FIELD PERFORMANCE OF SEVERAL PLUM GENOTYPES GROWN UNDER ENVIRONMENTAL CONDITIONS OF PITESTI – MARACINENI

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Abstract

The studies were carried out in the microfield trials of the Research Institute for Fruit Growing Pitesti - Romania, with 15 plum genotypes of different origin: 'Roman', 'Romanta', 'Romaner', 'Iulia', H 3/15, H 43/18 (Romania), 'Cacanska Lepotica', 'Cacanska Rodna', 'Cacanska Secer' and 'Mildora' (Serbia), 'Vision' and 'Valor' (Canada) and 'Oneida', 'Standard', 'Stanley' - control (USA). During 2010 - 2012 were carried out observations and determinations of: ripening times, production capacity, quality of fruit and response of plum genotypes to Plum pox virus. 'Čačanska Lepotica', 'Valor', 'Vision', 'Standard', 'Romanta' and H 3/15 had the highest yield per tree, whereas 'Mildora', 'Roman' and H 43/18 had the lowest yields. The largest fruits were recorded with 'Valor', 'Vision', 'Oneida', 'Roman', 'Romanta' and H 43/18. The mean harvest season of evaluated cultivars started by H 43/18 on the 17th July and ended by 'Standard' and 'Oneida' on the 6-7th September. Regarding the response of these genotypes to Plum Pox Virus, most of them showed no symptoms on leaves and fruits in the field. 'Valor' and 'Cacanska Lepotica' had the best performance, which indicates their good suitability for the modern plum orchard. 'Romanta' may also be of some interest for growers because of the best precocity and large fruit size, and 'Oneida' for prolonging the harvest season.

Keywords: *Prunus domestica* L., *genotypes, yields, quality, Plum Pox Virus.*

INTRODUCTION

Plum (*Prunus domestica* L.) is the most important fruit species in Romania. Production of 544,622 t (average 2008 – 2010) ranks Romania among the greatest plum producers in the world.

In plum production, the highest revenue is gained by growing table cultivars, especially of early ripening time [5, 8, 10].

However, the assortment of plum cultivars in Romania is dominated by those intended for processing, while other kinds of cultivars are present in relatively low numbers [2, 4, 7, 8].

The aim of the present paper was to study 15 autochthonous and foreign plum cultivars, in order to select the best cultivars suitable for growing in Pitesti area.

MATERIAL AND METHODS

The studies were carried out in the field trials of the Research Institute for Fruit Growing Pitesti - Romania, with 15 plum genotypes of different origin: 'Roman', 'Romanta', 'Romaner', 'Iulia', H '3/15', H '43/18' (Romania), 'Cacanska Lepotica', 'Cacanska Rodna', 'Cacanska Secer' and 'Mildora' (Serbia), 'Vision' and 'Valor' (Canada) and 'Oneida', 'Standard', 'Stanley' - control (USA). During 2010 - 2012 were carried out observations and determinations of: ripening times (date of harvest start), production capacity (in kg/tree, by weighing the fruit amount per tree at the optimum harvesting time and scoring from 0-5), physical characteristics (fruit weight – in g, by weighing a mean fruit sample of 25 fruit), chemical characteristics (soluble solids measured by the portable digital refractometer at the optimum ripening time, in % Brix) and organoleptic characteristics (by sensory evaluation, scoring from 1-5). The response of the plum cultivars to Plum Pox Virus was estimated only in the Lab Protection, RIFG Pitesti, by reference to a scale: (-) 1 – no attack; (+) 2 – slight attack; (+) 3 – mid attack; (+) 4 – severe attack [6, 9]. The data

were statistically processed by the variance analysis [1].

RESULTS AND DISCUSSION

The studied genotypes were successively maturing in the period from July 17 (H '43/18') to September 6-7 ('Oneida' and 'Standard'). Maturation time varied slightly between years (from 2 to 10 days). The earliest genotypes were: H '43/18', 'Cacanska Lepotica', 'Roman', 'Romanta', 'Romaner' and H '3/15' which ripe in the first decade of August (Table 1).

Table 1. Ripening time of the plum genotypes in Pitesti

No.	Cultivar	Ripening time			
		2010	2011	2012	Average
1	Roman	10.08	5.08	1.08	5.08
2	Romanta	11.08	7.08	2.08	7.08
3	Romaner	12.08	7.08	8.08	9.08
4	Iulia	27.08	25.08	25.08	26.08
5	H 3/15	10.08	7.08	10.08	9.08
6	H 43/18	18.07	15.07	17.07	17.07
7	Cacanska Lepotica	5.08	1.08	3.08	3.08
8	Cacanska Rodna	26.08	25.08	24.08	25.08
9	Cacanska Secer	27.08	25.08	26.08	26.08
10	Mildora	26.08	23.08	25.08	25.08
11	Vision	25.08	22.08	24.08	24.08
12	Valor	25.08	22.08	24.08	24.08
13	Oneida	5.09	6.09	10.09	7.09
14	Standard	4.09	5.09	8.09	6.09
15	Stanley (control)	27.08	25.08	26.08	26.08

Yield level is a property directly related to the profitability of production [8, 10]. The analysis of yield proves that only three cultivars ('Cacanska Lepotica', 'Vision' and 'Valor') had higher production than the control cultivar (over 19 kg/tree) and can be classified as high yield (average score = 4.8 – 5 points). Five cultivars ('Romanta', 'Standard', 'Stanley', 'Cacanska Rodna', and 'Oneida') had yields that are good, average score ranging from 4 to 4.5 points. Six genotypes (H '3/15', 'Cacanska Secer', 'Roman', 'Mildora', H '43/18' and 'Roamer') had medium good yield level (average score ranging from 2 to 3.5 points) and only one cultivar ('Iulia') gave very poor yield (6.90 kg/tree, average score = 1.5 points) (Table 2).
Fruit size is a very significant property in table cultivars, because cultivars with a larger-sized fruit are more appreciated and find a ready sale on the market [5, 8, 10]. Average fruit weight in studied cultivars ranged from 38.97 g ('Iulia') to 57.10 g ('Roman') (Table 3).

Table 2. Fruit yield of the plum genotypes in Pitesti

No	Cultivar	Fruit yield (kg/tree)				
		2010	2011	2012	Average	Scores (0-5)
1	Roman	9.4	10.8	12.0	10.73 ^{oo}	3
2	Romanta	16.5	18.4	20.8	18.56	4,5
3	Romaner	8.2	9.8	11.3	9.7 ^{ooo}	2
4	Iulia	7.0	6.5	7.2	6.90 ^{ooo}	1.5
5	H 3/15	11.3	14.5	15.9	13.90 ^{o}	3.5
6	H 43/18	9.2	8.5	12.7	10.13 ^{ooo}	2.5
7	Cacanska Lepotica	18.2	22.5	25.4	22.03	5
8	Cacanska Rodna	15.3	18.4	16.5	16.73	4
9	Cacanska Secer	12.7	11.0	15.9	13.20 ^{o}	3.2
10	Mildora	10.3	9.5	11.6	10.46 ^{oo}	2.8
11	Vision	20.6	21.6	25.0	22.40	5
12	Valor	15.8	18.8	22.5	19.03	4.8
13	Oneida	16.5	15.7	19.4	17.20	4
14	Standard	18.4	17.1	20.2	18.56	4.5
15	Stanley (control)	23.5	22.3	10.4	18.73	4.5

5% LSD=4.664 kg/tree; 1% LSD=6.287 kg/tree; 0.1% LSD=8.345 kg/tree

The majority of genotypes ('Roman', 'Romanta', H '43/18', 'Vision', 'Oneida') had larger fruit versus the control, their weight varying significantly. Large fruit had the following genotypes: 'Roman', 'Romanta', H '43/18', 'Vision', 'Oneida', 'Čačanska Rodna', 'Mildora', and 'Valor' – over 45 g (Table 3).

Table 3. Fruit weight of the plum genotypes in Pitesti

No	Cultivar	Fruit weight (g)			
		2010	2011	2012	Average
1	Roman	58.1	60.2	53.0	57.10 ***
2	Romanta	50.3	52.6	49.8	50.90 **
3	Romaner	42.5	40.6	44.0	42.37
4	Iulia	38.5	39.4	39.0	38.97 ^{ooo}
5	H 3/15	47.8	45.2	42.7	45.23
6	H 43/18	52.3	55.4	50.1	52.60 ***
7	Cacanska Lepotica	43.4	42.1	40.8	42.10
8	Cacanska Rodna	48.0	44.6	45.9	46.17
9	Cacanska Secer	42.0	43.5	40.1	41.87 ^{ooo}
10	Mildora	46.8	47.9	42.3	45.67
11	Vision	50.2	49.7	48.1	49.33*
12	Valor	48.0	45.2	45.0	46.07
13	Oneida	49.2	51.6	48.3	49.70 *
14	Standard	43.6	44.8	42.7	43.70
15	Stanley (control)	42.2	46.7	47.5	45.47

5% LSD=3.472 g; 1% LSD=4.681 g; 0.1% LSD=6.212 g

Soluble solids content varied between 12.10% ('Standard') and 21.33% ('Mildora'). The high content in soluble solids was recorded on

'Cacanska Rodna', 'Cacasnka Secer' and 'Mildora" cvs., and these cultivars can be also recommended for dehydration (Table 4).

Organoleptic qualities are an important pomological feature of cultivars, recommending them on the market [8, 10]. The extern properties were evaluated (size, shape, colour) as well as taste of fruit. Average score for extern properties was good for all cultivars and ranged from 4.0 ('Iulia') to 4.9 points ('Roman'), which indicates that cultivars are of attractive appearance.

The taste of fruit ranged from 3.5 ('Roman', 'Romanta' and 'H 43/18' genotypes) to 4.5 points ('Cacanska Rodna'). The best organoleptic qualities were found in 'Valor', 'Cacanska Rodna', 'Mildora', 'Vision' and 'Cacanska Lepotica' (over 9.0 points) (Table 4).

Table 4. Content in soluble dry weight of the plum genotypes in Pitesti

No	Cultivar	Soluble dry weight (%Brix)*	Sensory evaluation of fruit quality (Scores (1-5)		
			Appearance	Taste	Total score
1	Roman	13.70	4.9	3.5	8.4
2	Romanta	13.73	4.8	3.5	8.3
3	Romaner	14.00 *	4.5	3.9	8.4
4	Iulia	16.00 ***	4.0	4.0	8.0
5	H 3/15	13.77	4.2	3.8	8.0
6	H 43/18	13.97 *	4.9	3.5	8.4
7	Cacanska Lepotica	16.23 ***	4.6	4.4	9.0
8	Cacanska Rodna	19.13 ***	4.6	4.5	9.1
9	Cacanska Secer	20.57 ***	4.3	3.8	8.1
10	Mildora	21.33 ***	4.7	4.4	9.1
11	Vision	14.80 ***	4.8	4.3	9.1
12	Valor	14.60 ***	4.8	4.4	9.2
13	Oneida	13.80	4.8	3.9	8.8
14	Standard	12.10°	4.5	3.7	8.2
15	Stanley (control)	13.03	4.4	3.8	8.2

*5% LSD=0.846 %; 1% LSD=1.140 %; 0.1% LSD=1.513 %

The major objective in plum culture all over the world and Romania as well is the resistance and tolerance to virus diseases, PPV particularly, which is very hazardous to the plum culture. The annual spreading rate of this disease is very high, 20 – 45%, related to the variety, vector and infection source [3]. The response of plum genotypes to PPV proved that none variety showed any PPV tolerance, most genotypes showing a slightly and mid-attack on leaves. Five genotypes showed no symptoms of PPV on leaves or fruit ('Roman', H '43/18', 'Mildora', 'Oneida' and 'Standard'). One can see that there is no a positive correlation between the constant symptoms on leaves and fruit at the same variety and the attack was more severely on leaves than fruits (Table 5).

Table 5. Response of the plum genotypes to Plum Pox Virus

No.	Cultivar	Plum Pox Virus	
		On leaves	On fruit
1	Roman	1	1
2	Romanta	2	1
3	Romaner	2	1
4	Iulia	2	1
5	H 3/15	3	1
6	H 43/18	1	1
7	Cacanska Lepotica	2	1
8	Cacanska Rodna	3	2
9	Cacanska Secer	3	2
10	Mildora	1	1
11	Vision	2	1
12	Valor	2	1
13	Oneida	1	1
14	Standard	1	1
15	Stanley (control)	3	1

PPV: 1 (-) – no attack; 2 (+) – slightly attack; 3 (+) – mid attack; 4 (+) – severe attack.

CONCLUSIONS

The best properties had the following cultivars: 'Cacanska Lepotica', 'Valor', 'Vision' and 'Oneida' and they are recommended to spread in commercial orchards in Pitesti area. 'Roman' and 'Romanta' cvs. may be of some interest for growers because of the best precocity and large fruit size; 'Oneida' and 'Standard' cvs. are interesting for prolonging the whole harvest season; 'Cacanska Rodna', 'Cacasnka Secer' and 'Mildora" cvs. can be recommended for drying.

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