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RESEARCH ON BIOMETRIC STUDIES ON APRICOT HYBRID FRUITS

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Abstract

Plum pox virus (PPV) gen. Potyvirus, agent of Sharka disease, is the most devastating viral pathogen of stone fruits. The identification and exploitation of PPV-resistant sources represents the main eligible strategy for the long-term protection of the apricot cultivation. In this work, biometric studies were performed on hybrid fruits compared to the parents. Four hybrid combinations were studied, 'Dacia ♀ x Rareş ♂', 'Excelsior ♀ x SEO ♂', 'Siret ♀ x Amiral ♂' and 'Bucovina ♀ x Harcot ♂'.

Key words*: hybrids, combination, apricots, resistance.*

INTRODUCTION

Plum pox virus has been acknowledged as the most destructive viral pathogen for the stone tree species. This is a consequence of the decrease in quality of the fruits and the financial loss from their premature fall (Polák, 1994). Up to current date, seven PPV strains have been identified and serologically and molecularly characterized - strain D (Dideron) isolated for first time on an apricot in South-East France; strain M (Marcus) identified on an apricot in North Greece (Pelet, 1968; Myrta et al., 1998); strain Ea (El amar) described in Egypt for apricot (Wetzel et al., 1991a); strain SoC (sour cherry) detected in the Republic of Moldova (Mircetich et al., 1982); strain SwC (sweet cherry) identified in Italy (Quiot et al., 1995); strain PPV-Rec coming from the recombination of the two major strains (M and D), discovered in Albania, Bulgaria, Czech Republic, Germany and Slovak Republic (Ranković et al., 1995). Strain PPV-W (Winona) was identified in Canada (Roy, 1994).

The virus was artificially transmitted to the sour and sweet cherries, yet the infections remained local, as there was no proof of them having spread further (Pop, 1975). Natural infections in *P. cerasus* species were reported by Revers et al. (1999), but PPV infection is known as extremely unusual since it is hardly present in most Europe. Infection with this virus can trigger a considerable loss.

Around 100 million trees in this stone species are infected in Europe, to the point that certain sensitive trees can drop their fruit in a percentage between 80 and 100 (Vilanova et al., 2003).

In the East and Central Europe, the sensitive plum species can exhibit premature fruit fall and fruit cracking. The exploitation of the natural resistance to PPV can play an important role in the fight against the Plum Pox Virus, especially when the strategy of the pathogen-derived resistance, transgenesis - induced, will not be accepted as an alternative to the conventional improvement (by the member states in the European Union) (Ravelonandro et al., 2000).

MATERIALS AND METHODS

For the study purpose, Romanian and foreign varieties, with different characteristics that have been monitored during the research work conducted on the collection in the experimental field of the Faculty, as well as apricot varieties within the Variety Testing Centre in Ulmi locality, Dambovita county. The following hybrid combinations have been obtained:

1. Crossing combination 'Dacia ♀ x Rareş ♂' (LIV)

2. Crossing combination 'Dacia ♀ x Amiral ♂' (PAN)
3. Crossing combination 'Siret ♀ x Amiral ♂' (BTP)
4. Crossing combination 'Bucovina ♀ x Harcot ♂' -
5. Crossing combination 'Excelsior♀ x SEO ♂' (MON)

As work methods, determinations have been made in regards to:
1. Size of the fruit (height and base) (cm)
2. Weight of the fruit (g)
3. Weight of the stone (g)
4. Pulp/stone ratio
5. Firmness (kgf/cm^2)
6. Soluble dry substance (g/100 g)
7. Description of the hybrid fruits (aspects related to phenotype)

RESULTS AND DISCUSSIONS

1. Description of the hybrid fruits derived from the crossing combination 'Dacia ♀ x Rareş ♂'.
From this combination, 9 hybrid fruits, called LIV 1 - LIV 9 have been obtained. Fruits are large, ovoid, symmetrical, yellow - orange in color and topped by burgundy on the sunlit side. They have the mucron on the outgrowth area, slightly symmetrical.
2. Description of the hybrid fruits from the crossing combination 'Dacia ♀ x Amiral ♂'.
A number of 11 hybrid fruits, called PAN 1 - PAN 11, have been derived from this combination. Fruits are medium in size, yellow-orange in color, with reddish spots on one side.
3. Description of the hybrid fruits from the crossing combination 'Siret ♀ x Amiral ♂'
From this combination, 10 hybrid fruits were obtained, called BTP 1 - BTP 10. Fruits are medium in size, spheroid in shape, slightly symmetrical, tricolor background (yellow, orange, red), covered in reddish on a third of its surface. An excrescent mucron shows on the apex of the fruit.
4. Description of the hybrid fruits from the crossing combination 'Bucovina ♀ x Harcot ♂'.
Fruits from this combination have not yet reached maturity.
5. Description of the hybrid fruits derived from the crossing combination 'Excelsior♀ x SEO ♂'.
A number of 5 hybrid fruits, called MON 1 - MON 5, were obtained from this combination.
The fruit is large, ovoid, symmetrical, yellow-orange color as background covered in raspberry red and burgundy in the shape of spots, on the sunlit side.

Table 1. Results concerning the average values of the fruit size in the hybrid combinations of interest

No.	Hybrid combination	Fruit size		Weight (g)
		Height (cm)	Base (cm)	
1.	Dacia♀ x Rareș ♂ **LIV**	5.3	3.7	43.8
2.	Dacia ♀ x Amiral ♂ **PAN**	4.3	3.4	34.8
3.	Siret ♀ x Amiral ♂ **BTP**	4.7	3.5	33.2
4.	Excelsior ♀ x SEO ♂ **MON**	5.5	4	66.4

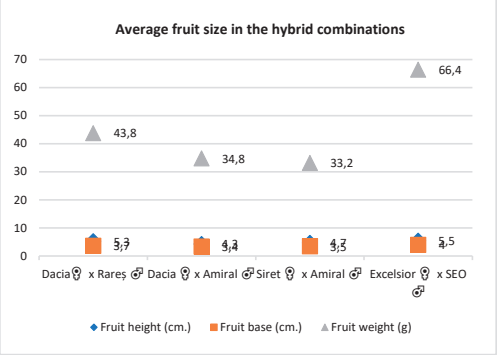

Figure 1. Average fruit size in the hybrid combinations

In terms of the average size of the hybrid fruits from the four combinations of interest, the chart above shows that the height ranges from 4.3 to 5.5 cm, with the highest in the 'Excelsior ♀x SEO ♂' combination, measuring between 3.4 and 4 cm in the fruit base. The fruit weight from the combination varies a great deal.
The maximum value still held by 'Excelsior ♀ x SEO ♂', 66.6 g, whereas the minimum is in the Siret ♀ x Amiral ♂ combination, i.e. 33.2 g. The conclusion to be drawn is that these hybrid fruits fall within the medium to large sizes category.

Table 2. Results concerning the average values for the stone weight and the pulp/stone ratio

No.	Hybrid combination	Stone weight (g.)	Pulp/stone ratio %
1.	Dacia♀ x Rareș ♂	3.3	8.6
2.	Dacia ♀ x Amiral ♂	3.2	9.4
3.	Siret ♀ x Amiral ♂	3.1	9.5
4	Excelsior ♀ x SEO ♂	4.2	8.9

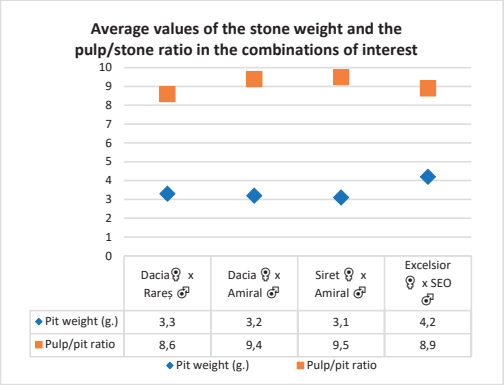

Figure 2. Results on the average values for the stone weight and the pulp/stone ratio

As seen in the chart, the hybrid combinations 'Dacia♀ x Rareș ♂', 'Dacia ♀ x Amiral ♂' and 'Siret ♀ x Amiral ♂' are noticed to have close values when it comes to the stone weight (3.1-3.3 g), while the combination 'Excelsior ♀ x SEO ♂' has a stone of 4.2 g.

In regard to the pulp/stone ratio, it is evident that the ratio is clearly favorable for the hybrid combinations 'Dacia ♀ x Amiral ♂', with 9.4 and 9.5 for 'Siret ♀ x Amiral ♂', followed by 'Excelsior ♀ x SEO ♂', 8.9 and 8.6 for the combination 'Dacia ♀ x Rareș ♂'.

Tabel 3. Results concerning the average values of the pulp firmness (kgf/cm^2) and the soluble dry substance (%)

No.	Hybrid combination	Pulp firmness (kgf/cm^2)	Soluble dry substance (g./100 g.)
1.	Dacia♀ x Rareș ♂	2.1	12.1
2.	Dacia ♀ x Amiral ♂	2.7	11.4
3.	Siret ♀ x Amiral ♂	1.9	12.3
4.	Excelsior ♀ x SEO ♂	1.4	12.4

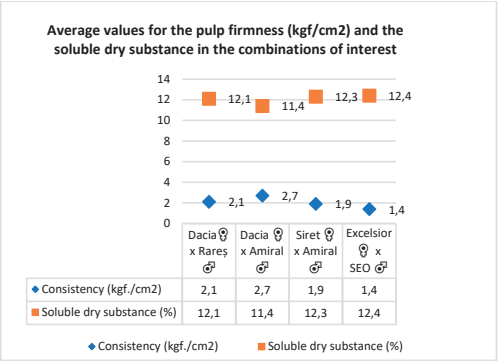

Figure 3. Average values for the pulp firmness (kgf/cm^2) and the soluble dry substance (%)

As for the pulp firmness, the chart 3 shows that the highest value is held by 'Dacia ♀ x Amiral ♂' with 2.7 kgf/cm^2, whereas the lowest is for the combination 'Excelsior ♀ x SEO ♂', with 1.4 kgf/cm^2; 'Dacia♀ x Rareș ♂' has the value of 2.1 kgf/cm^2 and 'Siret ♀ x Amiral ♂' has 1.9 kgf/cm^2.

Similar values are noticed for the soluble dry substance in three hybrid combinations, namely 12.4 kgf/cm^2 for 'Excelsior ♀ x SEO ♂', 12.3 kgf/cm^2 in 'Siret ♀ x Amiral ♂' and 12.1 kgf/cm^2 for the combination 'Dacia ♀ x Rareș ♂'. The hybrid combination 'Dacia ♀ x Amiral ♂' has a percentage of soluble dry substance of 11.4 kgf/cm^2. It is worth mentioning that 'Dacia' and 'Amiral' cultivars are early varieties, while 'Excelsior' falls into the late category.

CONCLUSIONS

The conclusion to this article is that the hybrid fruits place themselves into the class of medium to large size. These fruits are larger compared to their parents, but this description can also come from the fact that there are fewer on the branch, selected during the pollination process and many of them have fallen amid the physiological drop process. These fruits are larger, sweeter, with a better pulp/stone ratio.

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