REALIAZARI SI PERSPECTIVE IN AMELIORAREA PARULUI LA STATIUNEA DE CERCETARE DEZVOLTARE PENTRU POMICULTURA VOINESTI

ACHIEVEMENTS AND PERSPECTIVES IN PEAR BREEDING AT THE RESEARCH STATION FOR FRUIT GROWING VOINESTI

Nistor Andreies, Mihaiela Erculescu
Research Station for Fruit Growing Voinesti, Romania

Abstract

The pear breeding program at the RSFG Voinesti started in 1950; beginning with 1960 we introduced, as a main selection objective, the resistance to the principal diseases and pests, alongside with the other agro-technical and technological characteristics. The principal source for the resistance to the diseases and pests were some grown biotypes, having the ascendance in *Pyrus serotina*. During a period of over half of a century, we realized a large biological material for the selection (about 12,000 hybrids F1; F2; F3 and F4), of which we selected and registered 6 new cultivars, which accumulated in their genotype the most important characteristics, established for the selection. In the still existing test cultures, there are many selections with perspective.

Cuvinte cheie: genitori, hibridare sexuată, selecție, elită, test, soi nou
Keywords: genitors, sexual hybridization, selection, elite, test, new cultivar

1. Introduction

For the strengthening of the pear trees culture, being in an accentuated decline in Romania, the breeders of the assortment of this species had in view to obtain some cultivars, having improved qualities, as compared with the assortment in culture: firstly, resistance/tolerance to the disease and pests, which had limited the creation of new orchards, respectively*: Erwinia amylovora* (fire blight), *Venturia pirina* (pear scab), *Fabraea maculata* (spot), *Psylla sp*. Another important objective was, also, the late fruits ripening and the good storage without cooling equipment. It is surprising, that a country with a big fruits production in the past years, supplies the market with imported fruits, especially with pears.

2. Material and methods

The sexual interspecific hybridization was the main method used for the creation of the initial selection material. For each working stage, the criteria for the promotion of the biological material had a certain specifics, according to the proposed objectives and the working phase, but in all phases the mandatory objectives had been: the resistance to scab (*Venturia pirina*), the resistance or tolerance to the fire blight (*Erwinia amylovora*), the tolerance to spot (*Fabraea maculata*) and to the white spotting (*Micosphaerella sentina*), *Psylla* sp. The selections retained in F1 were again crossed (backcross, modified backcross), usually with European cultivars with good taste and commercial aspect, obtaining new generations: F2, F3 and F4.

Starting with F3 and especially in F4, the percentage of descendants, having resistance to diseases and pests, decreases very significantly, so that obtaining some F4 and F5 generations is not justified.

Unfortunately there are not profound studies for the pear tree, regarding the genetic control of the resistance to diseases and pests - not systematic studies regarding the heritability of these characters, so that the only criteria for choosing the genitors, which shall transmit these features, were the own phenotypical observations and obviously the experience of the other improvers in the domain.

Having in mind the respective situation, we used the genitors of the table 1. For the resistance to *Psylla* sp., the evaluation was done on an own scale, with marks from 1 (without attack symptoms) to 5 (strong attack).

At the fire blight and scab, all genotypes were eliminated, regardless of the attack frequency or intensity.

The DUS and VAT test included, besides the resistance to the diseases and pests, also the other observations and determinations, needed in the case of experiments of this kind (the phenology of the fruit growing organs, the trees growth vigour, the fruits growing potential, the fructification type, the fruits taste and visual aspect, the trees growing description, etc.).

The genitors, who strikingly transmit characters, making up the named selection criteria, are in a small number for the character of the resistance to the diseases and pests – and more for the rest of the features.

The researches performed at the RSFG Voinesti (Gh. Moruju, N. Andreies) found out that the number of individuals inheriting the feature of resistance to the scab, especially in the case of the interspecific hybrids of the type *Pyrus communis* x biotype, cultivated with the ascendance in *Pyrus serotina*, decreased as one advanced in the filiation. In the case of modified backcross or backcross, only the recurrent genitor was used. In F1, 70% of the hybrids manifest resistance especially to the scab, in F2 only 25-30% and in F3 only 10–15% manifested this character. The probability that a genotype to include 3-4 characters making up the improvement object – the feature of the resistance to the diseases and pests being eliminatory – was of about 0.5% in F2 (N. Andreies, 1985).

3. Results and discussions

After passing to the process of obtaining the initial biological material, the selection and the selections tests in DUS and VAT test cultures of over 10,000 hybrids in F1, F2, F3 and F4, 6 new cultivars were registered, of which 5 interspecific cultivars and one intraspecific – and also the further test of some selections with perspective.

Euras (synonym 116/4 D.A; 70-18-284), obtained after the following hybridization scheme: [(B.C.*Pyrus Serotina* x Olivier de Serres) x Decana de iarna], registered in 1994, authors Gheorghe Moruju and Andreies Nistor.

- Spreading: it was multiplied in the RSFG Voinesti nursery and distributed in the Dambovita County and in the neighboring counties.
- The tree vigour is medium, it gives good results grafted on franc; grafted on quince A, it registers losses after planting in orchard, it is necessary to further test the affinity to the quince rootstock. It manifests resistance to scab (*Venturia pirina*) and is tolerant to the fire blight (*Erwinia amylovora*) and *Psylla s*p., good fruit bearing potential.
- The fruit is small to medium size, ovoid shape, and yellow at consumption maturity, it can be consumed starting with December, when it has a crunchy flesh, until April, when the flesh becomes semi - fondant, with good taste. It is very well kept in spaces without cooling equipment, but in sterile environment and a humidity of over 85%.

Corina - synonym: 9/55-81; 81-28-56, hybridization scheme: [Passe Crassane x (B.C.*Pyrus Serotina* x Olivier de Serres)] x Decana de iarnă, registered in 2004, author N. Andreies.

- The tree vigour is medium, good affinity with the quince A rootstock; resistant to scab (*Venturia pirina*), sensitive to the *Psylla* sp. and fumagine (*Capnodium salicinum*). It does not present symptoms of fire blight (*Erwinia amylovora*).
- The fruit is medium to large size, in the form of a truncated cone, slightly asymmetrical, the aspect of the type of the Beurre Bosc; very good taste, consumption maturity in October - November.

In cooled spaces the keeping duration is increased.

Orizont – synonym: 2/102-81; 81-7-4 obtained by sexual interspecific hybridization, after the following formula: [(B.C. *Pyrus Serotina* x Olivier de Serres) x Olivier de Serres] x Josephine de Malines, registered in 2004, author N. Andreieş.

- Spreading: a little / not so spread multiplied in the RSFG Voinesti nursery and put into account in the county and in the neighboring zones.
- The tree vigour is medium, it has affinity to the quince A rootstock, a globular crown, a tendency of branch depleting, it implies shorting trimmings. It is resistant to *Venturia pirina*, it does not present symptoms of fire blight (*Erwinia amylovora*) attack; it is tolerant to the *Psylla* sp. atttack.
- The fruit is medium to large (150-200 g), globular, the back colour is yellow at consumption maturity, with a red hue on the sunny side. The flesh is half - fine, sweet - sourly, lightly astringent. The consumption period is December till February, kept in spaces without cooling equipment.
- Qualities: winter cultivar, handsome fruits, good taste, good resistance to diseases and pests.
- Defects: branch depletion – and in cool years it becomes astringent.

Tudor – synonym: 5/104-84; 84-2-93 obtained after the following hybrid combination: [(B.C. *Pyrus Serotina* x Decana de iarna) x Passe Crassane] x TN 30-44 Angers, homologated in the year 2007, author N. Andreieş.

- Spreading: multiplied in the RSFG Voinesti nursery and put into account the in the Dambovita tree growing region and in the neighboring zones.
- The tree has medium vigour, branches of long skeleton, a pyramidal crown. It has affinity with the quince A rootstock, but in the test culture much better results were obtained when it has been grafted on the Franc rootstock. It is resistant against the scurf (*Venturia Pirina*) attack; it does not present symptoms of fire blight (*Erwinia amylovora*) attack, it is tolerant to the *Psylla* sp. attack.

- The fruit is big, in pear – form, regular outline, waxy skin, the back colour at maturity is yellow, red colour is superposed over that on about half of the fruit surface, attractive aspect; fondant flesh, juicy, good – very good taste, specific flavour. The skin is rather thick. The consumption period, in keeping conditions without cooling sources, is comprised between the first decade of September and the second decade of October.

- Qualities: big, handsome fruits, very good taste, high resistance/tolerance to the principal diseases and pests of the pear tree.

- Defects: the fruit skin is rather thick and the branching capacity is weak; it implies shorting trims.

Cristal - synonym 2/8-86; 86-3-8, cultivar obtained by intraspecific sexual hybridization, after the following formula: [(Rosior Pietros x Decana de iarna) x Decana de iarna] x Beurre Hardy.

- Resistance/tolerance to specific diseases and pests, homologated in the year 2009, certified in the year 2010, author N. Andreies.

- Spreading: multiplied in the RSFG Voinesti nursery and distributed in the county and in the neighboring zones.

- The trees vigour is medium, good affinity with the A type quince tree, wide pyramidal crown. It blossoms about in the same period as the Williams cv. Good fruit bearing potential, like that of the other homologated cultivars.

- Fruit in the shape of a truncated cone, lightly ribbed, medium – big, yellow back colour, fondant flesh, very good taste.

- Consumption maturity, in storages without cooling, realized in October-November.

- Qualities: good lolling fruits, good taste, good fruits bearing potential, resistance/tolerance to the specific diseases and pests.

- Defects: not known.

Romcor synonym: 9/19-81; 81-28-20. Interspecific cultivar obtained after the following hybridization scheme: [Passe Crassane x (*Pyrus Serotina* x Olivier de Serres)] x Decana Comisiei, homologated in the year 2009, author N. Andreies.

- Spreading: multiplied in the RSFG Voinesti nursery.

- The tree has medium vigour, a pyramidal crown, it has been tested only on the Franc rootstock, on which it realizes big fruits productions (30-40 t/Ha). Resistant to the scab (*Venturia pirina*) attack, tolerant to the fire blight (*Erwinia amylovora*), relative sensitive to *Psylla* sp. and fumagine (*Capnodium* sp.).

- The fruit is big (250 g), in the form of a truncated cone, yellow-greenish colour, white flesh, juicy, very good taste.

- The consumption maturity is realized in October-November, in the conditions of keeping without cooling.

- Advantages: great fruit bearing potential, resistance against scurf, very good taste, late maturation.

- Disadvantages: somewhat sensitive to *Psylla* sp. and fumagine (*Capnodium*) – and the colour of the fruit is not very attractive.

From the selections being tested, the following have the qualities needed for registration: 2/6-79; 4/23-87; 1/17-87, the last already having 2 years under ISTIS observation. All the 3 selections have fruits with good aspect and pleasant taste, comparable with the Williams cv., tolerance to diseases and pests, consumption maturity in keeping conditions without cooling: October-November. Great fruit bearing potential, compatibility with the quince tree A rootstock.

4. Conclusions

- In order to induce resistance/tolerance to diseases and pests, mainly the interspecific sexual hybridization method was used, continued by Backcross and modified Backcross. The principal sources for resistance /tolerance to the main diseases and pests have been the biotypes cultivated with ascendance in *Pyrus serotina*.

- In F3 the descendents with agro-technical and technological value are obtained, corresponding to the proposed objectives; starting with F4, the diseases resistance/tolerance features decreases significantly.

- By the used method, the needed time for the realization of a genotype with the desired features is of approximately 25 – 30 years.

5. References

1. Andreieş Nistor, 2003. The limits of the ecological tree growing. Hortinform nr. 12.
2. Proceeding of the Eight International Symposium on Pear Vo. I-II. Bologna – Italia. Acta Horticulture. ISHS 2000.
3. 10 th Internaţional Pear Symposium – ISHS Portugal 2007.

Tables and Figures

Table 1. The biological material used in the sexual interspecific and intraspecific hybridizations in F1, F2 and F3

Cultivar / Selection	Species	Resistant to *Venturia pirina*	The source for			
			tolerance to *Psylla*	tolerance to fire blight	appearance and taste	consumption maturity
Cultivated biotypes having ascendence in *Pyrus serotina*	*Pyrus serotina*	X	X	X	-	-
Olivier de Serres	*Pyrus communis*	-	-	-	0	X
Decana de iarna	*Pyrus communis*	-	-	-	X	X
Decana Comisiei	*Pyrus communis*	-	-	-	X	-
Passe Crassane	*Pyrus communis*	-	-	-	X	X
Josephine de Malines	*Pyrus communis*	-	-	-	X	X
TN 30-44 Angers	*Pyrus communis*	-	-	-	X	0
Untoasa Clairgeau	*Pyrus communis*	-	-	-	X	-
Williams	*Pyrus communis*	-	-	-	X	-
6/101 E	Interspecific					
4/33 E	Interspecific					
Other selections F2 and F3	Interspecific					

X = character with striking manifestation
- = character with unsure manifestation
0 = character with moderate manifestation