Status of apple and pear genetic resources in Armenia

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Armenia occupies a smaller North-Eastern part of the vast Armenian upland located in the Southern part of Transcaucasia. The relief of the country is a combination of highlands, plateaus and hollows, 70% of the country total area is situated at the altitudes of 1600-3000 m above sea level, and the average absolute height is 1500-1800 meters above sea level. Due to the highland continental climate the country is subjected to hot summers and cold winters.

Physical geographical conditions have provided for the formation of the vegetation cover variable in composition and differentiated by vertical zones: the lowest level is occupied by desert while the highest places are under alpine vegetation. In between there are semi-deserts, mountainous steppe areas, meadows, woods and thin forests which occupies about 12% of the territory of Armenia and rich in wild fruit trees.

Horticulture and apple genetic resources

The history of horticulture in Armenia comes from ancient times. The evidences are the numerous historical monuments, mythology and scientific data. The territory of the country is the native land of such species as grape, apricot, pear, cherry, plum, sweet cherry, pomegranate, walnut and others. About 32 wild species of pear (Pyrus L.), out of these 12 species are Armenian endemic plants, and 1 species of apple (Malus L). Species of Pyrus with remarkable diversity and variety of forms constitute mixed pear-groves on the territory of Armenia. Wild species of pears present in their gene pool drought and cold resistance and poor soil tolerance; they can be useful in pre-breeding and breeding activities as parental materials for hybridization and as matrix for grafting.

Nowadays the fruit growing is the oldest and most profitable branch of the country’s agriculture. Various fruit species are cultivated in the Republic – apricot, peach, plum, cherry, apple, pear, quince, nut, almond, fig, pomegranate, etc., eastern persimmon and, recently, kiwi.

The apple tree and the pear tree have their valuable place in horticulture. In particular various local varieties have been developed.

At the end of the XIX century professor Rollov in his study «The history of Yerevan state» (1897) describes 56 local varieties of apple tree, which subsequently lost their place to Michurin’s varieties and later to the imported European and American varieties.

The rich gene pool of wild fruit species and forms and the presence of rich diversity of cultural valuable aborigine varieties in the country’s forests as well as on some protected areas show that Armenia is one of the best centres of the formation of these species.

Studies have been performed throughout the years 1955-1960 and 65 aborigine varieties are separated and their descriptions are prepared.

Local varieties of apple trees are specific in their vigorous growth, longevity, yielding, resistance to pests and diseases. Many varieties are drought and frost resistant.

The conservation of these species is of high importance. It is also noteworthy the recovering ability of the mechanical damages including damages of fruits caused by hail. The wounds from damages heal easily and the fruit does not rot. Within the discovered varieties the eldest apple tree has 180 years and the pear tree has about 600 years and even at that age
they exceed by their productivity. Field collections of PGRFA are available at the Nalbandyan Experimental Station of the SC of Viticulture, Fruit-growing and Wine-making, at the Eraskhau Experimental Station of the SC of Soil, Agrochemistry and Melioration, Yerevan Botanical Gardens and private farms. Field collections established in research institutions and private farms comprise 342 accessions, out of which 268 accessions are maintained in research institutions, but majority of these collections are represented by apricot and peach, number of apple and pear varieties is very limited. The documentation system for collection orchards does not exist. Some data on apple and pear accessions are available on www.pgrfa.org/arm. EURISCO catalogue includes data on one accession of Malus and 5 accessions of Pyrus from the national inventory.

This rich gene pool deserves an attention and conservation actions, especially in the form of collection orchards which will enable the breeding activities as well as contribute to utilization of their valuable genetic characteristics.

Brief description of the most valuable Armenian landraces

Some Apple varieties

Syunikakhndzor
The pulp is yellowish white, small granular, non-fragile, very fleshy, acidulous sweet with pleasant taste and flavour. This variety is highly frost resistant and has low soil and care requirements. Maturity period is in first decade of October and fruits can be preserved till May. Fruits are transportable.  

Variety values: longevity, high productivity, pest and disease resistance, nice appearance.

Shaqarkeni
Variety is very old. Fruits are small, 20-60 g with different forms (round, flat round, sometimes longish without edges), with rough peel, and are yellowish white at the stage of maturity. The pulp is white, small granular, fragile, very sweet, less fleshy, without flavor. The variety is dry and frost resistant. It is highly infected by moth and mildew. The maturity period is in first decade of July, but it is eatable even green.  

Variety values: early-ripening, eating ability of unripe fruits.

Karmrkeni
The fruits have medium size with 130 g, weight; the biggest has 180 g, round, flat roundish, flat surface. The peel is thick, hard, strongly dark reddish, with small gray reddish spots under peel covered by bloomy wax-layer. The pulp is small granular, hard, white yellowish sometimes with reddish spots, slightly astringent, sweet, with pleasant taste and flavor of cider. The variety is dry and frost resistant and has low care requirements. The periodicity is not observed in 70 years old trees. The trees live up to 150 years and are not infected by fleecy phylloxera, mildew and moss; are slightly infected by moth. Maturity period is in half October and can be conserved one year. The transportability is very high.  

Variety values: longevity, high productivity, longevity of fruits and transferability.

Chekh-chechkkan
The fruits are large; the average weight is 185 g, sometimes 300 gr. The form is not stable, mostly cylindrical, sometimes oval, pyramid like, even roundish and slightly edged. The seed bags are large, fully opened. While shaking the fruit the seeds are chinking, that's why
the name is derived (chink-chinking). The pulp is yellowish white, fragile, small granular, red striped lines, sometimes spotted, fleshy, acidulous sweet with pleasant taste and flavor. The yielding periodicity is expressed very slightly. The maturity period is in first decade of October and can be conserved even a whole year and is eatable from the beginning. **Variety values:** longevity, high productivity, longevity of fruits, pest and disease resistance.

**Zangezuri**

The fruits are large, 120-150 g, sometimes more, conical or conical slightly edged. The peel is thick and flat, yellowish green, with lemon yellowish gray spot when well ripened, medium greasy. The pulp is yellowish white, small granular, hard, acidulous sweet, with special flavor. The trees are frost and dry resistant, demand low requirements to soil, care and water and will grow even in non arable conditions. The vegetation period starts late. The yielding periodicity is not observed. They are not infected by fleecy phylloxera, moss and mildew. The fruits are firmly stacked to the branches. Fruits are quickly healed after hail damages and do not fell down. Maturity period is in first decade of October and fruits can be conserved till May. Fruit transferability is very high. **Variety values:** high productivity, pest and disease and drought resistance.

**Vardananq**

The fruit stem is thick with medium length. The pulp is yellowish white, large granular, sweet, fleshy with flavor. The maturity period is the end of November and the fruits can be conserved till the end of June. The tree is productive; 250-300 kg yield is received per tree. The yielding periodicity is not observed. The tree is drought resistant.

**Some Pear varieties**

**Dzmernek** is Armenian very old, aborigine variety. The trees are large, reach 5-8 m height and have 5-6 m diameter. The trunk is thick. The skeleton branches are thick and form a straight corner with long leader. The trees are long living and healthy. The leaves have medium or large size, 8-12 x 6 x 8 cm, with sharp tips and very small toothed edges, thick, rough, dark green, shining. The leaf stem is long, with 5-7 cm thickness. The flowers are large; buds are rose and white when opened. The fruits are medium or large, round, slightly longish; 150 g, and 320 g fruits are also happen. The fruit stem is long. The pulp is white, fleshy, slightly acidulous sweet, granular near kernel. The tree has high productivity, sometimes very high, 300 kg per tree and sometimes 1000 kg/per some trees. The yielding period is at the end of October and the fruits become eatable from mid-November and can be conserved till June. The trees have highly frost resistance, early yield; have pest and disease resistance especially against phylloxera and moss.

**Malacha** is Armenian very old variety. The trees are medium with 3,5-4,0 m height and 4-4,5 m, diameter, widely conical, dense. The skeleton branches are medium. The leaves are medium or large 7-9 cm x 5-7 cm, widely oval, with sharp tips, thick, strong toothed edges. The leaf stem is medium or long 3-6 cm, thick. The flowers are reddish in buds and white when opened. The fruits are large or medium, 180-250 g, long pear like, smooth skin. The pulp is white, with yellowish green edges, fleshy, sweet, and slightly acid, with flavor. The productivity is medium, 130-150 kg per tree. The fruits have high quality. The maturity
period is from 2nd decade of August till the 2nd decade of September. Yields every year and have no periodicity. The trees are long living, have not high frost resistance, and have slight pest and disease resistance.

The following literature is used for the description of varieties