

Problems of preservation and use of grapevine genetic resources in Azerbaijan

Dr. Mail Amanov
Director of Azerbaijan Research
Institute of Viticulture and Wine-making

Azerbaijan is one of the richest regions of the globe for the wealth of grapevine grades. The evolution process of local grape grades in our republic is very complicated and interesting. The majority of local grape grades of Azerbaijan has directly come from wild grapevine by cultivating, namely repeated sowing the seeds and selecting the best forms. As a result of natural and artificial selection the rich fund of local grape grades of various economic value was created. Under the statement of great scientist, academician N. Vavilov (6), a concentration of a plenty of local grape grades in the certain region serves the proof that this region is the primary center of occurrence of a grapevine culture.

The development of viticulture in Azerbaijan has an ancient history. Many historical data testify to it. So, for example, during the archaeological excavation which is carried out in 1962 nearby Akstafa area, in vicinities of a historical monument Shomutepe, dating from the V-IVth century B.C., were found out the remains of various plant cultures including the grape seeds. The researches have shown that it is the seeds of a cultural grapes. On the basis of this find was proved that the viticulture in Azerbaijan has, at least, seven thousand-year-old history. This fact testified the famous Italian scientist, archaeologist and paleontologist Lorenzo Kostantini who has investigated a wild flora of Caspian regions including Azerbaijan and has also found out the seeds of cultural grapes nearby Shomutepe.

During many centuries the viticulture was a leading branch of agriculture and a basic source of economic well-being of the people of Azerbaijan. In Azerbaijan the peak period of development of viticulture has come on seventieth-beginning of eightieth years. In this period the common area of vineyards in our republic was lead up to 286 thousand hectares. The total crop of grapes on the average made 1,5-2,1 million tons per one year. However since 1986 the branch of viticulture, occupying the important place in economy of republic, began to weaken appreciably. As a result of implementation of the decree of government of former USSR "About measures of struggle with alcoholism and drunkenness" in republic have been uprooted 130 thousand hectares of vineyards under technical grape grades. Later, as a result of change of ownership relations and by virtue of a number of other reasons, in republic remained only 20 thousand hectares grapevine spreadings.

As a result of all these negative factors there was a threat of loss by centuries created by a nature and man the most valuable local and introduced grape grades. In such situation it was required by forwarding inspections to reveal, to study, to classify and to collect all gene fund of grapes of Azerbaijan. Azerbaijanian scientists have executed this task in time and on high level. By research works which have been carried out on all territory of Azerbaijan, was found that from 512 grape grades, cultivated in republic formerly, 75 grades are lost and 55 grades are on the verge of disappearance. Therefore in modern conditions a task of prevention of an exhaustion of grapevine genetic resources is got with a special value. One of ways of the decision of this task is to found new ampelographic collections of vine on the territory of Azerbaijan. For today one of them, incorporated in Gyanja experimental station of Azerbaijan Research Institute of Viticulture and Wine-making (ARIVW) in 1968, was kept only. There is 258 local, introduced and selected grades of grape in this collection. For last two years the new large collection is created in Apsheron experimental base of ARIVW. The collection numbers 310 local and introduced grape grades.

With the purpose of creation of primary material for conducting selection, alongside with other questions, the study of genefund of wild vine has a large value.

The occurrence of wild vine in Azerbaijan disappears into very far times of ancient history. The imprint of the leaf of wild vine *Vitis Silvestris* Gmel., which was found by archaeologists on the stone on top pliosam of Arax river of Zangelan area (near Minjivan railway station, located on border with Iran), testifies to it (1;2).

The wild vine *Vitis Silvestris* Gmel. has spread on the vast territory of our republic from 18 metres below sea-level (Kura riverside in Salyan area) to 2000 metres above sea-level (Kusar area). It is represented by typical fluff - leafed (var. *typica* Negr.) and naked - leafed (var. *aberrans* Negr.) forms (2).

On the territory of Talish Mountains, alongside with *Vitis Silvestris* Gmel., the other variety of wild vine - *Vitis Labrusca* grows plentiful.

In 1975-1985 we carried out extensive scientific researches on study of biomorphological peculiarities of wild vine of Zangezur zone along Arax riverside (in Megri, Zangelan and Jebrail areas). Since 1995 till the present time we investigate wild vine in various zones of Azerbaijan. As a result of the expeditions on 13 routes 7709 samples of wild vine is revealed and labeled, 1286 of them have in details studied. By researches we reveal the forms of wild vine, distinguishing resistance to drought and frost, mildi and oidium. These samples are used in selection works. G. Alleweldt, who was investigated wild vine of Turkey in 1965, had achieved the same results (13).

On the literary data, the wild vine forms with white berries is an unusual occurrence in world practice of study of wild vine. The outstanding scientists of the world such as Ch.Darvin (7), N.Vavilov (6), A.Negrul (8;9), etc. have engaged by investigation of a vegetation including grapevine of Europe, Asia, Africa and other regions of Globe, gave information about diversity and polymorphism of grapevine, but never mention existence of wild vine forms with white berries.

During the researches of wild vine in territory of Zangezur zone and Azerbaijan republic we found a new, unknown for science form of wild vine with white berries. The attributes of this form do not coincide with attributes of forms, investigated before. The presence of the new form in one certain areal gives us the basis for allocation of it in the special variety with two subspecies - *Vitis Silvestris* Gmel. var. *Zangezur Mail* and *Vitis Silvestris* Gmel. var. *Alpan Mail*. The new form is steady to main fungous diseases such as *plasmopara viticola* (mildi) and *uncinula necator* (oidium).

During investigations on the territory of Azerbaijan we found out lianas of huge sizes which are not having analogues in practice of studying wild vine genefund. So, in 1980 we have found out a liana in length more than 100 metres and thickness of a trunk 75 centimetres in forest of village Vejnali of Zangelan area. In 1996 in Kusar area was found out a liana, reaching 90 metres in length with a diameter of a trunk 60 centimetres. As a result of forwarding trips in 2001 in village Alikhanli of Fizuli area was found out a huge liana of wild vine, diameter of which is 120 centimetres. It is necessary to note that this find is a phenomenon unprecedented in world practice of wild vine investigations.

In conclusion it is due to state that this valuable genefund of grapevine, being property not only our republic, but all world, requires the further all-round deep study and should interest scientists of all regions of Globe where are engaged in problems of vinegrowing.

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The activities on mobilization, conservation, documentation and characterization of grapevine genetic resources in Azerbaijan

The Azerbaijan republic is located in the east part of Transcaucasia between 38° 24', 41° 54' northern latitudes and 44° 46', 50° 02' east longitudes. In its structure enters Mountain Karabakh Autonomous Area and Nakhichevan Autonomous Republic. Azerbaijan is basically located in a subtropical climatic zone.

Basic elements of a relief of Azerbaijan are: 1. Mountain system of the Small Caucasus; 2. Mountain system of the Large Caucasus; 3. Talish mountain system; 4. The Arax riverside lowlands.

The natural conditions of Nakchichevan Autonomous Republic's areas, and also the areas, located on the spurs of of the Talish Range, Large and Small Caucasus Range favour to development of industrial vine-growing.

A wild wood grapes (*Vitis Vinifera* Subsp. *Silvestris* Gmel.) plentifully grows in many areas of Azerbaijan. It is submitted typical fluff-leafed (var. *typica* Negr.) and naked-leafed (var. *aberrans* Negr.) forms. It is no doubt that the wild grapes was long since used by men in food and served as an initial material for deducing many local grape varieties.

The process of evolution of local grape varieties assortment in Azerbaijan is very complicated. The local grape varieties were created as a result of long national selection in each area separately.

Characterizing modern grape assortment of Azerbaijan, it is possible to note its fixing to separate zone, and presence in the assortment grape varieties of different ecological-geographical groups.

The Azerbaijan republic with regard to assortment of a grapes is on a joint of two influences. As it known, assortment a grapes of Georgia (especially of western part) is sated very fluffed forms that belong to ecological-geographical group of the Black sea basin (convar *pontica* Negr.). In assortment of Central Asia's republic prevail naked-leafed forms which belong to east ecological-geographical group (convar *orientalis* Negr.). On assortment of Azerbaijan's grape varieties the strongest influence was rendered by east group (80 % of all varieties). The local grape assortment in Nakhichevan AR on 85 % consist of east group varieties, from which 65 % is table varieties (Shafeiyi, Bendi, Nagshabi, etc.), 20 % is wine varieties (Malagi, Aldara black, Sarma black, etc.) and 15 % is the Black sea basin's varieties (Kalambir white, etc.). There are east group and the Black sea basin's varieties in the Absheron's grape assortment. A number of these varieties such as Gyoibendam white, Pishras black, Shani black, etc. has the attributes of east group varieties (large size of bunches and berries) and of the Black sea basin's varieties (felt-fluffed leaves). It is certainly to speak about a hybrid nature of these varieties.

The local grape varieties of Galilabad region belong to ecological-geographical group of of the Black sea basin.

All these facts testify to wealth and diversity of grape varieties in Azerbaijan. The study of grape varieties assortment is of interest both with theoretical, and from the practical points of view.

The scheduled work on study of Azerbaijan's grape varieties began in 1998. Since this moment regular researches of grape varieties are conducted on a uniform technique. In the beginning the local varieties were studied by a forwarding method. As a result of the investigations at vineyards of separate areas have made the description of the found out varieties and have taken cuttings for planting in collections. The grape varieties, revealed in different areas of Azerbailan, have studied under stationary conditions in the ampelographic collections of Gyanja experimental station and Absheron experimental base of Azerbaijan Research Institute of Viticulture and Wine-making

For last two years the new large ampelographic collection was created in Absheron EB. The collection numbers 310 local and introduced grape varieties.

As a result of investigations, carried out by ARIVW for the period 2000-2003 on the field of selection and varieties-studying, was established that in vine-growing zones of Azerbaijan is cultivated 411 aboriginal grape varieties. The investigations in this direction will be continued till 2006 year. The realization of expeditions on 21 routes is planned.

In the Absheron experimental base of ARIVW the laying of a new ampelographic collections with local grape varieties and steady forms of the wild vine, which has been found out as a result of forwarding trips on the territory of our republic, will begin at the end of December of 2003.

In ARIVW for last years the database of 504 cultivated grape varieties and 21 wild vine samples is created according to the requirements of passport descriptors system has jointly developed by IPGRI and FAO. Database includes the items of information about the name of the variety, its synonyms, origin, direction of use, colouring of berries, latitude, longitude and altitude of its inhabit place.

The materials of genotypes (leaves, seeds), cultivated in ampelographic collections of ARIVW, will be sent in Georgian and Ukrainian RIVW for realization of molecular genetic identification.

One of the major tasks of the further development of vine-growing branch is the improvement and enrichment of grape varieties assortment of republic vineyards by way of introducing valuable foreign varieties, studying unspreaded local varieties, studying unspreaded local varieties and deducing new high-yield qualitative grape varieties.

The best method of improvement grape assortment is the laying of ampelographic collections in various ecological conditions, the studying in them of behavior of grape varieties and deducing from them most perspective ones. As the decision of the republican seminar on a technique of laying ampelographic collections, which have been sent by Azerbaijan Council on genetic resources together with ARIVW, since 1998 are establishes the following categories of ampelographic collections:

a) Collections of world value. In these collections all grape varieties of former USSR`s republic (varieties of ampelographic collections of Georgian Scientific Research Institute of Fruit-growing, Viticulture and Wine-making, Ukrainian SRI of Viticulture and Wine-making "Magarach", Moldavian SRI of subtropical plants, Viticulture and Wine-making, Russian SRI of Viticulture and Wine-making, as well as varieties of Central Asia`s republic), and also most interesting grape varieties and graftings from other countries of the world will be assembled.

b) Collection of republican value. All aboriginal, local selected grape varieties as well as wild vine forms of Azerbaijan republic will be collected at these collections.

c) Collections zone or regional value (at skilled stations). These collections should have sets of varieties and graftings, componenting specialization of a concrete area or zone, recommended by republican institute.

Proceeding from above-stated, ARIVW since 2002 carries out the laying of ampelographic collections of world, republican and regional value in Absheron experimental base. The grape varieties planted in the site of the collection for ecological-geographical groups (for proles). In this connection the collection was broken into three quarters: 1. proles orientalis; 2. proles pontica; 3. proles occidentalis.

The cuttings of the local varieties and wild vine samples, revealed in various zones of our republic, will be cultivated in the control site of ARIVW with the purpose of a laying to ampelographic collection the next year on appropriate scheme.

It is known, that till now in all research institutes the study of grape varieties was basically carried out on a method ampelographic descriptions. But it is not enough because it is impossible to study a grapes without using modern techniques of fiziological-biochemical, morphological-anatomic, ontogenetic, molecular, populational and biometric genetics.

In connection with financial difficulties and for lack of the staff, the study of genotypes on molecular genetics level in ARIVW is organized rather poorly.

However in the field of passportization of grape varieties and genotypes the huge work is carried out.

In view of absence in ARIVW the appropriate equipment, it is planned the realization of crioconservation of seeds, buds and leaves of valuable genotypes in ARI of genetic resources where there is a chamber, specially equipped for it.

In modern conditions in republic the special value is got with a task of prevention of an exhaustion of grapevine genetic resources. With this purpose a State Commission on vegetative genetic resources of Azerbaijan was created in 1995. The work of the Commission is to develop the programs on revealing, accumulation, reproduction, use, inventory and protection of genetic resources of cultures. With the purpose of implementation of a complex of measures on carry out of duties taken on by the Azerbaijan Republic in connection with acceptance by U.N.O. the Convention about a biological variety and prevention of threat of disappearance of genetic resources of plants, animals and microorganisms, on the grounds of the decree of the President of Azerbaijan in December 2001 was created a State Commission engaged in development of the strategic programs on protection of genetic resources of Azerbaijan.

In 1998-1999 between our Institute and Crete University the exchange of experience was carried out in the field of study and documentation of grapevine genetic resources, therefore the Azerbaijan Vitis database was developed.

In ARIVW the works on the description and conservation herbarium materials (young and mature shoots, leaves and bunches) of the wild vine samples, which has been found out as a result of forwarding trips on all areas of our republic, are conducted. The seeds of the wild vine samples are kept in Institute in the special safes.

Tolerant samples of a wild grapes are cultivated on experimental base of ARIVW with the purpose of further use them in selection work on creation of new grape varieties, highly resistant to diseases and pests of grapevine.

The researches on study germplasm will be carried out at the University of Milano

The researches on comparative study of the seeds of traditional varieties and wild forms will be continued in ARIVW.

During the researches we carried out comparative study of the size and form of seeds of wild grapevine samples, brought from near - Arax zone, and of several cultural varieties of the same zone.

The most significant distinction between wild and cultural forms of a grapes were observed in common length of a seed body. Length of the seed of the wild forms makes on the average about 4,5-5,0 mm. Length of the seed body of the cultural varieties changes on the average between 6,7-10,5 mm. The seed beak of the wild forms is short, but one of the cultural varieties is long.

The index of relation of the seed length to its width is a characteristic parameter. The relation of length to width at the wild forms makes quantity from 0,76 up to 0,83, but at the cultural varieties - from 0,44 up to 0,53.

On our data, relation of width to length at the wild forms makes 0,70-0,80, and at the cultural varieties - 0,42-0,59.

Thus, the carried out scientific researches have shown that the attributes of seeds are an essential parameter in a common complex of morphological differences wild, intermediate, hybrid and cultural forms.

The comparative study of seed morphology confirms spreading on the territory of Azerbaijan "true" wild grapevine: *Vitis Silvestris* Gmel.