Improving the Pistachio Growing in Turkmenistan and Uzbekistan

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Abstract

Central Asia is one of the gene centers of pistachio (*Pistacia vera* L). They grow naturally as *P. vera* forests and are good for the prevention of erosion. *P. vera* trees grow normally in areas where the rainfall is below 200 mm/year. Wild pistachio trees used to protect dams' basin and to create forests are more suitable to transform the forest to cultural orchards. In Turkmenistan and Uzbekistan about 150 thousand hectares of wild pistachio exist. Different types and abundance of pistachio are found under natural growth or seed sown and with the selection in these areas, new and high-quality pistachio cultivars can be obtained for world pistachio market. When the present areas are transformed to pistachio orchards, product may be obtained after the 3-4 years. Production is expected to add economy of both countries. Uzbek and Turkmen technical experts, who were educated for pistachio production in their country, as well as the Pistachio Research Institute in Turkey, by Turkish experts. However, there are legal and the techniques problems in these countries that need to be taken care of, regarding the agricultural development of pistachio,

INTRODUCTION

Pistachio grows in the appropriate microclimate of the northern and southern hemisphere between 30-45° parallel. Central Asia is among the gene centers of pistachio. They grow naturally, as well as by cultivation such as *Pistacia vera* forestation to optain nuts and prevent soil erosion. In the Central Asian Republics only one species of *Pistacia* (*P. vera* L.) can be commonly found. Due to its edible fruits, *P. vera* occupies a special position within the genus. *P. vera* is well known for its wide distribution, ranging from the foothills of the Kirgiz mountainous range (42°5' latitude North) to the foothills of the Parapamiz (35°6' latitude South) and from the Boam canyon in the Kirgiz mountainous range (74°3' longitude East) to Southwest of the Kopetdag (55°4' longitude West) (Kayimov et al., 2001). Central Asia represents a large and diverse region where a wealth of *P. vera* genetic resources exists, and it provides opportunities for reciprocal germplasm exchange and scientific collaborations (Abdushukur et al., 2009).

The abundance of wild pistachio (*P. vera* L.) trees in the Central Asia will contribute to both the Central Asian economy and world pistachio production. The evaluation of wild pistachio trees as natural resources, the establishment of new modern pistachio orchards, the conservation of pistachio genetic resources, the selection of new pistachio types among the naturally growing wild pistachio trees, and genetic material changes with other pistachio producer countries can be considered as principal subjects to improve the pistachio growing in Turkmenistan and Uzbekistan. Pistachio trees have grown in the south of the both countries, and the fruits have great demand in food industry as appetizers, chocolates, sweets and ice cream, as well as the trunk of the tree is hard and has high-calorie when it is burned.

Central Asia countries especially Tajikistan, Turkmenistan, Uzbekistan and Kirgizstan have a big potential with their rich genetic diversity for selection of new pistachio cultivars with respect to yield, quality, resistance to drought and pests and diseases. Pistachio is very important for the development of fruit growing and country's economy in Turkmenistan and Uzbekistan. Low productive and poor quality wild

pistachio trees can be improved in both countries, however, pruning, fertilization and other cultural application will increase the yield and quality.

South Kopetdag Region includes pistachio stands of the Southwest of Turkmenistan. They are the continuation of *P. vera* population of the Parapamiz entering into Turkmenistan through two patterns of distribution: one located East of Gushgy ('the Gushgy grove') and the second west of Gushgy (the Pool grove, Khatoom grove and the Badhiz forest reserve all known as 'Badhiz'). In this region *P. vera* populations (almost 75 000 ha) are represented by isolated and sometime rare stands growing at an altitudinal range of 600-1000 m a.s.l. (Kayimov et al., 2001).

Average pistachio production are 210, 114, 93 and 55 thousand tons in Iran, U.S., Turkey and Syria, respectively (Table 1). Syria production appears to be the average value of fresh fruit. In this case, we can consider that the average dry fruit production is approximately 30 thousand tons. In Turkey, some of the pistachio orchards have been obtained with grafting of wild *Pistacia* species. In Anatolia, especially in Gaziantep, Kahramanmaras, Adiyaman and Siirt provinces, *P. vera*, *P. khinjuk* and *P. terebinthus* are widespread, and the wild trees have been transformed to the pistachio trees by grafting (Arpaci and Atli, 1996).

Cooperation about research and development of pistachios between Turkmenistan-Uzbekistan and Turkey will be beneficial for all the countries, and for the peoples living in the wild pistachio growing regions in Central Asia.

PROJECT ACTIVITIES

Training

Seedling production and grafting efforts initiated under the supervision of Turkish experts at Ashgabat Forestry Management in Turkmenistan, and Saraykorgan Forestry Management in Uzbekistan. Theoretical and practical trainings had been given to the Turkmen and Uzbek technical staff at different periods in Turkmenistan, Uzbekistan and Turkey about the seedling production, grafting and new orchard establishment by experts of the Turkish Pistachio Research Institute.

Applied trainings were carried out about the grafting and pruning of wild pistachio trees in the Kopetdag, Garrigul Research Station of Deserts Institute in Karakum Desert, Gushgy (Serhadabad) and Ashgabat Aktogay Nursery in Turkmenistan; and in the Saraykorgan Forestry Station, Gallaoral Pistachio Station and Kamachi Forestry Station of Karshy in Uzbekistan.

Selection

Selection activities were initiated in naturally grown pistachio areas and in reforestation areas in order to obtain good quality and high yield new pistachio types. In this regard, a big potential has been determined in Kopetdag, Garrigala (Mahdumkulu), Gushgy (Serhadabad) and Badhiz region in Turkmenistan; and Gallaoral Pistachio Station, Babadag, Saraykorgan, Farghona and Karshy Region in Uzbekistan.

Some good quality pistachio types have been found in Uzbekistan and Turkmenistan, however, selection activities were performed in limited areas because of time shortage. New pistachio types in these areas can be acquired to the world pistachio sector. For this reason, more extensive selection activities should be carried out by experts in both countries.

Establishment of Germplasm and Adaptation of Orchards

New pistachio orchards containing new selected pistachio types and introduced new cultivars from other pistachio producing countries should be established in suitable ecological regions of both countries, in order to determine the performances of new types and cultivars. Research studies should be conducted for pistachio production in salty soils and limited irrigation conditions in desert areas of both countries.

Seedling Production and Orchard Establishment

Nurseries should be established in suitable areas of both countries. The rootstock and cultivar base material plots and greenhouses should be established in the nurseries. Technical staff and potential pistachio producers should be trained about orchard establishment, rootstocks, cultivars and pollinators, and model orchards should be established for orchard management trainings.

Grafting Activities and Pruning of Wild Pistachio Trees for Grafting

Pruning is very important to fruit trees, because 15-20% of the yielding branches are removed with the pruning. The annual light pruning could increase the pistachio yield as 15-17% (Arpaci et al., 1995). Pruning and grafting activities have been started in natural pistachio areas and planted pistachio areas for reforestation in both countries. These activities should be continued, and these pistachio areas can be the potential economical income of both countries. The budsticks of pistachio cultivars and/or types and their convenient pollinators should be used in the grafting, and both technical staff and pistachio growers should be trained.

Sustainability

Cooperation should be continued between Turkey and Turkmenistan-Uzbekistan under the "Improving the Pistachio Growing in Turkmenistan and Uzbekistan" project. The cooperation with research institutions and organizations, the training of Turkmen and Uzbek specialists in Turkey, and the investigations of Turkish experts in Turkmenistan and Uzbekistan will be beneficial to all sides. This is because Turkmenistan and Uzbekistan have a big potential for pistachio production, and Turkey has a great experience in growing techniques and breeding of pistachio.

RESULTS AND SUGGESTIONS

- Turkmenistan and Uzbekistan have about 150 thousand hectares *Pistacia vera* forest and 100 thousand ha of these areas may be grafted and used for pistachio production.
- There are natural growth of *P. vera* forests, as well as forestation that may help also erosion prevention in both countries.
- Types abundance in the natural growth or seed sown pistachio areas in both countries exist.
- With the selection in these areas, new and high-quality pistachio cultivars can be obtained for world pistachio production. For this reason, new selection studies should be conducted.
- There are suitable climatic regions for pistachio production in Turkmenistan and Uzbekistan.
- Pistachio areas are under the responsibility of the Ministry of Forest in Turkmenistan and Uzbekistan. Activities are conducted by horticulturist.
- Wild pistachio areas are under the administration of government. For this reason, farmers not interested in pistachio production in such areas, and therefore, pistachio cultivation can not be developed in these two countries properly.
- Wild pistachio areas should be divided to appropriate portion and given to farmers. In this case, pruning, grafting and cultivation process will be better.
- According to researches, 5 hectare pistachio orchard is enough for livelihood of a 5 person family (Caliskan et al., 2007).
- Training activities of Turkmen and Uzbek experts should be continued about selection, breeding, pruning, grafting, pollination, irrigation, pest and disease management, harvest and processing techniques.
- According to research studies in Turkey; 800 kg/ha dry fruit are taken in dry conditions (Arpaci et al., 1997), and 1780 kg/ha are taken in irrigated conditions (Acar et al., 2008).
- If 50 thousand hectares wild pistachio areas have been transformed to pistachio orchard by grafting in Turkmenistan and Uzbekistan:

- Grafting in 3 years and 8 years later the trees can start bearing fruit
  50.000 ha x 800 kg x 6 $ = 240.000.000 $ income can be expected.
- In addition, the pruning, grafting and maintenance of 50 thousand ha area will help to reduce the unemployment in the rural areas.

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Tables

Table 1. World Pistachio Production (tons) (FAOSTAT, 2009).

Countries	2005	2006	2007	2008	Average
Iran	229.657	230.000	230.000	150.000	209.914
USA	128.367	107.955	108.598	110.000	113.730
Turkey	60.000	110.000	73.416	130.000	93.354
Syria*	44.642	73.183	52.066	50.000	54.973
China	34.000	36.000	38.000	30.000	34.500
Greece	9.365	8.228	9.000	8.000	8.648

*as fresh fruit