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Morphological Diversity of *Amygdalus arabica* Oliv. In Natural Forests of Ilam Province, Iran

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ABSTRACT

Mountain almond [*Amygdalus arabica* Oliv.] as a food and pharmaceutical plant, is seen in 8 semi-arid regions of Ilam province, existing as a relatively pure and dominant stands or as scattered form, especially in areas with gypsum base stone in an altitude range between 600 to 1700 meters above sea level. This plant is a shrub with height of 2 m that sometimes reach a height of 5 m and stump diameter of 20 cm with narrow, long, smooth green branches, and brown to grey stems and relatively spherical crown. In this research, changes in particular characteristics such as seed form and size in different regions of the province, have been studied. Results indicated that there are significant changes in the studied properties, that is expected because of their other masculine flowers. The variation in this plant could be suitable and used as a gene bank for modified gens. The leaves are simple and lanceolate shape, dark green to bright, sharp end and tined base with uneven margins, a length of 1.6 to 2.5 cm and width 6 to 10 millimeters. Petiole is light green and the length is between 2 to 3 mm. The flowers are other masculine androgen, large size and white tended to red color as clusters. The fruit contains a grain seed that tends to long oval spherical shape with 1 to 2 cm in length and width of 6 to 10 mm. Seeds weight ranged between 300 and 750 grams.

Keywords: *Physiological diversity, Amygdalus arabica Oliv., Ilam Province*

INTRODUCTION

Almond's gender [Amygdalus] in the Rose family [Rosaceae] and the subfamily of Prunus, has about 40 species that grow in the world [Iran nejad Parizi, 1999]. About 30 species in Iran, as the most valuable plants of Iran-Tourane mountainous vegetative region, have been reported [Iran nejad Parizi, 1999, Khatmsaz, 1992]. *A. arabica* is an important species in aspect of economic, social and environmental importance, and is considered as much valuable genetic resource. Almond species have particular importance and value of environmental adaptation to difficult conditions, soil conservation and use of pharmaceutical and food industries. Large areas in Ilam province is covered by natural plant types of several almond species. The most important species is mountain almond [*Amygdalus arabica* Oliv.] and this research is trying to consider of the distribution, ecological conditions and effective factors limiting the establishment and survey of diversity apparent properties in Ilam province. Information on conditions and effects on the distribution and diversity of almond's ecological factors can help and look good basis for developmental programs and may lead to a resuscitation of natural resources, in similar areas.

In this research, changes in particular characteristics such as seeds, leaves, branches and stems form and size in different regions of the province, have been studied. Results indicated that there are significant changes in the studied properties that are expected because of their other masculine flowers. The variation in this plant could be suitable and used as a gene bank for modified gens.

MATERIAL & METHODS

For the conduction of this study, first through the information gathered from natural resources experts, local people and forest circulation, the distribution areas in the province

was found as indicated [Table 1], and their primary boundary was distinctly marked on topographical maps [1: 50,000 scale].

Then, with in classes based on height above sea level [classes 200 meters], geographical directions [north and south] and type of geological formations [Gurpy, Imam Hassan, Pabdeh, Asmari, Gachsaran, Ilam, Sarvak-Surgah, Aghajari and Amiran] to ecological units was divided.

Then, after the study and control units for almonds in field were specified, for the registration of morphological characteristics, we used stratificasion sampling method [Zubeiri, 2002], by 93 total sampling plots size 30 * 20m [based on results of implementation for least level method] randomly established.

Whit in sample plots, whole of morphological characteristics for regional, and location of plot such as: topography, soil, vegetation, etc. and all the apparent almond characteristics, such as: shrub height, crown height, crown diameter, collar diameter of the largest stem and natural regeneration, based on common methods [Zubeiri, 2000], are measured, and recorded in the special form of sampling.

RESULTS & DISCUSSION

Distribution

A. arabica in Ilam province covers an area of 32,450 hectares [image no.1]. In terms of height above sea level, the range between 600 to 1700 meters and in terms of climate is dry temperate, semi-arid temperate, semi-arid and semi- cold humid. Totally, three types of vegetation are seen in this range:

- *Amygdalus arabica*-Quercus brantii
- *Amygdalus arabica*
- *Quercus brantii-Pistacia atlantica-Amygdalus arabica*

Study of 93 sample plots harvested in the field distribution of this species indicate that, except the lower parts where the pure type can be seen, , oak and pistachio shrubs are present as type formation in other areas.

In low altitudes, *Ziziphus nummularia*, and *Vitex pseudonegondo* especially in the rivers beds, and in higher altitudes Acer *monspesulanum* are seen in this habitat.

Other tree and shrub species which were present in the habitat are respectively:

Quercus persica, Pistacia atlantica, Pistacia khinjuk,

Crataegus monogina, *Daphne angustifolia, Nerium indicum*, *Ziziphus nummularia, Ficus carica*

The most important plant and herb species in this field are:

Teucrium polium, Carthamus oxycanthalis, Aegilops crassa,

Astragalus spp., Poa bulbosa, Echinops ritro,

Phlomis anisodonta, Citrallus colcocynthis, Lolium sp.

Avena westii, Cymbopogon olivierii, Sanguisorba minor,

Cynodon dactylon, Romex ephedroides, Vicia sp., Convolvolus sp., Delphenium smiculaefolium

Botanical characteristics

This plant in Ilam province as shown in image [number 2] is a shrub with an average height of 2m that sometimes in the form of small tree reach to a height of 5 m and stump diameter of 20 cm. The branches are narrow, long, smooth and green. The stems are brown to grey and their crowns are relatively spherical.

The leaves are simple and lanceolate shape, dark green to bright, sharp end and tined base with uneven margins, of a length of 1.6 to 2.5 cm and width 6 to 10 millimeters. Petiole is light green and the length between 2 to 3 mm. Results of this study indicate that leaf size in the north direction and in a somewhat higher altitude which have more moisture, are relatively larger than the leaves in southerm parts and lower altitudes.

The flowers are other masculine androgen, large sized with a white line to red as clusters.

Reviewing the size of grains [seeds] suggests that the fruit containing a grain seed that tended to long oval spherical with 1 to 2 cm in length and width of 6 to 10 mm. Seeds weight in Ilam province ranged from 300 to 750 grams.

Effect of major ecological factors

Effect of major ecological factors on the distribution and characteristics of A. arabica:

Climate

Climate or weather is one of the main factors influencing the structure of plants. As it can be seen in [Table 2], the almond can grow and show presence in four climates so much so that it can exist not only in semi-arid tropical climate not only highest density and canopy, but also shows maximum dimensions for morphological characteristics.

Altitude

As it is seen in [Table 2], *A. arabica* is distributed in a range of 600 to 1700 meters above sea level. Comparison of *A. arabica* status in different heights show that the density, height and crown dimensions in height classes 700 to 900 and 900 to 1100 meters above sea level significantly differ from other classes. The chart in image [number 3] shows change corresponding to increasing altitudes.

Geological Formation

A. arabica exists in the region in eight geological formations, but the highest number per hectar [349], the highest height [122 cm] and highest crown diameter [114 cm] have been traced in Gachsaran formation, which has significant differences with others. Pabdeh formation is second in this regard. This result shows the tolerance of *A. arabica* on gypsum soils.

Geographical direction

Although the density, height and crown diameter is greater in the northern direction, but it was clear that there are significant differences for these traits between the southern and northern parts.

Soil depth and texture

Comparison of *A. arabica* status in respect of soil depth texture showed that major distribution of the species is located in surface soils, but the density, height and crown diameter increased with increasing soil depth, and they have a better presence. Also, the species showed better germination and higher dimension with clay-sand soils.

CONCLUSION

Natural existence of *A. arabica* in a relatively extensive level, especially in destroyed areas and formations that susceptible to severe erosion, as well as it is occurrence in difficult environmental conditions and extreme poor soil, is point of hope due to good resistance and possibility as a valuable genetic resource in preventing further destruction of these areas in Ilam province and other similar regions, *A. Arabica* is of worthy of attention.

This almond shrub/tree with its power and consistency is able to grow between tropical dry to semi-humid cold, but in semi-arid tropical climate, it has been the highest density, canopy and regeneration.

After that, semi-dry cold, semi-humid cold and dry temperate climates are respectively. Good presence of this specie in areas susceptible to erosion and poor soils such as Gachsaran and Pabdeh, has become a genetic value and potential for development in these areas.

Dimensions of the leaves in north and somewhat higher altitudes, that have more moisture and rainfall, is relatively larger than others and this result conforms with findings of Sorkheh et al [2009] and Talhouk [2000].

It is worth noting that Talhouk [2000] say that effect of variations in altitude dosn`t significant, but influence of rainfall has emphasized.

The grain [seed] dimensions, especially seed length and seed weight, in different ecological units of Ilam province have significant differences, and the results conform to Talhouk [2000] but does not match with Sorkheh et al [2009].

Because of land development, utilization and livestock grazing pressure in the Foothills and marginal flat lands, the highest level of this species is concentrated in the province in slopes of 30 to 45 percent.

Although *A. arabica* in Ilam province is economically important, but the most important aspect is related to the environmental value and conservation of soil and water.

REFERENCE

De Giogio D. and G.B. Polignano, (2001). Evaluating the Biodiversity of Almond Cultivars From a Germplasm Collection Field in Southern Italy, Sustaining the Global Farm, 305-311p.

Hosseinzadeh, J., (2003). Study of ecological factors affecting almond species distribution in Ilam Province, forest and populus magazine, Forests and Rangelands Research Institute, Publications No.9

Irannezhad Parizi, M.H. (2000). Study of ecological habitats of Almond (Amygdalus spp.) In Kerman province. Scientific conference on research findings about development and exploitation of forests in south Ahwaz.

Khatamsaz, M., (1993). Flora of Iran, Rosaceae. Forests and Rangelands Research Institute, Publications No.352, 6pp.

Sabeti, Habibolah, (1994). Trees, shrubs and forests of Iran. Yazd University, 875 pp.

Sorkheh K., B. Shiran, V.Rouhi, E. Asadi, H. Jahanbazi, H. Moradi, T. M. Gradziel, and P. Martinez-Gomez, (2009). Phenotypic diversity within native Iranian almond (prunus spp.) species and their breeding potential, Genetic Resources and Crop Evaluation, Volume 56, 7:947-961.

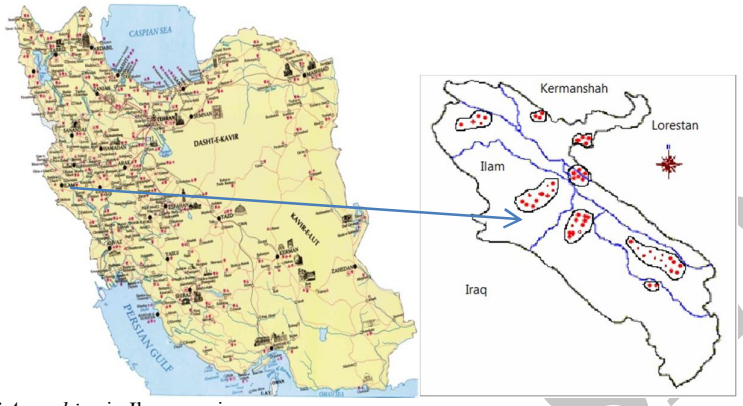
Talhouk S.N., Lubani R.T., Baalbaki R., Zurayk R., Alkhatib A., Parmaksizian L. and Jaradat A.A., (2000). Phenotypical diversity and morphological characterization of Amygdalus L. species in Lebanon. Genetic Resources and Crop Evaluation, Volume 47, 1:93-104.

Zubairi, M., (1995). Forest Sampling. Tehran University, Publications No.2238, 401 pp.

Zubairi, M., (2003). Forest Biometry. Tehran University, Publications No. 2561, 411 pp

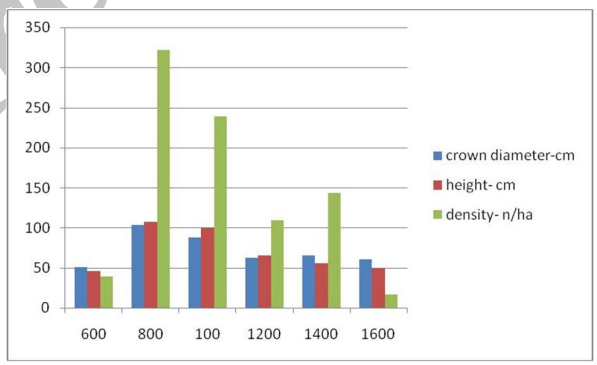
Table 1. Quantitative and qualitative status of *A. arabica* in different climates of Ilam province

Climate	Area (ha)	Numbers of measered	Regeneration (n/ha)	Density n/ha))	Height (cm)	Crown lenght (cm)	Crown diameter (cm)	Collar diameter (cm)
Dry temperate	3219	24	200	186	60	54	58	2.6
Semi-dry temperate	16792	130	300	250	94	77	93	3.1
Semi-dry	5660	35	100	144	86	63	75	3.4
Semi-humid cold	6779	44	200	127	55	51	64	2
Total	32450	233						



Img1. distribution area of *A. arabica* in Ilam province

Img2.individuals and stand of *A. arabica* in Zarinabad, Ilam



Img 3. Characteristic diagram of *Amygdalus arabica* in several elevations