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An evaluation of the morphologic variety of *Amygdalus schoparia* branches in Qazvin province, Iran (Case study: Abyek town)

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ABSTRACT

Among the most suitable shrub species in order to rebuilding destroyed areas is different types of almond specially amygdalus schoparia.Iran is located in a half-dry, dry region of the world. This shrub belongs to Iran torani and zagros region and occupies larg areas in many parts of iran and its neighboring countries. This research has done by the aim of investigation of the morphological variety of branch in two habitats of abyek town including Rahmatabad and Miankooh.This research performed to investigation of A.schoparia branch morphological diversity in two natural habitat with the names,Rahmatabad and Myankouh in Abyek city. From 48 individuals of shrubs in two habitats sample branches were collected in a completely random way. The branches were collected randomly from 48 individuals of shrubs in two habitat. Quantitative traits including branch length, branch diameter, branch angle at the junction of the trunk, the number of sub branches, number of buds on the branches and qualitative traits including branch healthy, branch form and color surveyed. Cluster analysis based on squared Euclidean distance grouped in 5 groups containing Morphological characters distinguishing with distinct attributes offered . Shrubd on the results of this research it can be concluded that viewed differences are mostly created as a result of environmental factors.

Key words: amygdalus schoparia, branch, morphological diversity, cluster analysis, Qazvin, Iran.

INTRODUCTION

Iran is the main center for distribution of genus *Amygdalus., L* and in fact, this is one of the most important elements of Elburz and Zagros mountains, stepps, mountains and semi desert localities in Iran. *Amygdalus* is one of the most problematic genera in family *Rosaceae* and taxonomy of this genus like many other genera in this family with numerous problems because of high degree of variation in morphological conditions(Khatamsaz 1993).It shows high degree of variation within one species, high hybridization inter species and high homoplasy under ecological conditions.

Amygdalus scoparia species is one of shrub reservoirs of Iran. Excessive sensitivity and attention to northern forests of the country has caused ignorance and neglect of the officials about forests outer the northern areas and as a result

they are exposed to destruction and reduction. In the past few decades the majority of nomadic people have been using the woods cut out of *Amygdalus scoparia* in order to make coal and fuel. During 70s executive state organizations such as Department of Natural Resources and water shade have got familiar with this type and its importance and begun the rehabilitation of mountain areas by operation of seed and seedling plantation of *Amygdalus scopar*ia. This species is a valuable source of vegetable oil for human nutrition and health with relatively high oxidative stability (Abbey et al. 1994; Bliss 1999). *Amygdalus scoparia* kernel oil showed significantly unsaturated to saturated fatty acids ratio and calculated oxidisability value than those of olive oil (Farhosh2008). This species has high economic value, too. being in favor of light and resistance against dryness, wind, heat and saline soil is of most important ecological features of almond(Irannejad parizi 1995).wild population of almond species present an extended morphological and geographical area in west and central Asia(Tehranifar 1998).Regarding to vegetative form, the species of Amygdales are distributed as four forms in iran: shrubs with brachyblast (short shoots), shrubs without brachyblast and spiny shrubs (zarinkamar1993,zarinkamar and Dinarvand 2006). Regarding to their branching outs stability almonds are divided to three groups of thorn less branching out, more or less thorny branching out and thorny branching out(Sabeti 1956). Also roundness and groove sometimes as were criteria for separation of different species. Issues such as incompatibility of almond varieties and their geographical spreading in extended level and effect of different climate in this biological realm makes difficult to study and classification of different types of wild almond (Chaichi 1988). since using morphological methods is one of the oldest methods of classification of plants and because of extensive multiplicity of almonds morphological characteristics, aim of this research as an initial and basic study, is introduction of branch features as a morphologic classifying factor for *Amygdalus scoparia*. This research is trying to recognize whether there is such a variety in almond types and if yes how much? This research can be completed with further studies in the future and be used genetics and plant classifying studies.

MATERIALS AND METHODS

This research performed in two habitats of Abyek towns protected area of natural resources office including Rahmatabad at 50° 34′ 25″ to 50° 34′ 57″ eastern length and 36° 06′ 21″ to 36° 06′ 37″north width limit and miankooh at 50° 29′ 05″ to 50° 29′ 23″ east length and 36° 05′ 27″ to 36° 05′ 38″ north width. Rahmatabad habitat with average annual rainfall of 265 millimeter is known as a reservoir since 1389 and is placed at high latitude of 1750 to 2020 from sea level. Miankoh habitat with average rainfall of 240 millimeter per year is located at latitude of 1380 to 2000 meter from the sea level. Soil of both areas contains notable percentage of lime and has located in Loam texture class(clay,loam and sandy loam). Major portion of the habitats has stony mood and a lot of shrubs have gshrubn between them and trough their protection. 24 shrubs were selected randomly in each habitat and from external part of each shrub crown one branch was separated from last branching out.Then a few features like branch length, diameter, angle, sub branches and buds and some quality features including health and form of branch, its size and color were measured and registered. Meanwhile about each shrub altitude calculated by GPS system, shrub height and total of shrubs diameters was registered. First, using cluster analysis (ward method) shrubs under the investigation were divided in different clusters. In order to compare the feature averages between two habitats T test exam was used. Quality features of two habitats were analyzed using Mann Whitney method of analysis. We used SPSS(version16.00) software in order to analyze the data.

RESULTS

T test exam presented significant differences about branch angle in two habitats. In Rahmatabad habitat the most branch length, angle, number of sub branches and fewest number of buds and Miankooh habitat most branch diameter, number of buds and least diameter were observed. Least range of branch length and angle were equal in both habitats. Specification averages of latitude, height of almond shrubs, branch diameter and number of buds in Rahmatabad is more than in Miankooh.instead the specification average of shrub diameter, branch angle and number of branch that branching outs in Miankooh habitat is more than Rahmatabad. (chart1)

Table 1. Average of factors in two habitats

Mean / site	Altitude(m)	Height(m)	Shrub diameter(cm)	Length(cm)	Branch diameter(mm)	Angle(°)	Number of buds	Sub branches
Rahmatabad	1836	1.49	14.6	29.32	4.04	36.95	34.70	6.2
Myankouh	1484	1.26	19.04	26.04	3.97	43.75	24.66	8.32

The result of cluster analysis of two habitats proved that there is a significant difference between factors under investigation. (Fig 1.2) cluster analysis based on squared Euclidean distance of specific parameter matrix in two habitats presented five groups with different morphological features of *Amygdalus schoparia* (Fig 3).

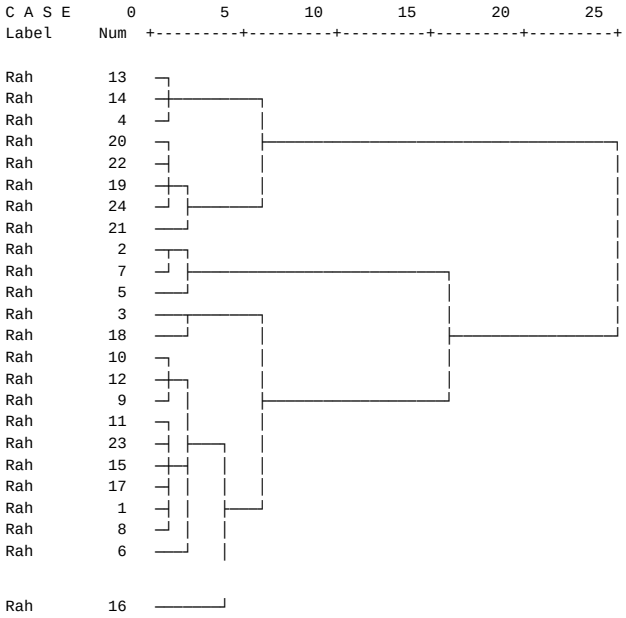


Figure1. Rahmatabad habitat Denderogram

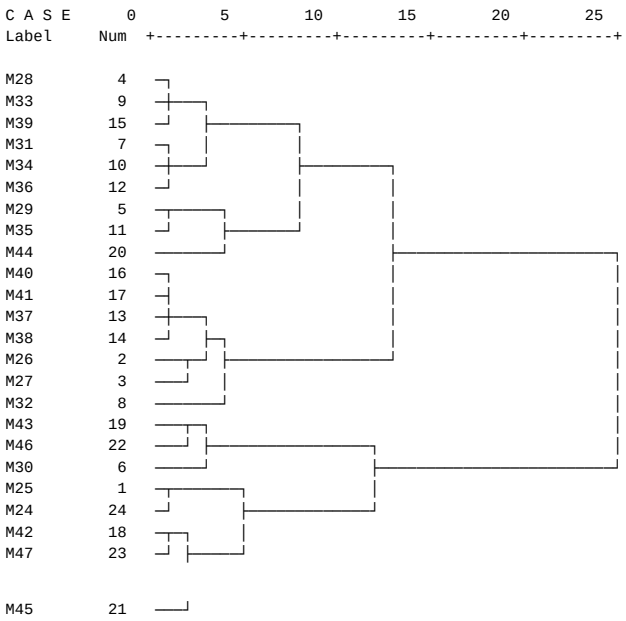


Figure2. Myankouh habitat Denderogram

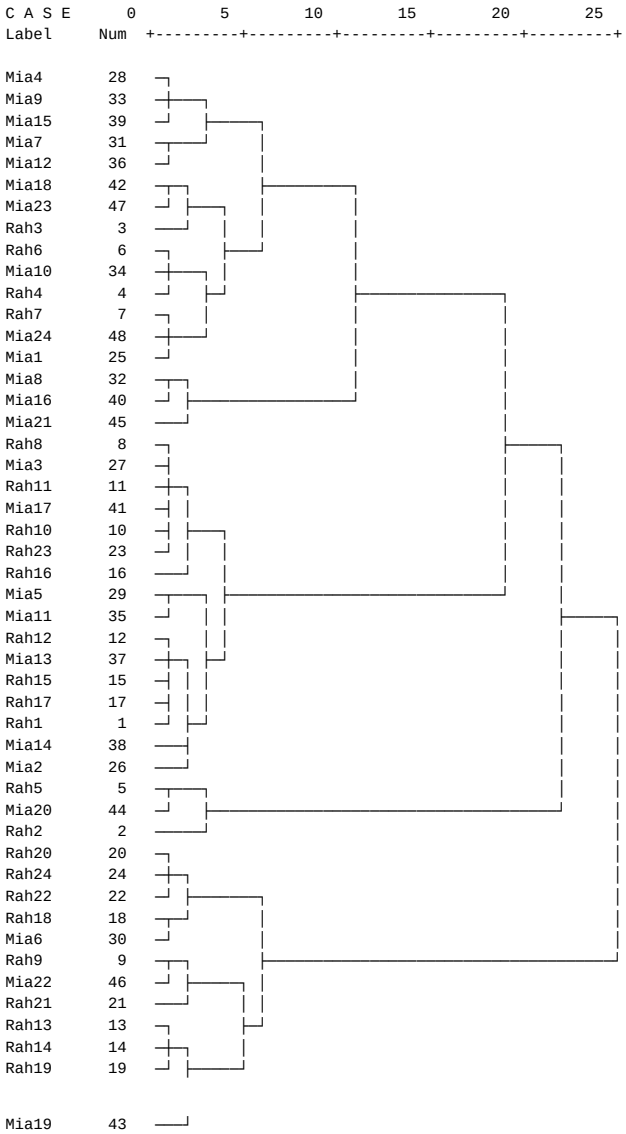


Figure3. synthetic dandrogram of two habitats.

In figure3 1-24 belong to Rahmatabad and 25-48 belong to Miankooh.group 1 with 12 subjects that 9 of them are from Rahmatabad. Group 2 including 3 subjects from two gshrubing plces.group 3 with 16 subjects equally from both habitats. Group 4 with 3 subjects that all of them are from Miankooh site. Group 5 with 14 subjects that 10 of them are from Miankooh. Then average of features was compared between groups.(chart2)

Table 2: average of group features

Mean / group	Diameter(cm)	Angle(°)	Length(cm)	Number of buds	Number of subbranches
1	3.66	18.83	36.62	21.19	4.5
2	5	39.66	25.33	66.66	21
3	4.53	55.87	38.6	32.9	5.93
4	2.16	57	21	15	4.66
5	3.89	37.64	17	35.07	8.75

These five groups, based on these variables, have different amounts (1-5 diagrams)

Diagram 1: diameter (cm) comparison of branches in the groups

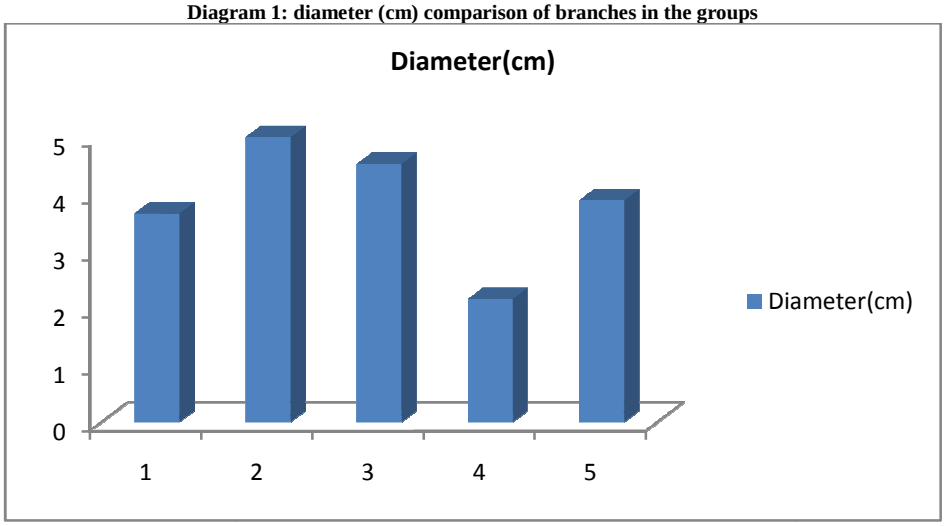


Diagram 2: angle ( ) comparison of branches in the groups

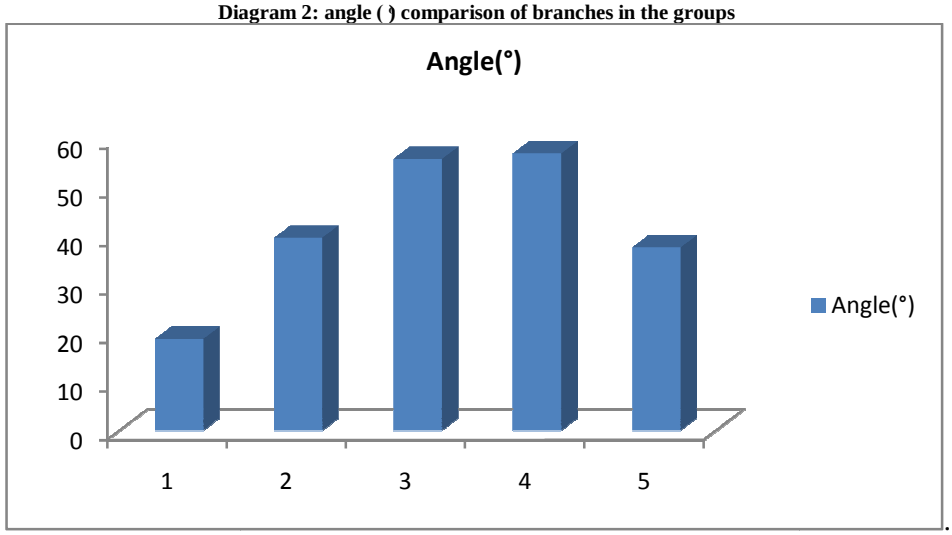


Diagram 3: branch length (cm) comparison in the groups

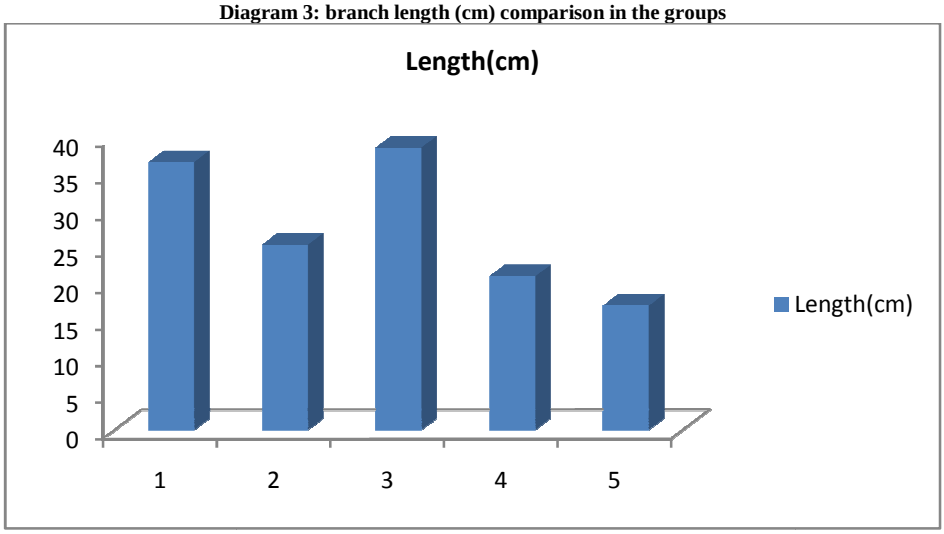


Diagram 4: sub branch number comparison in the groups

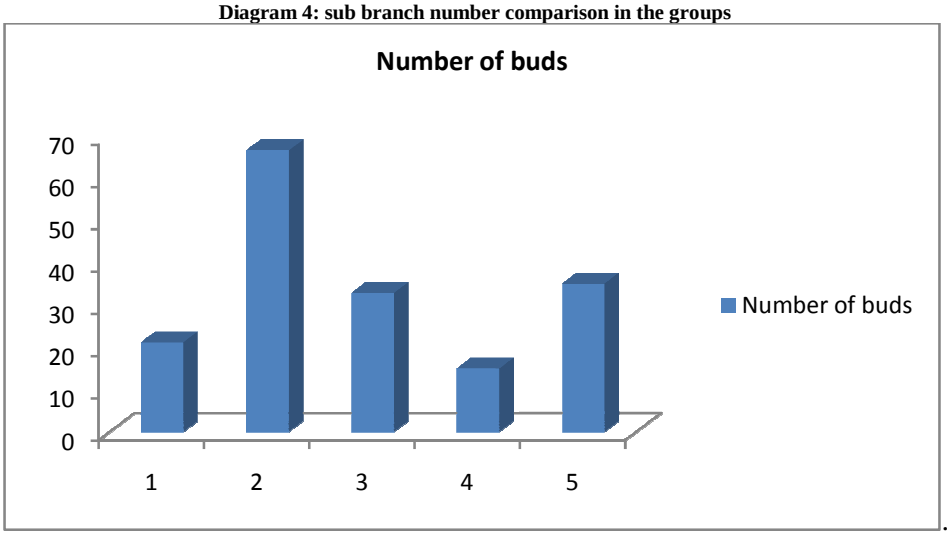
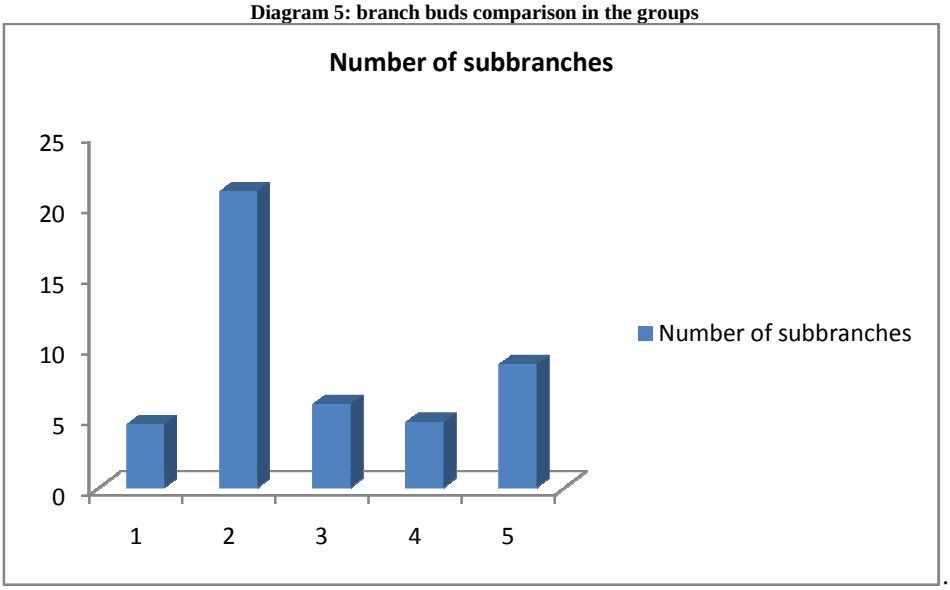


Diagram 5: branch buds comparison in the groups



The results taken by Pearson correlation between number of buds with shrub diameters, branch diameter and number of sub branches presented 1% positive correlation in range. Branch angle with latitude, shrub diameters, branch length and number of branch branching out, presented negative correlation (Chart 3).

Chart3. branch features correlation

	altitude	height	Shrub diameter	Branch lenght	Branch diameter	angle	Number of buds	Sub branches
altitude	1							
height	0.236*	1						
Shrub diameter	-0.219	0.407**	1					
Branch lenght	0.109	0.114	-0.009	1				
Branch diameter	0.63	0.357*	0.016	0.151	1			
angle	- 0.13.8	0.005	-0.13	-0.22	0.114	1		
Number of buds	0.39	0.220	0.295*	0.001	0.451**	0.67	1	
Sub branches	-0.213	0.031	0.295	-0.245	0.252	-0.005	0.645**	1

***correlation became significant in 1% level. * Correlation became significant in 5% level.*

Qualitative features
Four codes were allocated for branch health: 1- healthy branch – 2- wounded branch – 3- branch with some dryness – 4 branch with mold signs

Five codes were allocated for shape feature of branch: 1- straight – 2- with curve or tendency – 3- bent – 4 semi circle – 5 wavy

And for branch color there were three codes: 1- light green – 2- yellowish green – 3- dark green

Significant differences between branch health and its shape were observed. Mann-Whitney analysis conclusions presented significant differences between two habitats only about color feature.

DISCUSSION

Considering high genetics variety of almond masses, this variety is not completely recognizable trough phonotype observations, because plant phonotype cannot depict its real genotype(Staub, 1996). Considering "dendogram" of regions under investigation and variety of sub clusters in Miankooh it seems that morphologic variety of branch in Miankooh is more than Rahmatabad. Considering average lower height in Miankooh in comparison to Rahmatabad and similar variant condition shrubs on number in Hectare, it might be able take the presence of different genotypes as a cause of this fact. Group 4 consisting 3 shrubs from Miankooh habitat have not been mixed with any other group. Quality investigation demonstrates the incongruous quality of shrub stem in these three shrubs from health point of view. These shrubs contain wounded stems and disorganized crown and branches that can be in two habitats because of animal grazing or genetic closeness of theses shrubs with others. The result of being synthetic shows that the higher the elevation from sea levels the smaller the diameter of the shrubs. The smaller the angle of the shrubs of the branch and the less the number of the incidental branches. So, the groups with more shrubs from the habitat of Rahmatabad, according to average of these 3 characters, show less numbers (group 1). The result about the length of the branch presents that, the bigger the diameter of the shrubs, the smaller the length of the branches and the bigger the angle and the bigger the average of the diameters of the branches (group 5).Group 2 with two shrubs from the Rahmatabad habitat and one shrub from Miankooh habitat have the biggest average of the number of incidental branches. Every three shrubs have green color with a yellow hint and a curve, the reason is recognized only by morphologic investigation. Group 3 has the equal number of two habitats, in characteristic averages; they show half of characteristics of one habitat and half characteristics of the other. These characteristics include the biggest average of the length of branch and the less number of the incidental branches similar to the subjects of Rahmatabad and the average of the above diameters and bigger diameter of the branch and also less number of incidental branches similar to subjects of Rahmatabad and a big average of diameters and bigger angle of the shrubs and relatively big diameter of diameters are similar to Miankooh. In fact it seems that clusters of each habitat in categorizing the sets of two habitats are protected and mixed with other similar subjects of the habitat. At higher altitude seems the lighter the color of the branches. Since in higher levels by getting more light the speed of decomposition of chlorophyll of plants is increased. In wounded shrubs and branches with mold sign element, the branch colors are lighter shade that is shows they are getting dry. It seems that the considered differences between the groups are mostly created under environmental factors. It is recommended to use statistic method of multi variant analysis to basic signs and pay more attention to relation of physiological and soil factors with morphologic factors so that the environmental elements be engaged in the research results. Leaf interpretive characteristics are obvious signs for separating almond specious (Vafadar 2008). By entering leaf and seed morphology of this type more exact conclusions are gained, too (Zeinolabedini 1381). When in laboratory situations are ready the genetic differences will be investigated by either propagation or seed plantation. Tahan (2009) used microsatellite (SSR) local derived from both expressed sequence tag (EST) and an onymous genetic sequence to explore the genetic diversity and population structure of *Amygdalus nana* (an endangered wild relative of cultivated wild almond) in Xinjiang of china. in particular, the population collected from Tacheng County (outside the protected areas) had the highest levels of genetic diversity and had significantly different genetic constitution from other populations.

Vafadar(2010) examined Pollen grain of 16 species and three hybrids of the genus *Amygdalus* L., representing two subgenera and two sections distributed in Iran by light and scanning electron microscopy. Results showed that among pollen grain characters, shape is useful character solely for separating of taxonomic rankes in Iranian *Amygdalus* specially in sub generic or section level.

We need more data sources including molecular, biochemical and micro morphological data for taxonomical resolution and evaluation of relationships among species in this genus Vafadar(2010).

In general, the morphologic features cannot present variety of *Amygdalus scoparia* type, alone.

REFERENCES

[1] Abbey, M., Noake, M., Belling, G.B. and Netsel, P.J. **1994**. Partial replacement of saturated fatty acids with almonds or walnuts lowers total plasma cholesterol and low-density-lipoprotein cholesterol. Am. J.Clin. Nutr. *59*, 995–999.
[2] Asadi,F. Mirzaei Nedoshan, H. Modirrahmati,A and Naderi Shahab 1383 Morphologic pointers usage in spruce differences, Iran Spruce and jungle researches, scientific and research seasonal….
[3] Alvani nejad, s, 1387 survey of effective factors on Amygdalus schoparia type transmittal in two regions of Fars province,Forestry Msc thesis, natural resources college, Tarbiat modarres university, page 144.
[4] *Amygdalus L. (Rosaceae)*: Species relationships,distribution and evolution under domestication. - Genetic Resources and Crop Evolution, 43: 229-247.Chaichi,S,1367, genetic variety and geographic dispersal of Amygdalus schoparia hereditary storages.Zeytoon 1387, 22-25
[5] Iran nejad Parizi, M, 1374, ecologic survey of Amygdalus schoparia natural types societies in Kerman province, forestry Msc thesis, natural resources college, Tarbiat modarres university, page 145
[6] Sabeti, H,1373, jungles, trees and shrubs of Iran, second edition, Yazd university press 105-129
[7] Staub,J.E, F.C. Serquen and M.Gupta. **1996**. Genetic markers, map construction, and their application in plant breeding HortScience 31: 729-741
[8] Tehranifar, A, M, Adli, 1377, almond nurture, Jahad daneshgahi publications 7-8
[9] Taheri abkenar,Kambiz,1389, Silvics in Forests of Outside in Northern of Iran, Haghshenass publications page 152
[10] Vafadar, M., Attar, F., Maroofi, H. & Aghabeigi, F. **2008** 1231: Leaf anatomical study of the genus *Amygdalus* L. (*Rosaceae*) in iran and its taxonomical implication. Iran. J. Bot.143-155.Tehran
[11] Zeinolabedini, M, gerigorian, V,Valizadeh, M, Moghaddam,M, Modarres hashemi, S, 1381. Genetic variety of Isfahan province Amygdalus schoparia masses using some morphologic features and seed storage proteins, Iran gardening sciences and skills magazine, third book, numbers 1 & 2,15-28
[12] Zarinkamar, F., **1993**, Comparative foliar anatomy of five xerophyte species from Iran. –Iranian Journal of Botany, 6(1): 153-168