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Biodiversity, life forms and chorotypes of threatend medicinal plants in Tehran watershed, Iran

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This research was carried out to identify and introduce the threatened medicinal plants, life form, and chorotypes of them in Tehran watershed. Initially after distributed species identification on the watershed based on the fieldwork, each of the species was compared with the red list and finalized. Results showed that in Tehran watershed there are 51 threatend medicinal plants belonging to 21 families and 43 genera. The families with the high number of red species include, Rosaceae (8 species) and Lamiaceae (7 species), and the main genera was *Ferula* (3 species). 43 species isd Endemic in Iran, 3 species are in Data Deficient (DD), 20 species in Vulnerable (VU) and 26 in Low Risk (LR) status. Two species *Ferula persica* Willd. and *Dracocephalum kotschyi* Boiss. are in Endangered (EN) status Because of low distribution and overuse of those. The dominant life forms of the identified species using Raunkiaer's method were: Hemicryptophytes (He) with 41.18% (21 species) and Phanerophytes (Ph) with 39.22% (20 species). From the choryotype perspective, the most of the identified species belongs to Irano-Turanean, and then Europe-Siberian- Irano-Turanean regions.

Keywords: Biodiversity, Endemic species, Vulnerable and endangered species, Conservation of Tehran watershed species.

Iran have a suitable position because of it's phylogenetical reserves (more than 7500 plant species), weathering (11 of 13 types of world climate) and political geography conditions is an important habitat in the field of medicinal plants. Identifying and introduction of endemic medicinal plants of one country is necessary in management of using them, and then develop the idustry of the medicinal plants. The IUCN Red List Categories and Criteria were developed for classifying species at high risk of global extinction (IUCN 2001, 2003), i.e. for assessment at the global level. At regional, national and local levels with two options: 1) to publish an unaltered subset of the global Red List encompassing those species that reproduce in the region or at any stage regularly visit the region. This may be a feasible option, particularly when the

region has a high number of endemics or threatened near endemics, or when there is currently a pronounced overall deficiency of data pertaining to species status within the region (IUCN, 2003). 2) To assess species' extinction risk and publish Red Lists within the specific region (IUCN, 2003). For the purposes of regional conservation assessments there are important reasons to assess species' extinction risk and publish Red Lists within specific geographically defined areas. The IUCN Red List of Threatened Species highlights species that are at the greatest risk of extinction and promotes their conservation by 'concentrating minds on true priorities' (Collar, 1996).

Assessment of extinction risk and setting conservation priorities are two related but different processes. Assessment of extinction risk, such as the assignment of IUCN Red List Categories, generally precedes the setting of priorities. The purpose of the Red List categorization is to produce a relative estimate of the likelihood of extinction of the taxon, draw attention to the conservation needs of select species to be under threat (Scott *et al*., 1987). This approach successfully attracted conservation efforts to many such species, but the Red List is now more powerful because it has moved towards documenting entire species clades and regions, including threatened and non-threatened species (IUCN, 2004) the obtained results are often incorporated in Action Plans aimed at the recovery of species. Setting conservation priorities, on the other hand, which normally includes the assessment of extinction risk, also takes into account other factors such as ecological, phylogenetic, historical, or cultural preferences for some taxa over others, as well as the probability of success of conservation actions, availability of funds or personnel to carry out such actions, and legal frameworks for conservation of threatened taxa. In the context of regional risk assessments, a number of additional pieces of information are valuable for setting conservation priorities (IUCN, 2003). Loss of genetic and species diversity by the destruction of natural habitats will take many years to correct and restore (Ejtehadi *et al*., 2003). Therefore the primarily goal of this research has been to document threatened endemic medicinal plants of Tehran watershed and present recommendations for conservation action.

Materials and Methods

Study area

Tehran watershed with 206484 hectare area is located at Tehran province in Iran (51° 10' 26" E to 51° 41' 00" and 35° 22' 26" N to 35° 57' 17"). It has 900-3957 m altitude above sea surface (Fig. 1). The climate is arid to semi-arid at rough regions and cold to cold-humid at elevations based on Emberger method with annual precipitation 150-750 mm. rainfall at rough regions is rain and snow at elevations. Minimum and maximum monthly mean temperatures were -9.6 and 38 in January and August respectively.

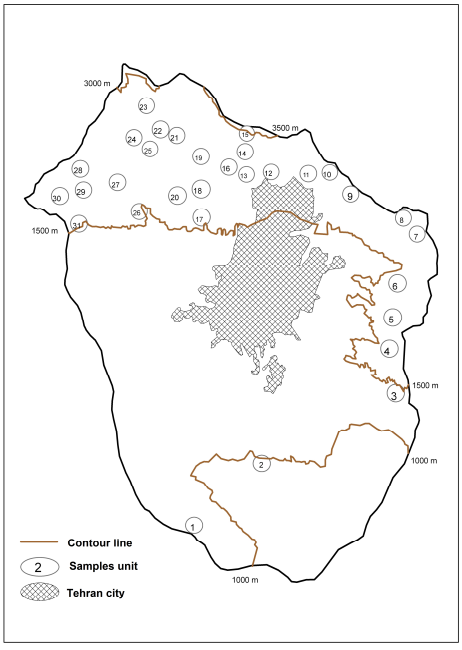

Fig. 1. The location of study area

To investigation the vegetation cover of this study area, after preliminary investigations and using land use maps at 1:50000 scale, studying related references (Mobayen, 1980-1996; Mozaffarian, 1983; Javanshir and Riazi, 1987; Ghahraman, 1975-2003 and Rechinger, 1963–1998) and field studies, were selected 31 habitats at different elevations using aspect and slopes and distance to Tehran city. Collection and identification of plant species was conducted with field studies. Positions were recorded by GPS. Not identified species transported to laboratory and the herbarium of Research Institute of Forests and Rangelands to identification. Assessment the risk of extinction performed with two phases. 1) Comparison and adjustment of identified species in the study area with the Iran Endangered flowered Species (Jalili and Jamzad, 1999). 2) Assessment of 650 species using The IUCN Red List Categories and Criteria (IUCN, 2001) and regional (IUCN, 2003) and other related references including (Ghahraman and Attar, 1998; Jalili, 2000; Khansari, 2001; Jalili and Jamzad, 2005; Salehi Shanjani, 2005; Abdi, 2008).

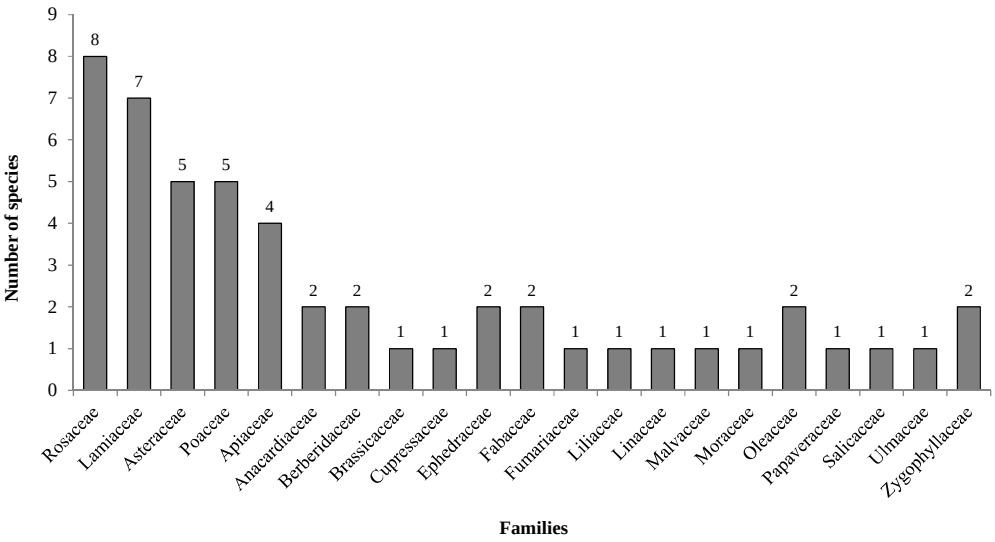

Fig. 2. Contribution of different plant families in the study area

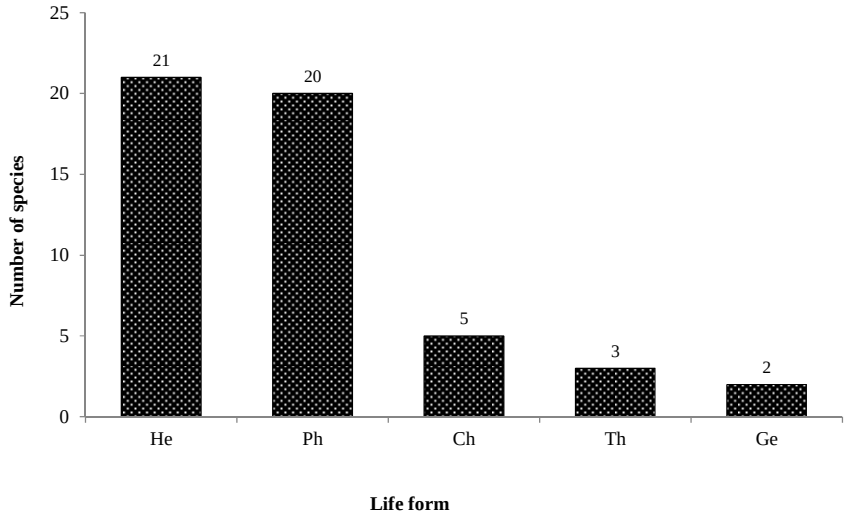

Fig. 3. Life form of species in the study area based on Raunkiaer's method
(He= Hemicryptophyte; Ph= Phanerophyte; Ch= Chamephyte; Th= Therophyte; Ge= Geophyte**)**

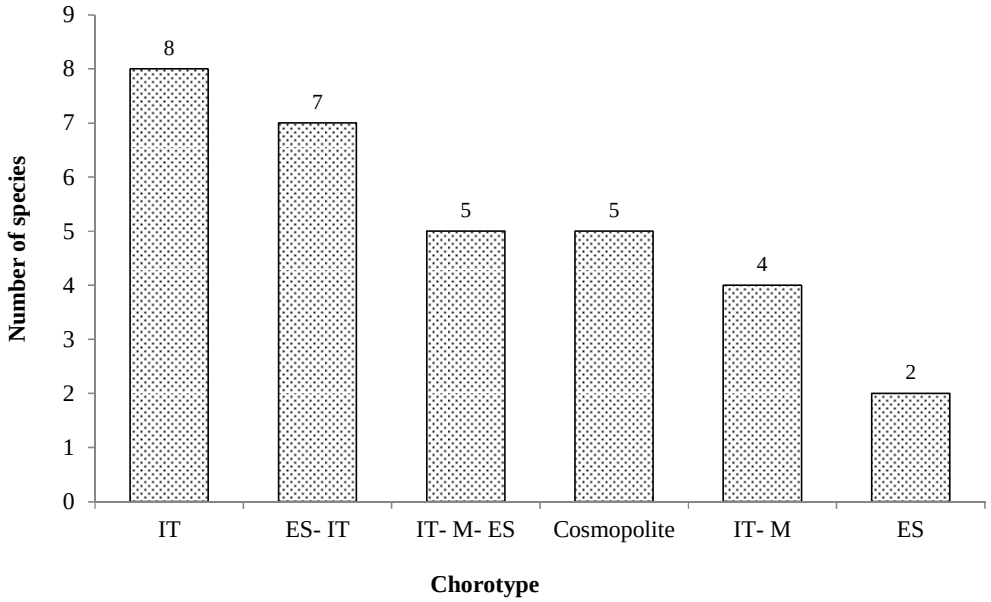

Fig. 4. Geographical distribution of plant species
(IT= Irano-Turanean; ES= Europe-Siberian; M= Mediterrainean; Cosm= Cosmopolit**)**

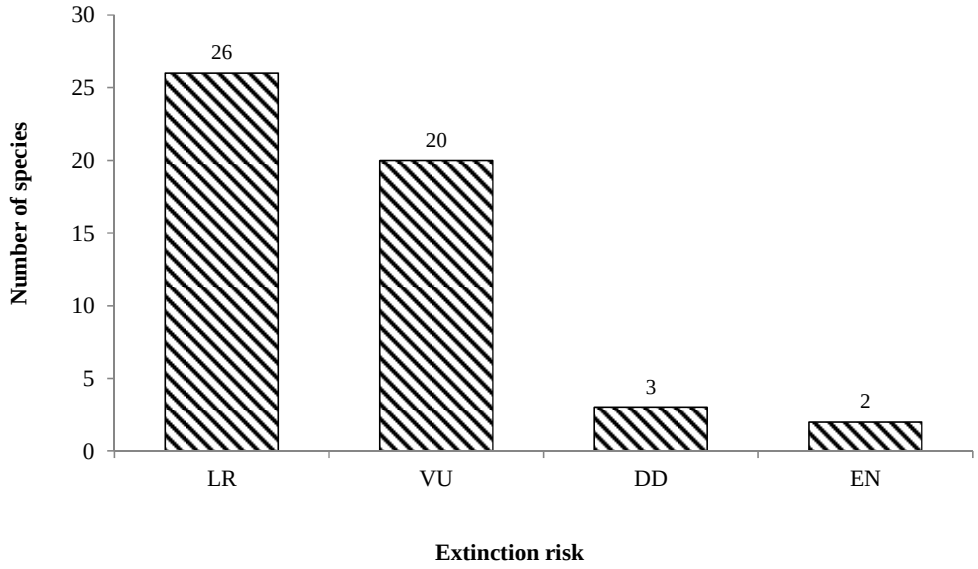

Fig. 5.The extinction risk of identified species based on The IUCN Red List Categories
(LR= Lower Risk; VU= vulnerable; DD= Data Deficient; EN= Endangered**)**

Results

Of the 51 threatend medicinal plants belonging to 21 families and 43 genera were identified in Tehran watershed (Table 1). The families with the high number of red species include, Rosaceae (8 species), Lamiaceae (7 species), Asteraceae (5 species), Poaceae (5 species) and Apiaceae (4 species). The main genera was *Ferula* (3 species), *Berberis*, *Ephedra*, *Nepeta*, *Fraxinus*, *Amygdalus* and *Rosa* (2 species). 43 identified species on the study area is Endemic in Iran.

The extinction risk of identified species based on The IUCN Red List Categories were: 3 species are in Data Deficient status (DD), 20 species in vulnerable status (VU) and 26 in Lower

Risk (LR) status. Two species *Ferula persica* Willd. and *Dracocephalum kotschyi* Boiss., Because of low distribution and overuse of those are in Endangered (EN) status. Life forms of the identified species based on Raunkiaer's method (1934) were: Hemicryptophytes (He) 41.18% (21 species), Phanerophytes (Ph) 39.22% (20 species), Chamephytes (Ch) 9.80% (5 species), Therophytes (Th) 5.88% (3 species), and Geophytes (Ge) 3.92% (2 species). From the choryotype perspective, 62.75% (32 species) identified species belongs to Irano-Turanean, and then Europe-Siberian- Irano-Turanean regions 19.61% (10 species), Cosmopolite 5.88% (3 species), Irano-Turanean – Mediterrainean - Europe-Siberian 5.88% (3 species), Irano-Turanean–Mediterrainean 3.92% (2 species) and Europe-Siberian 1.96% (1 species).

Table 1. Family name, life form, chorotype, Danger status, Endemism and Elevation of threatened medicinal plants in the study area

Species	Life form	chorotype	Danger status	Endemism	Elevation
1. Anacardiaceae					
1-Pistacia atlantica Desf. sub sp. *mutica* (Fisch. & C. A. Mey.) Rech.	Ph	IT	VU	End	1200-2000
2-Rhus coriaria L.	Ph	IT, M	VU	End	1600-2200
2. Apiaceae / Umbelliferae					
3-Eriocycla olivieri (Boiss.) Wolff.	Ch	ES, IT	LR	End	1700-2300
4-Ferula gummosa Boiss.	Hem	IT	LR	End	1900-2000
5-Ferula ovina (Boiss.) Boiss.	Hem	IT	LR	End	1500-2800
6-Ferula persica Willd.	Hem	IT	EN	End	1600-2200
3. Asteraceae / Compositae					
7-Achillea millefolium L.	Hem	Cosm	LR	End	1400-2300
8-Echinops cephalotes DC.	Hem	IT	LR	End	1600-1900
9-Scariola orientalis (Boiss.) Sojak.	Hem	IT	LR	End	900-2500
10-Tanacetum polycephalum Schultz Bip.	Hem	IT	LR	N	1400-2400
11-Taraxacum bessarabicum (Hornem.) Hand.-Mazz.	Hem	IT	LR	End	1500-1800
4. Berberidaceae					
12-Berberis integerrima Bunge.	Ph	ES, IT	VU	End	950-2100
13-Berberis vulgaris L.	Ph	IT, M, ES	VU	End	1500-2500
5. Brassicaceae/ Cruciferae					
14-Alyssum bracteatum Boiss. & Buhse.	Hem	IT	LR	End	1200-2200
6. Cupressaceae					
15-Juniperus excelsa MB.	Ph	IT	VU	End	1500-2500
7. Ephedraceae					
16-Ephedra major Host.	Ph	IT	VU	End	1300-2500
17-Ephedra procera Fisch. & Meyer.	Ph	IT	VU	End	1300-1800
8. Fabaceae					
18-Astragalus cemerinus G. Beck ex Stapf.	Hem	IT	LR	End	1800-2400
19-Glycyrrhiza glabra L.	Hem	IT, M, ES	LR	N	900-2000
9. Fumariaceae					
20-Fumaria vaillantii Loisel.	Th	ES, IT	LR	End	1800-2400
10. Lamiaceae / Labiatae					
21-Dracocephalum kotschyi Boiss.	Ch	IT	EN	End	1500-3000
22-Lagochilus kotschyanus Boiss.	Ch	IT	LR	End	1400-1900
23-Mentha piperita L.	Hem	IT	LR	End	1600-1800
24-Nepeta glumerulosa Boiss.	Ch	IT	LR	End	1400-2700
25-Nepeta pogonsperma Jamzad & Assadi	Hem	ES, IT	LR	End	3000-3200
26-Thymus kotchyanous Boiss. & Hohen.	Ch	IT	LR	N	1500-3000

27-Ziziphora clinopodioides Lam.	Hem	IT	VU	N	1500-3500
11. Liliaceae/Alliaceae					
28-Allium atroviolaceum Boiss.	Ge	IT	LR	End	1700-2000
12. Linaceae					
29-Linum usitatissimum L.	Hem	IT	DD	End	1000-2000
13. Malvaceae					
30-Althaea officinallis L.	Hem	ES, IT	LR	N	1500-1800
14. Moraceae					
31-Ficus carica L.	Ph	IT, M	VU	End	1200-2000
15. Oleaceae					
32-Fraxinus excelsior L.	Ph	ES, IT	LR	N	1000-2000
33-Fraxinus rotundifolia Mill.	Ph	IT	LR	End	1700-1900
16. Papaveraceae					
34-Papaver modestum Jord.	Th	IT	DD	End	1500-2000
17. Poaceae/ Gramineae					
35-Bromus tomentellus Boiss.	Hem	IT	LR	End	1800
36-Cynodon dactylon (L.) Pers**.**	Hem	Cosm	LR	End	900-2500
37-Dactylis glomerata L.	Hem	ES, IT	LR	End	1200-2500
38-Festuca ovina L.	Hem	ES, IT	VU	End	1400-2400
39-Psathyrostachys fragilis (Boiss.) Neveski.	Ge	IT	LR	End	1400-2000
18. Rosaceae					
40-Amygdalus lycioides Spach.	Ph	IT	LR	End	1200-2500
41-Amygdalus scoparia Spach.	Ph	IT	VU	End	1500-2000
42-Cotoneaster nummularioides Pojark.	Ph	IT	VU	End	1300-2800
43-Crataegus oxyacantha L.	Ph	IT	VU	End	1300-2000
44-Malus orientalis Ugl.	Ph	ES, IT	VU	End	2000
45-Mespilus germanica L.	Ph	ES	VU	End	1600
46-Rosa canina L.	Ph	IT, M, ES	VU	End	900-2500
47-Rosa foetida Herm.	Ph	IT	VU	End	1100-2200
19. Salicaceae					
48-Populus euphratica Oliv.	Ph	IT	VU	End	1300
20. Ulmaceae					
49-Ulmus minor Miller.	Ph	ES, IT	VU	End	1600-2000
21. Zygophyllaceae					
50-Tribulus terrestris L.	Th	Cosm	VU	N	1500-2300
51-Zygophyllum fabago L.	Hem	IT	DD	N	900-1200

Discussion

Iran is the habitat of over 7500 plant species, because of its climatic diversity and high biodiversity has many capabilities in related to the medicinal plants. Based on some studies, about 10 to %15 of Iran's species consist of the medicinal plants. Tehran watershed with having varied ecological factors has good condition for distribution of medicinal plants. But two species *Ferula persica* Willd. and *Dracocephalum kotschyi* Boiss. are in Endangered (EN) status Because of low distribution, overuse, Increasing consumption demand of the rural and municipal communities, Increasing the cattle and ranches and ignoring the appropriate principals of utilization on rangeland arae (e.g. overgrazing, grazing premature and eradication). Mismanage-ment on the rangeland areas caused change in the mixture of plant community. Based on IUCN Categories and Criteria, Evidence show that many Endemic medicinal plants at the greatest risk of extinction. Therefore natural resourses managers should be promotes their conservation planning. If its conservation measures are not achieved, the species may be extinct and will be into the extinct class. We present a series of recommendations for conservation action: 1) it needs to conserve the genotypes by

considering conservation management and seeds collection for plant genetic banks. 2) Introducing adopted genotypes with the acceptable material efficiency for reproducing them at herbs farms (in the same ecoregions). 3) Moreover, improvement of the dominant attitude in the watershed and rangeland management sectors, in regards to the use of herbs directly on the natural habitat of these plants. Again, we emphasis that such researches should be performed at other regions beacause recognition and documentation of plant species particularly at the danger status and their geographical distribution are essential for further researches as well as for their protection. Such researches help the natural resourses managers to decrease or eliminate the danger of plant extinction by appropriate planning.

References

Abdi N. 2008. Evalution of red plant biodiversity in Markazi province. Iran. J. Rangelan. Forests Plant Breeding. Genet. Res. 16(1): 50-74. (In Persian).

Collar NJ. 1996. The reasons for Red Data Books. Oryx 30: 121–130.

Ejtehadi H, Amini T, Kianmehr H, Assadi M. 2003. Floristical and Chorological Studies of Vegetation in Myankaleh Wildlife Refuge, Mazandaran Province, Iran. Iranian Int. J. Sci. 4(2): 107-120.

Ghahraman, A. 1975-2003. Colored Flora of Iran, Vol. 1-20, Research Institute of Forests and Rangelands Press, Tehran, Pp. 2625. (In Persian).

Ghahraman, A. 1978. Colored Flora of Iran, Vol. 1, Environmental protection organization, Pp. 125. (In Persian).

Ghahraman, A., and Attar F. 1998. Biodiversity of flora of Iran, Vol. 1, Tehran University press, Pp. 1176. (In Persian).

IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK. Ii + 30 pp.

IUCN. 2003. Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK. Ii + 26 pp.

IUCN. 2004. 2004 IUCN Red List of Threatened Species, IUCN-SSC (http://www.iucnredlist.org)

Jalili, A. 2000. Biodiversity and plant diversity (Reality, Capability and Guidelines), Research Institute of Forests and Rangelands Press. 8p. (In Persian).

Jalili, A., and Jamzad Z. 1999. Red Data Book of Iran; A Preliminary Survey of Endemic, Rare & Endangered Plant Species in Iran; Research Institute of Forest & Rangelands; Ministry of Jahad-e Sazandegi. Pub: No. 215. Pp. 748.

Jalili, A., and Jamzad Z. 2005. Threteaned plant species of Iran, ed Asareh, M., pp65-72, Plant Diversity of Iran, Research Institute of Forests and Rangelands Press. 471Pp. (In Persian).

Javanshir, K., and Riazi, B. 1987. Vegetation, The comperihensive plan of the Khojir-Sorkhehesar national park, Report, Iranian Environmental Protection Organization press. (In Persian).

Khansari, N. 2001. The Cartagena protocol on biosafety to the convention on biological diversity. Iranian Environmental Protection Organization press. (In Persian).

Mobayen, S. 1980-1996. Flora of Iran. Vol.1-4, Tehran. Pp. 2700. (In Persian).

Mozaffarian, V. 1983. The Family of Umbelliferae in Iran- Keys and Distribution. Tehran: Research Institute of Forests and Rangelands Press; Pp. 395. (In Persian).

Raunkiaer, C. 1934. The life forms of plants and statistical plant geography, Oxford, Clarendon Press.

Rechinger, K.H. (Ed), 1963–1998. Flora Iranica, Vol. 1-180. Akademische

Drucku. Verlagsanstalt, Graz, Austria, Pp. 9368.

Salehi Shanjani, P. 2005. New approach for genetic conservation in the forests of North of Iran. Forest and Rangeland Journal, 68-69: 60-66.

Scott, P. et al. 1987. Red Data Books: the historical background. In The Road to Extinction: A Symposium Held by the Species Survival Commission (Madrid, 7 and 9 November, 1984) (Fitter, R. and Fitter, M., eds), pp. 1–5, IUCN.