

**THE FLORA OF THREATENED BLACK ALDER
FORESTS IN THE CASPIAN LOWLANDS,
NORTHERN IRAN***

**A. GHAHREMAN, A.R. NAQINEZHAD **, B. HAMZEH'EE,
F. ATTAR and M. ASSADI**

University of Tehran
and Research Institute of Forests & Rangelands, Tehran, Iran

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Abstract

The Caspian (Hyrcanian) lowland forest zone in northern Iran is characterized by small remnant alder forest communities, dominated or subdominated with an Euxino-Hyrcanian element, *Alnus glutinosa* ssp. *barbata*. The first floristic inventory of these alder forests in northern Iran is presented. The floristic catalogue is based on the data of 133 phytosociological releves in eight different alder forest sites and on a supplementary floristic inventory of the same sites. Totally, 209 taxa were determined out of which 25 taxa are endemic of Hyrcanian district. Classification based on life form, indicates that the geophytes and phanerophytes make up the largest proportion of the plants in the studied flora.

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** Corresponding author

From the chorological point of view, the largest proportion of the flora belongs to the Euro-Siberian and pluriregional elements. In addition to the total assessment, variation of life forms and phytochoria between different study sites are discussed herewith.

There are some similarities and differences in the floristic composition between the study sites based on using similarity indices formula.

Key words: Caspian lowlands, *Alnus glutinosa* ssp. *barbata*, Black alder, Flora, chorology, Life form, Similarity index

Introduction

The Hyrcanian (Caspian) district of northern Iran, possesses a closed canopy deciduous forest, unlike the arid to semi-arid landscapes of most Iran. This forest is restricted to the southern Caspian lowlands and to the adjoining northern slopes of the Elborz mountains up to 2500 m.a.s.l. (FREY & PROBST 1986). Today, the lowest zone of these forests have been deforested and replaced largely by cultivated lands, human settlements and/or industry. Due to this land conversion, many plant species are restricted to isolated remnants of a formerly more widespread lowland habitat. Some of these remnant forests are characterized by high presence of threatened black alder [*Alnus glutinosa* (L.) Gaertn. ssp. *barbata* (C.A. Mey.) Yaltirik], a hygrophilous Euxino-Hyrcanian element [nomenclature according to Flora Iranica, No. 96 (1972), *In*: RECHINGER 1963-1998, YALTIRIK 1967, BROWICZ 1982]. This subspecies has been considered as a separate species, *A. barbata* C.A. Mey. by some authors such as KOMAROV (1934-1954).

To date, a few floristic inventories have been conducted exclusively in the forest habitats of northern Iran. Moreover, as the lowland forests including *Alnus glutinosa* are on the decline due to above-mentioned reasons, there is no exact information available on their vegetation and flora structure. There are only some vegetation studies such as RASTIN (1983) and partly DJAZIREI (1965),

TREGUBOV & MOBAYEN (1970), ZOHARY (1973), MOSSADEGH (1981) and ASSADOLLAHI *et al.* (1982). During 2002-2004, we studied the flora and vegetation of these remnant *Alnus glutinosa* ssp. *barbata* forests (NAQINEZHAD 2003). However, this paper emphasizes just on the flora of these lowland forests. The life forms of the taxa and their chorology are classified. The microhabitat of each taxon is presented. Similarities and differences between study sites as well as endemism of taxa are also discussed.

Materials and Methods

Study sites

Eight remnant protected or subprotected sites dominated by *Alnus glutinosa* ssp. *barbata* that extend from west to east of Caspian shores (Gilan and Mazandaran Provinces) were selected (Table 1, Fig. 1). These sites are almost the best representative of habitats of this species in northern Iran. *Alnus glutinosa* ssp. *barbata* as a dominant or subdominant plant species, forms several communities with unique floristic composition in each of these sites.

Climate and Geology

All of the sites have obvious homogeneity in geomorphology and climate. Geomorphologically, Caspian coastal plain varies greatly in width, ranging from less than one in Ramsar to 35 km in the Sefid-rud delta. Most parts of the plain are now considered as highly productive agricultural areas covered by rice fields, tea gardens and other crops. In contrast with Elborz ranges with Paleozoic and Mesozoic formations, the Caspian lowland is young and characterized by Quaternary deposits which designate a spectrum of conditions from completely continental (Inland zone) to coastal condition as well as intermediate environment. Quaternary formation consists of alluvial deposits as well as marine terraces strandlines, mudflats and fan-deposits distribute throughout the study areas. It is interesting that whole lowland

forests including study sites were formed after the last decrease in the Caspian sea level. In this time, the distance between the foothills of the Elborz ranges and the sea became recognizable (ANONYMOUS 1977, 1978).

In the Caspian area, annual precipitation, varies between 600 mm in the east to over 2000 mm in the west (e.g. Anzali). Climatically, the Caspian lowland may be regarded on the whole as a region of rainy summers and mild winters which are reminiscent of a typical oceanic climate not unlike that of the Atlantic coast of Europe (ZOHARY 1973).

In all sites with climatological stations (ANONYMOUS 1950-2000), most of the precipitation occurs from early autumn to early spring. The autumn months (Oct. to Dec.) are the most humid months of the year. There are two general peaks in precipitation (Fig. 2), first one in Oct. and the second in Jan. or Feb. There are no obvious differences in mean monthly temperature (between 15° C in Khorram-abad (Tonekabon) and 16.7° C in Lahijan) and the mean daily max. of the warmest month (differs from 29.1° C in Nowshahr to 30.4° C in Khorram-abad (Tonekabon) and Kelarabad). The mean daily min. temperature of the coldest month ranges from 1.9° C in Lahijan and Ramsar to 3.4° C in Nowshahr- the easternmost site of the study. The highest reported absolute max. temperature ranges between 34° C in Khoshkehdaran and 39.5° C in Lahijan. The lowest reported absolute min. temperature ranges between -2.5° C in Khoshkehdaran and -10° C in Ramsar. Mean annual precipitation differs from 1080.7 mm in Khorram-abad (Tonekabon) to 1469.7 mm in Kelarabad (Fig. 2).

Using GAUSSEN's method of climate classification (SABETI 1969), two different climatic types are present in the area, namely, 1) submediterranean climate in Ramsar, Khorram-abad (Tonekabon), Khoshkehdaran, Kelarabad, Nowshahr and 2) temperate xeric climate in Lahijan.

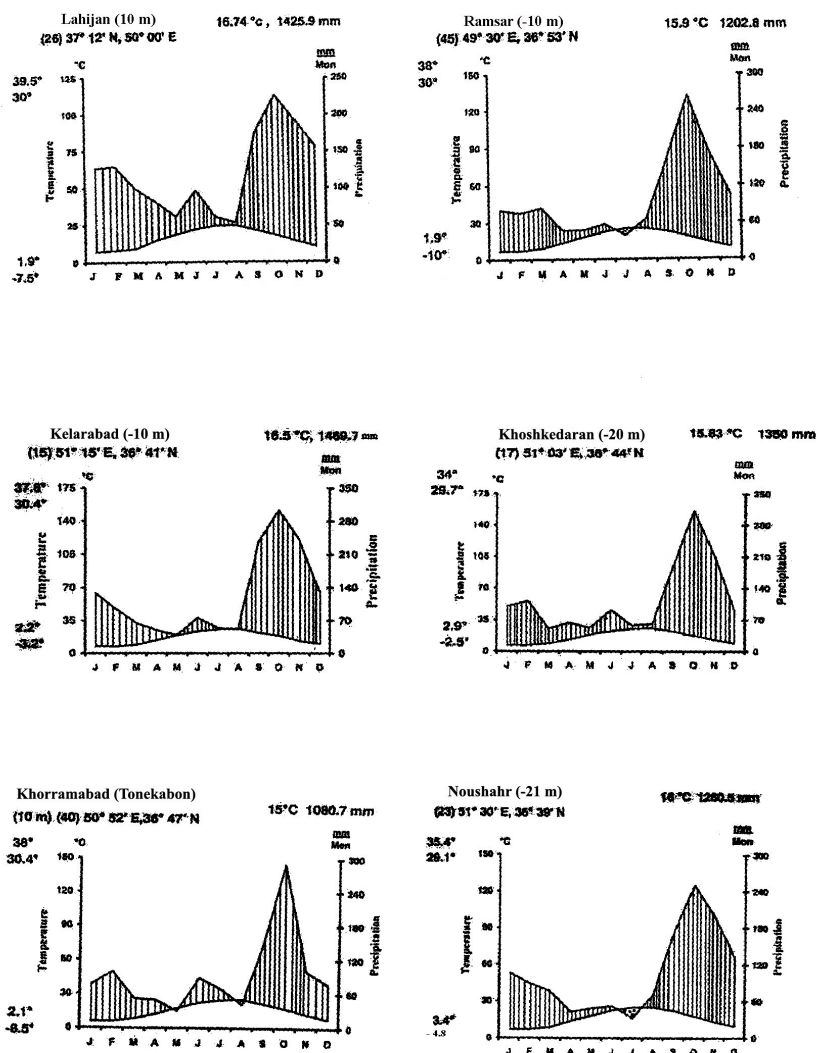


Fig. 2. Climatological curves from the study sites or neighbouring areas (ANON 1950-2000).

Methods

Data collection was performed in four seasons from 2002-2004. Vouchers of the collections are deposited in the Central Herbarium of Tehran University (TUH). Nomenclature is based on RECHINGER (1963-1998), ASSADI *et al.* (1988-2003), DAVIS (1965-1988), TUTIN *et al.* (1964-1980) and KOMAROV (1934-1954). For the determination of some ferns, we used PARSA (1978, FRASER-JENKINS (1980) and WENDELBO (1976). Some seedlings of forest plants have been determined based on AGHABEIGI (1997) and HANF (1983).

Life forms were named following the RAUNKIAER's classification (BRAUN-BLANQUET 1932). For detailed informations about phanerophytes, PEARS (1985) was used (Megaphanerophyte= more than 30 m high, Mesophanerophyte= 8-30 m high, Microphanerophyte= 2-8 m high, Nanophanerophyte= less than 2 m high, Climbing phanerophyte= no height restriction). The distributions of the species are based on the reviews, monographs and distribution information in the floras, particularly Flora Iranica, Flora of Turkey and Flora of Europaea. The terminology and delimitation of the main phytochoria (Irano-Turanian [IT], Mediterranean [M] and Euro-Siberian [ES]) is based on the known classical works particularly those of ZOHARY (1973) and partly (Irano-Turanian elements) by LÉONARD (1988). In our assessment, PL (pluriregional elements) are plants ranging in distribution over three phytogeographical regions and SCOS (subcosmopolitan elements) are plants ranging in distribution over most continents but not all of them. Also cosmopolitan elements are abbreviated by COS (cosmopolitan). For the microhabitats of aquatic species, we used the classification of COOK (1996). Floristic similarity indices were calculated for pair-wise comparisons between the eight sites. The index used is: $CC = c / (a + b - c) \times 100$ (%) JACCARD (1902) where *a* is the total number of taxa on one site, *b* is the total number of taxa on the other and *c* is the number of shared taxa.

Results and Discussion

A total of 209 species of native and naturalized vascular plants belonging to 79 families and 149 genera are known from Caspian lowland alder forest in the eight study sites (Table 2). Twelve families of Pteridophytes and 67 families of

Angiosperms (56 dicotyledons and 11 monocotyledon families) constitute the studied flora. Rosaceae, Papilionaceae, Asteraceae, Cyperaceae, Brassicaceae, Lamiaceae, Scrophulariaceae, Apiaceae, Ranunculaceae, Aspidiaceae, Polygonaceae and Liliaceae s.l., all exceed 5 taxa and show the highest species richness respectively.

Two families are represented by 4 taxa, 9 families with 3 taxa, 15 families with 2 taxa and 41 families have only one taxon.

Six families including Asteraceae (11 genera), Poaceae (10 genera), Rosaceae (9 genera), Lamiaceae (8 genera), Apiaceae (5 genera) and Liliaceae s.l. (5 genera), contain more than 5 genera. Six families have 3 genera, 17 families have 2 genera and the rest are unigenic.

As it concerns the species richness of the genus, genera exceeding three species include *Carex* (9 spp.), *Rubus* (6 spp.), *Cardamine* (5 spp.), *Ranunculus* (5 spp.), *Veronica* (5 spp.), *Polystichum* (4 spp.), *Dryopteris* (3 spp.), *Equisetum* (3 spp.), *Geranium* (3 spp.), *Poa* (3 spp.) and *Solanum* (3 spp.). Eighteen genera are represented by 2 taxa and 120 genera only with one taxa.

The life form of a plant is an adaptative response to its environment and provides an ecological classification that may be indicative of habitat conditions (ARCHIBOLD 1995).

With total assessment, the geophytes are the dominant life form containing 30% of studied flora, followed by the phanerophytes (22%), therophytes (21%), hemicryptophytes (17%), hydrophytes (9%) and chamaephytes (1%) (Fig. 3). In the total geophytes (62 taxa), GB (bulbous geophyte) 3, GC (corned geophyte) 3 and GR (rhizomatose geophyte) constitute 94 percent. In the total hydrophytes (20 taxa), Fl (floating hydrophytes), Su (submerged hydrophytes) and Em (emergent hydrophytes) constitute 25, 25 and 50 percent, respectively. Detailed classification of phanerophytes (46 taxa) are considered as Pha (pp) [36%], Pha (ps) [26%], Pha (pg) [17%], Pha (pn) [13%], Pha (pm) [5%] and Pha (epi) [3%].

Since the life form classification is based essentially on plant reaction to extremes of climate, the individual spectrum or the variation when two or more

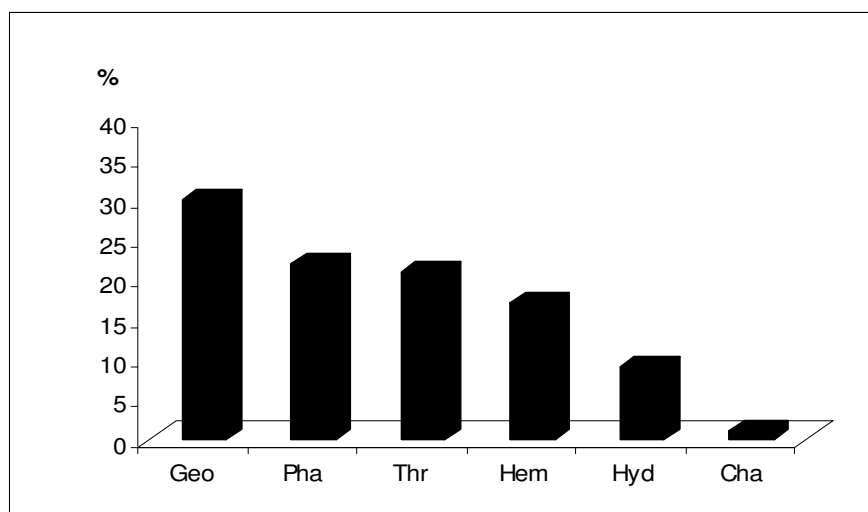


Fig. 3. Life form spectrum in the total sites [abbreviation according to Table 2]

spectra are compared should tell us much about macroclimatic patterns at the field sites (PEARS 1985). Analytical life form spectra for the each site, shows remarkable resemblance among them. This is probably due to similar climatic conditions as well as to approximately similar altitude. Almost, all the study sites, follow a nearly similar pattern of life form spectrum. Phanerophytes and geophytes have the highest proportion followed by therophytes, hemicryptophytes, hydrophytes and chamaephytes. The pattern of variation of each life form over the study sites has been demonstrated in Fig. 4. Some life forms such as hemicryptophytes, therophytes and phanerophytes do not demonstrate high variation between the sites. Therophytes show a peak of presence in Telecabin. This is due to the more affected faces of this site caused by human activities. Despite of a relatively constancy of above-mentioned life forms, hydrophytes and geophytes, show more variation between these sites. Hydrophytes are much limited to more humid sites i.e. Amirkelayeh, Mazga and Langerud where it shows the highest concentration. Occurrence of this life form decreases gradually toward Safrabasteh, Telecabin, Chaldarreh, Khoshkehbaran and Kelarabad where the lowest concentration of hydrophytes is known.

Also the highest concentration of geophytes is found in Chaldarreh, Kelarabad and Khoshkehbaran. It seems that, these concentrations are the best correspondence with a normal structure and flora of lowland Hyrcanian forest (ZOHARY 1973, RASTIN 1983). The occurrence of geophytes decreases toward the more humid and wet sites due to the dominance of other life forms such as hydrophytes.

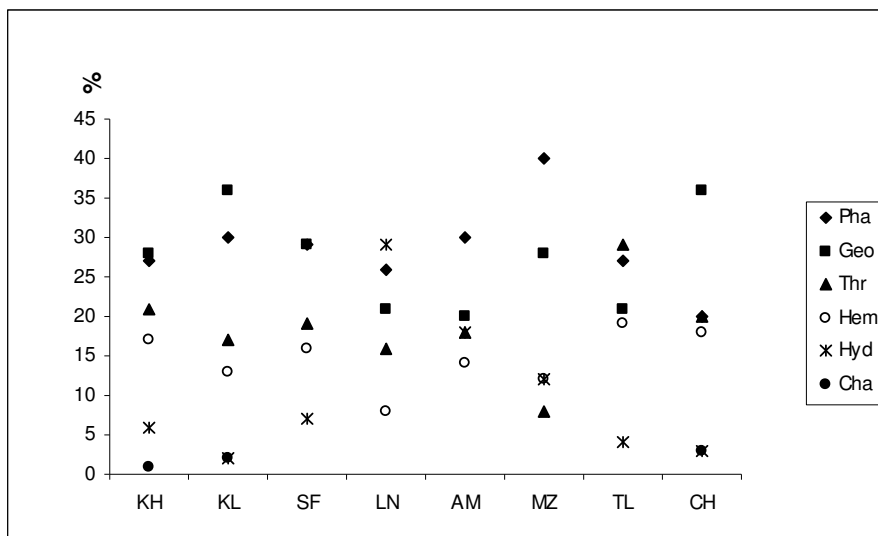


Fig. 4. Variation of each life form over the sites [abbreviation according to Tables 1 & 2]

Chorologically, the following taxa are endemic or nearly endemic to the Hyrcanian district: *Acer velutinum*, *Ilex spinigera*, *Hedera pastuchovii*, *Alnus subcordata*, *Lindelofia kandavanensis*, *Myosotis anomala*, *Buxus hyrcana*, *Campanula rapunculus* ssp. *lambertianus*, *Quercus castaneifolia* ssp. *castaneifolia*, *Parrotia persica*, *Scutellaria tournefortii*, *Teucrium hyrcanicum*, *Ruscus hyrcanus*, *Scilla hohenackeri*, *Gleditsia caspica*, *Epimedium pinnatum*, *Primula heterochroma*, *Ranunculus dolosus*, *Rubus hyrcanus*, *Rubus persicus*, *Rhynchocorys maxima*, *Scrophularia megalantha*, *Veronica francipetae*, *Viola alba* ssp. *sintensisii* and *Symphyandra odontosepala*. The species that are confined to Euxino-Hyrcanian sub-province (ZOHARY 1973) are: *Dryopteris caucasica*, *Polystichum worronowi*,

Acer cappadocicum, *Willemetia tuberosa*, *Alnus glutinosa* ssp. *barbata*, *Cardamine tenera*, *Sedum spurium*, *Diospyrus lotus*, *Pterocarya fraxinifolia*, *Danea racemosa*, *Glyceria caspica*, *Cyclamen coum* ssp. *caucasicum*, *Veronica crista-galli* and *Solanum persicum*. The presence of these endemic taxa reveals special ecologic and biogeographic importance to the area.

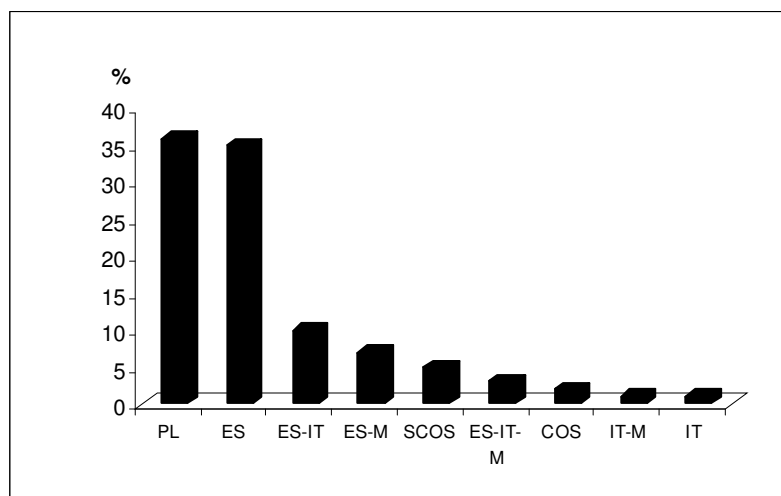


Fig. 5. Percent of phytochoria elements in the total sites [abbreviation according to Table 2]

Chorologically, in the total sites, the flora is much affected by Euro-Siberian and Pluriregional elements (totally 71%) (Fig. 5). This occurrence is due to three reasons. Firstly, a phytogeographical floristic link between our study sites (Hyrcanian district) and other areas in Euro-Siberian region. Secondly, humid or wet faces of most of these sites can be considered as habitats for the bulk of pluriregional plants adapted to wet places and thirdly, human activities responsible for the establishment of weeds.

Phytogeographical elements include PL (36%), ES (35%), ES/IT (10%), ES/M (7%), SCOS (5%), ES/IT/M (3%), COS (2%), IT (1%) and IT/M (1%) (Fig. 5). Two peaks in phytochoria curves are recognizable, one in Euro-Siberian and another one in Pluriregional elements (Fig. 6). The detailed assessment of phytogeographical elements in each site demonstrates that some phytogeographical elements such as ES/IT, ES/IT/M, COS, ES/M, IT, IT/M and SCOS are relatively

constant in all sites, while ES and PL elements show more variation between the sites (Fig. 6). The highest presence of Euro-Siberian elements can be found in Kelarabad while the fewest one are in Langerud. Alternatively, Amirkelayeh show the lowest and Chaldarreh demonstrates the highest amount of pluriregional elements. It seems that Kelarabad forest has the highest correspondence with a common Euro-Siberian forest.

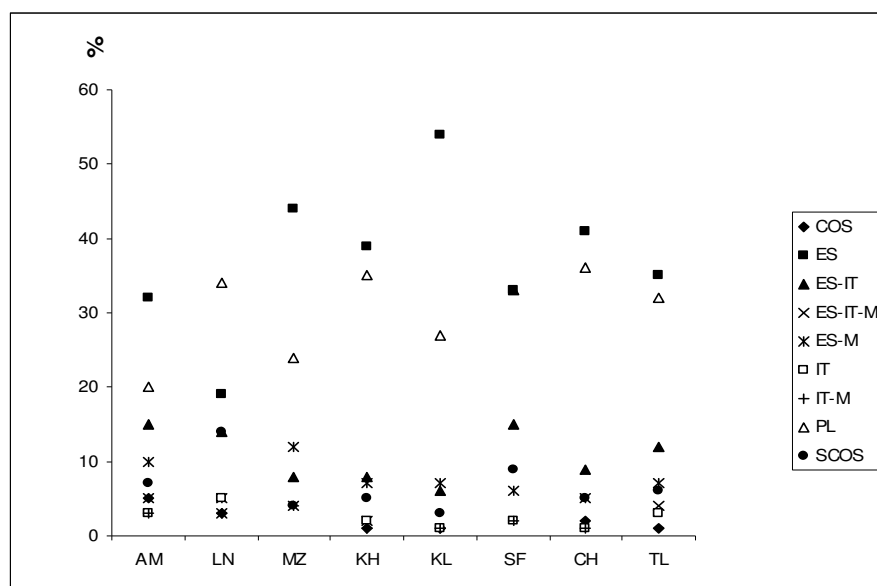


Fig. 6. Variation of each phytochoria over the sites [abbreviation according to Tables 1 & 2].

Occurrence or non-occurrence of 209 taxa is scored for the eight study sites. They include Amirkelayeh (40 taxa), Chaldarreh (112 taxa), Kelarabad (84 taxa), Khoshkehdaran (132 taxa), Langerud (38 taxa), Mazga (25 taxa), Safrabasteh (52 taxa) and Telecabir (70 taxa). Species number reflects differences in altitude, area and biotope diversity of the sites. JACCARD's similarity coefficient varies from 11 % to 46 % (Fig. 7). The highest similarity is observed between Kh & Kl and the lowest index is calculated between Ln and Kl. It seems that, we are able to classify our sites into two main ecological groups with more floristic similarity in each of

them i.e. wet or humid sites (Langerud, Amirkelayeh, Mazga and Telecabbin) and dryer ones (Khoshkehbaran, Kelarabad, Chaldarreh and Safrabasteh).

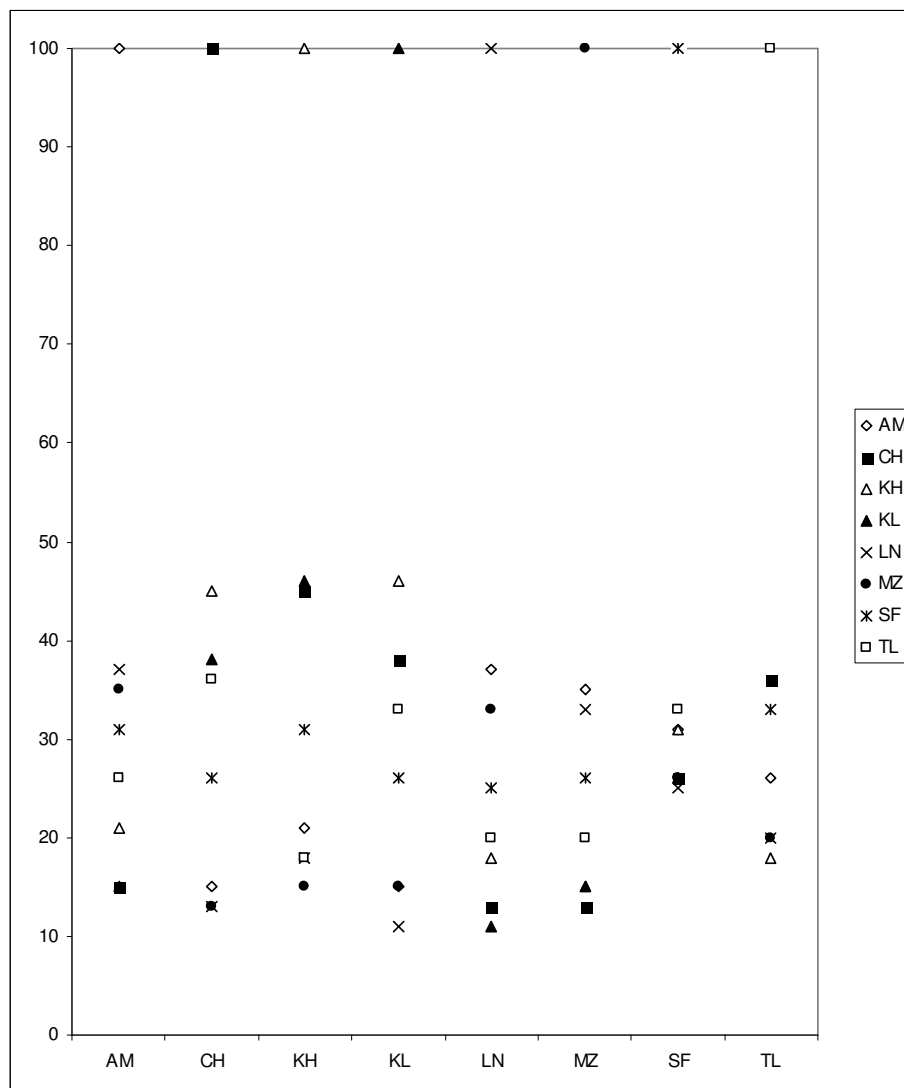


Fig. 7. Percent of similarity between study sites based on JACCARD's (1902) Similarity Index [abbreviation according to Tables 1 & 2].

Table 2. Floristic catalogue of studied lowland forests

| Name of Taxa | Life Form | Chorology | Habitat | Locality | Herb. No. (TUH) |
|---|-----------|-------------------|-----------|------------------------|-----------------|
| Pteridophyta | | | | | |
| Adiantaceae | | | | | |
| <i>Adiantum capillus-veneris</i> L. | GR | SCO | CF | Ch, Hz | 30874 |
| Aspidiaceae | | | | | |
| <i>Dryopteris affinis</i> (Lowe) Fraser-Jenkins | GR | ES | CF | Ch, Kh, Kl, Hz | 30869 |
| <i>Dryopteris caucasica</i> (A. Braun) Fraser-Jenkins & Corley | GR | ES (EH) | CF | Kl | 30863 |
| <i>Dryopteris</i> sp. | GR | | CF | Kh | s.n. |
| <i>Polystichum aculeatum</i> (L.) Roth | GR | PL | CF | Kh | 30872 |
| <i>Polystichum wormnowi</i> Fom. in Mon. | GR | ES (EH) | CF | Ch, Kh, Kl | 30851 |
| <i>Polystichum cf. brauni</i> (Spenner) Fee | GR | ES | CF | Ch, Kh | 30870 |
| <i>Polystichum</i> sp. | GR | | CF | Kh | s.n. |
| Aspleniaceae | | | | | |
| <i>Asplenium adiantum-nigrum</i> L. | GR | PL | CF | Ch, Kh, Ln, Kl | 30857 |
| <i>Asplenium trichomanes</i> L. | GR | PL | CF | Ch, Hz | 30855 |
| <i>Phyllitis scolopendrium</i> (L.) Newm. | GR | PL | CF | Ch, Kh, Kl | s.n. |
| Athyriaceae | | | | | |
| <i>Athyrium filix-femina</i> (L.) Roth. | GR | PL | CF | Ch, Kh, Kl, Ln, Mz | 30881 |
| <i>Cystopteris fragilis</i> (L.) Bernh. | GR | SCO | CF | Kh | s.n. |
| <i>Matteuccia struthiopteris</i> (L.) Tod. | GR | PL | CF | Ch, Kl, Mz | 30890 |
| Azollaceae | | | | | |
| <i>Azolla filiculoides</i> Lam. | Hyd (fl) | PL | HCF (HYD) | Ln | s.n. |
| Equisetaceae | | | | | |
| <i>Equisetum arvense</i> L. var. <i>alpestre</i> Wahlenb. | GR | PL | CF | Kl | 30876 |
| <i>Equisetum ramosissimum</i> Desf. | GR | PL | MCF | Ch | 30879 |
| <i>Equisetum telmatia</i> Ehrh. | GR | PL | CF | Ch, Kh, Kl, Tl | 30877 |
| Hypolepidaceae | | | | | |
| <i>Pteridium aquilinum</i> (L.) Kuhn in Kersten | GR | COS | MCF (HYG) | Ch | 30885 |
| Ophioglossaceae | | | | | |
| <i>Ophioglossum vulgatum</i> L. | GR | PL | CF | Kh, Kl | 30889 |
| Polypodiaceae | | | | | |
| <i>Polypodium vulgare</i> L. | GR | PL | CF | Ch, Kh, Kl, Mz, Sf, Tl | s.n. |
| Pteridaceae | | | | | |
| <i>Pteris cretica</i> L. | GR | PL | CF | Ch, Kh, Kl, Sf | 30886 |
| <i>Pteris dentata</i> Forsskahl ssp. <i>flabellata</i> (Forssk.) Runem. | GR | PL (Africa) [HYR] | CF | Kh, Kl | 30887 |
| Salviniaceae | | | | | |
| <i>Salvinia natans</i> (L.) All. | Hyd (fl) | PL | HCF (HYD) | Ln | 31529 |
| Thelypteridaceae | | | | | |
| <i>Thelypteris limbosperma</i> (All.) Fuchs in Amer. | GR | PL | HCF (HEL) | Am, Kh, Ln, Mz, Sf | 30862 |

Table 2. (contd.)

| Spermatophyta | | | | | |
|---|-------------|------------------------|--------------|--|-------|
| Angiospermae - Dicotyledoneae | | | | | |
| Aceraceae | | | | | |
| <i>Acer cappadocicum</i> Gled. | Pha (pn) | ES (EH) [Pakistan] | CF | Ch | s.n. |
| <i>Acer velutinum</i> Boiss. | Pha (pg) | EN-(ES) (HYR) | CF | Ch, Kh, Kl, Tl | 30606 |
| Amaranthaceae | | | | | |
| <i>Alternanthera sessilis</i> (L.) R. Br. | Thr | PL (S. Asia) | HCF (HYG) | Ch, Kh, Sf | s.n. |
| Apiaceae | | | | | |
| <i>Berula angustifolia</i> (L.) Mertens & W.D. Koch | Hyd (em) | PL | HCF (HEL) | Am, Ch, Kh, Ln, Sf | 30608 |
| <i>Hydrocotyle ranunculoides</i> L. | Hyd (em) | PL | HCF (HEL) | Ln | s.n. |
| <i>Hydrocotyle vulgaris</i> L. | GR | ES | HCF (HYG) | Am, Ln, Mz, Sf | 30604 |
| <i>Pimpinella affinis</i> Ledeb. | Hem | ES (EH)-IT2 | MCF | Ch, Hz | 30602 |
| <i>Sanicula europaea</i> L. | Hem | PL | CF | Kh | 30771 |
| <i>Torilis arvensis</i> (Huds.) Link | Thr | PL | MCF | Kh, Kl, Sf | 30769 |
| Aquifoliaceae | | | | | |
| * <i>Ilex spinigera</i> (Loes.) Loes. | Pha (pp) | EN-(ES) (HYR) | CF | Ch, Kh, Kl | 30607 |
| Araliaceae | | | | | |
| * <i>Hedera pastuchovii</i> Woron ex Grossh. | Pha (ps) | EN-(ES) (HYR) | CF | Kh, Kl, Mz, Sf, Tl | 30662 |
| Asclepiadaceae | | | | | |
| <i>Asclepias cf. currasavica</i> L. | GR | PL | CF | Sf | 31431 |
| <i>Periploca graeca</i> L. | Pha (ps) | ES (EH)-M | CF | Am, Kh, Sf | s.n. |
| <i>Vincetoxicum scandens</i> Sommier & Levier | Cha | ES (EH & SE Russia) | CF | Ch, Kl | 30762 |
| Asteraceae | | | | | |
| <i>Artemisia annua</i> L. | Thr | ES-M-IT2, 3 | MCF | Tl | s.n. |
| <i>Bidens biternate</i> (Loureiro) Merrill & Scherff | Thr | PL | MCF | Tl | 31400 |
| <i>Bidens tripartita</i> L. | Thr | PL | HCF (HYG) | Ch, Kh, Sf, Tl | 31408 |
| <i>Carpesium abrotanoides</i> L. | Hem | PL (ES, SW Asia) | CF | Ch, Kh, Sf, Tl | 31402 |
| <i>Cirsium vulgare</i> (Savi) Ten. | Hem | ES-IT [N. Africa] | CF | Sf | 30897 |
| <i>Conyza bonariensis</i> (L.) Cronq. | Thr | SCO | CF-MCF | Am, Ch, Hz, Kh, Kl, Ln, Mz, Sf, Tl | 30893 |
| <i>Eclipta prostrata</i> (L.) L. | Thr | PL (Asia) | HCF (HYG) | Kh, Ln | 31409 |
| <i>Myriactis wallichii</i> DC. | Thr | ES (HYR)-IT3, 4 | CF | Ch, Hz | 30898 |
| <i>Sigesbeckia orientalis</i> L. | Thr | PL (warm regions) | CF-MCF | Ch, Hz | 31405 |
| <i>Sonchus oleraceus</i> L. | Thr | COS | MCF | Am | 31563 |
| <i>Willemetia tuberosa</i> Fisch. & C.A. Mey. ex Dc. | Hem | ES (EH) | MCF | Kl | 30896 |
| <i>Xanthium</i> sp. | Thr | | CF | Kh | s.n. |
| Betulaceae | | | | | |
| <i>Alnus glutinosa</i> (L.) Gaertn. subsp. <i>barbata</i> (C.A. Mey) Yaltrik | Pha (pg) | ES (EH) | CF | Am, Ch, Kh, Kl, Mz, Sf, Tl | 31525 |
| * <i>Alnus subcordata</i> C.A. Mey. | Pha (pg) | EN- (ES) (HYR) | CF | Ch, Kh, Kl, Sf | s.n. |
| Boraginaceae | | | | | |
| * <i>Lindelofia kandavanensis</i> Bornm. & Gauba | Hem | EN-(ES) (HYR) | CF | Kh, Kl, Sf | 31508 |
| * <i>Myosotis anomala</i> Riedl. | Hem | EN-(ES) (HYR) | CF | Kh | 31510 |
| <i>Myosotis caespitosa</i> Schultz, Syn.: <i>M. scorpioides</i> L. subsp. <i>caespitosa</i> (Schultz) Hermann | Hem | PL | CF | Tl | 30785 |

Table 2. (contd.)

| Brassicaceae | | | | | | |
|--|----------|------------------------------------|---------------|--------------------------------|-------|--|
| <i>Alliaria petiolata</i> (M.B.) Cavara & Grande | Hem | PL (temperate Eurasia & N. Africa) | CF-MCF | Kh, Kl, Tl | 30803 | |
| <i>Cardamine flexouosa</i> With. (Naqinezhad <i>et al.</i> 2005) | Thr | PL | HCF(HYG) | Kh, Tl | 30807 | |
| <i>Cardamine hirsuta</i> L. | Thr | COS | HCF (HYG) | Am, Ch, Kh, Kl, Tl | 30799 | |
| <i>Cardamine impatiens</i> L. | Thr | PL | CF | Ch, Kh, Kl | 30800 | |
| <i>Cardamine parviflora</i> L. | Thr | PL (Europe & Asia) | CF | Sf, Tl | 30796 | |
| <i>Cardamine tenera</i> Gmel. Jun. in C.A. Mey. | Hem | ES (EH) | HCF (HYG) | Kh, Kl, Tl | 30804 | |
| <i>Nasturtium microphyllum</i> Boenn. ex Reichenb | Hem | PL (Europaea & Asia) | MCF-HCF (HYG) | Kh | 30835 | |
| <i>Nasturtium officinale</i> R. Br. | Hem | PL (Europaea & temperate Asia) | MCF-HCF (HYG) | Ch, Kh, Tl | 30830 | |
| Buxaceae | | | | | | |
| * <i>Buxus hyrcana</i> Pojark. | Pha (pp) | EN-(ES) (HYR) [Tur] | CF | Kh, Kl | s.n. | |
| Callitrichaceae | | | | | | |
| <i>Callitriche brutia</i> Petagna | Hyd (su) | ES [N Africa] | HCF (HYD) | Kh, Kl, Sf | 30614 | |
| Campanulaceae | | | | | | |
| * <i>Symphandra odontosepala</i> (Boiss.) Esfand. (Esfandiari 1980) | Hem | EN-(ES) (HYR) | CF | Ch, Hz, Kh, Kl | 30611 | |
| * <i>Campanula rapunculus</i> L. subsp. <i>lambertianus</i> (Dc.) Rech. f. | Hem | EN-(ES) (Hyr) [Transeucasica] | MCF | Ch | 30610 | |
| Cannabaceae | | | | | | |
| <i>Humulus lupulus</i> L. | Thr | PL | CF | Am | 30609 | |
| Caprifoliaceae | | | | | | |
| <i>Lonicera</i> sp. | Pha (ps) | | CF-introduced | Kh, Kl | 30793 | |
| <i>Sambucus ebulus</i> L. | GR | ES-IT [N. Africa] | MCF-CF | Am, Kh, Kl, Ln, Sf, Tl | s.n. | |
| Caryophyllaceae | | | | | | |
| <i>Cerastium glomeratum</i> Thull. | Thr | SCO | CF | Ch, Kh, Ch, Kh, Kl, Ln, Sf, Tl | 30767 | |
| <i>Stellaria media</i> (L.) Vill. | Thr | SCO | CF | Ch, Kh, Kl, Ln, Sf, Tl | 30680 | |
| Convolvulaceae | | | | | | |
| <i>Calystegia silvestris</i> (Willd.) Roem. et Schult. | GR | ES [NE Africa] | MCF-CF | Am, Ch, Kh, Kl, Tl | 30812 | |
| Cornaceae | | | | | | |
| <i>Cornus australis</i> C.A. Mey. | Pha (pp) | ES-IT1,2 | CF | Kh, Tl | 30759 | |
| Corylaceae | | | | | | |
| <i>Carpinus betulus</i> L. var. <i>betulus</i> | Pha (pg) | ES | CF | Ch, Kh, Kl, Tl | 31520 | |
| Crassulaceae | | | | | | |
| <i>Sedum spurium</i> M.B. | Hem | ES (EH) | CF | Ch | 30856 | |
| Ebenaceae | | | | | | |
| <i>Diospyrus lotus</i> L. | Pha (pp) | ES (EH) [disjuncted in Himalaya] | CF | Ch, Kl, Tl | s.n. | |
| Euphorbiaceae | | | | | | |
| <i>Acalypha australis</i> L. | Thr | PL (Jap. Ch., America) | CF | Ch, Kh, Tl | 30627 | |
| <i>Euphorbia amygdaloides</i> L. | Cha | ES [Algeria] | CF | Ch, Kh, Kl | 30632 | |
| <i>Euphorbia peplus</i> L. | Thr | ES-M | MCF | Kh, Kl | 30626 | |
| <i>Mercurialis perennis</i> L. | GR | ES [N. Africa] | CF | Kl | 30633 | |
| Fagaceae | | | | | | |
| * <i>Quercus castaneifolia</i> C.A. Mey. subsp. <i>castaneifolia</i> | Pha (pg) | EN-(ES) (HYR) | CF | Tl, Kl | s.n. | |
| Geraniaceae | | | | | | |
| <i>Geranium dissectum</i> L. | Thr | PL | MCF | Kl | 30619 | |

Table 2. (contd.)

| | | | | | |
|---|----------|-----------------------------------|-------------------------|--------------------------------|-------|
| <i>Geranium purpureum</i> Vill. | Thr | ES-M | MCF | Kl | 30617 |
| <i>Geranium robertianum</i> L. | Thr | SCOS | MCF | Ch | 30618 |
| Hamamelidaceae | | | | | |
| * <i>Parrotia persica</i> (DC.) C.A. Mey | Pha (pm) | EN-(ES) (HYR) | CF | Kh, Kl | s.n. |
| Hypericaceae | | | | | |
| <i>Hypericum tetrapterum</i> Fries | Hem | ES-M (E) [Iraq] | CF | Ch, Kl, Tl | 30773 |
| <i>Hypericum androsaemum</i> L. | Cha | ES [N. Syria, Tur-Ammanus] | CF | Ch | 30775 |
| Juglandaceae | | | | | |
| <i>Pterocarya fraxinifolia</i> (Poir.) Spach | Pha (pg) | ES (EH) | CF | Ch, Kh, Kl, Sf | 30656 |
| Lamiaceae | | | | | |
| <i>Clinopodium umbrosum</i> (M.B.) C. Koch | Hem | ES (HYR)-IT2, 4 [Assam & Burma] | CF | Ch, Hz, Sf | 30640 |
| <i>Lamium album</i> L. | GR | PL | CF | Ch, Hz, Kh, Kl | 30634 |
| <i>Lycopus europaeus</i> L. | Hem | PL | HCF (HYG) | Am, Ch, Hz, Kh, Ln, Mz, Sf, Tl | 30637 |
| <i>Mentha aquatica</i> L. | GR | ES | HCF (HYG) | Am, Ch, Hz, Kh, Kl, Mz, Sf, Tl | 30642 |
| <i>Prunella vulgaris</i> L. | GR | PL | CF | Ch | 30644 |
| <i>Salvia glutinosa</i> L. | Hem | ES | CF | Ch, Hz | 30635 |
| * <i>Scutellaria tournefortii</i> Benth. | GR | EN-(ES) (HYR) | CF | Ch, Hz, Kh | 30639 |
| * <i>Teucrium hyrcanicum</i> L. | GR | EN-(ES) (HYR) | CF | Ch | 30638 |
| Loranthaceae | | | | | |
| <i>Viscum album</i> L. | Pha(Epi) | PL | CF (Epiphyte, Parasite) | Kl | 30679 |
| Lythraceae | | | | | |
| <i>Lythrum salicaria</i> L. | Hem | PL | HCF (HYG) | Am, Ch, Kh, Hz, Ln, Mz, Tl | 30683 |
| Mimosaceae | | | | | |
| * <i>Gleditsia caspica</i> Desf. | Pha (pm) | EN-(ES) (HYR) [Tur] | CF | Ch, Kh, Kl, Sf, Tl | s.n. |
| Moraceae | | | | | |
| <i>Ficus carica</i> L. | Pha (pp) | IT2, 3-M [ES (EH)] | CF | Am, Ch, Kh, Kl, Ln, Mz, Sf | 30672 |
| <i>Morus alba</i> L. | Pha (pp) | IT2, 3 [HYR] | CF | Ch, Kh, Ln, Sf, Tl | 30670 |
| Onagraceae | | | | | |
| <i>Circaea lutetiana</i> L. subsp. <i>lutetiana</i> | GR | PL (ES-W. Asia & N. Africa) | CF | Ch, Kh, Kl, Tl | 30668 |
| <i>Ludwigia palustris</i> (L.) Elliott | Thr | PL | HCF (HYG) | Kh, Tl | 30665 |
| Oxalidaceae | | | | | |
| <i>Oxalis corniculata</i> L. | Thr | PL | MCF | Ch, Kh, Sf, Tl | 31446 |
| Papaveraceae | | | | | |
| <i>Chelidonium majus</i> L. | Hem | PL | MCF | Ch | 31444 |
| Papilionaceae | | | | | |
| <i>Trifolium campestre</i> Schreb. in Sturm | Thr | ES-IT-M | MCF | Tl | 30622 |
| <i>Vicia tetrasperma</i> (L.) Schreb. | Thr | ES-IT [NW Africa] | CF | Kh | 30624 |
| Phytolacaceae | | | | | |
| <i>Phytolacca americana</i> L. | Hem | SCOS (originated from N. America) | MCF-CF | Am, Ln, Sf, Tl | 31535 |
| Plantaginaceae | | | | | |
| <i>Plantago maior</i> L. | Hem | PL | MCF | Ch, Kh, Tl | 31443 |
| Podophyllaceae | | | | | |

Table 2. (contd.)

| | | | | | |
|--|----------|------------------------------|-----------|--------------------------------|-------|
| <i>*Epimedium pinnatum</i> Fisch. | GR | EN-(ES) (HYR) | CF | Ch | 31507 |
| Polygonaceae | | | | | |
| <i>Polygonum cf. barbatum</i> L. | GR | PL | HCF (HYG) | Am, Kh, Ln | 31496 |
| <i>Polygonum hydropiper</i> L. subsp. <i>hydropiper</i> | Thr | ES-IT | HCF | Am, Ch, Hz, Kh, TI, Sf, Ln, Mz | 31499 |
| <i>Polygonum persicaria</i> L. | Thr | PL | MCF | Hz, Ln, TI | 31505 |
| <i>Rumex conglomeratus</i> Murr. | Hem | ES-IT | CF | Am | 31547 |
| <i>Rumex sanguineus</i> L. | Hem | ES | CF | Am, Ch, Kh, KI, Mz, TI, Sf | 30758 |
| Primulaceae | | | | | |
| <i>Cyclamen coum</i> Miller subsp. <i>caucasicum</i> (K. Koch) O. Schwarz | GC | ES (EH) | CF | Ch, KI | s.n. |
| <i>*Primula heterochroma</i> Stapf | Hem | EN-(ES) (HYR) [Iran, Semnan] | CF | Ch, Kh | 30826 |
| <i>Samolus valerandi</i> L. | Hem | PL | MCF (HYG) | Ch, Kh | 30829 |
| Punicaceae | | | | | |
| <i>Punica granatum</i> L. | Pha (pp) | PL | MCF | Kh | 30825 |
| Ranunculaceae | | | | | |
| <i>Batrachium trichophyllum</i> (Chaix) Bosch | Hyd (su) | SCOS | HCF (HYD) | Kh, Sf | 30821 |
| <i>Ranunculus ophioglossifolius</i> Vill. | Thr | ES-M | HCF (HYG) | Kh, TI | 30820 |
| <i>*Ranunculus dolosus</i> Fisch. & C.A. Mey. | Thr | EN-(ES) (HYR) | HCF (HYG) | Ch, Kh, KI, TI | 30816 |
| <i>Ranunculus lingua</i> L. | Hyd (em) | ES [IT3], rare in M regions | HCF (HEL) | Am | 31521 |
| <i>Ranunculus marginatus</i> d'Urv. var. <i>trachycarpus</i> (Fisch. & C.A. Mey.) Aznavour | Thr | ES (S)-M [Afghanistan] | MCF | Kh | 30819 |
| <i>Ranunculus repens</i> L. | GR | PL | HCF (HYG) | Ch, Kh | 30755 |
| Rhamnaceae | | | | | |
| <i>Frangula alnus</i> Miller | Pha (pn) | ES [NW Africa, IT3] | CF | Ln, Mz | 31532 |
| <i>Paliurus spina-christi</i> Miller | Pha (pp) | ES-IT2, 3-M | MCF | Kh | 31448 |
| Rosaceae | | | | | |
| <i>Crataegus microphylla</i> C. Koch | Pha (pp) | ES (EH) | CF | Kh, KI, Ch, TI | 30693 |
| <i>Crataegus pentagyna</i> Waldst. & Kit. ex Wild. = Syn.: <i>C. melanocarpa</i> M.B. subsp. <i>elbursensis</i> (Rech. f.) Riedl | Pha (pp) | ES | CF | Kh | 30689 |
| <i>Geum urbanum</i> L. | Hem | ES [IT2, 3 + N. Africa] | CF | Am, Ch, Kh, KI, TI | 30692 |
| <i>Laurocerasus officinalis</i> Roemer | Pha (pp) | ES | HCF (HYG) | Mz | s.n. |
| <i>Mespilus germanica</i> L. | Pha (pp) | ES [Tur] | MCF | Ch, Mz, Kh, KI | 30690 |
| <i>Potentilla reptans</i> L. | Hem | ES-IT2 [N. Africa] | CF | Ch, Kh, Sf, TI | s.n. |
| <i>Prunus divaricata</i> Ledeb. | Pha (pp) | ES (E)-IT2,3 | CF | Am, Ch, Ln, Kh, KI, Sf, TI | 30691 |
| <i>Rosa</i> sp. | Pha (pp) | | CF | Kh | 30688 |
| <i>Rubus caesius</i> L. | Pha (ps) | ES-IT | CF | Am, Ch, Kh, KI, Ln, Mz, TI, Sf | 30708 |
| <i>Rubus cf. karakalensis</i> Freyn | Pha (ps) | ES-IT | CF | Am | s.n. |
| <i>Rubus discolor</i> Weihe & Nees | Pha (ps) | ES [Libanon] | CF | Ch, TI | 30723 |

Table 2. (contd.)

| | | | | | |
|--|-------------|-------------------------------------|----------------------|----------------------------------|-------|
| <i>*Rubus hyrcanus</i> Juz. | Pha (ps) | EN- (ES) (HYR) | CF | Ch, Kh, Kl, Mz, Sf, Tl | 30727 |
| <i>*Rubus persicus</i> Boiss. | Pha (ps) | EN-(ES) (HYR) | CF | Am, Ch, Kh, Kl | 30719 |
| <i>Rubus sanctus</i> Willd. | Pha (ps) | IT2, 3, 4 [EH- Balkan peninsula] | CF | Am, Kh, Kl, Ln, Tl | 30718 |
| <i>Sanguisorba minor</i> Scop. | Hem | ES-M | CF | Kh | s.n. |
| Rubiaceae | | | | | |
| <i>Galium elongatum</i> C. Presl | GR | ES | HCF (HEL) | Am, Ln, Kh, Sf | 31551 |
| Salicaceae | | | | | |
| <i>Populus caspica</i> Bornm. | Pha (pg) | ES (EH)-IT2,3 | CF | Sf | s.n. |
| <i>Salix</i> sp. | Pha (pp) | | HCF (HYG) | Ln | s.n. |
| Scrophulariaceae | | | | | |
| <i>*Rhynchosorys maxima</i> C. Richter | Hem | EN-(ES) (HYR) | MCF | Kh | 31513 |
| <i>*Scrophularia megalantha</i> Rech. f. | GR | EN-(ES) (HYR) | CF (on rocke) | Ch, Kh | 30760 |
| <i>Veronica anagallis-aquatica</i> L. | Hyd (em) | PL | HCF (HEL) | Kh, Kl, Tl | 31511 |
| <i>Veronica beccabunga</i> L. subsp. <i>abscondita</i> M.A. Fischer | Hyd (em) | ES (EH)-M | HCF (HEL) | Ch | s.n. |
| <i>Veronica crista-galli</i> Stev. | Thr | ES (EH) | CF | Kh, Kl | 30787 |
| <i>*Veronica francipetae</i> M.A. Fischer | Thr | EN-(ES) (HYR) | CF | Ch, Kh, Kl, Tl | 30788 |
| <i>Veronica</i> sp. | Thr | | HCF (HYG) | Tl | 31519 |
| Simarobiaceae | | | | | |
| <i>Ailantus altissima</i> (Mill.) Swingle | Pha (pg) | PL (E. Asia) | MCF (introduced) | Kh | s.n. |
| Solanaceae | | | | | |
| <i>Physalis alkekengi</i> L. | GR | ES-IT3, 4 | CF-MCF | Kh | 30749 |
| <i>Solanum dulcamara</i> L. Syn.: <i>S. persicum</i> Willd. ex Roemer & Schultes subsp. <i>pseudopersicum</i> (Pojark.) Schonbeck- Temesy | Pha (ps) | ES | HCF (HEL) | Am, Kh, Ln, Mz, Sf, Tl | 30756 |
| <i>Solanum nigrum</i> L. | Thr | SCOS | MCF-CF | Am, Ch, Hz, Kh, Ln, Sf, Tl | 30750 |
| <i>Solanum persicum</i> Willd. ex Roemer & Schultes Syn.: <i>S. persicum</i> Willd. ex Roemer & Schultes subsp. <i>persicum</i> | Pha (ps) | ES (EH) [IT] | MCF-CF | Am | 34146 |
| Tiliaceae | | | | | |
| <i>Tilia platyphyllos</i> Scop. | Pha (pn) | ES | CF | Kh | s.n. |
| Ulmaceae | | | | | |
| <i>Celtis cf. australis</i> L. | Pha (pn) | ES [W. Afghanistan] | CF | Kh, Kl, Ln | 30735 |
| <i>Ulmus glabra</i> Hudson | Pha (pp) | ES | CF | Kh, Tl | 30736 |
| <i>Ulmus minor</i> Miller | Pha (pp) | ES [IT2- N. Africa] | CF | Am, Ch, Kh, Sf, Tl | 30737 |
| Urticaceae | | | | | |
| <i>Parietaria officinalis</i> L. | Hem | ES | CF | Ch, Kh, Kl, Tl | 30743 |
| <i>Urtica dioica</i> L. subsp. <i>dioica</i> | Hem | PL | MCF | Kh, Kl, Sf | 30745 |
| Verbenaceae | | | | | |
| <i>Phyla nodiflora</i> (L.) Greene | GR | PL | HCF (HYG)- MCF | Sf | s.n. |
| Violaceae | | | | | |
| <i>Viola sieheana</i> W. Becker | GR | ES [Cyprus] | CF | Ch, Kl, Kh, Sf, Tl | 30776 |
| <i>*Viola alba</i> Bess. subsp. <i>Sintenisi</i> (W. Becker) W. Becker | Hem | EN-(HYR) [Tur- Uzbek] | CF | Ch, Kl, Kh, Tl | 30778 |

Table 2. (contd.)

| Angiospermae- | | | | | |
|---|-------------|--|--------------|--------------------------------------|-------|
| Monocotyledoneae | | | | | |
| Araceae | | | | | |
| <i>Arum maculatum</i> L. | GR | ES | CF | Ch, Kh, Kl | 30663 |
| Cyperaceae | | | | | |
| <i>Carex acutiformis</i> Ehrh. | GR | PL | HCF (HEL) | Ch, TI | 30849 |
| <i>Carex divulsa</i> Stokes in Withering | GR | ES-IT2, 3 [N. Africa] | CF | Ch, Kh, TI | 30844 |
| <i>Carex pallescens</i> L. | Hem | PL | CF | Ch | 30848 |
| <i>Carex pendula</i> Huds. | GR | ES-M | HCF | Kl | 31425 |
| <i>Carex remota</i> L. subsp. <i>remota</i> | GR | ES-M | HCF | Am, Ch, Sf, Kh, Kl, Mz, TI | 31432 |
| <i>Carex riparia</i> Curtis | Hyd (em) | ES-IT2, 3-M | HCF (HEL) | Am, Kh, Ln, Mz, TI | 30846 |
| <i>Carex</i> sp. | GR | | CF | Ch | 31413 |
| <i>Carex strigosa</i> Huds. | GR | ES | CF | Ch, Kh, Kl, Ln, Sf, TI | 31426 |
| <i>Carex sylvatica</i> Huds. | GR | ES [N. Africa, disjunct local in Altai Mts.] | CF | Ch, Kh, Kl, Sf, TI | 31412 |
| <i>Cladium mariscus</i> (L.) Pohl subsp. <i>mariscus</i> | Hyd (em) | ES-IT2, 3-M [Saudi Arabia] | HCF (HEL) | Am | s.n. |
| Dioscoreaceae | | | | | |
| <i>Tamus communis</i> L. | GC | ES-M [IT2] | CF | Ch, Kh | 30621 |
| Hydrocharitaceae | | | | | |
| <i>Hydrocharis morsus-ranae</i> L. | Hyd (fl) | ES-IT [NW Africa] | HCF (HYD) | Ln | 31530 |
| Iridaceae | | | | | |
| <i>Iris pseudacorus</i> L. | Hyd (em) | ES-M | HCF (HEL) | Am, Kh, Ln, Mz, TI | 30620 |
| Juncaceae | | | | | |
| <i>Juncus effusus</i> L. | GR | PL | HCF (HYG) | Ch, TI | 30781 |
| Lemnaceae | | | | | |
| <i>Lemna minor</i> L. | Hyd (fl) | PL | HCF (HYD) | HZ, Ln | 30651 |
| <i>Lemna trisulca</i> L. | Hyd (su) | COS | HCF (HYD) | Ln | s.n. |
| <i>Spirodela polyrrhiza</i> (L.) Schleiden | Hyd (fl) | SCOS | HCF (HYD) | Ln | 31526 |
| Liliaceae | | | | | |
| <i>Danae racemosa</i> (L.) Moench | Pha (pn) | ES (EH) [Syria] | CF | Ch, Kh | 30675 |
| <i>Ornithogalum</i> sp. | GB | | CF | Kl | 30677 |
| * <i>Ruscus hyrcanus</i> Woron. | Pha (pn) | EN-(ES) (HYR) | CF | Ch, Kh, Kl | s.n. |
| * <i>Scilla hohenackeri</i> Fisch. & C.A. Mey. in Hohen. | GB | EN-(ES) (HYR) | CF | Kl | 30678 |
| <i>Smilax excelsa</i> L. | Pha (ps) | ES-M | CF-HCF | Am, Ch, Kh, Kl, Ln, Mz, Sf, TI | 30676 |
| Orchidaceae | | | | | |
| <i>Listera ovata</i> (L.) R. Br. | GR | PL | CF | Kh | 31445 |
| Poaceae | | | | | |
| <i>Brachypodium sylvaticum</i> (Hudson) P. Beauv. | GR | ES-IT | CF | Ch | 31483 |
| <i>Echinochloa cruss-galli</i> (L.) P. Beauv. var. <i>submutica</i> Neilr. | Thr | PL | MCF | Ch, Kh | 31473 |
| <i>Echinochloa cruss-galli</i> (L.) P. Beauv. var. <i>cruss-galli</i> | Thr | PL | MCF | Am | 31472 |
| <i>Glyceria caspica</i> Trin. | GR | ES (EH) | HCF (HEL) | Ch | 30838 |
| <i>Microstegium vimineum</i> (Trin.) A. Camus | Thr | PL (Indochinese- Malesian) [N. Iran] | CF | Am, Ch, Hz, Kh, Kl, Sf, TI | 31475 |

Table 2. (contd.)

| | | | | | |
|--|----------|---------------------------------|---------------|------------------------|-------------|
| <i>Milium vernale</i> M.B. | Thr | ES-IT2, 3 | CF | Kh, Kl, Ch | 30839 |
| <i>Oplismenus undulatifolius</i> (Ard.) P. Beauv. | GR | PL | CF | Ch, Hz, Kh, Kl, Sf, TI | 31484 |
| <i>Paspalum dilatatum</i> Poir. | GR | PL | MCF | Hz | 31454 |
| <i>Paspalum paspaloides</i> (Michx.) Scribner | GR | PL (tropic & subtropic regions) | MCF | Hz, TI | 31453 |
| <i>Phragmites australis</i> (Cav.) R Trin. ex Steud. | Hyd (em) | PL | HCF (HEL) | Am | s.n. |
| <i>Poa trivialis</i> L. | GR | PL | HCF (HYG) | Ch, Kh, Kl, Sf, TI | 30841 |
| <i>Poa annua</i> L. | Thr | PL | MCF | Ch, Kh | 31463-31467 |
| <i>Poa nemoralis</i> L. | Thr | ES-IT2, 3, 4 | CF | Kh, Kl, TI | 31480 |
| <i>Polypogon semiverticillatus</i> (Forssk.) Hyl. | Thr | PL | CF | Ch | 30840 |
| Potamogetonaceae | | | | | |
| <i>Potamogeton crispus</i> L. | Hyd (su) | PL | HCF (HYD) | Kh | 31489 |
| <i>Potamogeton lucens</i> L. | Hyd (su) | PL | HCF (HYD) | Kh | 31488 |
| Sparganiaceae | | | | | |
| <i>Sparganium neglectum</i> Beeby | Hyd (em) | ES [N. Africa] | MCF-HCF (HEL) | Am, Kh, Ln, Mz | 30754 |

Symbols and abbreviations used in the floristic catalogue:**1. Site names**

Am= Amirkelayeh, Cha=Chaldarreh, Kh= Khoshkehbaran, Kl=Kelarabad, Ln= Langerud, Mz= Mazga, Sf= Safrabasteh, TI= Telecabin (detailed addresses have been presented in Table 1).

2. Life forms

Cha= Chamaephyte, Geo= Geophyte [GB (bulbose geophyte), GC (corm geophyte), GR (rhizomatose geophyte)], Hem= Hemicryptophyte, Hyd= Hydrophyte [em= emergent, fl= floating, su= submerged], Pha= Phanerophyte [pg= megaphanerophyte, pm=mesophanerophyte, pp= microphanerophyte, pn= nano-phanerophyte, ps= climbing phanerophytes], Thr= Therophyte.

3. Chorological types

COS= Cosmopolitan, ES= Euro-Siberian (EH= Euxino-Hyrcanian, Hyr= Hyrcanian, En= endemic), IT= Irano-Turanian (IT_{1,2,3,4}= classification of Irano-Turanian according to LÉONARD (1988)) M= Mediteranian, PL= Pluriregional, SCOS= Subcosmopolitan.
[]= transgressive into other areas or demonstrative of disjuncted phytogeographical area.

4. Habitat and Ecology

CF= closed forest, HCF= Humid closed forest, HEL= Helophyte, HYG= Hygrophyte, MCF= Margin of closed forest.

5. Notes

s.n.: Plants without herbarium number

* = Endemic plants of Hyrcanian

TUH= Central Herbarium of Tehran University

Threatening notes

Among the Caspian forests, the lowland forest zone is the one to which serious attention must be paid. Today, there remain only a few fragments of these forests in the plains of Gilan, Mazandaran and Golestan Provinces. One of these forests surveyed in this study is in Khoshkehdaran Natural National Monument, one of four categories of conservation in Iran. Khoshkehdaran forest show the highest dominance of *Alnus glutinosa* ssp. *barbata* and probably the best representative of a lowland alder forest in northern Iran or even in the Euxino-Hyrcanian province. This forest faces some critical problems. Rice fields and human settlements in the east, south and west make a destroying pressure on the forest. On the other hand, the availability of the forest for a lot of domestic livestock is easy. They produce a remarkable disturbance especially in south of the forest. It is, therefore, suggested that, this forest must be more isolated with the possession of neighboring lands by the Department of Environment.

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Addresses of the authors: A. GHAHREMAN, A.R. NAQINEZHAD* and F. ATTAR, Central Herbarium, Dept. of Botany, Faculty of Biology, College of Science, Univ. of Tehran, Tehran, Iran; B. HAMZEH'EE and M. ASSADI, Dept. of Botany, Research Institute of Forests & Rangelands, Tehran, Iran.

* E-mail: naqinezhad@khayam.ut.ac.ir

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