Alborze mountain the Southernmost habitat of Silver Birch species in the Globe.

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Abstract
There are about 60 species from Birch genus in the world which all distributed at Arctic and subarctic as well as cold mountain of temperate regions of the North hemisphere. All of these species are as tree or shrub as dominant in some places of boreal biome. In Iran only one species of Birch (Betula pendula Roth) found in high altitude of Alborz Mountain especially in Sangdeh and Lar regions in Mazandaran province as its latest habitat. By the aid of TWINSPAN (Two Way Indicator Species Analyses) method we found 9 indicator species in two ecological groups. The first group with indicator species of Cotonaster nummularioides was the indicator of a poor and Calcic habitat. The second group with indicator species of Actaea spicata was the indicator species of an acidic and rich habitat. Principal Component Analyses (PCA) ordination carried out for sample areas and species. This analyses showed five ecological groups which segregated due to differences with each other, each group possess some sample areas with the highest floristic similarities.

Key words: Birch, Alborz mountain, Ecological species group, PCA, TWINSPAN

Introduction
The species of Birch genus are distributed in the north America, Canada, Alaska, many places of Europe such as the mountain of the south Spain, Carpathian, Alps, Scandinavia, Siberia, west Asia, Caucasus, Iran and Iraq as well as Himalaya mountain, China and Japan (Krussmann, 1981). In Iran it distributed some areas of the Alborz mountain like rocky forests of Dodangeh, in south of Sari, as well as into the narrow gallery of Lar valley. Regarding vegetation history, these forests seem to be the last habitat and refuge of Betula pendula Roth. Dodangeh is located in the heights of the Hyrcanian forests with the area of about 2,000 ha and the altitude of 2,500–2,950m a.s.l. and Lar habitat is located in a gallery with the area of about 10 ha and mean altitude of 1700m a.s.l.

Material and methods
Study areas
Dodangeh forests are located in south of Sari, North Iran, with the latitude of 35° 10’ to 36° 30’ and longitude of 53° 10’ to 53° 27’ (Fig. 1). The altitude is varied from 2,500 to 2,950m a.s.l. The mean annual precipitation is 850 mm. Lar valley is located in the south of Amol with the latitude of 35° 55’ to 36° 04’ in Mazandaran province. This habitat is located in a gully with the area of about 10 ha and mean altitude of 1700m a.s.l. with the mean annual precipitation of 570 mm which most of this precipitation is snow during the late of fall and winter. Here has a cold mountain climate.

Methods
In order to determine floristical composition, ecological characteristics of *Betula pendula* and distribution range of this species in Sangdeh 20 relevés of the size 400 m² located along a transect of 250 m based on the distribution of species and geomorphology of the area were selected. In lar valley Birch admixed with other species seen in vegetation patch along 2km of the valley in the both sides of the river thus, whole patches were sampled. The data collected by Braun-Blanquet method (Braun-Blanquet, 1983) were subjected to analysis by Syn-Tax 5.0 (Podani 1995) and PC-ORD for Windows (McCune and Mefford 1999) by using TWINSPAN method to characterise ecological groups and importance of *Betula pendula* in successional trends. Life form spectrum of the area was obtained according to the Raunkiaer’s life form. Nomenclature and chorology of the species follow Asadi (1989–2002), Davis (1965–1988), Ghahreman (1980–2002), Komarov and Shishkin (1963–1974), Rechinger (1963–1998), and Zohary *et al.* (1980–1993).

**Results and Discussion**

In Lar valley 88 plant species in 52 families were identified. Here Poaceae family with 15 species or 17% then Asteraceae with 13 species as well as lamiaceae with 8 species, Cruciferaeaceae with 6 species and Chenopodiaceae with 5 species form the most abundant families. Among the whole 13 species out of 1800 are belong to the endemic plant of Iran while in Sangdeh altogether 181 plant species belonging to 129 genera and 52 families were identified in the study area based on Flora of Iranica (Rechinger 1963–1998), Flora of USSR (Komarov and Shishkin 1963–1974), Flora of Turkey (Davis1965–1988), Flora of Iran (Asadi 1989–2002), Colour Flora of Iran (Ghahreman 1980–2002). In Sangdeh out of these, 17% (31 species) were endemic of Hycranian and Irano-Turanian regions including four species, viz. *Aconitum iranshahrii* Renz., *Cortusa mathioli* subsp. *iranica*, *Delphinium elbursense* var. *elbursense* and *Doronicum wendelboii* which could be found nowhere else in the world. Despite the small size of the sampled area (20 relevés of 400m²), about 1.7% of the endemic plants of Iran (31 out of the total 1800) are present in this area. Rosaceae, Asteraceae, Poaceae, Lamiaceae and Caryophyllacea had 23 (13%), 20 (11%), 15 (8%), 8 (4%) and 7 (4%) species, respectively. Based on the table method of Braun-Blanquet (Braun-Blanquet 1983), we obtained one association named *Querco macrantherae-Betuletum pendulae* including *Scabiosetosum hyrcanii* subassociation as well as *Acer hyrcanum* and *Delphinium elbursense* var. *elbursense* variants. This association is recorded, for the first time, in the Hycranian and Euro-Siberian regions. The results of some analyses by Syn-Tax 5.0 and PC-ORD, by using TWINSPAN method, indicated two ecological groups with different ecological characteristics (Fig. 1). The first group with *Cotoneaster nummularioides* indicates a habitat of poor and calcareous soil with high C/N ratio. The second with *Actaea spicata* and indicates a habitat of richand weak acidic to acidic soil withlow C/N ratio. The biological activity of the soil is low in the first and high in the second one, therefore decomposition process will be longer in the first than the second group.

Life form spectrum of two areas were obtained based on life form system of Raunkiaer (Küchler and Zonneveld 1988) (Figs. 2, 3 ) as it show the percentage of Therophyte in these two habitate is completely different. Chorological studies of *Querco macrantherae-Betuletum pendulae* in Sangdeh showed that the number of plant elements of Irano-Turanian (Ir.-Tur.), Euro-Siberian (Euro-Sib.) and Hycranian (Hyrc.) regions exceed other existing vegetational regions (19 chorotypes) (Fig.4 ). The reason is that this association is located in the upper part of Hycranian and in the vicinity of Irano-Turanian region so that it can be exposed to the invasion of vegetation elements of the two regions. Since elements of Hycranian areas belong to Euro-
Siberian regions, the presence of Euro-Siberian elements in this association is both natural and indicator of Hyrcanian areas. In Lar habitat the number of plant elements of Irano-Turanian is similar to Sangdeh and has the highest number of plant, then the plant elements of polyregion has the second position (Fig.5). PCA analysis of sample plot showed five ecological groups which segregated due to differences with each other, each group posses some sample areas with the highest floristic similarities, group I with 4 releves was the biggest group, here the species of Cystopteris fragilis, Delphinium elbursense var. elbursense, Betonica nivea sub sp. mazandarana and Bromus benekeni were presence. The second group with two releves and species of Alchemilla hessiana, Melica transsilviana, Leontodon hispidus and Thanacetum parthenium had very similar character.

Since there has not been anywhere recorded about the presence of Betula pendula in Hyrcanian region and the distribution is restricted to this small area, it could be considered as a rare and endemic species. To concern this fact, there should be real protective measures regarding social, cultural and environmental protection conditions such as gradual removing of grazing animals, enclosing the vital patches and training of rangeland and forest habitats.

REFERENCES
Fig. 1, The ecological groups derived from TWINSPAN analyse.

Fig. 2, Life form spectrum of Birch in Sangdeh habitat.

Fig. 3, Life form spectrum of Birch in Lar Habitat.

Fig. 4, Plant elements chorology of Birch habitat in Sangdeh.

Fig. 5, Plant elements chorology of Birch in Lar.