

Iran in Botanical Perspective

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Iran, with an area of about 1.65m square kilometers, has some of the most varied and interesting flora in the region. Topographical, climatic and edaphic conditions have made it rich to the extent of more than 7,000 species. There are two main mountain chains: the Alburz range, extending from the northwest to the northeast of Iran, acts as a barrier preventing clouds moving from the Caspian towards the central basin of Iran. The Zagros range, running from the north-west to the south, prevents the eastward movement of clouds coming from the Mediterranean area. This is the reason why the eastern slopes of the Zagros and the southern parts of the Alburz are dryer than the opposing slopes.

The Hyrcanian area (the southern coast of the Caspian Sea and the northern slopes of the Alburz Mountains) is the most humid area in Iran, with an annual precipitation of about 2,000 mm in the western parts around Bandar-e Anzali. In contrast, the annual precipitation in the central basins, particularly the Dasht-e Kavir and Dasht-e Lut deserts, is less than 100 mm; there is sometimes no rain for several years.

Most parts of Iran belong to the Holarctic phytogeographical kingdom, and only the southern regions (north of a line from the Persian Gulf to the Oman Sea) belong to the Paleotropic kingdom. The Hyrcanian area is mainly covered by forests. In the Hyrcanian forest *Pterocarya fraxinifolia* (Poir.) K.Koch, *Celtis australis* L. and *Zelkova carpinifolia* Dippel are endemic Arcto-Tertiary elements. In this area, there are also relicts of tropical trees (Indo-Malaysian elements), for example: *Diospyros lotus* L. and *Albizia julibrissin* Durazz. *Gleditschia caspica* Desf. is one of the most important relict endemic trees in the Hyrcanian forest.

The second important forest region is the Zagros Oak woodlands. The most abundant tree species in all parts of the Zagros range is *Quercus brantii* Lindl. Other trees and shrubs are *Q. infectoria* Oliv., *Q. libanii* Oliv., *Crataegus azarolus* L., *Acer monspesulanum* L., *Pistacia khinjuc* Stocks and *Pyrus syriaca* Boiss. In this range, there are fascinating herbaceous and geophytic plants, such as: *Fritillaria imperialis* L., *F.*

persica L., *Tulipa humilis* Herb., *T. clusiana* DC., *Gagea chlorantha* (M.Bieb.) Schult. & Schult.f., *G. fistulosa* (Ramond ex DC.) Ker Gawl., *Ranunculus asiaticus* L., *Salvia* ssp., *Stachys* ssp. etc. The pistachio-almond scrub also can be seen on most foothills of the Zagros.

Juniper and cypress woodlands consist of *Cupressus sempervirens* L., *Juniperus excelsa* Willd., *J. communis* L. and *J. Sabina* L. *Cupressus sempervirens* is a cold-sensitive tree that is distributed in some valleys of the Alburz with a Mediterranean climate, such as the Roudbar and Marzan-Abad valleys. There are dense populations of *J. excelsa* in the eastern part of the Alburz range and also much more sparsely than those in the southern slope of these ranges. *Juniperus communis* and *J. sabina* are cold-resistant and spread over ground, especially above the tree line of the Hyrcanian forests.

When driving toward the central basin of Iran, one can see that most parts of Iran (about 12.5%) are covered by saline soils. There are interesting Halophytes in this area: *Salicornia europaea* L., *Halocnemum strobilaceum* M.Bieb., *Halostachys belangeriana* (Moq.) Botsch., *Tamarix* sp., *Anabasis setifera* Moq., *Salsola nitraria* Pall. etc. which are the most frequent species of Amaranthaceae. The lowland southern part of Iran belongs to the Nubo-Sindian province, a vegetation is characterized as the Pseudo-Savanian. *Ziziphus nummularia* DC., *Prosopis koelziana* A.Burkart, *Acacia tortilis* Hayne and *Calotropis procera* (Aiton) W.T.Aiton etc. are important scrubs and trees in this region. The annual precipitation this area is less than 300 mm.

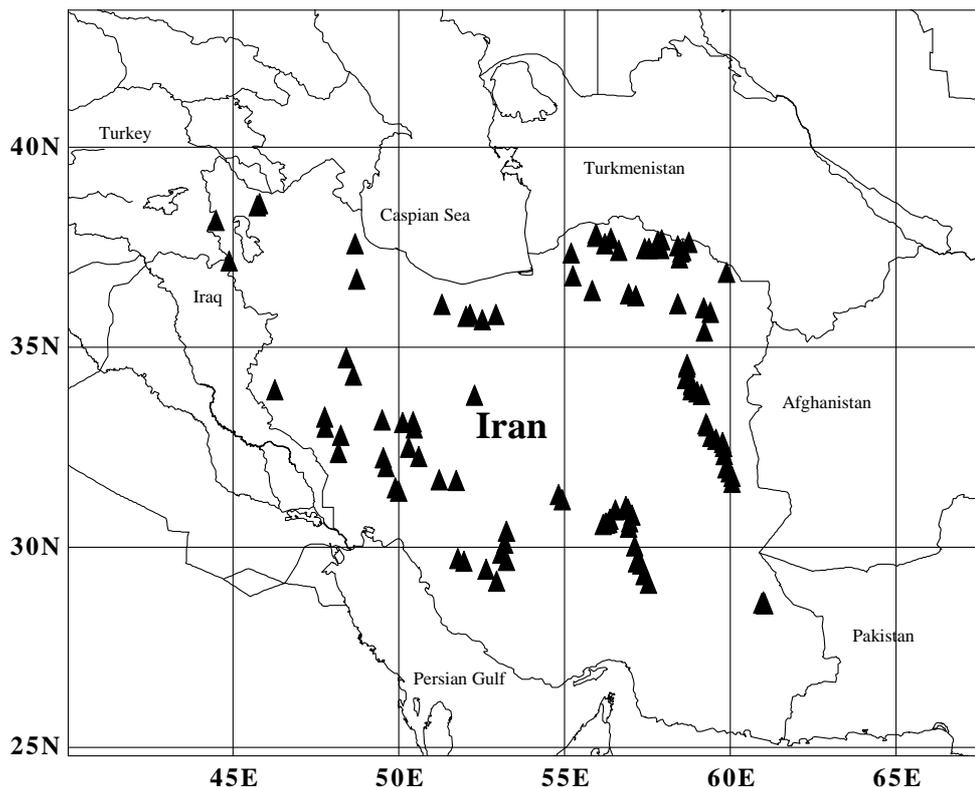
The most interesting vegetation in Iran is in mountains and alpine steppes, consisting of thorn-cushion, dwarf shrubs, tall umbels and grasslands. True scrubs and trees are rare in this area. A number of genera are centred in this region. Among the mentioned true Scrubs and trees, *Astragalus* (the largest genus in Iran with more than 700 species), *Cousinia* (with more than 350 species in the Flora Iranica area and nearly 260 species in Iran), *Acantholimon* and *Onobrychis* are the most important.

Bulbiferous geophytes plants are found mostly on mountains. The most beautiful and gorgeous bulb belonging to the lily family (Liliaceae), *Gagea*, has its main distribution centre in Iran and Central Asia. This genus is the biggest among other genera in the lily family following by *Fritillaria* and *Tulipa*. The main goal of my trip in Iran

was to know Iran better, culturally and botanically. I collect *Gagea* samples from the wild populations along with other lily family species and took as many photographs as possible.

Because of the topographical variation throughout Iran, plants come into flower in one place or another during most of the year. For instance, the *Gagea* species can be found in flower in the southern part of Iran in March and early April, while in the eastern and north-east, there is no flower until mid-April or early May. In order to find *Gagea* in flower in the north-western and western, I had to travel to those parts in late May, June, or July.

The trip started on 13 February from Kew and finished back at Kew on 16 July 2007. Starting from the southern part and finishing in the north-western parts, I covered almost all parts of Iran. Map shows localities of which I collected *Gagea* samples.

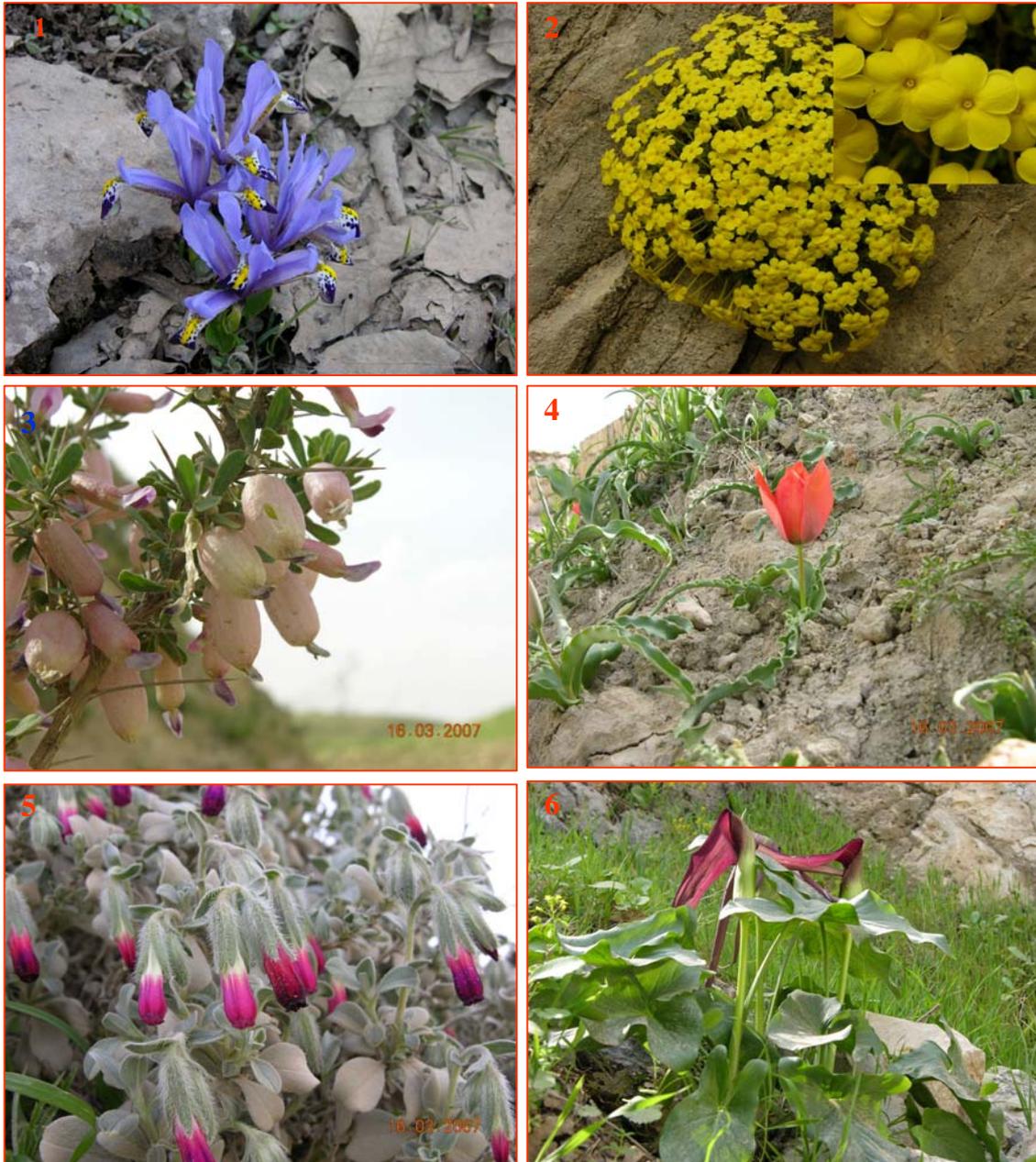


The first excursion took me to western and south-western Iran to visit and collecting samples from Arak, Kermanshah, Eslamabad-e Gharb, Ilam, Dareh Shahr, Pol

Dokhtar, Dezful, Izeh, Bagh Malek, Dehdasht, Ramhormoz, Behbahan, Gachsaran, Dogonbadan, Shiraz, Dasht-e Arjan, Kavar, Kouhenjan, Sarvestan, Arsanjan, Perspolis, Abadeh, Abarkouh, Isfahan, Kashan and Ghom. The main vegetation of Zagros Mountains is oak forest, mainly *Quercus brantii*. Other oak species like *Q. infectoria* can also be rarely found. *Crataegus* and *Pyrus* scrub and also trees are common. Historically, oak trees started to grow on this beautiful mountain from after the last glaciations, making this part of Iran habitable. It was occupied by immigrants, who established a great civilizations, particularly in Hamedan and around Shiraz. being gradually cut down by local peoples, these forests were much thicker in the past than they are now. There is now some control by the authorities; tree felling has decreased and the oak forests are beginning to recover.

The following samples of *Gagea* were collected and photographed during this excursion: *G. alexeenkoana* Misch., *G. reticulata* (Pall.) Salisb., *G. tenuifolia* (Boiss.) Fomin, *G. anonyma* Rech.f., *G. chlorantha* (M.Bieb.) Schult. & Schult.f. Other selected samples, which I photographed, are: *Iris reticulata* M.Bieb. (Fig. 1), *Crocus*, *Dionysia odora* Fenzl. (Fig. 2), *Astragalus fasciculifolius* Boiss. (Fig. 3), *Fritillaria*, *Tulipa* (Fig. 4), *Salvia*, *Onosma* (Fig. 5), *Arum* (Fig. 6), *Gentiana olivieri* Griseb. (Fig. 7), *Ephedra* (Fig. 8), *Amygdalus*, *Tamarix*, etc. In this trip, I visited several historical places like Tagh-e Bostan (Kermanshah), Takht-e Jamshid, Pasargad, Naghsh-e Rostam etc. In the middle of Abarkouh city, there is a very old cypress tree (*Cupressus sempervirens*, Fig. 9), which dates back to 4500 or 5000 years ago. This tree and a Cypress tree in Harzvil village near Manjil are the oldest Cypress trees in Iran.

The second excursion covered the central, south-eastern and eastern parts of Iran. I drove down to Yazd, Kerman and Jiroft, crossing the desert between Jiroft and Bampour to reach Iranshahr. From Iranshahr, I drove towards Taftan Mountain, then to Zahedan, Nehbandan, Sarbisheh, Birjand, Ghaen, Gonabad, Torbat-e Heydarieh, Neyshabur, Sabzevar, Shahroud and then Tehran. The south-eastern part of the country is the driest part, mostly covered by sand and halophytic plants. Bulbs are scarce in this area, being found mostly on hillsides. The *Gagea* species in this area are different from those, which grow in the south-west.



Figures 1-6. Flowers being photographed in western and south-western parts of Iran in March 2007. 1: *Iris reticulata* M.Bieb. from near Ilam, 2: *Dionysia odora* Fenzl. from Darrehshahr, 3: *Astragalus fasciculifolius* Boiss. from Darrehshahr, 4: *Tulipa* sp. from Laly, 5: *Onosma* sp. from Laly and 6: *Arum* sp. from Malavi.

Gagea anonyma (Fig. 10) is the main species in sandy to drier parts, being replaced by *G. setifolia* in higher altitudes. Among the other species such as *Eremurus persicus* Boiss. (Fig. 11), *Anemone biflora* DC. (Fig. 12), *Iris hymenospatha* Mathew & Wendelbo ssp. *Hymenospatha* (Fig. 13), *Colchicum*, *Asphodelus tenuifolius* (Fig. 14), *Calotropis procera* (Fig. 15), *Withania coagulans* (Stocks) Dun. (Fig. 16), *Convolvulus*, *Amygdalus*, etc., I found *Gagea reticulata* (Fig. 17), *G. stipitata* Merckl. ex Bunge and *G. bergii* Litv. Because of a heavy rain and snow in eastern Iran at that time, I had to come back to Tehran earlier than I had planned.

In some of these parts, people live in black goat-hair tents. Water shortage is the main problem in these areas and locals try to solve this problem by bringing water to the surface using wells connected by tunnels, known as *qanats*. Precipitation on Taftan Mountains is enough to attract several tribes. There are many black tents (Fig. 18) around these mountains. Local families are dependent on their goats and sheep. In desert region there are plenty of camels.

Botanically, the vegetation composition of the south-east differs from that of the east and the west. Vegetation in the southeast is similar to those of Baluchestan in Pakistan. One of the elements common between Iran and Pakistan is *Nannorrhops ritchieana* H.Wendl., a tree belonging to palm family. It usually grows in valleys and rivers. The image of our car (Fig. 19) shows one of the unpleasant times of this trip.

In the third excursion, I covered most parts of north-eastern and eastern Iran. The Alburz chain extends towards its eastern and ends in Golestan National Park. The vegetation at the far end of Alburz (In Golestan National Park) is a mixture of Hyrcanian, Irano-Turanian of central Iran and Central Asian species. For example, Golestan National Park holds about 1300 plant species. The Kopet Dagh Mountains, parallel to the border of Turkmenistan, is covered by vegetation more similar to those of Central Asia. Most parts of this region is populated by Turkmen and Kurds living on their farms with their sheep and cattle. Most of them weave carpets and make felt rugs.

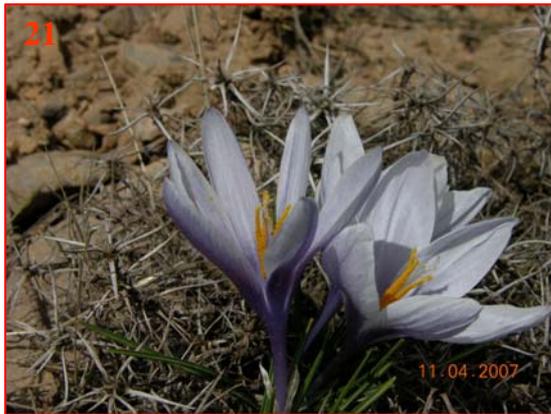
I found several species of *Gagea* e.g. *G. reticulata*, *G. vegeta* Vved., *G. iranica* Zarrei & Zarre (described and registered as a new species by the author) and *G. stipitata*. Other plant species are: *Dionysia*, *Hyacinthus transcaspicus* Litv. (Fig. 20), *Crocus*



Figures 7-12. Flowers being photographed from eastern and southeastern parts of Iran in April 2007. 7: *Gentiana olivieri* Griseb. from Laly, 8: *Ephedra* sp. from around Sarvestan, 9: *Cupressus sempervirens* L. from Abarkouh, 10: *Gagea anonyma* Rech.f. from Taftan Mountains, 11: *Eremurus persicus* Boiss. from around Rafsanjan and 12: *Anemone biflora* DC. from around Rafsanjan.



Figures 13-18. Flowers being photographed from eastern and southeastern parts of Iran in April 2007. 13: *Iris hymenospatha* Mathew & Wendelbo ssp. *Hymenospatha*, from around Rafsanjan, 14: *Asphodelus tenuifolius* Cav., from around Bam poor, 15: *Calotropis procera* (Aiton) W.T.Aiton, from around Bam poor, 16: *Withania coagulans* (Stocks) Dun., from the route of Khash to Iranshahr, 17: *Gagea reticulata* Salisb., from near Birjand and 18: Black tent in foothills of Taftan Mountains.



Figures 19-24. Flowers being photographed from eastern and northeastern parts of Iran in April 2007. 19: Our car was falling in the river near Birjand after heavy rain, 20: *Hyacinthus transcaspicus* Litv. from Bajgiran, 21: *Crocus michelsonii* B.Fedtsch, from Bajgiran, 22: *Eremurus luteus* Baker, from near Shahroud, 23: *Fritillaria raddeana* Regel, from the route of Chamanbid to Bojnourd and 24: *Tulipa montana* Lindl. Var. *montana*, from the route of Chamanbid to Bojnourd.

michelsonii B.Fedtsch. (Fig. 21), *Juniperus*, *Eremurus luteus* Baker (Fig. 22), *Tulipa*, *Fritillaria raddeana* Regel (Fig. 23), *Tulipa montana* Lindl. (Fig. 24), *Arum*, *Iris* etc. The main cities I passed are: Semnan, Shahroud, Azadshahr, Ashkhane, Bojnourd, Ghuchan, Bandar-e Gaz, Mashhad, Neyshabour, Sabzevar.

Apart from trips to the Central Alburz (around Tehran at the end of April and also in May), I still had to explore most of the west and north-western parts of Iran. The trip to this area was more difficult and time-consuming, with the result of collecting fewer plants than the other trips. I had to find the way up to high mountains, because I was looking for some species like *G. alexeenkoana*, which grows at higher altitude than the other species.

I started the excursion to the west, taking in Isfahan, Shahreza, Semirom, Hana, Farsan, Shahr-e Kord, Lordegan, Boroujerd, Daran, Aligudarz, Khunsar and Hamedan. *Fritillaria imperialis* (Crown Imperial, Fig. 25), one of the most attractive bulbs, grows around Khunsar and Aligudarz. This plant attracts lots of tourists from all over the world to see the Crown Imperial in the wild and to see how these plants help bees to make one of the most valuable honeys. Apart from *G. alexeenkoana*, I was able to collect *G. gageoides* (Zucc.) Vved. and *G. confusa* A.Terracc.

The plan for the north-western trip was to reach the high altitude of the Asalem pass (an amazing pass between Asalem and Khalkhal), Sabalan Mountains and the mountains bordering of Turkey and Iraq. All these mountains were so cold and rainy, while I was there. The species such as *G. alexeenkoana*, and *G. caroli-kochii* Grossh. were collected. *Gagea uliginosa* Siehe & Pascher, a rare species of *Gagea*, grows on the high plains of Sabalan. It has been reported from Damavand, but despite several trips I made to the Central Alburz, I could not find it.

In general, it was a good field trip to Iran. I went to several places; I have seen some new and amazing historical places such as: Naghshe Rostam (Fig. 26), Naghshe Rajab (Fig. 27) and Pasargad (Fig. 28). The nature was amazing. I collected a lot of samples and did lots of photographs. All of the collected plants will be used for further research and educational purposes in Iran and at Royal Botanic Gardens, Kew.



Figures 25-28. Photographs from around Iran. 25: *Fritillaria imperialis* L. from near Khansar, 26: Naghsh-e Rostam, from Kermanshah, 27: Naghsh-e Rajab, from near Persepolis, and 28: Pasargad, from around Shiraz.

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