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Protection of Some Rare and Critically Threatened Medicinal Plants in The Azerbaijan Flora

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Abstract

The flora of Azerbaijan differs by its great variety. One hundred and fifty families comprising of 1000 genera and 4700 species make 70 % of Caucasus flora. Out of which more than 1400 species have medicinal (315 species – alkaloids, 150 species – coumarins, 1000 – essential oils, and flavanoids). In the Middle Ages 300 wild-growing species were used for treatment in Azerbaijan medicine; now only 135 species have access in the State Pharmacopeia.

The plants are continuously increased at a result of in-situ conservations of medicinal plants. Their decrease has been prognosticated preliminarily. It was realized that young and generative development of the vegetable specimen in the populations belonged to *Urtica dioica* L. The amount of the specimen at cinil and subcinil phases in the *Astragalus dasyanthus* Pall. species was twice more than it was in immature and generative phases of the plant that cause gradual decrease of these populations. Restoration activities should be carried out for in-situ conservation of such plants.

The article is for the conservation and protection of medicinal plants of the region. Methods of population awareness and education of students, teachers and local people is ecology recommended along with the administrative measures.

Keywords: Medicinal herbs, Plant resources, Population, Phytocenology, Rare and threatened species.

1. Introduction

Republic of Azerbaijan – is the biggest country in the Caucasus Region of Eurasia. It is situated in Caucasus – in the basin of the Caspian Sea that is on the crossing of Europe and Central Asia. Its area is 86.600km^2 (11.5% – forests, 1.6% – water basins, 50% – cultivated lands, including: 27% pastures, 36.9% other lands). Azerbaijan has got a rich flora and a harmonious vegetation cover in the area. There are about 1.000 genera containing all plant groups, about 4700 plant species with higher spore, naked and covered seeds, flowers belong to 200 families, in this ancient Country making nearly 70% of the Caucasus flora; 5% (370 species) of them are regional endemic and rare plants (Akhundov, 1972; Hajiyev and Musayev, 1996; Asgerov, 2005-2011).

The physical and geographical environmental conditions of Azerbaijan characterized by a variety of climates, soils, abundance of water sources and solar radiation etc. – favour the abundant and rich flora source for many purposes including medicinal therapy. Species were collected during long-term expedition surveys covering all natural and geographical areas of Azerbaijan: the Great Caucasus, the Small Caucasus, the East-Western Lowland, the Steppe Plateau, Gobistan, Talysh as well the Nakhichevan AR.

The floral biodiversity has perennial grasses (66,4%), on the 2nd place annual ephemerals and ephemeroids (23,4%), the rest of them are other plants. The Azerbaijan flora has 435 species of trees and shrubs. These plants have formed a special plant cover in Caucasus Region as ancient, forest, desert, semi-desert, Caucasian, boreal, steppe, xerophyl, adventive et.al. can be met (Hajiyev, 2004).

The chemical structure and pharmaceutical properties of the collected plant species have been studied throughout several expeditions. As a result 800 species of medicinal, 850 species of essential oil plants have been collected and defined during the initial inventory. More than 1545 medicinal plants (including 315 species of alkaloid, 150 species of coumarine, and 1000 species of essential oil) represented 178 families and 740 genera have been ascertained in the Country.

This problem is also actual and urgent because of the stresses of anthropogenic factors that cause threat during recent decades and global ecological changes have more increased; biodiversity sharply began to decrease by ecosystems degradation; many valuable species have been lost or they are under threat to become lost.

One objective of the research was a study of the current state of medicinal herb populations much more used in Azerbaijan flora.

Protection of rare and critically threatened species in accordance with the Red List requirements has been evaluated.

2. Material and methods

Samples of rare and threatened food plant species were taken as a test subject. Classical and update methods have been used during the monitoring activities [Lavrenko, 1959; Davis, 1993]. Seed samples of the disappearing species were delivered to the National Gene Bank for long-term conservation.

Recently a number of arrangements are being implemented for the conservation of species with a limited areal spread in all over the world. A Red List of the threatened species as well as methods for their categories and criteria have been composed by the IUCN Council and a clear system was worked out to classify critically threatened species. During the monitoring activities 3.1 version of the IUCN has been used in the evaluation of plants status [IUCN, 2003].

For precise studies of the spread species, certain territories were marked and 15-20 examples were selected and taken picture of them. It has been used different systems for studying of plants life styles [Raunkier, 1937; Serebryakov, 1964].

3. Experimental Part

Thus the research was carried out in different areas beginning from arid semi-desert landscapes up to Alpine grasslands of Azerbaijan show that areal of certain species and varieties met in every step up to the recent days are getting narrower and their natural resources disappearing.

That is why there are such kind of species that were collected and used by the people before in the flora they are very seldom met in the wild at presesnt. Current status of the group of wild vegetable widely used as medicinal and food herb by the people has been studied by us according to the IUCN category and criteria [Ibadullayeva et.al., 2011]. In the following Table information about the current status of some medicinal herbs got narrower areals and even threatened in the flora of the Nakhichevan Autonomous Republic have been shown (Table 1).

Table 1. Current state of rare and threatened medicinal herbs in the Azerbaijan Flora

№	Name of the plants	IUCN criteria
1.	*Astragalus prilipkoanus* Grossh.	VU C2a(i)
2.	*A.regelii* Trautv.	VU C2a(i)
3.	*A.szovitsii* Fisch. & C.A.Mey.	VU C2a(i)
4.	*Astracantha aurea* (Willd.) Podlech	NT
5.	*A.karjaginii* (Boriss.) Podlech	VU C2a(i);D2
6.	*Allum akaka* S.G. Gmel. ex Schult. et Schult.	VU B2bc(i)
7.	*Allum woronowii* Miscz. ex Grossh.	EN B2ab(iii)
8.	*Pyrethrum komarovii* Sosn.	VUA2cd
9.	*Cachrys microcarpa* Bleb.	EN A2ac+C1
10.	*Cicer anatolicum* Alef.	VU B1b(i,v)c(i, iii)
11.	*Crataegus orientalis* Pall.ex Bieb.	NT

12.	*C.pontica* C.Koch	NT
13.	*Crocus speciosus* Bieb.	VU B2bc(ii,v)
14.	*Ceterach officinarum* Willd.	NT
15.	*Dryopteris filix- mas* (L.) Schott.	NT
16.	*Daphne transcaucasica* Pobed.	VU A1d
17.	*Euphorbia grossheimii* Prokh.	NT
18.	*Humulus lupulus* L	VU B2ab
19.	*Heracleum albovii* Manden	VU B1a(i)c(iii);C2(i)
20.	*Hippophae rhamnoides* L.	NT
21.	*Hypericum linarioides* Bosse	VU A1c; B1ac(ii)
22.	*H. formosissimum* Takht.	VU A1c; B1ac(ii)
23.	*Juniperus sabina* L.	EN B1ab(ii,iii)
24.	*Juniperus foetidissima* Willd.	CR A4acd
25.	*Juniperus communis* L.	NT
26.	*Juniperus excelsa* Bieb.	EN A2acd
27.	*Jurinea spectabilis* Fisch. & C.A. Mey.	CR A2cd
28.	*Pyrethrum kotschyi* Boiss.	VU A3cd
29.	*Hippophae ramnoides* L.	VU B1ac
30.	*Pulsatilla violacea* Rupr.	NT
31.	*Rosa nisami* Sosn.	EN B2ac(iii)
32.	*R.karjaginii* Sosn.	CR A3c; C2a(i)
33.	*R.sosnovskyana* Tamamsch.	VU A2cd
34.	*R.pimpinellifolia* L.	EN B2ac
35.	*R.tuschetica* Boiss.	VU B1bc
36.	*Rubus ibericus* Juz.	NT
37.	*Sorbus luristanica* Bornm.	EN A2ac
38.	*Sorbus persica* Hedl.	EN A2ac
39.	*Sorbus takhtajanii* Gabr.	EN A2ac
40.	*S. turcica* Zinserl. EN	EN A2ac
41.	*Thymus migricus* Klok. & Shost.	VU C2a
42.	*Valeriana alliarifolia* Adams.	VU A3bc

Recently we evaluated the threats to plants for their in-situ. It is known that first of all information about the local exploitation of the natural populations of useful plants then their resources and productivity should be studied in order to protect the wild. Afterwards, ontogenetic status of the plant should be researched and their life-styles, type of the life environment and bioecological features should be studied to conserve their natural resources.

At the cenological evaluation of the populations age indexes have been identified through ontogenes evaluation of the plants in all phases that is of the factors creating opportunity of prognosing natural status of the plant in future. For instance, let us pay attention to *Urtica dioica* species known as medicinal herb and widely used by the people.

During the investigation 10 populations have been worked in the geographical region

Gunnut-Gapijig of the Nakhichevan AR, in the territory of Yeni Yol of the Great Caucasus, in Shahriyar Forest of Gek-Gel Region of the Small Caucasus. Spread area and bioecological features of *U. dioica* species at each 10 registered populations have been studied.

U.dioica is a perennial plant, it is considered as plant of medicinal, food and forage significance as well as is very important for people. As this plant is widely used in Azerbaijan that is why study of the current status of the plant populations interested us very much.

The research activities have being carried out at all phases in the spring-autumn season. Role and phytocenological structure of the *U.dioica* species in the vegetation type have been studied, it was realized that the plant belongs especially to mesophyte ecological group in the flora as well as it is of valley-meadow, flood-lands elements. During the researches spread of the species in miscellaneous herb formations of grassland, bush, and forest vegetation within the plant grouping were observed in each three regions. Populations in the following amount were selected and evaluated as: Shahriyar Forest of the Small Caucasus (1-3), Yeni Yol of the Great Caucasus (4-6) 3, in the Nakhichevan AR (7-10) 4. In 2011 a comparative criteria was shown by using conception of ontogenesis of *U.dioica* species and registering them at immature (im), virginil (v), young generative (g1), middle age (g2), aged (g3), sub-senile (ss) and senile (s) periods. On the result according to the research method of the populations, materials collected at different phases of the plant their ontogenesis structure have been identified; development phases at plant individuals entirely defined, the obtained conclusions were specified on the diagramme (fig.1).

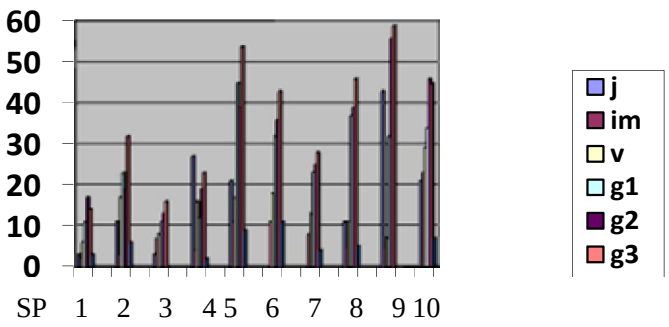

Figure 1. Ontogenetic structure of *Urtica dioica* species in 2009

As it is seen in the diagramme the generative development phase of ontogenesis mainly is characteric for all populations. Individuals belonged to sinil and subsinil periods in some populations (for eg.: at 3 and 9) were not met. Even increase of amount of those individuals belonged to the juvenile period at the populations were registered (at 3 – 33 plants, at 9 – 43 plants etc.). g_1, g_2 and g_3 phases are characteristic for all populations (260-360 plant individuals) and it tells about the stable development of the plant. Ascertaining of individuals belonged to hydrocyanic and sub-hydrocyanic periods at 3.46% of the plants spread in the natural populations tells us that these plants are young.

Structure of the ontogenesis of *U.dioica* species has also been studied by the same conseption

in 2010-2011 (Figure 2. and Figure 3).

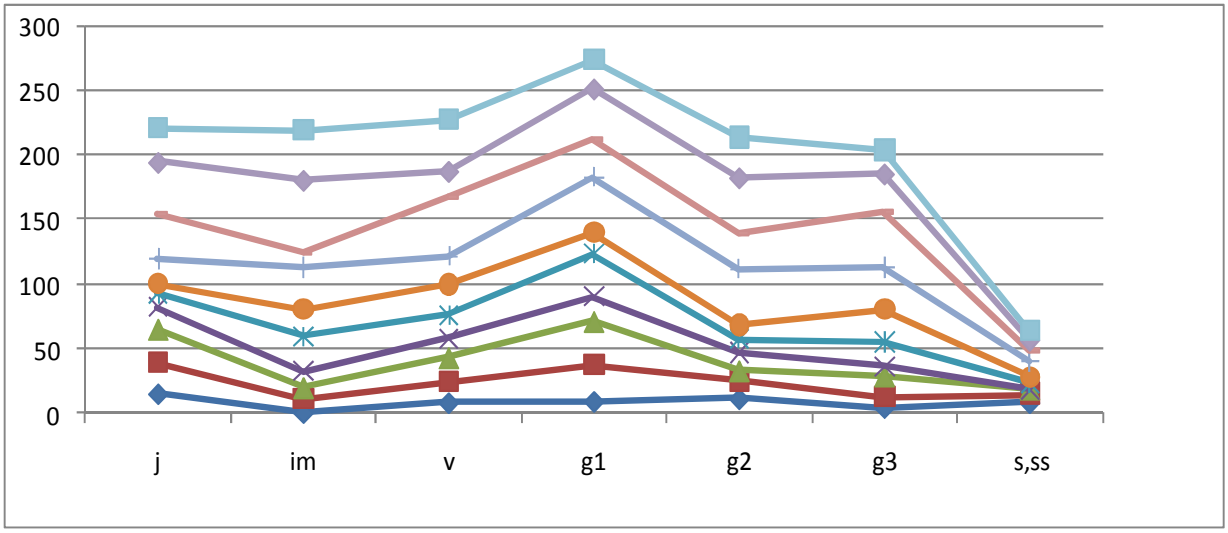

Figure 2. Ontogenesis Structure of the *Urtica dioica* species in 2010.

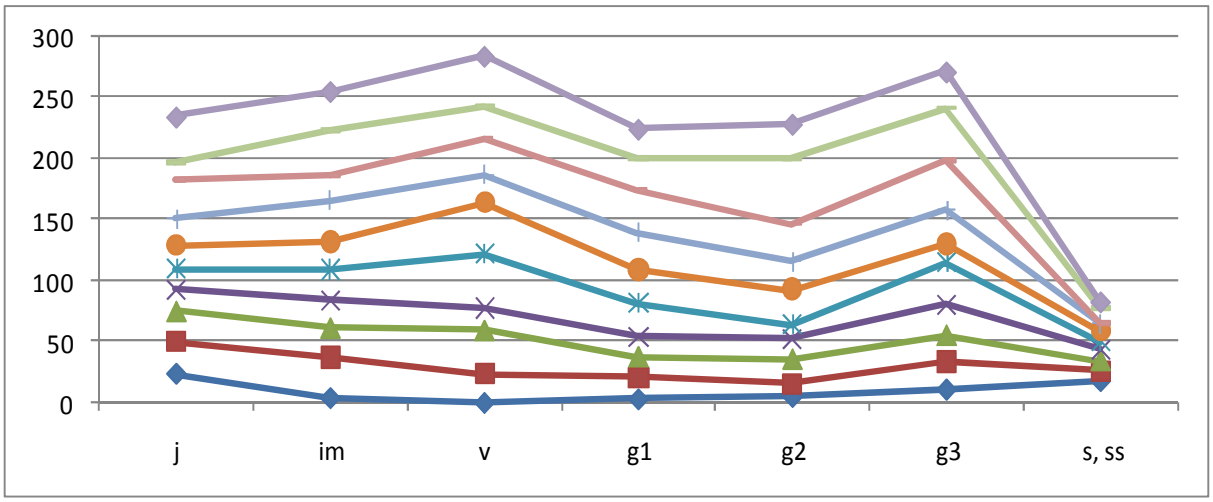

Figure 3. Ontogenesis Structure of the *Urtica dioica* species in 2011

It is clearly seen from the diagrammes that ontogenesis structure of the *U.dioica* species in the regions (The Nakhichevan AR, The Small Caucasus and the Great Caucasus) are the same, i.e. the aged individuals (s,ss) were being sharply decreased in the populations. Generation of new individuals, abondance of (j, im and v) phases and also the generative development is in the maximum limit (g_1-g_3) prove it once more.

In the same years a cenological evaluation at the natural phytocenoses of another medisinal plant *Astragalus dasyanthus* Pall.species has been carried out; a keen narrowing was observed at its populations. 3-yeard integrated ontogenic structure of the plant were specified in diagramme 4.

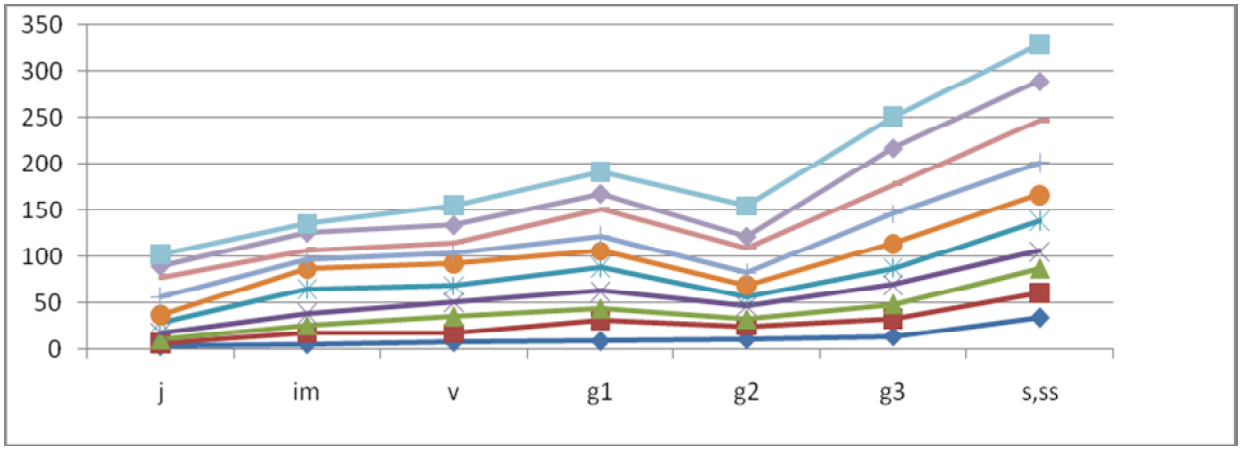

Figure 4. Cenopopulation structure of *Astragalus dasyanthus* species according to 2009-2011 years.

As it is seen from the diagramme individiuals belonged to sinile and subsinile periods i.e. aged ones of *A.dasyanthus* species at natural populations were gradually increased and the sum of the new individuals in common populations were not more than 150. And instead of it amount of the aged individuals were not more than 300.

I'd note that mainly the root and leaf of *A.dasyanthus* species are used as medicinal herb. As it has got sedative, hypotensive and vasohypotonic features it gives a good effect at treatment of deseases as: neurosis, hypotenia, chronical cardio-vascular deffect of I-II degree, at keen and chronical nefritis. Instruction of reciept: a spoonful plant is extracted in 250mg boiled water; the medicine is taken 3 times a day 20-40min after the meal. It is at the same time diuretic.

As a result of anthropogenic stresses decrease of the plant has been registered and there is a probability of to be undergoing to threat of lost in near future. It seems the roots of young plant are systematically collected and used by people that influences to the decrease of the plant. We consider the plant can be made to return back to its previous status by its reintroduction in its spread areas. Results of such researches carried out in natural populations can assist preliminary study of the situation in the ecosystem and prevent such possible treats.

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