

Full Length Research Paper

Protection of some rare and endangered vegetable plants in the flora of the Nakhichevan AR

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This research work is dedicated to the status evaluation in accordance with categories and criteria adopted in the international scale (IUCN) of some valuable species that are rare and the threatened ones in Nakhichevan flora. An evaluation was carried out on 14 species that are being decreased in the region and the results are as follows: *Bilacunaria microcarpa* - EN/A2ac+C1; *Dorema glabrum* - EN/A1cd+C2ab; *Eremurus spectabilis* - CR/B1ab(v)+B2ab(iv); *Allium akaka* - EN/B1ad(ii)+C1; *Arum rupicola* - VU/A3ab(iii)+C2ab(ii); *Puschkinia scilloides* - CR/B1ab(v) + B2ab(iii); *Stenotaenia macrocarpa*, *Gundelia tournefortii* and *Crocus speciosus* - LC; *Rheum ribes*, *Urtica urens*, *Prangos acaulis* and *Allium woronovii* - NT; and *Scilla mischtschenkoana* - DD.

Key words: Endangered plants of wild food, category and criteria, red list.

INTRODUCTION

The species' significance for food, medicine and other fields, as well as the vegetation kingdom, is gradually getting less and less and is being considered among the main priorities that a country would possess today. World scientists think that people will find themselves opposite to serious problems of food and water in the near future (Report of a WG on MAP ECPGR, 2004 to 2007). Genetic bases are owned by the countries, in other words, the biodiversity is under a big risk. In protecting the fauna and flora, restoring ecological balance, preserving and protecting rare and threatened plant species all over the world, several arrangements are being implemented (Akchakaya et al., 2000).

Azerbaijan is considered as one of the successful countries being an owner of vital origins for food safety of people. This significant resource abundance presented to Azerbaijan both economical and sustainable use and balance building responsibilities. Benefit of these potentialities and the descent biological resources of

Azerbaijan to the future generation are found along with the actual problems (Ibadullayeva, 2001; Talybov, 2001). Taking into account all of these, the current status of the rare, relic and endemic (at the same time significant for food) species of the Nakhichevan Autonomous Republic (that is, the integral part of Azerbaijan) have been evaluated.

MATERIALS AND METHODS

The research work was implemented in Sadarak, Sharur, Kangarli, Bahbak, Shahbuz, Julfa and Ordubad regions, and around Nakhichevan City of the Nakhichevan AR. Rare and dangerous food plant species' samples were taken as a test subject. The achieved sowing materials were introduced in the Botany Garden of ANAS Nakhichevan Department in Bio-resources Institute. Two species of the introduced plants were grown by seeds and more than 10 species were grown by the vegetative way; in addition, phonological observations (Mazurenko, 2009; Lapina, 1975) and monitorings (Yelagin, 1964) were implemented.

Seed samples were delivered to the National Gene Bank, which functioned under the subordination of the Genetic Resources Institute for long-term conservation. Initial data related to rare and threatened species have been taken from 'The Red Book' (Talybov and Ibrahimov, 2010).

Recently, a number of arrangements are being implemented on

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Table 1. Endemicness and evaluation of the rare vegetable species of Nakhichevan flora.

Plant	Endemics		IUCN to value
	Caucasian	Azerbaijan	
<i>Bilacunaria microcarpa</i>			EN/A2ac;C1
<i>Stenotaenia macrocarpa</i>	+		LC
<i>Dorema glabrum</i>		+	EN/A1cd;C2ab
<i>Gundelia tournefortii</i>			LC
<i>Rheum ribes</i>	+		NT
<i>Urtica urens</i>			HT
<i>Prangos acaulis</i>			HT
<i>Crocus speciosus</i>			LC
<i>Scilla mischtschenkoana</i>			DD
<i>Eremurus spectabilis</i>			CR/B1ab(v);B2ab(iv)
<i>Allium akaka</i>			EN/B1ad(ii);C1
<i>Allium woronovii</i>			NT
<i>Arum rupicola</i>			VU/A3ab(iii);C2ab(iii)
<i>Puschkinia scilloides</i>			CR/B1ab(v);B2ab(iii)

the purpose of protection of species with a limited areal spread all over the world. A 'Red List' of the threatened species as well as their categories and criteria were composed by the IUCN Council and a clear system was worked out to classify the highly threatened species (IUCN, 1994, 1996). Since 2001, the use of the new 3.1 version has commenced (Gärdenfors et al., 2001). Alongside with all of these, version 3.1 of 2003 of the IUCN was also used to evaluate species including CR, EN and VU categories (IUCN, 2003). The existing categories and criteria of the IUCN were used at the evaluation. As 9 categories of the IUCN were used in a new version, we also tried to evaluate the threatened plants according to those categories.

RESULTS AND DISCUSSION

In the period of the research years, the status of some significant rare and threatened species was defined in nature and both the categories adopted in the international scale and their relationships with the biome were registered. First of all, their previous and today's status, as well as their restricted factors have been specified and they were accessed in one of the relevant categories.

As wild food plants were widely used, the limit of their appearance within the threatened or endangered scale was higher. Taking into account the reasons why the plants become rare and why the disappearance of the plants spread in the Nakhichevan AR area, the data obtained from the literature (Hajiyev et al., 1996; Ibadullayeva, 2004) and the researches carried out, were evaluated as follows: Certain criteria (A, B, C and D) of each category were registered.

Criterion A was applied in the case of 90% reduction for the last 10 years or according to observation of 3 generations; in this case, the sub-features besides the taxon category and feature that was under a serious danger were taken into account. At the same time, an

activity plan has been developed to eliminate reasons for the decrease.

Criterion B was applied in the case of wrong consideration or the initial classification was not accurate yet. All the evaluations noted hereby declared the endangered classification met by the criterion and sub-criterion. In this case, a minimum criterion was registered. In the case where more than one criterion and sub-criterion have been registered, it means that each of them was enumerated. After taking them into account and registering all of these, the taxon was evaluated according to the 'Red List' of the IUCN. Sometimes, if the criterion registered in this study is not met, it is automatically located in the lower category of the previous danger.

Criterion C was applied in the case of location change and was registered at the previous danger position of the taxon, otherwise the populations in the regions are not in the same danger position. In this case, moves of the categories were completely ascertained and re-evaluated again.

Criterion D was not met during the research and should be applied in the case of definition of any geographical condition or different groups. If there is any little demographic change or genetic change or migration, it should be indicated. The study would like to note that categories and criteria of the present status of the majority of food plants and vegetables being under danger have been carried out in full accordance with the IUCN Regulations; however, the achieved results were indicated in Table 1.

As it is seen from the Table 14, vegetable species are under danger in the Nakhichevan flora. In the case of taking into account the 107 wild plant species that spread in the AR (Gasymov, 2010), it can be concluded that one of each 10 species is under danger of loss.

Bilacunaria microcarpa

As the amount dynamics of this species in the wild is not completely known, it is ascertained that it moves to a danger position of loss. Nevertheless, 90% reduction was observed during the last 10 years. The observation has been directly registered in this and at the same time, vital environment quality also reduced as a result of the anthropogenic factors (A2ac). More than 2500 plant species nowhere have been met within the AR. During the last 5 years, 20% of uninterrupted decrease has been registered (C1). It means that danger of the taxon's loss is considered to be high in the wild. The main restricted factor for the species is the massive and spontaneous collection of the plant species for trade as a result of anthropogenic factors. The plant is used as green vegetable and marinade, and it is also sold in markets. For the result of the researches that were carried out, it was ascertained that a distance of 3 to 5 km from the localities and settlements, between 5 and 10 plants per 1 km²; a 5 to 10 km distance, between 20 and 25 plants per 1 km²; and more than 10 km distance, between 25 and 50 plants per 1 km² were registered. It indicated that the species was under danger. The species' small populations were preferably met in the areas close to religious places like: Asny (Garabaghar Village), Gibla Spring-White Rock (Havush Village), Goynuik Sanctuary, Ganza, Salvarty (Shahbuz Region) and Black Valley (Julfa Region). It is also related to the people's belief in order not to touch substances, plant, animal, birds, etc., in the religious places.

Stenotaenia macrocarpa

This species is a unique Caucasus endemic, whose danger of loss is not so much (LC). According to its criterion indexes, it is one of the taxa that are not relevant to the aforementioned categories; however, it is one of those taxa, whose populations are relatively under danger. It can be met in the glades, bushy and woody areas of 1600 to 1900 m above the mean sea level. It is propagated by seeds. Change of its growing area caused a resource change of the irregular collection. It is accessed into the 1989 issue of the 'Red Book' of Azerbaijan. During the investigation carried out, it was observed that the species was used as food in fresh state only and its spread area was extended. So this species generates joint populations together with everlasting pea (*Lathirus* L.) genera, representatives of wild cereals (*Poaceae* Barnhart) in the areas like: Alchaly Spring, Darabichanak (Sharur Region), Batabat Forest (Shahbuz Region), Yarpagly (Bashkand Village), Daraboghaz (Kuku Village), Khazinadara (Arafsa Village), etc. That is why the *S. macrocarpa* species' accession into the 'Green Book' is considered as reasonable.

Dorema glabrum

It is a unique endemic plant that is endangered and the taxon is under threat in the nearest future. Its previous populations have not been met in several years. Perhaps, it survives in wild landscapes where people can not reach and therefore it is accessed in this category. The achieved arguments also indicate that the taxon is relevant for criteria A to C.

It spreads in the altitude of 600 to 1800 m above the mean sea level in the Nakhichevan AR. This species was included in the 1989 issue of the 'Red Book' of Azerbaijan. It was suggested that its preservation should be established in places where it was immediately distributed and multiplied in the Darydagh area (Ibadullayeva, 2004). The plant samples were collected from the areas of Zarani Station (coast of the Araz River), Garadara, Goynuk, New Havush and Hady Gayib. It was met by few populations in Duzdagh, Darydagh, hills along the road of Tanannam and Goynuk. Its resources disappeared and were used like green vegetable and medicinal plant. In addition, they were sold in markets.

Gundelia tournefortii

It is a unique front Asia species, with small populations seen in the areas of: Bilav, Tivi, Bist, Goynuk, Shurut (Ordubad Region), Paradash and Gyzylygshlag (Shahbuz Region). It is of the less threat limit category (LC) and its accession into the 'Green Book' was suggested by Talybov (2007). According to the category indexes, there is no access to any of the aforementioned categories, but its populations are considered as one of the taxa under threat. Its young stems are used in fresh state by peeling as green vegetable. It is multiplied by seeds in the wild/nature. So in July to August, seed-balls are opened and the seeds spread around, or as the dry plants are light, they are easily rolled on the ground by winds. In this way, the seeds spread around the area and grow in opportunity conditions. However, its seed origination has been achieved at the Botany Garden of the Institute of Botany, in Nakhichevan AR, while normal sprouts have been achieved in the initial spring from the sown seeds in autumn.

Rheum ribes

It is a unique endemic species and is accessed in the issue of 1989 for the 'Red Book' of Azerbaijan. It spreads in the territory of Nakhichevan AR only and is one of the taxa that are close to the danger limit (NT). It is usually grown in stony slopes. These species should be preserved and protected in special preservations or protection sites in order to study its biological properties. Its cultivation has been achieved by G. Sh. Shiraliyeva in the cultural flora; and it was restored again in the area of

about 2 ha in Batabat Province. In addition, the biology of the species was studied in detail (Shiraliyeva, 2009). Their uses, like medical and food plants, livestock trampling down the spread areas and extension of the new mountainous roads, are the factors influencing the decrease of its resource. However, the species was seldom seen in the areas of Duzdagh, Validagh, Gishlag, Darydagh and Nokhuddagh.

Urtica urens

It is a unique endemic species close to the danger limit (NT). Supposedly, loss of the taxon is bound to happen in the nearest future, in that it has not been met in many of the previous populations for several years. It might exist in natural landscapes out-of-reach by human beings. Its very few localities have been registered in the areas of Bichanak and Khazinadara Villages, and Nakhichevan suburb. Broad populations of the species were met during the investigation. Its use, like food and very valuable feed, is caused by a decrease of its resource.

Prangos acaulis

Its accession into the 'Red Book' had been suggested in the past 10 years (Hajiyev et al., 1996). Moreover, it is a unique plant. As it is intensively collected by the people for the purposes of food and trade in the early spring, its resource is running out. There is a probability of it getting under great threat of loss in the wild soon. It is possible to meet its sub-populations together with the *P. acaulis* in Duzdagh, Havush, Shurut, Ardyjdagh, Garagush meadow, Kuku and other areas from 650 to 1800 m above sea level. However, as its stems are being cut from the root during its collection and they do not even allow them to blossom, representatives of the species are getting few and decreasing day-by-day. As such, protection of the plant is urgent for these reasons.

Crocus speciosus

This species was ascertained as one of the taxa that were not accessed in CR, EN and VU categories, but it would be under threat in the nearest future when it is evaluated. That is why it is accessed in the category of low threat limit (LC). It spreads in the areas of Batabat, Khazinadara and Nurgut of Nakhichevan A.R. Consequently, together with the representatives of the sedge family, they make small populations in forest glades. Their resources decreased as they were intensively collected in the blossom period in autumn.

This plant should be preserved and protected in special preservations and its biological property should be studied. Its protection is urgent and necessary. It can be

also used in landscaping and decoration purposes as it is a decorative plant. However, the plants blossom in autumn and they are usually eaten by livestock as feed in spring and autumn. It is considered that the main restricted factor is livestock feeding within a normal limit where they grow.

Scilla mischtschenkoana

This taxon has not been studied that much and there is no much information about it. That is why it was accessed in the DD category. It has also been seldom met recently. Perhaps, it widely spreads in the areas that are not reached by humans; however, there is no information about the localities. Decrease of the species has been registered during the past 10 years (Talybov, 2009).

The species grow in rock clefts and among rock embankments in the low and middle mountainous belts. They mainly generate very small populations (25 to 30 plants) together with some early spring plants in Kotam, Ganza, Paradash, Garagush, Khanbulag, Demilar and Saatdash areas. They are collected and dried like vegetables and used in winter for food. They are sold in markets under the name "ağ pencer" and "eleyez". This factor causes the decrease of the plant resources.

Eremurus spectabilis

Its accession into the 'Red Book' was suggested at some point in time. At present, it is one of the taxa listed under the criterion and sub-criterion that is in the critical threat limit [CR/B1ab (v)], in the category of B2ab (IV), that is, spread rate B1 and spread area B2. The rate at which it spreads is less than 1 km² (B1); however, it spreads one-by-one and is known by everyone (a). As such, a continuous reduction has been observed (b). Although, the taxon can be evaluated in the spread area (v) by its amount only, mapping with locality spots is not possible. There are 2 plants per 10 km² (B2) at minimum, and it is evaluated on the base of the decreased areas between a-b and the amount of the sub-populations (IV).

As young plants are usually collected for food purposes in the early spring, they can not blossom. That is why their resources gradually decreased. The species originate absolutely or together with the other spring plants' sub-populations mainly in Havush, Ardyjdagh, Garagush Meadow, Ganly Gyol, Batabat, Khazinadara and Nurgut areas. The main restricted factor is its intensive and spontaneous collection for the trade purposes as a result of anthropogenic effects.

Allium akaka

This species belongs to the (C1) category that is found in the endangered limit [EN/B1ad (II)]; and there are enough

arguments concerning the taxon being forced to danger. It meets B1-C1 sub-criteria and medieval criterion on a relevant level as an individual obliged to a critic danger and that is why it is under a high risk of loss in the wild. The amount dynamics of the plant in the populations is not less than 250; although a minimum of 250% continuous decrease was observed during 3 years. The observation has been registered in the longer period than the generation observation and its access into the 'Red Book' was suggested at some point in time.

It is an onion with a nice view, and its root is eatable. This species is usually seen in Kotam, Areji, Garagush and Saatdash areas. It originates from sub-populations with other plants in the low and middle mountainous belts of the AR.

Allium woronovii

It is one of the taxa that are close to the endangered limit (NT). It is widespread from the middle mountainous belt to the sub-alpine belt. It grows in dry, stony and rocky slopes and in embankment areas in a seldom order. The plants' blossoming and seed maturation period is usually from May to June. The species is seen in Shahbulag and Garagush areas and in Gilanchay Basin.

Arum rupicola

The evaluation of this species coincided with the criterion and sub-criterion (ab) of the A3-C2 in the weak or sensitive category C2ab (II). Restoration of its amount dynamics is not possible in the wild. It is assessed in this category because of its approach to threat of loss. The decrease projected by 3 generations during 10 years is 30%. As the continuous decrease and extreme changes are observed in the amount of the taxon, the spreading level of the taxon in the wild is considered as weak.

It is collected like vegetable in the early spring, and is dried and used in winter. In addition, it is sold in markets in dried state. The plant is also used for medical purposes and it is the main restricted factor. The species is seen in the Baghyrdash Valley, Khanbulag, Ar Daghy, Bilav, Bichanak and Nahajir areas in a single population only or seldom under dog rose (*Rosa canina* L.) bushes, goat's-wheat (*Atraphaxis* L.), barberry (*Berberis* L.) and honeysuckle (*Lonicera* L.) bushy trees.

Pushkinia scilloides

This species has been evaluated in the category of B2ab (III) and is found close to the critic endangered limit [CR/B1 ab (v)]. Its spreading radius is less than 100 km² in sub-populations; moreover, more than 2 taxa are not usually seen in 10 km². It spreads one-by-one and its

decrease is continuous; in other words, a keen reduction is being observed in the amount of the taxa every year.

The species was generally being observed in Gunnut, Sarybulag, Usub Yurdu, Demilar, Garagush Meadow, Kuku, Batabat, Khazinadara and Gapyjig areas. The plant usually grows in embankment areas and desert slopes among mixed populations. They are cleaned of their flower stems being collected for food purposes in spring.

So, 14 species of wild vegetable in the region are rare and opposite to loss threat. Nonetheless, carrying out the following measurements to preserve these plant species is purposeful:

1. A seed collection sample is performed to collect the species gene pool, not harming its biological decrease;
2. Generative or vegetative reintroduction of the species to extend their spreading areas and natural resources increase;
3. Informing people, including pupils and students, in educational institutions concerning to these plants and their preservation, as well as hanging posters in the territory of settlements close to the spreading areas of these species;
4. Strengthening of the control on the existing biotopes of the species in the areas of preservation status, like national parks, preservations, reservations, arboretums, etc.

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