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Diversity of Subspontaneous Ferns of Ajara Floristic Region

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ABSTRACT. In the paper, subspontaneous ferns propagated in Ajara floristic region are described. Systematic and geographical analyses of ferns are made. Biological peculiarities are studied of subspontaneous non-native ferns of 4 families, 6 genus, 7 species. The ways of invasion and peculiarities of propagation of these ferns in Ajara floristic region are considered. Two new species of subspontaneous ferns for Ajara floristic region (*Pteris serrulata* Forssk., *Neprolepis exaltata* (L.) Schott.) are described. *© 2015 Bull. Georg. Natl. Acad. Sci.*

Key words: *fern, subspontaneous plants, ecdemic ferns.*

Expansion of exotic plants in Georgia began since ancient times. Kolkheti, and especially Ajara region of the Black Sea shore due the climatic conditions is the best area for non-native invaded species. Subspontaneous plants are one of the categories of non-native plant species propagated into wild nature from the cultural [1].

Batumi Botanical Garden situated on the Black Sea shore Ajara region is rich in ancient elements of flora and phytome rather typical for Kolkheti, therefore it always was a subject of interest for many researchers. A.Krasnov considered it to be a particular botanic geographical unit [2]. Like other seaside places, Ajara region is characterized with perhumid and warm subtropical climate as the results of several years' observations in Batumi, Mtsvane Kontskhi and Chakvi weather stations confirm. Intensified condensation induced by the interaction of humid air masses from the Black Sea and mountainous relief of sea shore causes abundance of atmospheric precipitations (annual rainfall equals 2400-2700 mm). Air average temperature varies within the limits 13.8-14.4°C. In January the average temperature is 4-6°C and in August it is 22-23°C. The absolute maximum temperature reaches 38-40°C, and the absolute minimum temperature may fall to -10 °C. Precipitation as snow occurs rarely and the height of its cover does not exceed 10 cm, in average. Relative humidity of air varies within the limits 70-80%, annual average wind speed is 4.6 m/sec, and maximum speed reaches 39 m/sec [3].

Materials and Methods. The subject of our study was non-native subspontaneous ferns propagated in the Batumi Botanical Garden, and in the Ajara Black

Table. Diversity of subspontaneous ferns of Ajara floristic region

Species	Family	Areal of origin	Life-form	Immunity status
Adiantum cuneatum Langst. et. Eish.	*Pteridaceae*	South America	Perennial grass	
Cyrtomium falcatum (L. f.) C. Presl	*Dryopteridaceae*	East Asia	Perennial grass	
Dryopteris atrata (Nallich.) Ching.	*Dryopteridaceae*	East Asia	Perennial grass	
Onoclea sensibilis L.	*Onocleaceae*	East Asia	Perennial grass	
Pteris vittata L.	*Pteridaceae*	Africa	Perennial grass	LC ver 3.1
Pteris serrulata Forssk.	*Pteridaceae*	Mediterranean Sea	Perennial grass	
Neprolepis exaltata (L.) Schott	*Nephrolepidaceae*	Tropics	Perennial grass	

sea shore greenery in whole. The study is based on the literature data, treatment of samples existing in the exsiccatae of the Batumi Botanical Garden and results of field works in different periods and seasons and processing of observations.

While considering the published literature we focused on the data on flora of western and South-western Georgia [4-9], including greenery of Ajara floristic region. It was found out from the existing literature sources that non-native ferns are met in Ajara floristic region only; porous non-native species of the highest plants are not observed so far in adventive flora of northern Kolkheti (Apkhazeti) and central Kolkheti [10,11].

Data on non-native ferns first were published in [4] by Dmitryeva where 2 species are considered: *Dryopteris atrata* and *Cyrtomium falcatum* .

According to the latest literature data, 5 non-native sub-spontaneous ferns were fixed in Ajara floristic region such as *Cyrtomium falcatum* Sm.; *Dryopteris atrata* (Well.) Ching.; *Onoclea sensibilis* L., *Pteris vittata* L., *Adianthum cuneatum* Langst. et. Eish. [4,5,9].

Results. At present, based on data of the botanical garden herbarium, processing literature data and results of our study we registered 7 species of 6 genus of 4 family of non-native sub-spontaneous ferns. All the species are perennial herbaceous plants (Table).

Systematic structure analysis of sub-spontaneous ferns propagated in Ajara showed that they are integrated into the 4 families: *Pteridaceae* (3 species), *Dryopteridaceae* (2 species *Onocleaceae* and *Nephrolepidaceae* 1 species) and 6 genera: *Adiantum* (1 species), *Cyrtomium* (1 species), *Dryopteris* (1 species), *Onoclea* (1 species), *Pteris* (2 species), *Neprolepis* (1 species).

According to generation, sub-spontaneous ferns in Ajara floristic region are distributed as follows: east Asian – 3 species: *Cyrtomium falcatum* (L. f.) C. Presl, *Dryopteris atrata* (Nallich.) Ching., *Onoclea*

Fig. 1. *Cyrtomium falcatum*

Fig. 2. *Pteris vittata*

sensibilis L., Mediterranean – 1 species: *Pteris serrulata* Forssk., African – 1 species *Pteris vittata* L., tropical - 1 species *Nephrolepis exaltata* (L.) Schott, south American – 1 species *Adiantum cuneatum* Langst. et Eish.

Habitats of the sub-spontaneous ferns, propagated in Ajara, are almost the same as habitats that are propagated in areal of origin.

In ecotopes at stony places of dry rocky slopes and stone walls *Cyrtomium falcatum* (L. f.) C. Presl., Fig. 1, *Pteris vittata* L. are met.

Adiantum cuneatum L. and *Pteris serrulata* Forssk. belong to wet rocky places. In woody ecotopes *Dryopteris atrata, Nephrolepis exaltata* (L.) Schott. are propagated in wood ecotope and *Onoclea sensibilis* L. is propagated in ecotope of perhumid meadow places.

In Ajara floristic region *Cyrtomium falcatum* (L. f.) C. Presl, *Dryopteris atrata* (Nallich.) Ching., *Neprolepis exaltata* (L.) Schott., *Onoclea sensibilis* L, are met rather frequently; rarely are met *Pteris vittata* L 2., *Adiantum cuneatum* Langst. et. Eish. and *Pteris serrulata* Forssk 3.

By the Red list of International Union for Conservation of Nature (IUCN) only one species among those species *Pteris vittata* L. is protected.

The results of our studies are the following: 6 species of 7 of subspontaneous ferns of Ajara floristic region develop sporules with germinating ability conditioning their propagation. The species *Nephrolepis exaltata* (L.) Schott 4 is reproduced only in vegetation way – by root stalks; *Adiantum cuneatum* Langst. et. Eish., *Onoclea sensibilis* L., *Pteris serrulata* Forssk. propagate as by sporules so in vegetation way. Vegetative propagation of *Onoclea sensibilis* L. in difference with other two species is especially fast.

Fig. 3. *Pteris serrulata*

Fig. 4. *Nephrolepis exaltata*

ბოტანიკა

აჭარის ფლორისტული რეგიონის სუბსპონტანური გვიმრების მრავალფეროვნება

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სტატიაში წარმოდგენილია აჭარის ფლორისტულ რაიონში გავრცელებული არაადგილობრივი გაველურებული 7 სახეობის გვიმრა: Adiantum cuneatum Langst. et. Eish., Cyrtomium falcatum (L. f.) C. Presl, Dryopteris atrata (Nallich.) Ching., Onoclea sensibilis L., Pteris vittata L. Pteris serrulata Forssk., Neprolepis exaltata (L.) Schott. რომლებიც ბუნებაში კულტურიდან გავრცელდნენ. ამათგან ორი სახეობა Pteris serrulata Forssk., Neprolepis exaltata (L.) Schott. ახალია აჭარის ველური ფლორისათვის. წარმოშობის მიხედვით აღმოსავლეთ აზიურია 3 სახეობა; ხმელთაშუა ზღვისპირული, აფრიკული, ტროპიკული და სამხრეთ ამერიკულია თითო სახეობა. აჭარის სუბსპონტანური გვიმრებიდან შედარებით ხშირი შეხვედრილობით ხასიათდებიან: Cyrtomium falcatum (L. f.) C. Presl, Dryopteris atrata (Nallich.) Ching., Neprolepis exaltata (L.) Schott., Onoclea sensibilis L, უფრო იშვიათია Pteris vittata L., Adiantum cuneatum Langst. et. Eish., და Pteris serrulata Forssk. ჩვენი გამოკვლევების საფუძველზე დადგინდა, რომ აჭარის ფლორისტული რაიონის სუბსპონტანური გვიმრების 7 სახეობიდან 6 ოვითარებს აღმოცენების უნარიან სპორებს, რამაც განაპირობა მათი გამრავლება-გავრცელება. ერთი სახეობა, Nephrolepis exaltata (L.) Schott მხოლოდ ვეგეტაციურად ფესურის საშუალებით მრავლდება, ხოლო Adiantum cuneatum Langst. et. Eish., Onoclea sensibilis L., Pteris serrulata Forssk. მრავლდებიან როგორც სპორებით, ასევე ვეგატაციურად.

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