THE COLCHIC LOWLAND ALDER WOODLAND WITH BOXWOOD UNDERSTORY (ALNETA BARBATAE BUXOSA) AND THEIR SOIL INVERTEBRATE ANIMALS

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(Received February 15, 2007)

Abstract

On the 14-15 ha territory of Colchic lowland the flooded forests with evergreen undergrowth are found for the first time. The soil population of invertebrate animals of alder woodland with boxwood is close to the same of boxwoods developed in Kintirishi Reserve and Racha Range. These relic ecosystems need an urgent conservation.

Introduction

The Colchis (Colchida, Kolkhis) is a well-known refugium for many Tertiary relic plant species and reveals as an etalon of heritage of the natural history. It can be concluded that, the swampy broadleaf forests are thought to be descendants of ancient boreal Tertiary period flora that once covered a large part of the Colchic lowland. Floristically rich alder forests (Alnus barbata) are especially characteristic of the abundant swampy lowlands. Alder woodland with boxwood (Buxus colchica) understorey is among the most important forest types. However, literature on this type of wetland forests (alder forests with evergreen boxwood understorey) preserved in swampy lowlands of Colchida is scarce. Several of the authors [Povarnitsin, 1936; Ketskhoveli, 1960; Kolakovsky, 1961; Sakhokia, 1980] describe that alder woodland with boxwood understorey were broadly represented in the Colchic wetlands. The most important information about density of boxwood forests in the Colchic lowlands was described by A. Gamrekeli [Gamrekelov, 1889:7]. He provides the citation of famous naturalist Prof. A. Nordmann (1803-1866) “on all of destination from Poti up to the check-point of St. Nikolai (Shekvetili) there is a very large forest of Boxwood, which fills air with boxwood smell”.

In the most recent literature, there was no information about presence of boxwood in the bottomland forests of the Black Sea coast. It can be concluded that, boxwood, like many ancient relic species disappeared from the bottomland forests of the Black Sea coast and saved mainly on the terraces of river gorges, along streams and calcareous habitats in the lower mountain zone [Mosulishvili, 2005].
Material and Methods
The researches were provided in July and October 2005. The soil invertebrate animals of alder woodland with boxwood understorey on both sides of riv. "Didi Gali" (rv. Tikori basin) were studied. For sampling of the materials the standard methods of soil zoology were used [Chillatov (ed.), 1987]. As coefficient of faunal likeness between different plots, indicating species identity, Acozard's coefficient was calculated.

The calculation of community likeness was based on Renkonen's coefficient, which expresses the dominance identity of the site's fauna derived by summing up the lesser of the dominance values of each species occurring in the two sites compared [Krebs, 1989].
The ecological characteristics of investigated plots are as follows:
1. The right bank of riv. "Didi Gali", alder woodland with boxwood understorey N 42° 21' 793", E 41° 37' 017" H = 5m;
2. The right bank of riv. "Didi Gali", alder woodland with boxwood and butcher's broom understorey;
3. The right bank of riv. "Didi Gali", Hornbeam forest with butcher's broom and boxwood understorey N 42° 23' 105", E 41° 36' 208";
4. The right bank of riv. "Didi Gali", Swampy alder woodland with evergreen colchic understorey. Buxus - as the subdominant;
5. The left bank of riv. "Didi Gali". Alder woodland with boxwood understorey.

Result and Discussion
In 2006, during working on the Wetland Ecosystem Project in the central Colchis, in the Tikori river basin, near Akaria, in the surroundings of "Didi Gali" it was revealed the fragment of the ancient relic Colchic forest, swampy alder forests with an understorey of boxwood (Alnus barbata barbata) (Fig. 1). Alder stands, as a many branched groups, represented as small size hills, spread in the wetlands with more or less intervals; the areas between the alder stands is covered with numerous wetlands including marshes and swamps. The alder woodland has been cut several times here and is degraded, at the same time morpho-physiometrically and structurally is not well organized. In some places a height of alder and boxwood trees were equal. In the prophehy of this alder woodland too many cut branches of boxwood trees were left.

The height of the main canopy species is about 7 - 8 m, the wood of the most of trees is ca 10 - 20 cm in the diameter (1.5 m above soil); forested lands occupied with stands of 0.4-0.5 density. The Buxo - Alnion forests are not rich in woody species and these species participated with the lowe density in the mentioned above woodland. These woody species are following: field maple (Acer campestre), elm (Ulmus glabra), common ash (Fraxinus excelsior), Caucasian wingnut (Pterocarya pterocarpa), hornbeam (Carpinus caucasica), beech (Fagus orientalis) etc.

In the alder stands, the understorey mostly forms boxwood, which rich up to 5-6m height. Together with boxwood, in the formation of the understorey participate following species: butch's broom (Ruscus aequale), alder buckthorn (Frangula alnus), common hawthorn (Crataegus laevifolia (monogyna), Anatolian blackberry (Rubus anatolicus), raspberry (Rubus idaeus), broad leaved spindle (Euonymus latifolia), guelder rose (Viburnum opulus), common elder (Sambucus nigra), holly (Ilex colchica) etc., also vines; tall brack (Smilax excisa), silk vine (Periploca graeca), and common ivy (Hedera helix).

Herbaceous vegetation of alder forest of the Colchic lowland is the following: Ophiopogon pendulafilis, Persicaria hydropiper, Arthrosteg hispidus, A. langsdorffii, Truellium thunbergii, Hydrocotyle ranunculoides, Iris pseudacorus, Juncus effusus, Sparganium neglectum, Carex vesicaria and Scirpoalgo neglecta. Most of the herbaceous plants of the listed above species forms
mono-dominant communities, spread on small area, which is the reason that the herbaceous vegetation here is heterogeneous and variegated. There are the following free floating aquatic plants: Salvinia natans, Hydrocharis morsus-ranae, Lemna trisulca, L. minor, Ceratophyllum submersum etc. in the marshes, streams and channels.

Fig. 1. Iris pseudacorus and boxwood on the left bank of "Didi Gali" river.

Beside those plant species, there are some other plants in the alder woodland with boxwood understory, which form more lower levels of the cenotypes. These species are the following: Carex acutiformis, Dryopteris filix-mas, Juncus befomius, J. inflexus, Kyllinga gracilis, Lycopus europaeus, Poa nemoralis, Paspalum dilatatum, Polypodium vulgare, Phyllitis, Schoenopendrium, Pachyphyagma macrophyllum, pteridium tauricum, Pteris cretica, Sagittaria trifolia, Solanum pseudopoeicum, T. latifolia, Urophasia platyphyllum, Phacelia globosa etc.

Unfortunately, a recent ecological condition of the alder woodland with boxwood understory of the central Colchic lowland is undesirable and it belongs to the critical ecosystems category. This forest represents the relic ecosystem and at present it is a degraded fragment of the primary original, the alder forest with boxwood understory, widely spread in the past in the Colchic lowland.

The research on the separate taxa of boxwood inhabiting animal population is very urgent and interesting. We studied most significant groups of soil invertebrate animals, such as nematode, earthworms and oribatid mites.

On the studied territory 21 species of nematode were registered: Trigla setifera, T. sp., Monhystera villiosa, Ploutus parvus, Mesodorylaimus spengeli, M. basili, Eudorylaimus acuticauda, Dorydorea triphila, E. carteri, E. diadematus, E. ligeunensis, E. sp., Aporealomellus kriegeri, A. obscurus, A. sp. Tylorcholaimella eseki, T. mirobilis, Cricrus papillatus, Comansus parvus, Jotonebus sp., Panagrolaimus rigidus. Most of them belong to the
order Dorylaimida. The great diversity of this order is characterized only for the natural ecosystems. The same results were received in natural boxwood ecosystems of Kintrishi Reserve and Racha Range as well [Jgenti et al., 2004, Kvavadze et al., 2004].

In soils of the alder woodland with boxwood understory only two species of earthworms were found (Dendrodromaena veneta and Dendrodrrito rubidaus tenus) with density 1-2 ind/m². Species diversity was higher in hornbeam-alder woodland with boxwood understory, where 5 species were registered: Dendrodromaena subterranius (8 ind/m²), D. hortensis (Michaelson, 1890) (4ind/m²), E. funceum (2 ind/m²), D. rubidaus tenus (2 ind/m²) and Phaenstima d figures (5ind/m²). The total density of the earthworms found on this territory composed 21 ind/m². These species are common for Kintrishi Reserve and Racha Range ecosystems where the understory is represented by boxwoods [Kvavadze et al., 2004].

On the studied territory 49 species of oribatid mites were registered. The wide distributed species with high dominance indexes were predominated in fauna. But a considerable number of mesotrophic species are also presented which are quite common in humid biotops of the western Georgia: Sigganacarus personatus, S. petuellis, Nanhermannia nana, Eremohelea geographica, Oribatella nigra, Acrocolurna longipilosa, Pergalumna minor, Edwaedzzes edwardsii and Oppia nitenis. In the swamped biotops the species typical only for the flooded ecosystems are also found, such as Oppia nitenis, Pergalumna minor and Edwardzzes edwardsii (Table 1).

Within the recent researches provided on the Anaklia territory [Murvanidze and Kvavadze, 2007], 52 species of oribatid mites were registered. The great part of them shows similarity with fauna found in alder forests with boxwood understory.

The early studies were conducted in the boxwood ecosystems of Kintrishi Reserve and Racha Range [Kvavadze et al., 2004, Murvanidze et al., 2004]. In Kintrishi Reserve boxwood is presented as an understory of chestnut forests and in Racha Range the chestnut forest with boxwood understory and pour boxwood are found.

**Table 1.** The list of oribatid mites of alder woodland, Kintrishi Reserve and Racha Range with dominance indexes (%) (dom. < 1:−)

<table>
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<th>#</th>
<th>species</th>
<th>Kintr. Reserve</th>
<th>Racha Range</th>
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<td>a1  a2  a3    a4  a5  k1  k2  r1  r2</td>
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<td>Pl. globosus</td>
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<td>Pl. italicus</td>
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<td>8</td>
<td>Pl. lentulus</td>
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<td>Pl. (?) mapry</td>
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<td>St. spinous</td>
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<td>St. spiculata</td>
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<td>71</td>
<td>Edwardsetes edwardsi</td>
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- 39 -
In the boxwoods of Kintirshi Reserve 41 species of orbatic mites were registered, and in Rachja Range - 34 species (Tab 1). Only in swamped alder woodland 23 species of orbatic mites were registered, in Kintirshi Reserve - 19 and in Rachja Range - 17. No common species was found in every site. 9 species were common for all three territories. 15 species are common for alder woodlands and Kintirshi Reserve, 16 - for alder woodland and Rachja Range and 11 - for Kintirshi Reserve and Rachja Range (Tab 1). Accordingly, indexes of faunal likeness showed 26% of similarity between alder woodland and Kintirshi Reserve, 21% - between alder woodland and Rachja Range and 17% - between Kintirshi Reserve and Rachja Range (Tab. 2).

| Table 2, Faunal likeness (%) of orbatic mites of alder woodland with boxwood understory, Kintirshi Reserve and Rachja Range |
|-----------------|----------------|----------------|
| alder woodland  | Kintirshi Reserve | Rachja Range |
| Kintirshi Reserve | 20              | 21             |
| Rachja Range    | 17              |                |

The cluster analysis shows that in clusters of faunal and dominance identities orbatic communities of alder woodland, Kintirshi Reserve and Rachja Range grouped separately. But in cluster of faunal likeness orbatic mites of Kintirshi Reserve grouped together with those of alder woodland; in cluster of dominance identities orbatic mites of one site in Kintirshi Reserve made 2 group with mites of alder woodland, and those of the second site made a group with dominant mites of the Rachja Range (Fig. 2 a, b).

The researches provided on will nematoda, earthworms and orbatic mites in alder woodland with boxwood understory and hornbeam-alder woodland with boxwood understory in riv. Tikori basin showed, that their species communities are similar to those of boxwoods of Kintirshi Reserve and Rachja Range, which indices on the relic ecosystems. Conservation measures in situ and their practical development has to be done in the near future.
Fig. 2. a) Cluster of faunal likeness of orbibatid mites of alder woodland with boxwood understory, Kintrishi Reserve and Rachia Range; b) Cluster of faunal likeness of orbibatid mites of alder woodland with boxwood understory, Kintrishi Reserve and Rachia Range.
References:

აღწერილია ჩაითვლებული ფრენები სახელმწიფო (ALNETA BARBATAE BUXOSA) ბუქი ბუქინის ტერიტორიაზე მხოლოდ
2007-11-12
(მოღწერილი 15.02.2007)

კორპორატიული დოკუმენტი 14-15 პატარალგოზმში პროვინციული ქართული ტერიტორიაზე დაფრენის ზღვარში.
თანა შეჩერების ჩაითვლებული ზემოქართული ტერიტორიის სახელმწიფო ფრენების თავისობით და რამდენიმე ბუქი ბუქინის მხოლოდ არ გსოლის და, მაგრამ შეთქმული არენის წყლის სახელმწიფო ტერიტორია.
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