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STUDY OF THE SUBASSOCIATIONS FORMED BY WOODY SPECIES OF THE Rosaceae FAMILY IN THE FOREST-ADJACENT SHRUBLANDS OF ZANGEZUR NATIONAL PARK

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ИЗУЧЕНИЕ СУБАССОЦИАЦИЙ, СФОРМИРОВАННЫХ ДРЕВЕСНЫМИ ВИДАМИ СЕМЕЙСТВА Rosaceae В ОКОЛОЛЕСНОЙ КУСТАРНИКОВОЙ ЗОНЕ ЗАНГЕЗУРСКОГО НАЦИОНАЛЬНОГО ПАРКА

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Abstract. The presented article provides information about the vegetation of woody species from the family *Rosaceae* Juss. distributed in the forest-edge shrublands of the Zangazur National Park, located within the flora of the Nakhchivan Autonomous Republic. The article also offers extensive data on the phytosociological characteristics of the woody plants from the *Rosaceae* family found in the studied area, as well as on the formations**,** associations, and for the first time, the subassociations identified by us that are formed by these species. As a result of our numerous studies, for the first time, the vegetation of the forest-edge shrublands of Zangazur National Park has been classified based on dominant species. In this classification, dominant species are defined as those with a presence of 50% or more, subdominants around 10%, and other species are evaluated as accessory (assector) species. According to our research, for the first time, a phytosociological classification of the vegetation formed by the woody species of the *Rosaceae* family in the forest-edge shrublands of Zangazur National Park has been carried out. As a result, 2 formations, 6 associations, and 3 subassociations were identified, and the term subassociation has been applied by us as a unit within the vegetation classification.

Аннотация. Приводятся данные о растительности древесных видов семейства *Rosaceae* Juss., распространённых в окололесных кустарниковых районах Зангезурского национального парка флоры Нахичеванской Автономной Республики. Изложены фитоценологические особенности древесных растений семейства Розоцветные, распространённых во флоре исследуемой территории, а также информация о формациях, ассоциациях и субассоциациях, впервые исследованных. Было осуществлено разделение растительности окололесного кустарникового района Зангезурского национального парка на формации, сгруппированные по доминирующим видам. В этой группировке доминирующие виды оценивались как составляющие 50% и более, субдоминанты — 10%, а остальные виды рассматривались как ассекторы. Впервые дана фитоценологическая классификация растительности окололесного кустарникового района Зангезурского национального парка, включающая 2 формации, 6 ассоциаций и 3 субассоциации, образованные древесными видами семейства *Rosaceae*. При этом субассоциация была использована в качестве самостоятельной единицы растительности.

Keywords: Zangazur National Park, forest-edge shrublands, phytocoenosis, association, subassociation.

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Ключевые слова: Зангезурский национальный парк, окололесные кустарники, фитоценоз, ассоциация, субассоциация.

The Nakhchivan Autonomous Republic is a typical mountainous region endowed with enchanting nature, rich flora, and diverse vegetation cover. The region's vegetation is clearly divided into distinct zones. One such zone is the territory of the Zangazur National Park, which significantly differs from other areas in terms of soil and vegetation. During the study of the area's flora and vegetation, many interesting aspects have been encountered. Notably, there are certain rare plant species that are found not only exclusively in Azerbaijan but also in the Caucasus, with their habitats located solely within this park. The area of Zangazur National Park stands out for its abundance of rare plants. Of the 202 species of rare plants found in the Autonomous Republic, 115 species are found within the boundaries of the National Park.

The region's unique elements also contribute to the preservation of these rare species in their natural populations. The vegetation of the study area often merges with steppe landscapes, forming special formations. Shrub species, particularly the woody representatives of the *Rosaceae* family, play a major role in the formation of mountain-xerophytic and steppe vegetation. The woody cover formed by these species mainly consists of woody plants of the *Rosaceae* family, which also form the lower layer of broad-leaved forests.

The forest-edge shrublands of Zangazur National Park are considered to be the areas where *Rosaceae* species are most widely distributed. In these forest-shrubland areas, both components exist in direct contact and exhibit a dynamic known as "introduction" between forest and shrubland. The structural edificators of the forest-edge shrublands are considered to be representatives of the *Rosaceae* family. Considering the relevance of the topic, conducting studies in this direction is deemed essential.

Material and research methods

Since 2019, studies have been conducted in the territory of the Nakhchivan Autonomous Republic to investigate the woody species of the *Rosaceae* family within forest-edge shrub vegetation. Regardless of their location, forest-edge shrublands in all surveyed areas are constantly in contact with woody plants of the *Rosaceae* family, forming various groupings. In determining the subassociations studied by us, the works of researchers such as V. V. Alexin [1], G. I. Poplavskaya [6], A. P. Shennikov [10], G. N. Vysotsky [3], and others were used, along with the methodologies developed by V. Sukachev [8, 9].

For the classification of the vegetation, the studies of B. A. Bykov, R. D. Yaroshenko [2, 11], Y. M. Lavrenko [5], L. I. Prilipko [7], A. Sh. Ibrahimov [4], and other researchers were used [12-14, 20-22, 24-27].

Discussion and conclusions of the study

The forest-edge shrublands of Zangazur National Park begin beyond the upper and lower boundaries of the forests and represent the areas where woody species of the *Rosaceae* family are most commonly found. These zones are areas where the forest and shrubland components are constantly in mutual contact. In these forest-shrubland areas, there is a type of "introduction" dynamic between the forest and the shrubland, and both components interact directly with one another.

In the forest-edge shrubland areas of Zangazur National Park, almost all woody shrub species belonging to the *Rosaceae* family can be found. In fact, the structural edificators of these shrublands are representatives of this very family. Occasionally, forest-forming species such as *Quercus macranthera*, *Fraxinus excelsior*, *Euonymus verrucosa*, *Euonymus europaea*, *Pyrus nutans*, *Pyrus*

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syriaca, and other tree and shrub species also occur in these areas. From an ecological perspective, the plant composition of the area consists of mesophyte, mesoxerophyte, and xerophyte elements. These areas are also characterized by a rich diversity of herbaceous species (Table).

Table

SPECİES COMPOSİTİON OF FOREST-EDGE SHRUB VEGETATİON
İN ZANGAZUR NATİONAL PARK

№	*Species Name*	*Abundance*	*Height (cm)*	*Phenophase (flower-fruit)*	*Layer*
1	*Pyrus nutans*	1-2	1000-1500	IV-V, VII-IX	I
2	*P. syriaca*	2-3	900-1000	IV-V	I
3	*Lathyrus hirsutus*	3-4	50-100	V, VI-VII, VIII	III
4	*L. aphaca*	2	40-50	VI-IX	IV
5	*L. miniatus*	1-2	30-50	V, VII-VIII	IV
6	*Quercus macranthera*	2-3	1000-1500	IV-X	I
7	*Fraxinus excelsior*	2	700-1500	IV, V-VII, VIII	I
8	*Euonymus verrucose*	1-2	100-200	V, VI-VIII, X	II
9	*E. europaea*	1	200-400	V, VI-IX, X	II
10	*Eryngium billardieri*	2-3	60-70	VI, VII-VII, IX	III
11	*Achillea millefolium*	3-4	15-70	V-VIII	III
12	*Dactylis glomerate*	3-5	20-140	V-VII	III
13	*Deschampsia caespitosa*	2	30-100	VI-VIII	III
14	*Hypericum elongatum*	1-3	30-70	VI, VII-VIII	III
15	*Vicia elegans*	2-3	40-60	VI, VI-VIII	III
16	*V. variabilis*	2-3	70-80	V-VI	III
17	*V. ervilia*	1-2	10-40	V-VIII	IV
18	*Linum austriacum*	1-2	30-60	V, VI-VII	III
19	*Lotus corniculatus*	3-5	20-40	V-VI, VI-VIII	IV
20	*L. tenuis*	1-2	20-60	V-VII, VII- IX	IV
21	*Trifolium arvense*	2-3	5-30	V, VII-VI, VIII	IV
22	*T. medium*	2	5-80	V, VI-VII-VIII	III
23	*T. trichocephalum*	1-2	15-40	VI-VII	IV
24	*T. pratense*	3-5	15-40	V-VII	IV
25	*T. canescens*	1-2	5-30	VI-VII	IV
26	*Polygala anatolica*	1-2	25-40	V-VI	IV
27	*P. andrachnoides*	1-2	10-25	VI-VII	IV
28	*Astragalus aduncus*	3-4	25-35	IV, VI-VII	IV
29	*Gladiolus kotschyanus*	2-3	30-60	V-VI	III
30	*Poa pratensis*	2	60-120	V, VI-VI, VIII	II
31	*P. bulbosa*	2-3	5-30	VII-VIII	IV
32	*P. alpina*	1-2	20-40	VII-VIII	IV
33	*P. nemoralis*	1-3	30-60	V, VI-VII, VIII	III
34	*Stipa lessingiana*	2-5	30-70	V-VI	III
35	*S. hohenackeriana,*	2-3	30-60	IV-V	III
36	*Helichrysum plicatum*	1-2	8-40	VI, VII-VII, VIII	IV
37	*H. graveolens*	2-3	15-30	VI, VII-VIII	IV
38	*Anthemis rigescens*	1-2	30-60	VII, VIII-VIII, IX	III

In the forest-edge shrublands of Zangazur National Park, the following plant groupings have been identified:

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Formation: 1. Meyer Hawthorn Formation (*Cratagueta meyerae*). This formation covers large areas and is considered one of the most extensive post-forest shrub formations, particularly in the Sultanbud, Uzunmeshe, and Batabat areas of the Shahbuz district. The tree and shrub species composition of this grouping is highly diverse (Figure 1). In the early stages of development, due to lower density, the grouping allows for the migration of various ecological elements, which gradually enriches its species composition. Depending on the ecological conditions of the area, the formation may exhibit a multi-layered structure.

Figure 1. Phytocoenosis of the forest-edge shrubland area of Zangazur National Park

Species of *Crataegus* (hawthorn) are abundant and dominant within the composition. Following the hawthorn species, the dominance of other species – particularly various plum (*Prunus*) and rosehip (*Rosa*) species – can be observed, varying by location. The canopy density of the shrub layer shows a wide range of variation. The species richness of both shrub and herbaceous polycarpic layers is remarkably high. The overall species composition identified within this formation includes a wide variety of herbaceous plants belonging to different families, such as: *Ornithogalum ponticum, Eryngium billardieri, Achillea millefolium, Phleum phleoides, Alopecurus armenus, Dactylis glomerata, Lathyrus hirsutus, L. aphaca, L. miniatus, Chaerophyllum aureum, Ch. macrospermum, Deschampsia caespitosa, Hypericum elongatum, Vicia elegans, V. variabilis, V. ervilia, Linum austriacum, Lotus corniculatus, L. tenuis, Trifolium arvense, T. medium, T. trichocephalum, T. pratense, T. canescens, Polygala anatolica, P. andrachnoides, Astragalus aduncus, Gladiolus kotschyanus, Poa pratensis, P. bulbosa, P. alpina, P. nemoralis, Stipa lessingiana, S. hohenackeriana, Helichrysum plicatum, H. graveolens, Anthemis rigescens*, as well as many other species [15-19, 23].

Within the composition of this formation studied in the forest-edge shrubland area of Zangazur National Park, the following associations and subassociations have also been identified by us.

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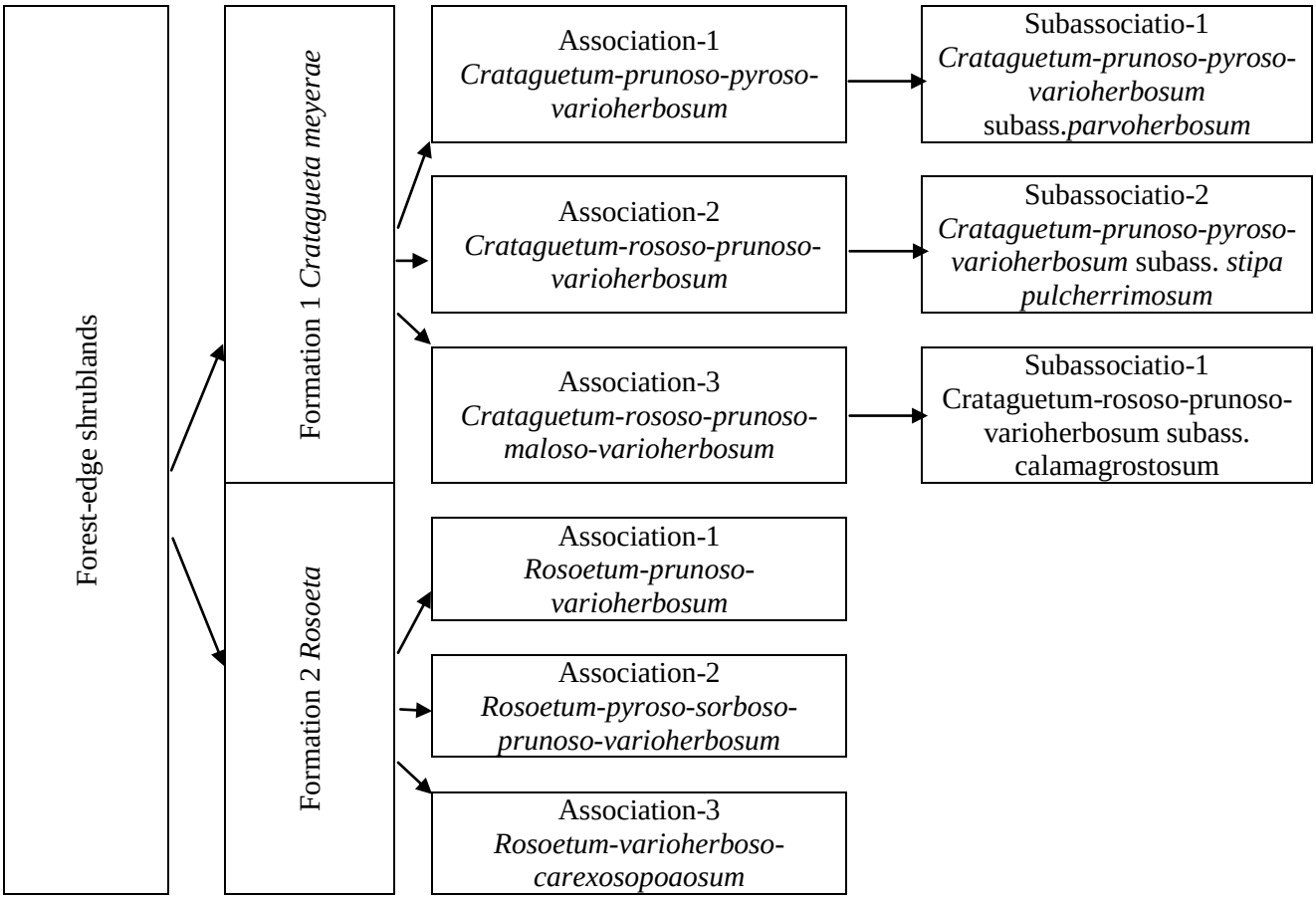

Figure 2. Classification Scheme of Shrub Vegetation in the Forest-Edge Areas of Zangazur National Park

Association 1: *Crataegus* stand with diverse herbaceous layer, *Pyrus* and *Prunus* elements (*Crataguetum-prunoso-pyroso-varioherbosum*)

Subassociation: 1. *Crataguetum-prunoso-pyroso-varioherbosum* subass. *parvoherbosum*

Subassociation: 2. *Crataguetum-prunoso-pyroso-varioherbosum* subass. *stipa pulcherrimosum*

Association: 2. Mixed-Herbaceous Hawthorn Stand with Rosehip and Plum (*Crataguetum-rososo-prunoso-varioherbosum*)

Subassociation: 1. *Crataguetum-rososo-prunoso- varioherbosum* subass. *calamagrostosum*

Association: 3. Mixed-Herbaceous Hawthorn Stand with Rosehip, Plum, and Apple (*Crataguetum-rososo-prunoso-maloso-varioherbosum*)

Formation: 2. Pure Rosehip Stand (*Rosoeta*)

Association: 1. *Mixed-Herbaceous* Plum and Rosehip Stand (*Rosoetum-prunoso-varioherbosum*)

Association: 2. *Mixed-Herbaceous* Stand with Plum, Pear, Bird Cherry, and Rosehip (*Rosoetum-pyroso-sorboso-prunoso-varioherbosum*)

Association: 3. Grassy-Sedge-Mixed-Herbaceous Rosehip Stand (*Rosoetum-varioherboso-carexosopoaosum*)

During our research, subassociations within associations of plant communities were identified and distinguished. The selection of these categories is carried out with the aim of reflecting dynamic processes within the communities. When determining subassociations within associations, variability in species composition and ecological characteristics was taken into account.

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Subassociations are defined based on secondary subdominant species included in the association, representing different ecological variants of the association, which constitutes a taxonomic unit within the association. When determining taxonomic variants, factors such as the closure (density) of the layers and the average age of trees and shrubs were considered. To more precisely and clearly characterize the general features of the shrub vegetation, and to highlight the overall characteristics of individual associations more distinctly, we preferred to indicate subassociations that differ by their ecological, edaphic, and other features. Using these distinct features and certain regularities, we were able to distinguish several subassociations that replace each other within one association. By carrying out the above processes, it became possible to characterize to some extent the changes occurring in phytocoenoses. The woody species of the Rosaceae family within the vegetation of the forest-edge areas of Zangazur National Park have long attracted attention due to their distinctiveness, high floristic and phytocoenotic diversity, and richness in rare species. The study of these woody species in the shrub vegetation of forest-edge areas is based on the ecological-floristic principles of vegetation classification.

Conclusions

As a result of the research conducted, for the first time, 2 formations, 6 associations, and 3 subassociations formed by woody species of the Rosaceae family were identified and studied within the forest-edge shrub vegetation of Zangazur National Park.

Based on our investigations, also for the first time, the subassociation has been applied and treated as a distinct unit within the vegetation structure.

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