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Taxonomic analysis of early spring and summer flowering plants of Talysh (Yardimli) territory within Azerbaijan

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Abstract: Study and preservation of biodiversity are one of the global problems of modern world. Reasonable reduction of the quantitive composition of plants leads to disturbance of normal activity of natural ecosystems. This limits human's opportunity of taking advantage of useful features of plants. For comprehensive research of the mentioned problems experimental site experiements in various regions of the country are very important. In the article taxonomical analysis of early spring and summer wild grass of Yardimli district of Azerbaijan. has been provided, new areals of some species (*Iris grossheimii* (in Komanu plateau, Dagduzu village), *Bellevalia longistyla* (in Chichekli plateau, Arvana and Avash villages), *Gladiolus imbricatus* (Deman village)) have been described, distribution maps have been created based on GPS coordinates. About 405 taxa and of 841 early spring and summer flora for district have been collected. Of these 51 of species are species and have been included in the Red Book of Azerbaijan. The list of species also include 17 endemics of Azerbaijan and 5 endemics of Caucasus.

Key Words: *biodiversity, new areal, rare and endemic species*

INTRODUCTION

All resources for well-being are found in the nature and their use and preservation depend on us. It gives food, air, minerals and all beauties with no return: vaulable part of these resources are biodiversity. Being the basis of existance of life nature provides food, clothes, energy and other needs for human. Therefore we must treat it properly and we need to be a kind of friend with biodiversity [Staff, 2019; Plumer, Brad, 2019; Deutsche, 2019; Ripple et al., 2017].

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Lesser Caucasus as a part of the Caucasus mountains differs from other system with its complex relief, climate and soil condition and multilement plant cover [Anokhin, 1981]. Development of specially preserved natural territories plays important role conservation of ecosystems and researching and studying the wild nature. Opportunities for preservation of rare and endangered flora as a result of activities of special protected natural areas have been provided. Studying the flora of individual territory, finding new taxa and identification of their usage opportunities are important tasks.

Flora exposes to changes due to various impacts (climate change, antropogen and zoogen factors). Study of the current situation of flora proves that transformation of the natual biocenosises leads to formation of modified phytocenosises which are rich with anthropophytes. In this perspective research of any territoreal flora, floristic analysis of early spring and summer plants, taxonomic and morphological analysis requires observations on this purpose [Aghayeva et al., 2015, 2018; Huseynova et al., 2019].

Flora of Yardimli region (Vergeduz district until 1930) has not been comprehensively studied so far. The relief of Yardimli region comprises of mountains, bypasses, the type soil is mountain-meadow, mountain-forest-dark brown and brown-mountain-forest types. Semi-desert area, forb meadow and mountainous slopes prevail [Mammadov et al., 2012]. More widespred plant species are found in mountains, rocks. Preservation of critical, rare and endemic species belonging to wild flora is one of the important challenges. Most of plants of district were used as a decorative, medicinal grasses, and forage. The purpose of this work is to conduct taxonomical analysis of plant biodiversity, endemic and rare species.

MATERIAL AND METHODS

Study territory. Yardimli district is in the south-eastern part of Azerbaijan and situated in the mountainous area. The territory is the part of Talish botanical-geographical region and borders with Lerik, Masalli and Jalilabad within Azerbaijan and with Iran in the south. The area of Yardimli districts occupies 66.720 ha. [Mammadov et al., 2012].

Specimens for research have been collected early

summer in 2018 and spring 2019. GPS coordinates of specimens collected in Chayuzu, Perimbel, Shafagli, Garvanke, Avash, Deman, Arvana (Chichekli plateau), Daguzu (Komani plateau), Nisapara, Peshtasar, Urakaran, Shirinel, Silevenye villages have been recorded and photos have been taken.

Researches were conducted by using areal, taxonomic, comparison-morphological methods. Structure of vegetative and generative organs of plants were studied, taxonomic composition of them were given in the genus, species level, smultaneously specimens of various species of various ecological groups were compared in detail [Martyn et al., 2015; Qaraxani, Musayev, 2013; Quseynova et al., 2014].

Morphological and taxonomical analysis have been conducted by using of flora and appropriate monographic works [Alizade et al., 2019; Asgerov, 2005, 2006, 2008; Flora of Azerbaijan I-VIII; Grossheim, 1949; Mextieva, 2014; Zernov, 2010, 2013, 2015], taxonomy and nomenclature of species were clarified based on critical analysis of specimens, morphological structure of plants were studied by using binocular Sunshine (St 3024R-2L, China).

Names of taxa have been introduced complying with the last nomenclatural changes [AZBIMM Version 2.1.1.; GBIF Home Page; The International Plant Names; The Plant List Version 1.1.; The World Checklist of Selected Plant families (WCSP); Tropicos; Seregin, 2019].

RESULTS AND DISCUSSION

As a result of our researches nearly 600 specimens of 405 taxa belonging to 58 genera, 28 families of early spring and summer flora have been prepared, identified and deposited to the herbarium fund. Species from *Hyacinthaceae* (*Muscari*, *Bellevalia*, *Gagea*, *Pushkinea*, *Scilla*), *Liliaceae* (*Fritillaria*), *Iridaceae* (*Iris*), *Alliaceae* (*Allium*), *Orchidaceae* (*Orchis*, *Dactylorhiza*), *Lamiaceae* (*Scutellaria*, *Ayuga*, *Thymus*), *Ranunculaceae* (*Ranunculus*, *Anemone*, *Adonis*), *Poaceae* (*Poa*), *Boraginaceae* (*Myososis*), *Asteraceae* (*Centaurea*, *Serratula*, *Tripogon*, *Matricaria*, *Senecio*, *Taraxacum*, *Artemisia*), *Fabaceae* (*Lathirus*, *Onobrychis*), *Apiaceae* (*Torilis*), *Caryophyllaceae* (*Dianthus*, *Silene*, *Cerastum*), *Scrophulariaceae* (*Veronica*), *Geraniaceae* (*Geranium*, *Erodium*), *Violaceae* (*Viola*), *Papaveraceae* (*Papaver*) and some other familias have been studied (Tab.).

It was observed that species of Hyacinthaceae (*Ornithogalum*) and Liliaceae families take dominates in the study territory. In the first stratum *Muscari*, in the second stratum *Bellevalia*, in the third stratum *Orchis*, *Iris* species have been observed. The subject area is rich in with early spring species. Species belonging to families *Orchidaceae, Liliaceae, Hyacinthaceae, Ranunculaceae, Boraginaceae, Lamiaceae, Alliaceae, Iridaceae, Caryophyllaceae, Asteraceae, Violaceae, Gentianaceae* dominant here.

The richest plant cover was found in Komani and Chichekli plateaus in 2100 m a.s.l. Mainly geophytes belonging to the genera *Ornithogalum*, *Iris*, *Allium* are found here. Soil of Komani plateau is dry, gray, meadow with sparse mountaineous vegetation type. *Iris grossheymii* dominates here.

It was identified that the soil of Perembel area is chestnut-brown, meadow relief and humidity of middle, riverside plant type is dense. Species of *Orchidaceae*, *Liliaceae*, *Hyacinthaceae*, *Ranunculaceae*, *Boraginaceae*, *Lamiaceae*, *Alliaceae*, *Iridaceae*, *Caryophyllaceae*, *Asteraceae*, *Violaceae*, *Gentianaceae* and other families are widely spread.

In our researches and site expeditions new areals have been identified for thre species: *Iris grossheimii,* Komani plateau, Daguzu village N38^0 51.073′, E48^0 06.525′; 2081 m a. s. l.; *Bellevalia longistyla,* Chichekli plateau Arvana and Avash villages N38^0 50.867′, E48^0 04.196′; 1618 m a. s. l.; *Gladiolus imbricatus,* Deman village N38^0 51.768′, E48^0 02.865′; 1469 m a. s. l. Among recorded species 17 are included to the Azerbaijan Red Book are endems of Azerbaijan, 5 species are endems of Caucasus (Fig. 1, 2). New localisation of these species have been identified too. The area of study is rich with rare and endem plant species, and 28 species growing in Yardimli district included to the second edition of the Red Book of Azerbaijan:

Ilex hyrcana Pojark., *Allium lenkoranicum* Miscz. ex Grossh., *A. akaka* S.G. Gmel. ex Schult. & Schult. f., *A. talyschense* Miscz. ex Grossh, *Sternbergia lutea* (L.) Ker Gawl. ex Spreng., *S. vernalis* (Mill.) Gorer & J.H.Harvey, *Hedera pastuchovii* Woronow, *Centaurea hyrcanica* Bornm., *Podospermum grossheimii* (Lipsch. & Vassilcz.) Kuth, *Tripleurospermum tenuifolium* (Kit.) Freyn ex Freyn, *Solenanthus brachystemon* Fisch. & C.A. Mey. ex Hohen, *Buxus sempervirens* subsp. *hyrcana* (Pojark.) Takht., *Paronychia kurdica* Boiss., *Silene talyschensis* Schischk., *Euonymus vellutiana*, *Colchicum trigynum* (Steven ex Adam) Stearn, *Diospyros loureiroana* G. Don, *Euphorbia marschalliana* Boiss., *Gleditschia caspia*, *Sedum lenkoranicum* Grossh., *Puschkinia scilloides* Adams, *Muscari armeniacum*

Table. The list of species collected from Yardimli territory during expeditions.

Families	Genera	Not existing in the BAK	Endemic species
Aguifoliaceae	*Ilex*		
Alliaceae	*Allium*		*Allium lenkoranicum* Miscz. ex Grossh.
Apiaceae	*Torilis*		
Araliaceae	*Hedera*		*Hedera pastuchovii* Woronow
Asteraceae	*Artemisia*, *Centaurea*, *Matricaria*, *Podospermum*, *Senecio, Serratula*, *Taraxacum*, *Tripleurospermum*, *Tripogon*		*Podospermum grossheimii* (Lipsch.&Vassilcz.) Kuth (Syn.: *Scorzonera grossheimii* Lipsch.&Vassilcz.)
Boraginaceae	*Myososis*		
Buxaceae	*Buxus*		
Caryophyllaceae	*Cerastum*, *Dianthus*, *Paronycha*, *Silene*		*Silene talyschensis* Schischk
Celastraceae	*Eunymus*		
Colchicaceae	*Colchicum*		*Colchicum trigynum* (Steven ex Adam) Stearn (Syn.: *Merendera candidissima* Miscz. ex Grossh.)
Crassulaceae	*Sedum*		*Sedum lenkoranicum* Grossh.
Fabaceae	*Gleditscia*, *Lathirus*, *Onobrychis*		
Geraniaceae	*Erodium, Geranium*		
Hyacinthaceae	*Bellevalia*, *Gagea*, *Muscari*, *Pushkinea*, *Scilla*		*Bellevalia longistyla* (Miscz.) Grossh., *Muscari elegantulum* Schchian,*M. grossheimii* Schchian, *Scilla caucasica* Miscz.
Ixioliriaceae	*Ixiolirion*	*Ixiolirion tataricum* (Pall.) Schult. & Schult.	
Iridaceae	*Crocus, Iris*, *Gladiolus*	*Iris grossheimii* Woronow ex Grossh. *Gladiolus imbricatus* L.,	*Iris grossheimii* Woronow ex Grossh
Lamiaceae	*Ayuga*, *Phlomis, Scutellaria*, *Thymus*		*Phlomis herba-venti* subsp. *lenkoranica* (Knorring) Rech. (Syn.: *Ph. lenkoranica* Knorring), *Scutellaria grossheimiana* Juz., *S. prilipkoana* Grossh.
Liliaceae	*Fritillaria*	*Fritillaria grandiflora* Grossh.	*Fritillaria caucasica* Adams, *F. grandiflora* Grossh. *F.kotschyana* Herb.
Malvaceae	*Alcea*		
Orchidaceae	*Dactylorhiza*, *Ophrys, Orchis*, *Steveniella*	*Steveniella satyroides* (Spreng.) Schltr.	*Ophrys caucasica* Woronow
Poaceae	*Poa*		
Polypodiaceae	*Woodsia*		
Ranunculaceae	*Adonis*, *Anemone*, *Ranunculus*		
Rhamnaceae	*Frangula*		
Rosaceae	*Alchemilla*, *Prunus*		*Alchemilla hyrcana* (Buser) Juz., *Prunus hyrcana*
Scrophulariaceae	*Scrophularia*, *Veronica*		*Scrophularia hyrcana* Grossh., *S. zuvandica* Grossh.
Ulmaceae	*Zelkova*		
Violaceae	*Viola*		

Iris grossheimii Woronow ex Grossh.
Bellevalia longistyla (Miscz.) Grossh.
Gladiolus imbricatus L.

Figure 1. Species with new areal within the area subject of study.

Figure 2. Some endemic species: 2.1. *Muscari grossheimii* Schchian; 2.2. *Scutellaria grossheimiana* Juz.; 2.3. *Fritillaria grandiflora* Grossh; 2.4. *Gladiolus imbricatus* L.; 2.5. *Bellevalia longistyla* (Miscz.) Grossh. (Endems of Caucasus); 2.6. *Iris grosshemii* Woronow ex Grossh. (Endems of Azerbaijan).

Leichtlin ex Baker, *M. grossheimii* Schchian, *Scilla siberica* subsp. *caucasica* (Miscz.) Mordak, *Ixiolirion tataricum* (Pall.) Schult. & Schult.f.. *Iris paradoxa* f. *choschab* (Hoog) B. Mathew & Wendelbo, *Iris reticulata* M.Bieb., *Gladiolus imbricatus* L., *Crocus biflorus* subsp. *adamii* (J.Gay) K.Richt., *Stachys lavandulifolia* Vahl, *Scutellaria grossheimiana* Juz., *S. prilipkoana* Grossh., *Thymus trautvetteri* Klokov & Des.-Shost., *Phlomis herba-venti* subsp. *lenkoranica* (Knorring) Rech.f, *Fritillaria caucasica* Adams, *F. grandiflora* Grossh., *F. kotschyana* Herb., *Alcea hyrcana* Grossh., *Ophrys sphegodes* subsp. *mammosa* (Desf.) Soó ex E.Nelson, *Steveniella satyroides* (Spreng.) Schltr., *Woodsia alpina* (Bolton) Gray, *Cyclamen coum* subsp. *elegans* (Boiss. & Buhse) Grey-Wilson, *Frangula grandiflora* (C.Y. Wu ex Y.L. Chen & P.K. Chou) Grubov, *Alchemilla hyrcana* (Buser) Juz., *Prunus fenzliana* Fritsch, *P. hyrcana*, *Rosa nisami* Sosn., *Danae racemosa* (L.) Moench, *Scrophularia zuvandica* Grossh., *Scrophularia hyrcana* Grossh., *Zelkova carpinifolia* (Pall.) K. Koch.

CONCLUSION

Flora of Azerbaijan have been complied in the middle of the last century. Later various researchers have been contributed to the study of flora [Asgerov, 2005, 2006, 2008; Askerova, 1982, 1986, 1988, 2006; Akhmed-zade 2006; Fataliev, 1987; Musaev, 1987, 2006]. Research of any territorial flora on its turn means potential for revealig of useful, decorative, industially important plants. Study of plant diversity of regions due to regular change of plant cover under the influence of environmental factors is important.

In this study new distribution area for three species (*Iris grossheimii*, *Bellevalia longistyla*, *Gladiolus imbricatus*) were identified and the list of endemic and rare species were presented [Red Book, 2013; Solomon et al., 2013]. Broad investigation in Lesser Caucasus will be launched starting from the next year.

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Azərbaycanın daxilində (Yardımlı) Talış ərazisinin erkən yaz və yay florasının taksonomik təhlili

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Biomüxtəlifliyin öyrənilməsi və qorunması müasir dövrümüzün qlobal problemlərindən biridir. Bitkilərin say tərkibinin nəzərəçarpan dərəcədə azalması təbii ekosistemlərin normal fəaliyyətinin pozulmasına gətirib çıxarır. Bu da öz növbəsində insanları bitkilərin faydalı xüsusiyyətlərindən istifadəsi imkanından məhrum edir. Göstərilən problemlərin hərtərəfli araşdırılması üçün ayrı-ayrı bölgələrdə çöl tədqiqatlarının aparılması mühüm əhəmiyyət kəsb edir. Məqalədə Yardımlı ərazisinin erkən yaz və yay florasına daxil olan yabanı ot bitkilərinin ilk dəfə olaraq taksonomik təhlili verilmiş, bəzi növlərin (*Iris grossheimii* (Komanu yaylası, Dağüzü kəndi), *Bellevalia longistyla* (Çiçəkli yaylası Arvana və Avaş kəndləri), *Gladiolus imbricatus* (Deman kəndi) tədqiqat ərazisi üçün yeni yayılma arealları verilmiş, GPS koordinatlarına əsasən xəritələri tərtib edilmişdir. Yardımlı ərazisindən ümumilikdə Azərbaycan florasında göstərilən 841 taksondan erkən yaz və yay florasına aid 405 takson toplanmışdır. Bu növlərdən 51-si Azərbaycanın Qırmızı Kitabına daxil olan nadir növlərdir, 17-si Azərbaycan, 5-i Qafqaz endemidir.

Açar sözlər: *bitki müxtəlifliyi, yeni yayılma arealı, nadir və endem növlər*

Таксономический анализ ранней весенне-летней флоры Талыша (Ярдымлы) в пределах Азербайджана

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Изучение и охрана биоразнообразия – одна из глобальных проблем современности. Уменьшение количественного состава растений приводит к заметному нарушению природных экосистем. Это в свою очередь ограничивает использование людьми полезных свойств растений. Для всестороннего разрешения указанных проблем необходимы постоянные полевые исследования в различных районах республики. В статье впервые приводится таксономический анализ дикорастущих травянистых растений ранней весенне-летней флоры Ярдымлинского района. Некоторые виды (*Iris grossheimii* (плато Команду, село Дагузу), *Bellevalia longistyla* (плато Чичекли, село Арвана и Аваш), *Gladiolus imbricatus* (село Деман) для исследуемой территории являются новыми. На основе координатов GPS составлены карты распространения. Из 841 таксона, указанных во Флоре Азербайджана, для Ярдымлинского района нами собрано 405. Из них 51 являются редкими и включены в Красную Книгу Азербайджана, 17 таксонов эндемики Азербайджан, 5 – эндемики Кавказа

Ключевые слова: *разнообразие растений, новые местонахождения, редкие и эндемичные виды*