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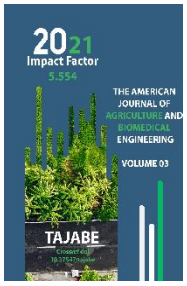

Ecological And Cenotic Analysis Of Wild Relatives Of Cultivated Plants Of The Republic Of Karakalpakstan And Khorezm

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ABSTRACT

The results of ecological and cenotic analysis of wild relatives of cultivated plants (DRC) of the Republic of Karakalpakstan and Khorezm are presented. Based on the classification of P. V. Kulikov (2005), a system was developed, where 8 ecologo-cenotic groups of DSCS were identified, and the resulting groups were divided into 16 subgroups. Ecological-cenotic analysis showed that the DSCS of the Republic of Karakalpakstan and Khorezm are mainly plants of deserts and meadows (58.5%). However, a significant share (19.9%) is made up of species with a narrow ecological amplitude, confined to specific habitats: saline soils and coastal (coastal and coastal-meadow). Desert-tope species are among the most vulnerable, 12 of which need to be preserved also because 3 of them are endemic and one is a relict species, which, due to their adaptation to extreme environmental conditions, can contain valuable genetic information.

KEYWORDS

Crop wild relatives of cultivated plants, flora, natural plant communities, biodiversity protection, ecological-cenotic analysis, etc.

INTRODUCTION

With the destruction of natural ecosystems, the wild relatives of agricultural crops, whose diversity provides food security for the growing population of the Earth, are irrevocably disappearing. At the global level, approaches to this problem are proposed in a number of intergovernmental agreements: the Convention on biological diversity (1992), the

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Global plan of action for the conservation and sustainable use of plant genetic resources (1996), the International Treaty on plant genetic resources for food and agriculture (2001), and others. The practical significance of these documents is reduced to the need to create national strategies for the conservation of plant genetic resources (cultivated plants and their wild relatives) in each state. Currently, the Vavilov all-Russian Institute of crop production (VIR) is creating a unified strategy for the in situ conservation of wild relatives of cultivated plants (WRCP) on the territory of Russia (Smekalova et al., 2002; Smekalova, 2011b). A draft law "on plant genetic resources" (2009) has also been prepared to provide a legal framework for the collection, storage, study and rational use of plant genetic resources, which is suitable for adoption in our state.

Due to its large area, the comprehensive study and preservation of the RSCR of our state can be most effectively implemented at the regional level. The Republic of Karakalpakstan is a priority area for studying DSK: the region is located at the junction of natural floral, geobotanical and geographical areas (the border of Europe and Asia) and has a rich plant world (Azhiev et al., 2016). The uniqueness of the research area is also explained by the presence of the Ustyurt plateau and the diversity of natural conditions. Due to the high degree of economic development of the territory, which includes plowing, overgrazing, urbanization and oil and gas production, the original flora of Karakalpakstan and the WRCP in its composition need to be preserved.

Wild relatives of cultivated plants (WRCP) are carriers of such biological properties as resistance to extreme environmental factors (high and low temperatures, droughts, salinization, flooding, etc.), as well as to diseases, pests, etc. Therefore, further progress in breeding is not conceivable without comprehensive and full use of wild relatives of cultivated plants (Brezhnev, Korovina, 1981; Smekalova, 2011).

The first stage of studying the WRCP is their inventory as part of the regional flora. To fully identify WRCP in the flora of Karakalpakstan and Khorezm were used literature sources, herbarium collections, field research materials, etc. (Azhiev, 2016; Azhiev et al., 2017).

The object of this research is wild relatives of cultivated plants - species of natural flora that are evolutionarily and genetically close to cultivated plants, are included in the same genus with them; introduced into the culture directly or participated in the formation of cultivated plants by using in crosses, and also – potentially suitable for creating or improving varieties of cultivated plants (Smekalova, Chukhina, 2011).

The research materials were :own herbarium collections and geobotanical descriptions made during field work; herbarium material stored in Botanical collections (Tsitsin Herbarium of the Russian Academy of Sciences, Prof. Elenevsky Department of Botany of Moscow Pedagogical State university, herbarium of Karakalpak Branch of the Academy of Sciences of the Republic of Uzbekistan (KKB ASRUz), herbarium of the Institute of Botany of an AS RUz; numerous literary data; archives of expeditions of KKB ASRUz, different years; materials of tabular processing of geobotanical descriptions of meadow, steppe and forest vegetation of Uzbekistan, Karakalpakstan (Determinant of higher plants of Karakalpak and Khorezm, 1981, 1982).

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Phytocenotic affinity of WRCP was studied on the basis of tabular processing of geobotanical descriptions of grassland, desert and forest vegetation of Karakalpakstan, as well as vegetation of plateaus and tugai of the Amu Darya Delta (Azhiev et al.2016, 2017).

As a result, the WRCP list included 171 species from 117 genera and 68 families (Ajiev, 2020).
The next goal was to study the ecological-cenotic analysis of the characteristic and specific habitats of the WRCP in the study area. Based on the classification of P.V. Kulikov (2005), we developed our own system, where we identified 8 ecologo-cenotic groups of WRCP, and the resulting groups were divided into 16 subgroups.

1. Forest group has brought: the actual riparian species WRCP (forestry subgroup): Elaeagnus turkomanica N.Kozl., E.orientalis L., Populus ariana Dode, P. diversifolia Schrenk, P. pruinosa Schrenk, Salix songarica Andress., S. wilgelmsiana Bieb.
2. The rock group included types of WRCP, confined to the outcrops of carbonate rocks, and growing on stony-gravelly rocks, slopes and cliffs: Capparis rozanowiana B.fedsch., Salsola incanescens C.A.Mey., Amygdalus spinossisima Bunge, Crataegus korolkowii L.Henry.
3. The Ruderal group consisted of species of WRCP characteristic of ruderal habitats and corresponding to the concept of ruderal: Datura stramonium L., Hyoscyamus niger L., H. pusillus L., Xanthium strumarium L.. Capsella bursa-pastoris (L.) Medik.
4. The coastal group includes species of coastal vegetation (mesophytes and hydromesophytes) (coastal subgroup): Sagittaria trifolia L., Typha laxmannii Lepech.; and species found in forests and along the banks of reservoirs (coastal forest subgroup): Trachomitum scabrium (Beg. et Bell.) Pobed., Bidens tripartita L., Inula caspica Blume., Lactuca tatarica (L.) C.A. Mey.L., Calystegiya sepium (L.) R. Brown, Echinochloa orizoides (Ard.) Fritsch., Polygonum amphibium L., Rumex halachy Rech..
5. Soren, the group included: types WRCP growing along irrigation ditches, on fallow lands, weedy places: Amaranthus albus L., A. retroflexsus L., Eruca sativa Mill., Taraxacum bicorne Dahlst., Brassica juncea (L.) Sczern., Chenopodium album L., Ch. filicifolium Smith., Ch. strictum Roth., Ch. murale L., Melo agrostis (Naud.) Pang., Cynodon dactylon Rich., Hordeum bogdanii Wilensky, Sorghum halepense (L.) Pers., Solanum nigrum L., Tribulus terrestris L.
6. Halophytic group formed: types of saline meadows (halophytic-meadow subgroup): Tripolium vulgare Nees., Lepidium latifolium L., Sisymbrium loeselii L., Chenopodium glaucum L., Suaeda altissima (L.) Pall., Alhagi pseudalhagi (Bieb.) Fisch., Glicirrhiza aspera L., G. glabra L., Digitaria sanguinalis (L.) Scop., Ceratocephala testiculata (Crantz) Bess.; and saline steppes and deserts (halophyte-sand subgroup): Cynoglossum viridiflorum Pall., Aellenia glauca (M. Bieb.) Aell., Ae. subaphylla (C.A. Mey.) Aell., Anabasis aphylla L., A.salsa (S.A. Mey.) Benth. ex Volkens, Haloxilon aphyllum (Minkw.) Iljin, Kalidium caspicum (L.) Ung.-Sternb., Kochia prostrata (L.)

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Schrad., Salsola dendroides Pall., S. foliosa (L.) Schrad., S. nitraria Pall., Suaeda prostrata Pall., Onobrychis micranta Screnk, Nytraria sibirica Pall., Plantago maritima L., Aegilops cylindrical Host, Limonium gmelinii (Willd.) O.Kuntze, Rheum tataricum L., Tamarix hispida Willd., Zygophillum oxianum Boriss.

7. In the desert group included: desert species proper (desert subgroup): Allium caspium (Pall.) Bieb., Daucus carota L., Ferula assa-foetida L., Isatis violascens Bunge, Acanthophillum borszczowii Litv., Aellenia iliensis (Lipsky) Aell., Agriophyllum latifolium Fisch. & C.A. Mey., A.scuarrozum (L.) Moq., Ceratocarpus arenarius L., Kochia odontoptera Schrenk., Salsola richteri (Moq.) Kar. et Litv., Haloxlion persicum Bunge ex Boiss & Bushe, Ephedra distachya L., Ammodendron conollyi Bunge, A.longiracemosum Raik, Astragalus unifolialatus Bunge., Iris falcifolia Bunge, Peganium harmala L., Agropiron fragile (Roth.) P.Candargy, Elymus racemosus Lam., Poa bulbosa L., Secale sylvestre Host, Stipa barchanica Lomonosova, Calligonum aphyllum (Pall.) Gurke, C. caput-medusae Schrenk, C.colubrinum Borzcz., Haplophyllum ramossisimum (Pauls.) Vved.; types of clay-sand deserts (clay-sand subgroup): Allium sabulosum Stev. ex Bunge., Ferula lehmannii Boiss., Zozima orientalis Hoffm., Lepidium perfoliatum L., Capparis spinosa L., Salsola gemmascens Pall., Carex pachystylis J. Gay., Imperata cilindrica (L.) Beauv., Astragalus transcaspicus Freyn, Plantago lachnanta Bunge; the types of deserts gravelly (gravelly-sandy sub-group) was classified as: Ferula dubjanskyi Korovin ex Pavlov, Psammogeton setifolium Boiss., Achillea nobilis L., Artemisia terrae-alba Krasch., Carthamnus gypsicola Iljin, Inula multicaulis Kar., Alyssum marginatum Seud. ex Boiss., Crambe kostchyana Boiss., Isatis minima Bunge, Leptaleum filifolium (Wild.) DC., Malcolmia turkestanica Litv., Kochia iranica Bornm., Salsola arbuscula Pall., Convolvulus hamadae (Vved.) V.Peter., C. fruticosus Pall., Alhagi persarum Boiss. et Bushe, Caragana grandiflora (Beib.) DC., Melillotus officinalis (L.) Pall., Trigonella grandiflora Bunge, Lagochilus acutilobus (Ledeb.) Fisch. & Mey., Malacocarpus crithmifolius (Retz.) C.A. Mey., Crataegus pontiaca C. Koch., Rosa majalis Herrm..

8. Meadow group is made up: proper meadow species of WRCP (meadow subgroup): Saccharum spontaneum L.; types of wet meadows (wet-meadow subgroup): Artemisia annua L., Cichorium intybus L., Convolvulus arvensis L., Medicago lupulina L., Trifolium repens L., Mentha asiatica Boriss., Abutilon theophrasti Medik., Althaea broussonetiifolia Iljin, Plantago major L., Beckmannia eruciformis (L.) Host, Bromopsis inermis (Leys.) Holub, Bromus japonicus Thunb., B. racemosus L., Echinochloa crussgalli (L.) Beauv., Phalaroides arundunaceae (L.) Rauschert, Setaria italica (L.) Beauv., S. viridis (L.) Beauv., S. verticillata (L.) Beauv., Polygonum aviculare L., Rumex drobovii Korov., Portulaca oleraceae L., Ranunculus sceleratus L., Urtica dioica L.; types of sand meadows (sand-meadow subgroup): Lactuca serriola Torner in

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L., Sinapis arvensis L., Fumaria vaillantii Loisel., Anisantha tectorum (L.) Nevski, Rumex marschallianus Reichb., Hultemia persica (Michx. ex Juss.) Bornm., Lycium ruthenicum Murr.; species typical for meadows and on forest edges (forest-edge-grassland subgroup): Atriplex cana C.A. Mey., Melilotus albus Medik., Hibiscus trionum L., Agropiron repens (L.) P. Beauv., Dactylis glomerata L., Lolium multiflorum Lam., Polygonum persicaria L.; and species found in meadows and on the banks of reservoirs (coastal meadow): Cynanchum sibiricum Willd. Equisetum ramosissimum Desf.

Studies have shown that the vast majority of WRCP species belong to desert, meadow, and halophytic plants (Fig. 1).

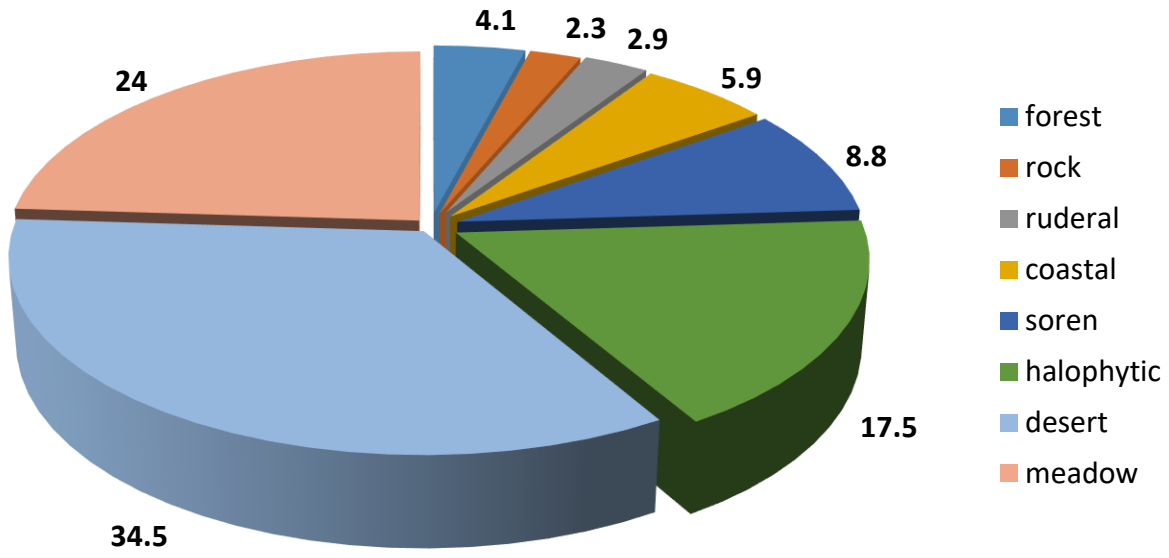

Figure 1. Percentage of ecocenotic groups of the Central Asian Republic in the flora of the Republic of Karakalpakstan and Khorezm

In general, 76% of species are associated with meadow and desert vegetation and their halophytic variants. 5.9% are plants associated with coastal cenoses, 0.6 and 1.2 % of the WRCP occurs in meadow and coastal meadows.

It was found that the core of the forest group of WRCP is formed by woody plants (7 species), which form the basis of coastal tugai (table 1). The structure of the meadow group is dominated by wet-meadow (23 species). For 7 species (4,1%) in forest-edge-grassland and sand-meadow subgroups.

Table 1.

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Ecological-cenotic structure of WRCP in the flora of the Republic of Karakalpakstan and Khorezm

№	Ecological-cenotic groups and subgroups	Number of species	%
1	The Forest group	**7**	**4,1**
	Forest	7	4,1
2	The Rock group	**4**	**2,3**
	Rock	4	2,3
3	The Ruderal group	**5**	**2,9**
	Ruderal	5	2,9
4	The coastal group	**10**	**5,9**
	coastal	2	1,2
	coastal forest	8	4,7
5	The Soren group	**15**	**8,8**
	soren	15	8,8
6	The Halophytic group	**30**	**17,5**
	halophytic-meadow	10	5,8
	halophyte-sand	20	11,7
7	The Desert group	**60**	**35,1**
	desert	27	15,8
	clay-sand	10	5,9
	gravelly-sandy	23	13,4
8	Meadow group	**40**	**23,4**
	meadow	1	0,6
	coastal meadow	2	1,2
	forest-edge-grassland	7	4,1

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	sand-meadow	7	4,1
	wet-meadow	23	13,4
Total		**171**	**100**

In the desert group, due to the wide distribution in the territory of deserts and Sands, the most numerous are actually 15.8% desert species of WRCP (27 species). The second position is occupied by gravel-sand species 13.4% (23 species). 10 types of WRCP (5.9%) are associated with clay-sand, which are vulnerable, since the extreme continentality and summer droughts play a huge role in drying out the clay sandstones of the Aral sea region. In particular, Salsola gemmascens is a rare species.

The presence of a halophyte group in the ecological-cenotic structure of the WRCP is explained by the spread of saline soils on the territory. The vast majority of halophytic WRCP are associated with saline Sands (20 species), and some species (10) grow on salt marshes and salt marshes as part of meadow vegetation.

As a result of ecological-cenotic analysis, it was found that the WRCP of the Republic of Karakalpakstan and Khorezm are mainly plants of deserts and meadows (58.5%). However, a significant share (19.9%) is made up of species with narrow ecological amplitude, confined to specific habitats: saline soils and coastal (coastal and coastal-meadow). Desert-tope species are among the most vulnerable, 12 of which need to be preserved also because 3 of them are endemic and one is a relict species, which, due to their adaptation to extreme environmental conditions, can contain valuable genetic information.

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