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State of Local Populations of *Aegilops triuncalis* L. in Uzbekistan

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Abstract

The genus *Aegilops* L. is considered one of the important representatives of the wild relative of cultivated plants. The article presents the place of *Aegilops triuncialis* L. in plant communities and the status of populations in the flora of Uzbekistan. The research was carried out in various botanical and geographical regions of Uzbekistan during 2021-2023 years. During the research, the existing literature and geobotanical records, samples stored in the Institute of Botany (TASH) fund, and data on the GBIF international website were analyzed. Based on literary sources, more than 100 local points were recorded. The vitality structure of 11 cenopopulations was studied during field research. Various abiotic and biotic factors influencing the state of populations were analyzed. The main cenopopulations of the species were observed to spread in various grassy shrubland communities.

Keywords

Aegilops triuncalis L., Uzbekistan, Population, Distribution, Flora, Herbarium, TASH

1. Introduction

Currently, the study of the wild relatives of cultural plants is important. The population study of plants of natural flora is becoming important in today's process of global climate change, growing water scarcity, and an increase in the world's population. Studies aimed at studying and evaluating the modern state of plant populations, preserving them *in situ*, and *ex situ* conditions are being conducted in many scientific [1]-[6] places of the world. Many research works [7] [8] [9] [10] are being conducted in this regard in the CIS countries. Many studies in this direction [11]-[17] are being conducted in Uzbekistan.

The above-mentioned data shows the relevance of research aimed at studying plants from a population point of view today.

The genus *Aegilops* L. consists of ca. 25 species in the world. It constitutes cultivated wheat's primary and secondary gene pool [18]. *Aegilops* L. has an important potential utilization in wheat improvement because of its resistance to different biotic and abiotic stresses and its close relation with cultivated wheat. *A. triuncialis* grows in Iran, westward to Türkiye, and eastward to Afghanistan and China with a distribution center in the south of the Caspian Sea [19]. The altitudinal distribution of the genus varies from −400 m up to 2700 m, but it differs greatly among the species [20] [21].

The largest diversity of the genus *Aegilops* can be found in the Fertile Crescent ranging from Palestine/Israel-Lebanon-Syria-Southeast Türkiye-North Iraq to Northwest Iran. Within this area, the central part of the Fertile Crescent between Euphrates and Tigris, where the southern slopes of the Taurus mountain range meet the lowlands and steppes, has the largest diversity. According to Hammer (1980), the origin of *Aegilops* can be sought in the Transcaucasian area, from which diploid species migrated in western and southwestern directions. Later, groups of tetraploid species due to their adaptation capacity spread again both west and southwest around the Mediterranean basin, as well as east into Central Asia.

Four species of *Aegilops* L., common in Uzbekistan, are being studied as wild ancestors of cultivated plants [15]. In Uzbekistan, these species are distributed at altitudes of 400 - 1600 m above sea level; above this, they are rarely found in mountainous areas [22] [23]. The species of representatives of the category common in Uzbekistan are annual ephemeroid plants in their life forms. Population studies [24] [25] [26] of annual plants on the territory of Uzbekistan were carried out very little. Today, it is necessary to conduct population studies on the species of the group, the place of representatives of this group in our flora, as well as their importance in the national economy.

During the years 2021-2023, our research was carried out in various botanical and geographical regions of Uzbekistan [27] and in the fund of the National Herbarium of Uzbekistan (TASH). The analysis of herbarium specimens shows that the first herbarium of this species was collected in 1914, and until today, a total of 340 herbarium specimens of this species have been collected, of which about 150 were collected from the territory of Uzbekistan (**Figure 1**).

In addition to Uzbekistan, the fund also contains samples of herbariums from Tajikistan, Kyrgyzstan, Kazakhstan, and Turkmenistan. During the 2022-2023 research, a total of 11 cenopopulations were studied with the participation of *Aegilops triuncialis* L. from different botanical-geographical regions of Uzbekistan (**Figure 2**).

2. Material and Methods

In the performance of the study classical botanical research methods were used.

Figure 1. Herbarium specimens held in the stone fund (1914-2022).

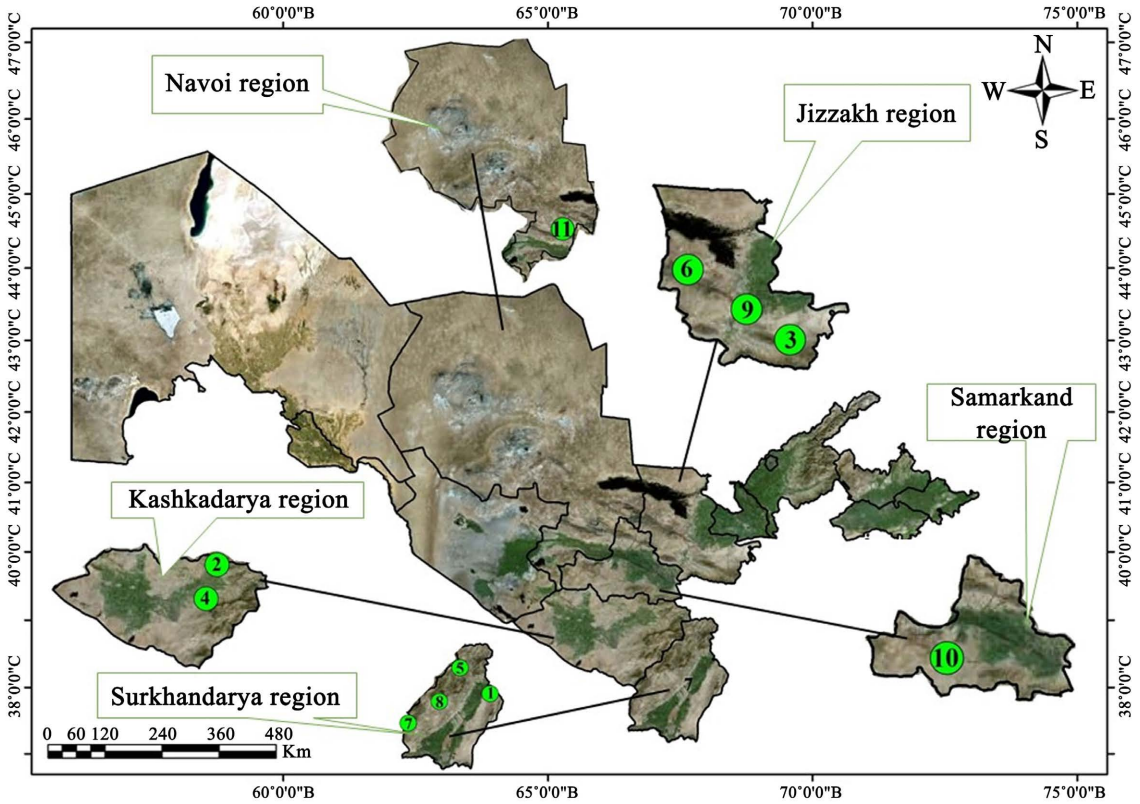

Figure 2. Study area.

The main method, used during the field research was route reconnaissance. The laboratory processing of the initial material was performed in strict accordance with all requirements, and the herbarium samples were stored in the Herbarium. The object of the study is the *Aegilops triuncialis* L.

Aegilops triuncialis L. multitillered annual with subcylindrical spikes. Plants: 20 - 30 cm tall (excluding spikes). Spike: 2.5 - 6 cm long (excluding awns), with 3 - 5 fertile and 2 - 3 rudimentary spikelets. Spikes breaking off as a unit. Glumes of lateral spikelets with 2 - 3 awns, 1.5 - 6 cm long. Central awn of apical glumes 5 - 8 cm long, lateral awns 1 - 3 cm. It occurs all over southern Europe and the Near East, extending eastwards into Central Asia. Well represented along the entire Fertile Crescent. Also found in Cyprus and southern Crimea as well as in Cis-Caucasia. Common throughout its range. Introduced in the US and a weed on rangeland. In Europe found as an adventive in several countries [28].

3. Result

To carry out population studies on plants, it is necessary to study the vegetation cover first. According to the analysis of the research conducted on the plant communities, this species is *sp*1 of the *Chenopodium*, *Artemisia*, *Aegilops*, *Poa*, *Astragalus*, and other formations in the plant communities of different regions of Uzbekistan. *sp*2 molality [29] [30] [31] [32] is distributed as a participating species. In our field studies, it was also noted that this species occurs in various plant communities as a participating species, in 11 studied cenopopulations there were no cases of dominance of this species. The studied cenopopulations were analyzed phytocenotically, while the main attention was paid to the geographical location of each studied cenopopulation, the coordinates of altitude above sea level, the dominant species, the degree of vegetation cover of the territory and the occurrence of *Aegilops triuncialis* in the studied cenopopulations (**Table 1**).

Aegilops L. species are wild relatives of cultivated plants. It is necessary to carry out targeted research on the reserve value of this species in the future based on the research [33] on determining the importance and reserve value of the spiked representatives of the wild ancestors of cultivated plants in the national economy. The reason is that this species is used as a fodder plant in livestock farming together with the renewal of wheat varieties, which are considered the main food plant. Targeted research on reserve indicators of this species population has not been conducted in Uzbekistan. Currently, many studies are being carried out in this direction in our republic [34]-[40].

4. Discussion

During the conducted field research, the viability status of each cenopopulation was analyzed using modern computer programs based on population characteristics. The viability status of cenopopulations was analyzed based on indicators such as the total number of species in each cenopopulation, and the degree of vegetation coverage of the area where cenopopulations were studied, *A. triuncialis* shared the height above sea level of the separated area (**Figure 3**).

Table 1. Phytoceonotic characteristics of cenopopulations.

№ CP	Geographical location of coenopopulation	Geographical coordination	Altitude, m (h)	Plant community	Total projective cover of vegetation, %	Projective cover of species, %
1	Surkhandarya region village Tomchi	E: 68,162293 N: 38,297688	699	*Pistacia vera-Carex pachystylis*	21 - 25	2
2	Kashkadarya region village Boztepa	E: 66,916622 N: 39,277557	1350	*Tamarix aralensis-Tamarix elongata*	65 - 70	1
3	Jizzakh region Molguzar ridge village Beshkuba	E: 68,302735 N: 39,810715	1113	*Prunus spinosissima-Poa bulbosa*	80	2
4	Kashkadarya region village Qorayli	E: 66,745612 N: 38,863118	768	*Papaver pavoninum-Poa bulbosa*	35 - 40	5
5	Surkhandarya region Denov	E: 67,413825 N: 38,863118	817	*Alhagi pseudalhagi-Silybum marianum*	30 - 35	1
6	Jizzakh region village Tuzkon	E: 67,053409 N: 40,470295	728	*Peganum harmala-Hordeum murinum*	30	1
7	Surkhandarya region Kuhitang, Surhan reserve, Shalqon	E: 66,634844 N: 37,863049	1757	*Juniperus seravschanica-Ferula tadshikorum*	80 - 85	3
8	Surkhandarya region village Xovdak	E: 67,217135 N: 38,181546	1120	*Hordeum spontaneum-Hordeum leporinum*	45 - 50	2
9	Jizzakh region Sangzor river basin	E: 67,772228 N: 40,095291	399	*Hordeum spontaneum-Poa bulbosa*	45 - 50	4
10	Samarkand region Nurobod district	E: 66,095971 N: 39,608353	563	*Phlomis thapsoides-Phlomoides napuligera*	10 - 15	2
11	Navoi region Khatirchi district village Chuya	E: 66,009051 N: 40,405931	1115	*Artemisia scoparia-Cousinia microcarpa*	45 - 50	3

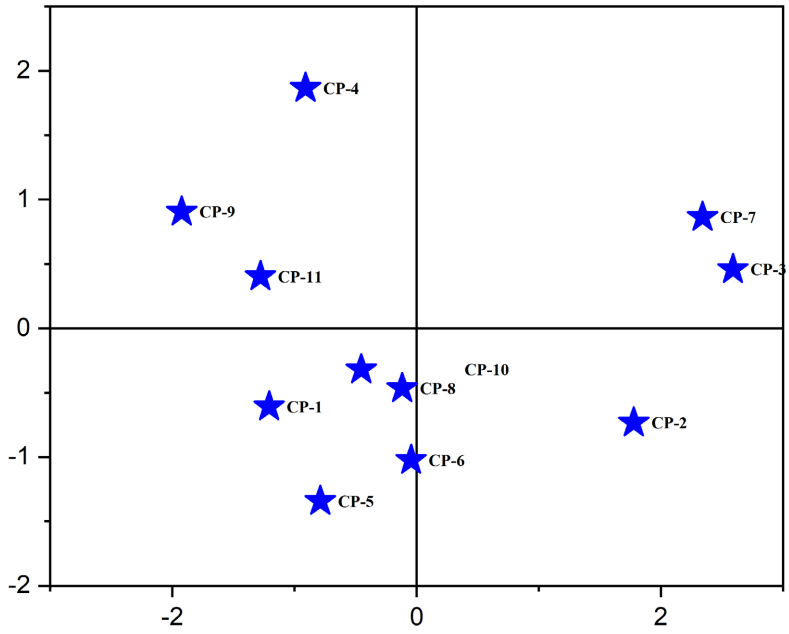

Figure 3. Viability indicators of cenopopulations.

The results of the analysis of the viability of the cenopopulations show that the indicators of the viability of the cenopopulations of Tomchi (CP-1), Denov (CP-5), Nurabad (CP-10) are the lowest, and the influence of anthropogenic factors on the areas where these cenopopulations are located is high. In particular, in the area where the Tomchi cenopopulation is located, livestock grazing by residents throughout the year, cases of residents using the area as arable land, and other factors were observed. In the area where the Denov cenopopulation is located, due to the ongoing construction of the Boysun-Denov highway, it was observed that there is a harmful effect on plant populations, as well as cases of livestock grazing by residents in this area. The area where the Nurabad cenopopulation is located in an arid region, and in the years when the amount of annual rainfall is low in this area, the germination of plant communities and low vegetation process were observed, as well as the grazing of livestock by the local population was

(a) (b) (c) (d) (e) (f)

Figure 4. Fieldwork.

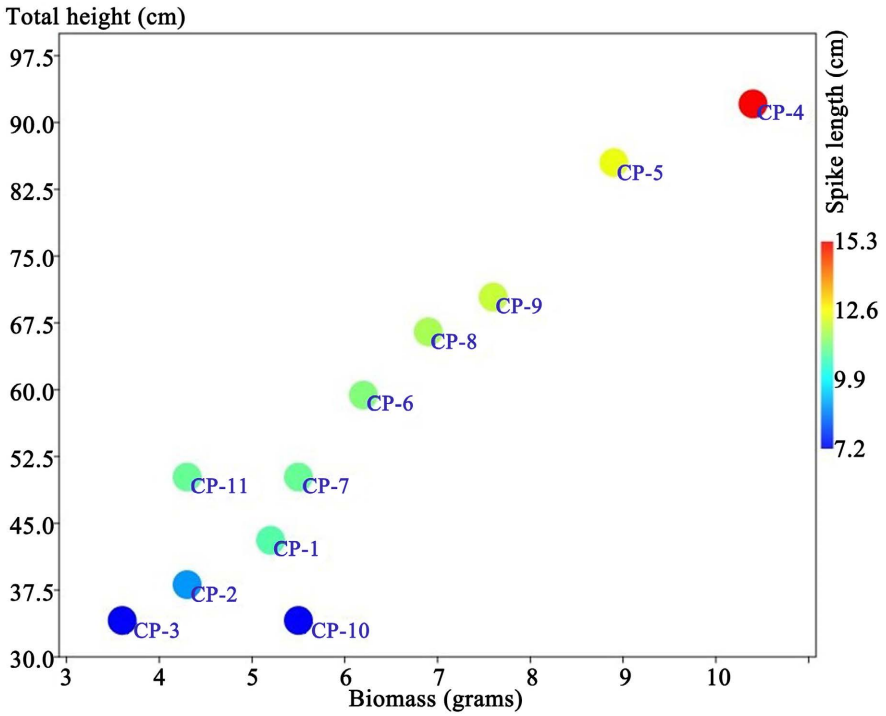

Figure 5. Analysis of biometric indicators of cenopopulations.

observed in this area. The above-mentioned factors led to the low viability of these cenopopulations. The indicators of the viability of Shalkan (CP-7), Beshkuba (CP-3), and Boztepa (CP-2) cenopopulations are the highest. It was observed that the reason is that these areas are located in a region much higher than the sea level, that irrigation is sufficient for the growth and development of plant communities, and that the soil of the areas is fertile. Since Shalkan cenopopulation is located in the territory of the Surkhan State Reserve, no anthropogenic factors have affected this cenopopulation, so the indicators of its viability are the highest (**Figure 4**).

During the conducted research, the average biometric indicators of plants in each cenopopulation were analyzed, in which indicators such as the total height, biomass, and spike length of 10 plants from each cenopopulation were analyzed, according to which the highest indicators were observed in 4 cenopopulations, and the lowest indicator was observed in 3 and 10 cenopopulations (**Figure 5**).

5. Conclusion

It is known that *Aegilops* species has been used for centuries. Representatives of the category are mainly used as nutritious and fodder plants. Representatives of the category are resistant to drought. During the research, 11 cenopopulations were studied with the participation of *Aegilops triuncalis* L., the studied cenopopulations were characterized phytocenotically, and the survival patterns of populations and the factors affecting them were analyzed. According to the results of studies, the survival indicators of the cenopopulations of Boztepa (2), Beshkuba (3), and Shalkan (7) were the highest, the survival indicators of cenopopulations

of Tuzkon (6) and Khovdak (8) were average, the survival indicators of cenopopulations of Tomchi (1), Denov (5), and Nurabod (10) were observed to be the lowest. The main factors affecting the survival indicators of cenopopulations can be attributed to the grazing of livestock by the population, road construction work, and so on.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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