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RECOVERY OF REPRESENTATIVES OF THE GENUS *AEGILOPS* L. FROM SEED

M.Z. Kurbanova[1], A.A. Imirsinova[2]

In the course of the research, the geographical distribution of representatives of the Aegilops L. genus throughout the Fergana Valley, the seed reserve in the cenopopulations, and the regeneration from the seed were determined. A GIS map and species composition were determined based on the data obtained throughout the Fergana Valley. Among the species studied is A. crassa Boiss. ex Hohen.We observed that the ecological range of Fergana Valley is somewhat limited. This species was found only in the Khojabad district of Andijan region, Imam ota hillsides (940032'47.66"N, 72036'21.8"E, at an altitude of 807 m above sea level, at a latitude of 2010 south-west). The number of bushes was small, 18,3±0,6 per 1 .

Keywords: *Aegilops L., Aegilops trinucalis L., Aegilops cylindrica Host., Aegilops tauschii Coss., Aegilops crassa Boiss. ex Hohen., cenopopulation, GAT map, soil seed stock*.

В ходе исследований установлено географическое распространение представителей рода Aegilops L. на территории Ферганской долины, изучены семенной запас ценопопуляций и их возобновление из семян. На основе полученных данных определены видовой состав и ГИС-карта распространения. Установлено, что экологический диапазон A. crassa Boiss. ex Hohen. в Ферганской долине ограничен: вид обнаружен только на адирах Имам-ота Ходжабадского района Андижанской области. Плотность популяции составила 18,3±0,6 кустов на 1 м².

Ключевые слова: *Aegilops L., Aegilops trinucialis L., Aegilops cylindrica Host., Aegilops tauschii Coss., Aegilops crassa Boiss. ex Hohen., ценопопуляция, ГИС-карта, почвенный семенной запас*.

INTRODUCTION

In recent years, many countries of the world have created National programs for the conservation of plant genetic resources. The basis of these programs is the preservation of species in situ. To date, the importance of the problem of preserving wild relatives of cultivated plants *"in situ"* in Uzbekistan is very great, and their comprehensive systematic analysis has not been fully covered. In recent years are conducting extensive research [1, 2, 3]. Human activities in agriculture and urbanization processes lead to the genetic erosion of wild relatives of cultivated plants. *Aegilops* L. family *Poaceae* Barnh. is considered one of the important categories of the family. The representatives of this group deserve attention because they are of great importance in creating useful genes in wheat varieties and in animal husbandry. In recent years, the genus *Aegilops* L. has been the most intensively studied group of grasses, especially since its close relationship with wheat cultivars was discovered. In particular, it helps to improve complex traits such as abiotic tolerance for drought and heat, in increasing the productivity of wheat varieties. Therefore, the study of the biological characteristics of the species of the series, and their geographical distribution is of great scientific and practical value. Such studies allow determining ways to preserve various ecological and biological diversity of plants.

At the same time, by studying the modern cenopopulation status and geographical distribution of these plants in different natural areas of the Fergana Valley, it is possible to assess the current status of representatives of the genus (*Aegilops* L.) throughout the valley and develop strategies for restoring cenopopulations.

Today, biomorphological and population studies

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are widely used in the world's leading scientific research centers to solve the issues of plant biodiversity conservation.

K.Tojibaev (2010) in his scientific work devoted to the study of the vegetation cover of the Southwest Tien-Shan mountain range, also touched on the place of representatives of the *Aegilops* genus (*A. crassa*, *A. cylindrica*, *A. triuncialis*) in the vegetation cover [11].

Kh.F. Shomurodov (2018) studied Kyzylkum fodder plants and gave information about their ontogenetic structure. H.F.Shomurodov in his researches in Kyzylkum, among the representatives of the species we are studying, *A. tauschii*, *A. triunsilis* evaluated the forage quality [12].

A.A.Imirsinova (2019, 2020, 2025) touched upon the reproductive biology of the studied species in his scientific works [4, 5].

Genetic studies conducted by F.Sh.Sobirov (2021) [9].

Research by Ogg and Seefeldt shows that *A. cylindrica* seeds remain viable for at least 5 years in arid areas with an annual rainfall of at least 35 cm. In contrast, in regions with high annual precipitation, seeds do not survive in the soil for more than 3-4 years [7].

Fergana Valley is one of the most densely populated regions, and today, due to the development of natural areas and urbanization processes, plant species are becoming impoverished. During the study of the representatives of the species throughout the valley, we aimed to develop their current state, practical recommendations for reproduction and preservation and protection measures as a genetic resource.

MATERIAL AND METHODS

Our research focuses on the family *Poaceae* Barnh., particularly several species of the genus *Aegilops* L., including *Aegilops triuncialis* L., *Aegilops cylindrica* Host., *Aegilops tauschii* Coss., and *Aegilops crassa* Boiss. These species are listed in the Plants of the World Online (POWO) (http://www.plantsoftheworldonline.org) and the International Plant Names Index (IPNI) (www.ipni.org) databases [13, 14].

Distribution points and samples of representatives of the species along the valley were determined and collected using routed and stationary (permanent) geobotanical methods of . Cenopopulation analyses were held by the methods of [6].

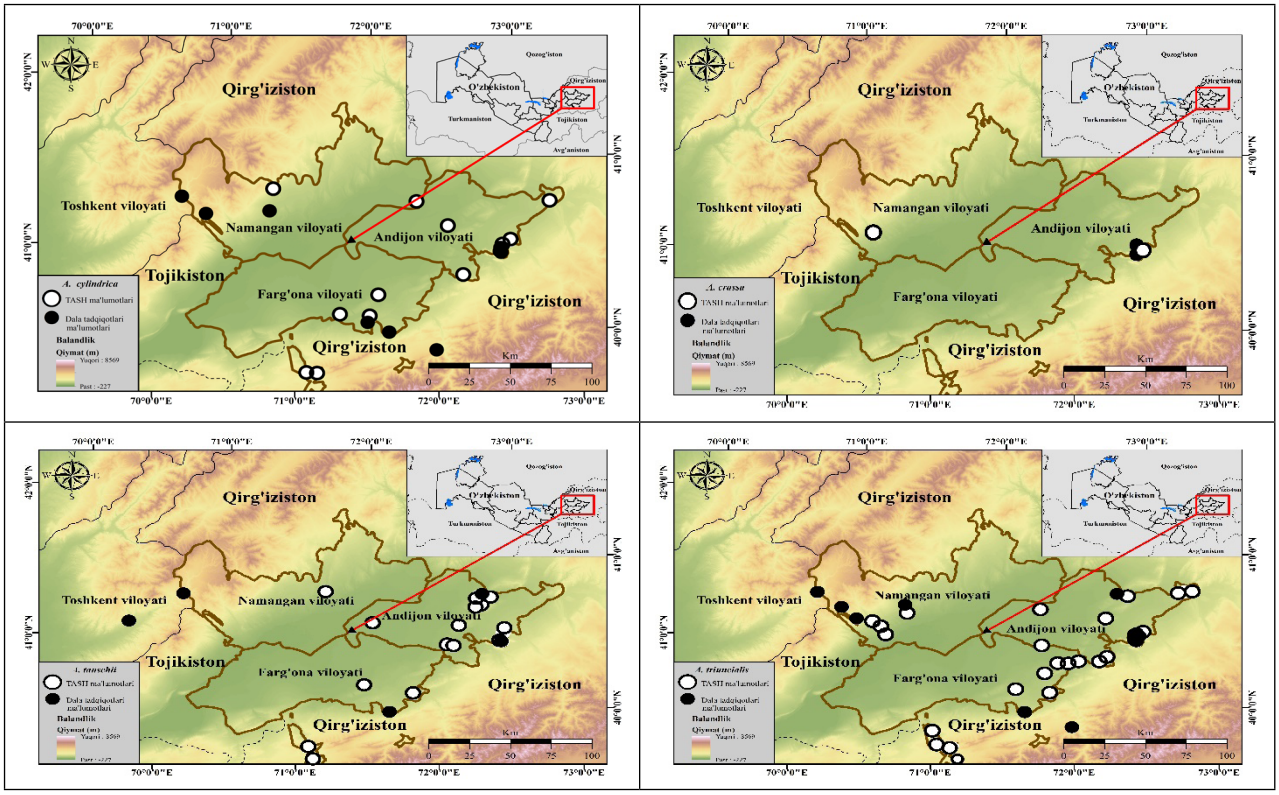
A.A.Imirsinova (2019, 2020) touched upon the reproductive biology of representatives of this species in Uzbekistan. Genetic studies conducted by F.Sh.Sobirov[15]. Today, more than 800 herbarium specimens of *Aegilops* L. are stored in the National Herbarium of Uzbekistan (TASH).

The Fergana Valley has its own climatic conditions, and the species we studied in the years 2020-2021 were found in the desert (h-400-500 m), hilly (h-780-790 m) and mountainous (h-1160-1200 m) steep regions of the valley, they were almost not found in the pasture region.

RESEARCH RESULTS AND DISCUSSION

During the researches, representatives of the species were found in the desert steep region of Fergana region – *A. triuncialis*, *A. cylindrica*, *A. tauschii*, in the hilly steep region of Andijan region – *A. triuncialis*, *A. cylindrica*, *A. tauschii*, *A. crassa*, in the mountainous steep region of Namangan region – *A. triuncialis*, *A. cylindrica*, *A. tauschii* species were found Table 2. We can observe that the hills of Andijan region are richer in species of the group compared to other regions. Due to this, this area has some favorable environmental factors for the reproductive development of the species on pic. 1.

Distributional points and patterns of species representatives across the Valley. One of the characteristic features of ephemeroids is that they occupy one area in the natural environment for a short time, high fertility or vegetative productivity, and small biomass, and their spatial distribution are considered a one-way process from invasion to regression.



Picture 1. Distribution maps of species of the genus *Aegilops* L. in the Fergana Valley.

Representatives of this group are more common in the Fergana Valley than the rest of the species and are found in areas from 242 m to 12000 m above sea level. Grows in soil conditions typical of different regions. This species is characterized by its high tolerance to climate and anthropogenic factors, occupying a wide range (Fig. 1).

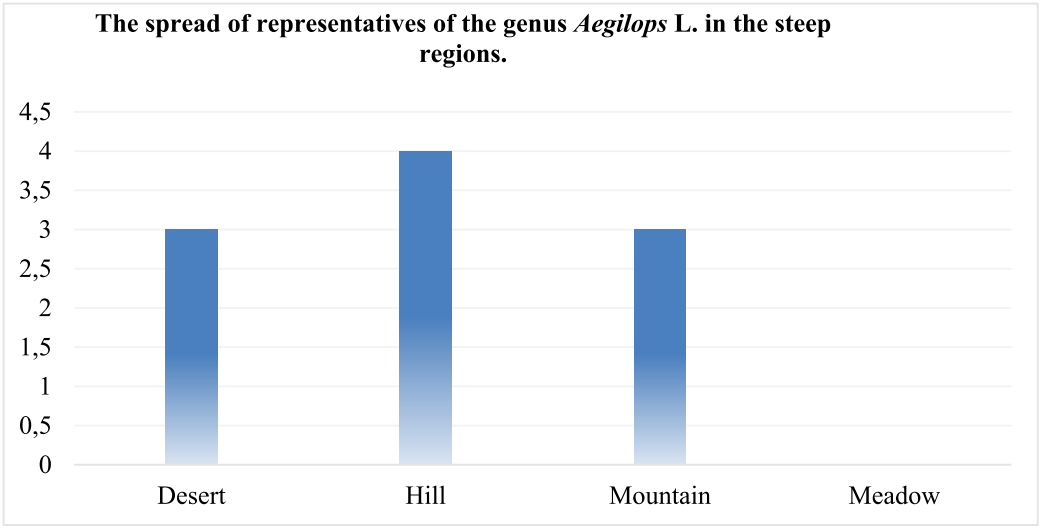


Figure 1. Distribution of representatives of the genus *Aegilops* L. across vertical zones.

Since all members of the *Aegilops* L. genus are annual plants, it is important that they regenerate themselves from seeds in nature.

The restoration of plants from seeds is presented in the works of [10].

The regeneration of plants from seeds and the

stress factors affecting them are highlighted [8]. In the literature, information about the regeneration of representatives of the wheat family from seeds in the natural environment was almost not found.

We analyzed the reproduction of representatives of the genus in cenopopulations by studied areas. The following results were obtained during the conducted research (tab.1).

Table 1.

Location of representatives of the *Aegilops* L. genus in the soil layers of the seed reserve in the soils of the Fergana Valley, pcs./(2021)

Cenopopulation	Seed reserve in soil layers, pieces/m²					
	Total	Percent %	0-2 cm		2-5 cm	
			piece	%	piece	%
***Aegilops triuncialis* L.**						
CP 1 (Imam Ota)	551,2±30,3	1100	530,9±31,3	96,3	20,6±3,8	33,7
CP2 (YukoriVodil)	113,7±11,5	1100	98,3±12,5	86,4	15,4±2,0	13,6
CP 3 (Kamchiksay)	328,7±9,5	1100	313,5±8,5	95,3	15,2±1,5	44,7
Aegilops cylindrica Host.						
CP 1 (Imam Ota)	208,7±6,3	1100	180,3±5,6	86,4	28,4±1,7	13,6
CP 2 (Yukori Vodil)	224,6±1,0	1100	196,2±0,3	87,3	28,4±3,3	12,7
CP 3 (Kamchiksay)	246,8±10,6	1100	204,9±9,9	83,0	41,9±3,4	17,0
***Aegilops tauschii* Coss.**						
CP 1 (Imam Ota)	295±4,8	1100	245,7±14,0	83,3	49,3±2,2	16,7
CP 2 (YukoriVodil)	102,8±1,1	1100	89,5±1,3	87,0	13,3±0,25	13,0
CP 3 (Kamchiksay)	230,8±0,8	1100	162,2±0,8	70,2	68,6±1,0	29,8
***Aegilops crassa* Boiss.**						
CP 1 (Imam Ota)	90,4±3,0	1100	77,5±2,6	85,7	12,9±0,7	14,3

We recalculated our observations for every 1 in 10 samples. *A. triuncialis* in CP1, the average total number of seeds per 1 was 551.2, of which 530.9 (96.3%) were on the soil surface and 20.6 (3.7%) at a depth of 2-5 cm. The total number of accents in CP 2 of the same type was 113.7 units. 98.3 (86.4%) grains were found at a depth of 0-2 cm, and 15.4 (13.6%) grains were found at a depth of 2-5 cm. There was a total of 328.7 seeds in CP 3 (Kamchiksoy), of which 313.5 (95.3%) seeds were in 0-2 cm and 15.2 (4.7%) seeds in 2-5 cm.

A. cylindrica it was found that 208.7 seeds of the species were located in the 0-2 cm layer and 28.4 (13.6%) in the 2-5 cm soil layer. In Kamchiksoy cenopopulation, 246.8 seeds of the species were found, of which 204.9 (83%) were in the 0-2 cm soil layer, and 41.9 (17%) were in the 2-5 cm layer. In the Upper Vodil cenopopulation of this species, the total seed reserve in the soil was 224.6 pieces, of which 204.9 pieces (83%) were in the 0-2 cm soil layer, and 41.9 pieces (17%) were in the 2-5 cm depth.

There were 295 seeds in the Imam ota cenopopulation of *A. tauschii*, 245.7 (83.3%) in the 0-2 cm soil layer and 49.3 (16.7%) seeds of the species were found in the 2-5 cm layer. There were 102.8 seed reserves in CP 2, of which 89.5 (87%) were scattered in the 0-2 cm soil layer and 13.3 (13%) in the 2-5 cm layer. In CP 3, the total number of seeds in the soil was 230.8 pieces, 162.2 (70.2%) seeds were found in the 0-2 cm soil layer, and 68.6 (29.8%) seeds were found in the 2-5 cm layer.

A. crassa the total seed stock of crassa was 90.4 units on average, 77.5 (85.7%) units in the 0-2 cm layer of the soil, and 12.9 (14.3%) units in the 2-5 cm layer.

Among the studied species, *A. triuncialis* L. in the Imam ota cenopopulation, the seed stock was higher (551.2 units) than other species. This is due to the fact that the species are densely and uniformly located in this area, and the anthropogenic factors are somewhat limited. The lowest rate of *A. crassa* was observed in the cenopopulation of the species crassa (90.4). This species is very rare here. This is mainly caused by irregular grazing of livestock and anthropogenic factors Fig.2.

Germination of the studied species in natural areas coincided with the end of September and the beginning of October.

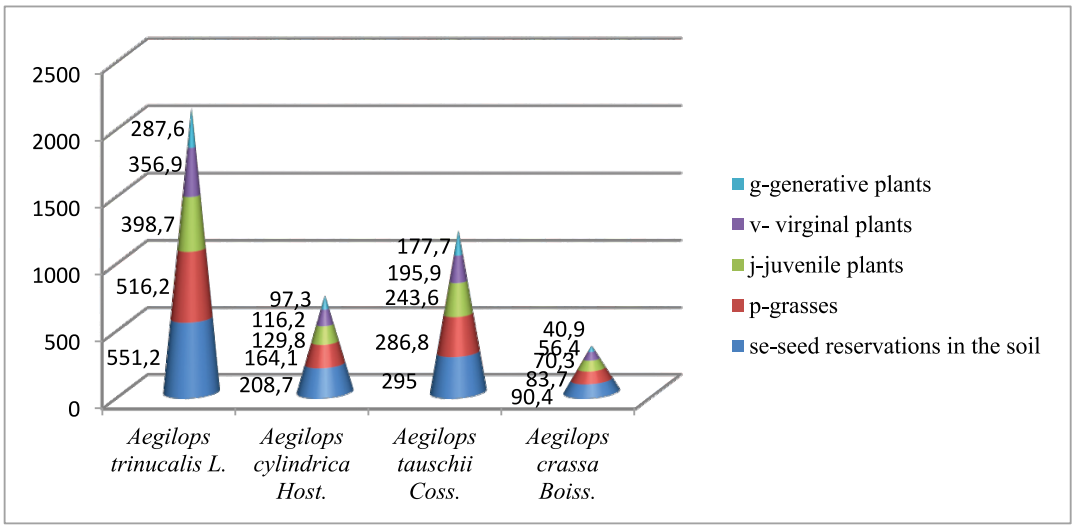


Figure 2. Reproduction of *Aegilops* L. from seed in the hilly region (Andijan, 2022).

Khojabad district of Andijan region is a region rich in species of representatives of the group, and the recovery from seeds in isolated cenopopulations gave the following results.

The Imam ota cenopopulation of *Aegilops trinucalis* L. is an area with a limited human factor, and the average seed stock (se) was 551.2 units. Germination of species in this area took place on 21.09.2021. The number of sprouted grasses (p) was 516.2 pieces, and 398.7 pieces remained in the young state of yuvinel (j). Species in transition to this age state. The young state of Virgenil (v) was realized in this area in the last third of February. At this stage of ontogenesis, 356.9 plants survived. During the generative (g) period, 287.6 plants developed and we calculated their seed productivity.

A. cylindrica the spread area is located in the eastern part of Imam Ota Edirets, and anthropogenic transformation is somewhat high in this area. Viable seeds in the soil were 208.7 units, and the resulting lawns produced 164.1 units. 129.8 plants remained in the juvenile stage of development. 116.2 plants remained in the virginal state, while 97.3 plants remained in the generative period.

In the cenopopulation of *A. tauschii*, the average number of seeds in the soil was 295 per 1 m^2. There were 286.8 pieces of sprouted grass, and 25.2 pieces of plants died during the transition to the young state. 243.6 plants developed and passed to the virginal stage. At this age, there were 195.9 plants, and 97.3 plants survived to the generative stage.

As a result of the expeditions carried out along the valley, *A. crassa* was found only in the highlands of Khojabad district. The number of viable seeds in the soil was 90.4, and the number of germinated grasses was 83.7. 70.3 pieces of plants were preserved in the juvenile state. While 56.4 plants survived the virgin stage, 40.9 plants reached the flowering stage and bore fruit fig 3.

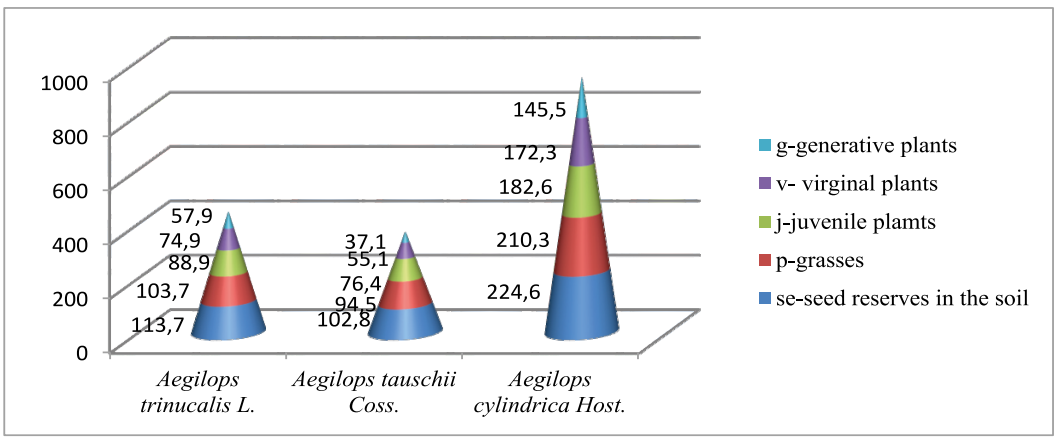


Figure 3. Reproduction of *Aegilops* L. from seed in the desert steep region (Fergana, 2022).

Representatives of the species were found in the desert steep region of Fergana region (around the Aksu stream). Only three species of the genus (*A. trinucalis* L., *A. tauschii* Coss., *A. cylindrica* Host.) were found in this area.

The number of viable seeds of *A. trinucalis* L. in the soil was 113.7, and the number of germinated grasses (p) produced 103.7. About 10 seeds did not germinate for various reasons. Most of the plants in the grass stage died in this area (14.8 units). The number of young plants reached 88.9 units. The human factor is high here, and 74.9 plants have survived to the virginal stage. At this stage too, 17 plants died due to the heavy use as fodder. During the generative period, 57.9 plants were preserved.

The soil seed stock of *A. tauschii* was 102.8 units, and the recovered lawns were 94.5 units. Most of the lawns died, and 76.4 plants continued to grow at a young age. We observed that 55.1 plants survived to the virginal stage. 37.1 plants survived to the generative stage and yielded.

A. cylindrica the seed reserve in the soil was 224.6 units, and the number of sprouted grasses was 210.3 units. The number of dead seeds is 14.3. During the grass stage of this species, many sprouts died, and the number of plants that passed to the young stage was 182.6. 172.3 plants were preserved in the virginal state. 145.5 plants passed to the generative stage, and the largest number of plants died during the transition from the grass stage to the yuvinel stage fig. 4 (27.7 plants).

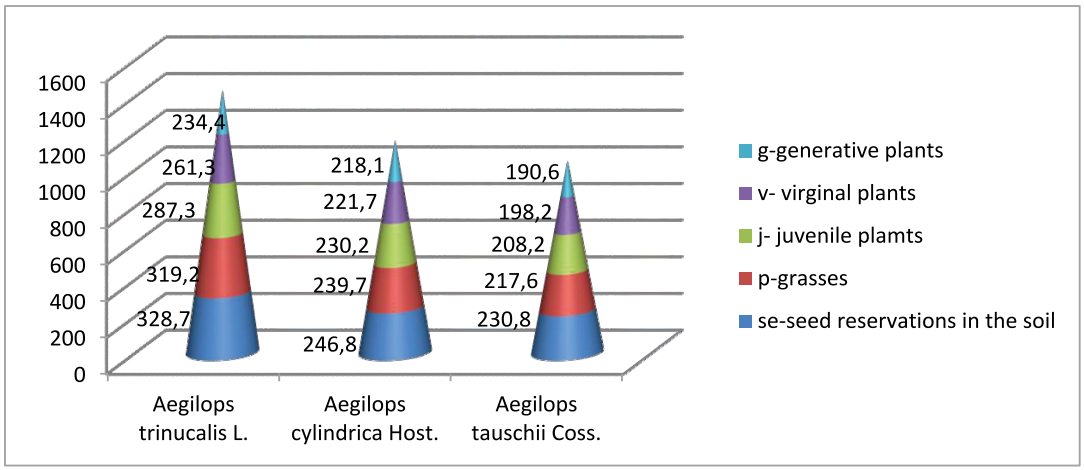


Figure 4. Reproduction of *Aegilops* L. from seed in the steep mountain region (Namangan, 2022).

Three species of representatives of the genus were also found in the desert steep region of the Fergana Valley (*A. trinucalis*, *A. cylindrica*, *A. tauschii*).

The number of viable seeds of *A. trinucalis* L. in the soil was 328.7, and 319.2 plants germinated. 287.3 specimens of the studied species passed to the juvenile state, and the rest died. 261.3 plants that have passed to the virginal young state. During the generative period, 234.4 plants were preserved.

A. cylindrica of viable seeds in the soil of this area amounted to 246.8 units. The number of lawns formed from them was 239.7 pieces, and 230.2 pieces of plants were saved in the yuvinel stage. 221.7 units of plants developed to the virginal stage, and 218.1 units were produced by the plants that passed to the generative stage.

The soil seed reserve of *A. tauschii* in this area was 230.8 units, and the number of sprouts was 217.6 units. 208.2 plants survived to the juvenile state. The number of plants that have passed to the virgin age state is 198.2 units, and the number of bushes that have passed to the generative age state and produced grain is 190.6 units.

CONCLUSION

In Fergana region (desert) – *A. triuncialis* L., *A. cylindrica* Host., *Aegilops tauschii* Coss.; In Andijan region (hill) – *A. triuncialis* L., *A. cylndrica* Host., *A. tauschii* Coss., *A. crassa* Boiss.; In Namangan region (mountains) – *A. triuncialis* L., *A. cylndrica* Host. species met.

Among the studied regions, in Andijan and Fergana regions of the Fergana Valley, due to the increase of anthropogenic influence, the soil seed reserve of the representatives of the genus and the self-regeneration of species from it to the generative stage gives a somewhat low indicator. Therefore, it

is important to preserve the representatives of this group in natural ecotopes, where the representatives of this group have acquired specific adaptations over the years.

A. crassa distribution in the Fergana Valley is somewhat limited, this species was found only in the Khojabad District of Andijan Region, Imam Ota hillside (940032'47.66»N, 72036'21.8»E, at an altitude of h-807 m above sea level, at a latitude of 2010 in the southwest).

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AEGILOPS L. TURKUM VAKILLARINING URUG‘DAN QAYTA TIKLANISHI

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Kalit so‘zlar: *Aegilops L., Aegilops triuncialis L., Aegilops cylindrica Host., Aegilops tauschii Coss., Aegilops crassa Boiss. ex Hohen., senopopulyatsiya, GAT xaritasi, tuproq urug‘ zaxirasi.*

Tadqiqotda *Aegilops* L. turkum vakillarining Farg‘ona vodiysi bo‘ylab geografik tarqalishi, senopopulyatsiyalaridagi urug‘ zaxirasi va urug‘dan qayta tiklanishi aniqlandi. Farg‘ona vodiysi bo‘ylab olingan ma’lumotlar asosida GAT xaritasi va turlar tarkibi aniqlandi. Bunga ko‘ra Farg‘ona viloyatida (cho‘l) – *A. triuncialis* L., *A. cylindrica* Host., *A. tauschii* Coss.; Andijon viloyatida (adir) – *A. triuncialis* L., *A. cylndrica* Host., *A. tauschii* Coss., *A. crassa* Boiss.; Namangan viloyatida (tog‘oldi) – *A. triuncialis* L., *A. cylndrica* Host., *A. tauschii* Coss. turlari uchradi.

Efemeroidlar tabiiy muhitda mavjud bitta hududni egallab turishi qisqaligi, yuqori urug‘lilik yoki vegetativ mahsuldorlik, biomassasining kichikligi xarakterli xususiyatlaridan biri bo‘lib, ularning fazoda tarqalishi invaziyadan regressiyagacha bo‘lgan bir yo‘nalishli jarayon hisoblanadi. Turkum vakillari o‘simliklar jamoasida tez unib chiqishi, unib chiqish foizlari yuqori ekanligi, ildizlari tuproqqa chuqur kirib borishi, urug‘lari bug‘doydoshlar oilasining boshqa vakillariga nisbatan kechroq pishib yetilishi, birmuncha yaxshi rivojlangan boshoqcha qipig‘iga ega ekanligi bilan ustun o‘rinni egallaydi.

Mazkur turkum vakillari Farg‘ona vodiysida boshqa turlarga nisbatan keng tarqalgan bo‘lib, dengiz sathidan 242 *m* dan 12000 *m* gacha bo‘lgan hududlarda uchradi. Turli hududlarga xos bo‘lgan tuproq sharoitlarida o‘sadi. Ushbu tur iqlim, antropogen omillarga yuqori tolerantlik ko‘rsatib, keng diapazonni egallab turishi bilan xarakterlidir. Biroq bugungi kunda antropogen ta’sirning o‘sib borishi oqibatida turkum vakillarining ayrim turlari juda sanoqli joylardagina uchramoqda. O‘rganilgan turlar orasida *Aegilops crassa Boiss*. ex Hohen.ning Farg‘ona vodiysida ekologik diapazoni birmuncha cheklanganligi kuzatildi. Ushbu tur faqat Andijon viloyati Xo‘jaobod tumanining Imom ota adirliklarida (940032’47.66”N, 72036’21.8”E, dengiz sathidan h-807 *m* balandlikda, janubi-g‘arbining 201^0 kengligida) uchradi. Tuplar soni oz bo‘lib, 1 m^2 maydonda 18,3±0,6 donani tashkil etdi. Ushbu turkum vakillarini tabiiy ekotoplarda saqlash ahamiyatga ega bo‘lib, bu yerda mazkur turkum vakillari yillar davomida o‘ziga xos moslanishlarga ega bo‘lgan.

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