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ARTICLE 4

Biodiversity and Areas of Distribution of Di-, Tetra- and Hexaploid Wheat (*Triticum* L.) Species in Azerbaijan

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ABSTRACT

This study presents the results of an investigation into the biodiversity and distributional areas of diploid, tetraploid, and hexaploid wheat (*Triticum spp.*) species in Azerbaijan. The contrasting soil and climatic conditions, vertical zonality, and abundant solar radiation of the region have formed rich biodiversity, confirming Azerbaijan as one of the primary centres of wheat origin and diversification. A total of 14 wheat species have been identified in Azerbaijan: three diploid hulled species (*Triticum urartu*, *T. boeoticum*, and *T. monococcum*); seven tetraploid species including two hulled forms — one wild (*T. araraticum*) and one cultivated (*T. dicoccum*) — and five free-threshing naked-grain species (*T. durum*, *T. turgidum*, *T. turanicum*, *T. polonicum*, and *T. carthlicum*); and four hexaploid species comprising two hulled forms (*T. spelta* and *T. vavilovii*) and two free-threshing forms (*T. aestivum* and *T. compactum*). Botanical variety data from field collections spanning all major agro-ecological zones are presented. Given the ongoing threat of genetic erosion, urgent collection, comprehensive study, and ex situ conservation of all endangered wheat species in Azerbaijan is strongly recommended.

Keywords: *diploid wheat; tetraploid wheat; hexaploid wheat; Triticum; genetic resources; biodiversity; centre of origin; Azerbaijan*

1. INTRODUCTION

One of the primary centers of origin for cultivated plants, Western Asia is also distinguished by its richness in wheat species. Nine botanical species of the wheat genus are considered endemic to this center. In Azerbaijan, which is one of the key zones of the Western Asian center, the contrasting soil and climate conditions, vertical zonality, and abundant natural solar radiation have contributed to the formation of rich biodiversity. The intensity of speciation, the abundance of wild and rare species, subspecies,

varieties, and forms confirm that this region is one of the original centers of origin for wheats (*Triticum* L.).

As a result of archaeological excavations and paleontological research, numerous cereal plant remains (straw, grain, and flour) have been discovered in layers dating back to the 4th–2nd centuries BCE in the areas of Binagadi, Mingachevir, the Nakhchivan Autonomous Republic (Kultepe), Goygol, and Asgaran (Khojaly). In addition, stone sickles used for grain cultivation, threshing tools, and stone hand mills for grinding

grain have been found. Charred seeds of various types of wheat, barley, and emmer, dating back to the mid-3rd millennium B.C., were discovered during excavations at the Kultepe mound in Nakhchivan. These findings prove that in the territory of the Nakhchivan ASSR during that period, durum, bread, and club wheats, emmer, different types of barley, and other crops were cultivated. Boat-shaped stone grain grinders and flint inserts for wooden sickles were also found at the site (1-7).

2. MATERIALS AND METHODS

Among the genera distinguished by their biodiversity within the Poaceae Barnh. family, the genus *Triticum* (wheat) is particularly notable. The genus comprises 19 natural species (both widespread and endemic), along with numerous natural mutants and synthetic species of hybrid origin. Based on ploidy level, the genus *Triticum* is classified into three groups: (1)

diploid wheats (monococcum group), (2) tetraploid wheats (dicoccoides group), and (3) hexaploid wheats (spelta group).

Among wheat species, the most important and widely cultivated is bread wheat (*Triticum aestivum* L.), followed by durum wheat (*T. durum* Desf.), which is an indispensable raw material for pasta and confectionery industries. The cultivated emmer (*T. dicoccum* (Schrank) Schuebl.) was historically grown on different continents for groat production. Other tetraploid species such as *T. turgidum* L., *T. turanicum* Jakubz., *T. polonicum* L., *T. carthlicum* Nevski (= *T. persicum* Vav.), and hexaploid species such as *T. compactum* Host., *T. spelta* L., and *T. sphaerococcum* Perciv. had limited practical significance. The remaining species are found either in the wild or as biological intermediates among the aforementioned species. In Azerbaijan, a total of 14 wheat species have been identified (Table).

Table1. Wild, rare and cultivated wheat species of Azerbaijan (Dorofeev et al, 1979)

Subgenus	Section	Species groups	Species	Ploidy, 2n	Genomes	
<i>Triticum</i>	<i>Urtu</i> Dorof. et Filat.	Monococcion	<i>T.urtu</i> Thum. ex Gandil.	14	A ^u	
	<i>Dicoccoides</i> Flaksb.	Emmers	<i>T. dicoccum</i> (Schrank) Schuebl.	28	A ^u B	
			Tetraploids with light threshing	<i>T. turgidum</i> L.	28	A ^u B
		<i>T. durum</i> Desf.		28	A ^u B	
		<i>T. turanicum</i> Jakubz.		28	A ^u B	
		<i>T. polonicum</i> L.		28	A ^u B	
		<i>Triticum</i>	Spelt	<i>T. spelta</i> L.	42	A ^u BD
	<i>T. vavilovii</i> Jakubz.			42	A ^u BD	
	<i>Boeoticum</i> Mig. et Dor.	<i>Monococcon</i> Dum.	Monococcion	<i>T. boeoticum</i> Boiss.	14	A ^b
				<i>T. monococcum</i> L.	14	--"--
	<i>Timopheevii</i> A.Filat. et Dorof.	Emmers	<i>T. araraticum</i> Jakubz.	28	G ^b	

3. RESULTS AND DISCUSSION

I. Among the wild diploid wheats, *T. urartu* Thum. ex Gandil., *T. boeoticum* Boiss., and *T. monococcum* L. have been collected in Azerbaijan (1–6).

T. urartu Thum. ex Gandil. – A wild, hulled species (the grain is difficult to separate from the husk) with the Au genome. In the Zangilan region, the botanical varieties var. *spontaneorubrum* and var. *albonigricans* have been found.

T. boeoticum Boiss. – A wild, hulled species with the A^b genome. From the regions of Jabrayil (630–750 m above sea level), Nakhchivan AR (Babek district, Chalkhangala village, 1230–1270 m a.s.l.), Shabran, Zangilan (630 m a.s.l.), Shamakhi (720–1270 m a.s.l.), and Hadrut, 19 botanical varieties belonging to 2 subspecies have been collected (1–6):

-subsp. *boeoticum* – in Azerbaijan var. *aznaburticum*, var. *baydaricum*, var. *boeoticum*, var. *pseudoboeoticum* var. *viridiboeoticum*, var. *symboloenense*, var. *viridisymboloenense*, var. *pseudozuccarinii*, var. *mayssuriani*, var. *pubescentinigrum*, var. *helenae* botanical varieties were found.

-subsp. *thaoudar* – in Azerbaijan var. *thaoudar*, var. *azerbajdjanicum* var. *nigrireuteri*, var. *balansae*, var. *balaclavicum*, var. *fuscum*, var. *luteinigrum*, var. *mazzettii* botanical varieties were found.

T. monococcum L. – A cultivated, hulled species with the A^b genome – 10 botanical varieties have been collected from the regions of Shusha, Khankendi (1000–1230 m above sea level), Lachin, Ismayilli (600–1300 m a.s.l.), and Yardimli (1000 m a.s.l.): var. *monococcum*, var. *macedonicum*, var. *flavescens*, var. *pseudoflavescens*, var. *macedonicum*, var. *pseudomacedonicum*, var. *hohensteinii*, var. *hornemannii*, var. *pseudohornemannii*, var. *vulgare* (1–6).

II. Wild tetraploid wheats (A^bG genomes). Only one species is found in Azerbaijan – *T. araraticum* Jakubz. 1947. In various classifications, it has been referred to under different names: *T. dicoccoides* subsp. *armeniicum* Jakubz., 1932; *T. armeniicum* (Jakubz.) Makush., 1938; *T. montanum* Makush., 1948; *T. chaldicum* Menabde, 1948; *T. turgidum* subsp. *armeniicum* (Jakubz.) A. et De Löve, 1961; *T. timopheevii*

subsp. *armeniicum* (Jakubz.) J. Mac Key, 1966 (1–6).

From the Nakhchivan AR (Babek district, Chalkhangala village, 1230–1270 m a.s.l.), Agsu (290–700 m a.s.l.), Shamakhi (290–700 m a.s.l.), and Nagorno-Karabakh (410 m a.s.l.), 8 botanical varieties belonging to the subspecies *araraticum* have been collected: var. *araraticum*, var. *nachitschevanicum*, var. *araxicum*, var. *thumaniani*, var. *pseudostrausianum*, var. *pseudoarmeniicum*, var. *pseudoaaronsohnii*, var. *nigrum* (1–6).

III. Cultivated tetraploid wheats (A^uB genomes). In Azerbaijan, the following species are found: *T. dicoccum* (Schrank) Schuebl., *T. turgidum* L., *T. durum* Desf., *T. turanicum* Jakubz., *T. polonicum* L., *T. cartlicum* Nevski (= *T. persicum* Vav.) (1–7).

T. dicoccum (Schrank) Schuebl. – Cultivated emmer wheat. From the Nakhchivan AR (Babek and Sharur, 1230–1270 m a.s.l.), Karabakh (Shusha, Khankendi, Aghdara, 800–1400 m a.s.l.), Lachin (1300–1400 m a.s.l.), Lerik and Ismayilli (600–1300 m a.s.l.), 12 botanical varieties belonging to 2 subspecies have been found:

-Subsp. *dicoccum* convar. *dicoccum* – var. *dicoccum*, var. *rufum*, var. *pseudorufum*, var. *semicanum*, var. *macratherum*, var. *atratum*, var. *hybridum*; var. *pseudoerythrurum* belonged to the European group of the European subspecies.

-Subsp. *asiaticum* Vav. convar. *transcausicum* Flaksb. - var. *uniluteotinctum*, var. *uniaeruginosum*, var. *haussknechtianum*, var. *jakubzineri*, var. *aeruginosum*, var. *chevsuricum*, var. *flaksbergerii* belonged to the Southern Caucasus botanical variety of the Asian subspecies.

In recent years, new hybrid-origin emmer wheat accessions have been developed. The new hybrids do not differ in spike shape from emmer, and include forms that combine traits of durum wheat (naked grain, vitreousness, grain shape, and color) and emmer (grain shape and color). Accessions have been identified with red and white grain, with elongated and oval grain shapes.

In addition, constant low-growing forms have been identified with false (as in *T. vavilovii*) and true (as in *T. turgidum*) branching. Some

hybrids are phenotypically indistinguishable from emmer, but have easy threshing; the naked-grain types thresh easily regardless of the type of thresher used.

Constant forms of cultivated emmer have been identified: short (35.0–60.0 cm), medium (65.0–95.0 cm), and tall (over 125 cm), with early and late heading (May 1–13), hulled and naked-grain types — all with easy threshing, with normal spikes, flat, inflated, and turgidoid spike forms. Compared to short and medium-height forms, tall samples show higher resistance to fungal diseases (6).

***T. turgidum* L.** — Turgidum wheat has been collected from almost all regions of Azerbaijan — from lowland, foothill, and mid-mountain areas (48 botanical varieties) (1-3). In Azerbaijan, var. *turgidum*, var. *melanatherum*, var. *nigroglumarum*, var. *musciabile*, var. *dreischianum*, var. *speciosissimum*, var. *ferespeciosissimum*, var. *herrerae*, var. *rubroherrerae*, var. *gentile*, var. *nigrobarbatum*, var. *striatum*, var. *speciosum*, var. *martensii*, var. *nigromartensii*, var. *albofumidum*, var. *megalopolitanum*, var. *salomonis*, var. *pseudomirabile*, var. *rubroalbum*, var. *nigropseudomirabile*, var. *albojodurum*, var. *pseudosalomonis*, var. *rubroatrum*, var. *falsejodurum*, var. *jodurum*, var. *muticospeciosum*, var. *muticospeciosum* botanical varieties of convar. *turgidum* - the group with simple, unbranched spikes have been found.

Convar. *compositum* Filat. — belongs to the group with branched spike. The following varieties have been found in Azerbaijan: var. *ramosolusitanicum*, var. *nachitschevanicum*, var. *pseudocervinum*, var. *plinianum*, var. *columbinum*, var. *cubinum*, var. *pavoninum*, var. *ramosostriatum*, var. *levipavoninum*, var. *leviramostriatum*, var. *schemachanicum*, var. *mirabile*, var. *felsemirabile*, var. *lencoranicum*, var. *giganteum*, var. *centrigranium*, var. *pseudocentrigranium*, var. *compositum*, var. *pseudolinnaeanum*, var. *causicum*

Out of the 420 *Triticum turgidum* specimens stored in the VIR world collection, 90 (21.4%) were collected from the territory of Azerbaijan during the Soviet era, up until the 1970s–80s. Of the 71 known varieties, 47 (66.0%) have been found in Azerbaijan. This once again proves that

Azerbaijan is one of the main centers of formation and polymorphism of *T. turgidum* wheat forms.

***T. durum* Desf.** — Durum wheat is found in all ecological and geographical conditions of Azerbaijan. However, its botanical varieties are not evenly distributed. Botanically, the richest region is Shirvan, where the composition varies sharply depending on altitude (–16 to 1200 m), with 19 botanical varieties recorded. The number of botanical varieties decreases in the following regions: Mugan-Salyan (16), Mil-Karabakh and Lankaran (11), Shaki-Zagatala (10), Guba-Khachmaz (8), Ganja-Gazakh, Nakhchivan AR, and Nagorno-Karabakh (7), the mountainous zone of the Lesser Caucasus (6), Aras lowlands (5), and Absheron (3) (1-3).

Studies have shown that durum wheats of Azerbaijan exhibit high intraspecific polymorphism, with 52 botanical varieties observed. By this indicator, they are second only to bread wheat. The most commonly found hard wheat varieties in our Republic belong to the subsp. *durum*. The most widely distributed are var. *leucurum*, var. *hordeiforme*, var. *melanopus*, var. *apulicum*, var. *caerulescens*, var. *leucomelan*, var. *affine*, var. *reychenbachii*, var. *alexandrinum*, var. *provinciale*, var. *valenciae*, and var. *niloticum*. However, some breeding cultivars belong to the subsp. *horanicum*, particularly var. *horanoleucurum*. Durum wheats are distributed along a vertical zonation from below sea level (–16 m, Caspian lowland) up to 1870 m (Shusha, Kecheldag). In cultivated fields, they are mainly found in plains and foothill regions at altitudes of 800–1000 m. (1-3).

In recent years, accessions belonging to the truly branched botanical variety (subconvar. *duroramosum* Dorof.), including var. *ramosoleucurum*, var. *ramosoleucomelan*, var. *ramosohoreiforme*, var. *ramosoerythromelan*, var. *ramosoaffine*, var. *ramosocaerulescens*, var. *ramosobscurum*, var. *ramosoalbobscurum*, and var. *ramosolibyicum*, have been selected and submitted to the National Gene Bank.

***T. turanicum* Jakubz.** (= *T. orientale* Persiv.) — Turan wheat is genetically related to durum wheat, forming fertile hybrids. In terms of biodiversity, Azerbaijan (11 botanical varieties)

and Turkey (10) occupy leading positions. Historically, it was mainly collected from Tartar, Khojavend, Agdam, Aghjabadi, Fizuli, Masalli, Jalilabad, and Agsu districts. In Azerbaijan, the following botanical varieties have been recorded: *var. ferghanicum*, *var. gasimustafakemalii*, *var. generosum*, *var. insigne*, *var. jalovanianum*, *var. notabile*, *var. turanaffine*, *var. turaninigrum*, *var. turanobscurum*, *var. turanmursiense*, *var. turaniprovinciale* (1-3).

***T. polonicum* L.** – Polish wheat has been found in Azerbaijan (Fizuli district) in durum wheat fields, in small quantities, as a rare biological mixture, represented by three botanical varieties: *var. polonicum*, *var. pseudolevissimum*, and *var. villosum* (2, 3). In recent years, accessions with ordinary and branched spikes belonging to *var. chrysospermum*, *var. pseudochrysospermum*, *var. skalasubovii*, *var. pisarevii*, *var. rufescens*, *var. pseudocaryopsirubrum*, *var. rubrosemineum*, *var. caryopsirubrum*, *var. heydelbergi*, *var. abyssinicum*, *var. levissimum*, and others have been selected and submitted to the National Gene Bank (7).

***T. cartlicum* Nevski = *T. persicum* Vav.** – Kartvel (Iran) wheat was first recorded in Azerbaijan by N.N. Kuleshov (1926) in Nakhchivan. Later, at altitudes of 90–1600 m, it was observed in Nakhchivan AR (Culfa, Babek, Sharur, Shahbuz), Kalbajar, Aghdara, Agdam, Yevlakh, Saatly, Sabirabad, Gazakh, Goygol, Agsu, Shamakhi, Lerik, Masalli, Jalilabad, Bilesuvar, Goranboy, Khachmaz, Shabran, Guba, Shaki, and Zagatala, with six botanical varieties recorded: *var. stramineum*, *var. pseudostramineum*, *var. rubiginosum*, *var. pseudorubiginosum*, *var. nigrorubiginosum*, and *var. fuliginosum*. The collected accessions also differ in spike density, intensity of coloration, and the length and coarseness of spikes and awns.

IV. Hexaploid wheats (A⁴BD genomes). In Azerbaijan, the species *T. aestivum* L., *T. compactum* Host., *T. spelta* L., and *T. vavilovii* Jakubz. are distributed (1–7).

***T. aestivum* L.** – Bread wheat is the most widely distributed, ecologically plastic, and cosmopolitan species. It occurs on all five continents – from the Polar regions to the southern extremes of America, Africa, and Australia,

and from below sea level up to 4000 m elevation (Peru). In terms of varietal diversity and the number of collected accessions, Azerbaijan ranks first in the South Caucasus. Botanically, the richest regions (39 botanical varieties) are Nakhchivan AR and Shaki-Zagatala. These are followed by Shirvan (31 botanical varieties), Guba-Khachmaz (25), Mugan-Salyan (21), Ganja-Gazakh (20), Mil-Karabakh and Lankaran-Ashtara (19), Aras lowlands and Nagorno-Karabakh (17), and Absheron (6). The most widely distributed botanical varieties are *var. suberythrosperrum*, *var. lutescens*, *var. ferrugineum*, and *var. caesium*. In addition, in cultivated fields, *var. milturum*, *var. barbarossa*, *var. pseudobarbarossa*, and *var. hostianum* occur as biological mixtures. In plains and foothill regions, genotypes with a winter growth habit predominate, whereas in mountainous and high-mountain areas, semi-winter and spring types are more common. Hairy and dark-colored forms are mainly found in high-mountain regions (1-3)

In modern classification, based on morpho-biological and ecological traits, bread wheat is divided into the subspecies *hadropyrum* (Flaksb.) Tzvel. – representing the Asian subspecies, and subsp. *aestivum* – representing the Indo-European subspecies (1).

In our Republic, the Asian subspecies is represented by the groups of convar. *rigidum* and convar. *semirigidum*, and specimens belonging to the European subspecies (subsp. *aestivum*) have also been found (1-3):

-convar. *rigidum* represented by the following botanical varieties: *var. subgraecum*, *var. suberythroleucum*, *var. suberythrosperrum*, *var. subferrugineum*, *var. submeridionale*, *var. submesopotamicum*, *var. subhostianum*, *var. subpseudohostianum*, *var. subbarbarossa*

-convar. *semirigidum* represented by the following botanical varieties: *var. pseudoalbirubrum*, *var. cinereum*, *var. introitum*, *var. delfii*, *var. graecum*, *var. nigrigraecum*, *var. pseudo-graecum*, *var. erythroleucum*, *var. pseudoerythroleucum*, *var. chiovendae*, *var. caesioides*, *var. cinerosum*, *var. almaatense*, *var. indicum*, *var. melanopogon*, *var. variabile*, *var. nigricans*, *var. bengalense*, *var. meridionale*, *var. pseudo-meridionale*, *var. hamadanicum*, *var. turcicum*,

var. *pseudoturcicum*, var. *griseum*, var. *mesopotamicum*, var. *iranicum*, var. *hostianum*, var. *pseudohostianum*, var. *kazvinicum*, var. *barbarossa*, var. *pseudobarbarossa*, var. *luritanicum*, var. *rubrimurinum*, var. *renovatum*, var. *fuliginosum*.

The European subspecies is represented by the following botanical varieties: var. *aureum*, var. *albirubrum*, var. *lutescens*, var. *milturum*, var. *anglicum*, var. *villosum*, var. *aestivum*, var. *nigraristatum*, var. *ferrugineum*, var. *sardoum*, var. *caesium*.

T. compactum Host.- Dwarf, compact wheat is very close to bread wheat, differing only by its short and dense-compact spikes. It has both winter and spring growth habits. In Azerbaijan, it has had no significant agricultural importance. A total of 13 botanical varieties have been frequently found as biological mixtures in soft and hard wheat population fields in Nakhchivan AR, Nagorno-Karabakh, Kalbajar, Shamakhi, Zagatala, Guba, and Gusar. Pure plantings have been observed only in Nakhchivan AR. In our Republic, the following varietal forms have been collected: var. *fetissoyii*, var. *erinaceum*, var. *cabritanicum*, var. *rubriceps*, var. *pseudorubriceps*, var. *albiceps*, var. *kanaschii*, var. *echinoideum*, var. *kerkianum*, var. *humboldtii*, var. *wernerianum*, var. *compactum* var. *icterinum*

T. spelta L. - The winter spelta wheats of Azerbaijan are tall, with high leafiness and strong tillering; they are resistant to cold, frost, and humidity, but susceptible to drought, and are immune to yellow rust, brown rust, and powdery mildew. Spelta flour is of high quality. A total of 25 botanical varieties have been collected from the following regions: Nakhchivan AR (Babek, Sharur), Shusha, Lachin, Gabala, Goygol, Goranboy, Kalbajar, Ismayilli, Shamakhi, Zagatala, Guba, Gusar, Khachmaz, and Masalli: var. *vavilovii*, var. *asiduhamelianum*, var. *albiduhamelianum*, var. *asialbispicatum*, var. *jakubzineri*, var. *thumanianii*, var. *marinae*, var. *asiamissum*, var. *asirecens*, var. *asineglectum*, var. *subbuldojii*, var. *pseudobuldojii*, var. *mustaphaevii*, var. *karabachicum*, var. *flaksbergeri*, var. *subbaktiaricum*, var. *pseudobaktiaricum*, var. *subsharkordii*, var. *pseudosharkordii*, var. *samuricum*, var. *shemachanicum*, var. *sinakajae*,

var. *asialbivelutinum*, var. *asirubrivelutinum*, var. *asicaeruleum*.

T.vavilovii Jakubz.- Vavilov wheat is a true winter species, a xerophyte highly resistant to drought and high temperatures, and a relatively monomorphic species. In Azerbaijan, three botanical varieties have been rarely observed: var. *azericum*, var. *mirabile*, var. *vavilovii*. var. *munuru*, var. *mravianii*, var. *ruvromravianii* var. *nova*

4. CONCLUSION

Thus, in Azerbaijan, 14 wheat species belonging to the genus *Triticum* have been identified: 3 diploid hulled species – *T.urartu* Thum. ex Gandil., *T. boeoticum* Boiss., *T.monococcum* L.; 7 tetraploid species – 2 hulled, one of them wild (*T. araraticum* Jakubz.), *T. dicoccum* (Schrank) Schuebl., and 5 free-threshing (naked-grain) species – *T.durum* Desf., *T.turgidum* L., *T.turanicum* Jakubz., *T.polonicum* L., *T.cartlicum* Nevski; 4 hexaploid species – 2 hulled, *T. spelta* L., *T. vavilovii* Jakubz., and 2 free-threshing species – *T. aestivum* L., *T. compactum* Host.

Taking into account the above-mentioned, we consider that the urgent collection, comprehensive study, and utilization of endangered wheat species in Azerbaijan for obtaining donors and genetic resources is both timely and essential. For this purpose, it is necessary to collect, multiply, and restore cultivated, rare, and wild species and varieties, landraces, modern cultivars with complex biological and economic traits, advanced perspective hybrids, rare botanical forms, mutants, genetic lines, donors, and genetic resources, as well as to implement comprehensive research and conservation measures.

The rare, relict species of the genus *Triticum*, *T. karamyshevii*, has been cultivated in Azerbaijan since ancient times. Its low requirements for soil and climate conditions and its ecological plasticity have stimulated its cultivation on soils with poor fertility and weak physico-chemical properties, especially under continental climatic conditions. However, in the past century, the abolition of private farms, the establishment of collective and state farms, the transition to “planned” production, and the introduction of

more productive breeding cultivars led to the displacement and loss of local landraces, including valuable *T. karamyshevii* genotypes, which had passed through centuries of natural and artificial selection.

Emmer wheat groats are rich in easily digestible proteins and amino acids. For centuries, it has been cultivated by Turkish peoples for the purpose of obtaining groats. After primitive gatherers discovered that its grains were tastier and more nutritious, they developed local landraces through spontaneous selection and transmitted them from generation to generation.

As is known, local emmer wheat forms are semi-winter and spring types. The tillering capacity of emmer wheat is very intensive, similar to barley. When included in multi-field crop rotation, its vegetation period allows sowing after late-harvested predecessors (cotton, sugar beet, winter cabbage, and other vegetable crops) at the end of autumn, or under favorable conditions, in winter or early spring, to obtain high yields. Due to its strong tillering, emmer wheat can also be used in controlling perennial rhizomatous weeds (meadow grass, couch grass, thistle, etc.). For this purpose, barley is

usually employed; however, during one growing season, emmer wheat can also effectively suppress these dangerous weeds. Since emmer wheat grain and groats are more expensive than barley, their cultivation offers higher economic returns.

The high domestic demand for groats in our Republic is met through exports. Currently, at the Genetic Resources Institute, local emmer wheat accessions and complex wheat-emmer hybrids have been cultivated for propagation, restoration, and study. The main goal is to multiply them and preserve them for future generations. In addition, studying the morpho-biological and agronomically important traits of emmer wheat under various soil and climatic conditions provides opportunities to obtain initial breeding material, genetic resources, and donors.

By efficiently using the initial breeding material, it is possible to develop, within a short time, high-yielding and grain-quality wheat cultivars with immunity, suitable for different regions of Azerbaijan. Furthermore, previously collected accessions should be propagated in their original habitats for restoration and reconstruction.

REFERENCES

- Dorofeev, V. F., Filatenko, A. A., Migushova, E. F., Udaczin, R. A., & Jakubziner, M. M. (1979). Cultural flora of the USSR: Vol. 1. Wheat. Kolos, Leningrad.
- Mustafaev, I. D. (1964). Wheats of Azerbaijan and their importance in breeding and form-building process [Doctoral dissertation summary]. VIR, Leningrad.
- Mustafaev, I. D. (1973). Determinant of the wheat of Azerbaijan. Az.Gos.Izd., Baku.
- Rustamov, K. N. (2014). New samples of *Triticum compactum* Host. from Nakhchivan Autonomous Republic. Vavilov Journal of Genetics and Breeding, 18(3), 511–516.
- Rustamov, K. N. (2022). Biodiversity and distribution area of di- and tetraploid species *Triticum* L. in Azerbaijan. Biosphere, 14(4), 379–384. <https://doi.org/10.24855/biosfera.v14i4.696>
- Rustamov, K. N., Abbasov, M. Ə., & Babayeva, S. M. (2020). Azerbaijani crop gene pool. Muallim, Baku.
- Rustamov, K., Hajiyev, E., & Babayeva, S. (2025). Evaluation of genetic diversity within the gene pool of polonitic wheat (*Triticum polonicum* L.) in Azerbaijan. Acta Botanica Caucasica, 4(2), 73–80.
- Vavilov, N. I. (1987). Centers of origin of cultivated plants. Nauka, Leningrad.



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