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Ecogeographical Analysis of *Brassicaceae* Species Distributed in the Southern Caucasus (Azerbaijan Region)

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ABSTRACT

This article presents a systematic analysis of *Brassicaceae* species distributed in the Azerbaijani sector of the Southern Caucasus, structured for the first time according to five major phytogeographical regions. Although representatives of the *Brassicaceae* family in the flora of Azerbaijan are characterized by high ecological adaptability, their distribution across different regions and their relationship with ecological and geographical factors have not yet been systematically studied. The aim of this study is to identify the distribution patterns of species across phytogeographical regions and to assess their correlations with ecological factors and anthropogenic impacts. Although previous studies reported 74 genera and 248 species of the family in the flora of Azerbaijan, recent research—taking into account taxonomic revisions and newly discovered species—has identified 77 genera and 255 species. The degree of anthropogenic impact was assessed based on field observations and population density indicators. Based on literature sources, this section presents the *Brassicaceae* species included in Azerbaijan's "Red Book," their conservation status, as well as endemic and subendemic species, highlighting the unique floristic value of the region. This research distinguishes itself from previous studies by moving beyond traditional taxonomic inventories. It offers an integrated assessment of species distribution in relation to ecological gradients and human impact—an approach that has not previously been systematically applied to the flora of this region. The findings highlight the significance of conserving both the floristic richness and the biodiversity of Azerbaijan's phytogeographical zones.

Keywords: *Brassicaceae*; Southern Caucasus; Ecogeography; Plant Diversity; Genus; Species

JEL Codes: Q1; Q2; Q5

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1. Introduction

The South Caucasus comprises the territories of Azerbaijan, Georgia, and Armenia, situated south of the Main Caucasus Ridge of the Greater Caucasus Mountains [1]. This region is floristically rich and characterized by a wide range of ecological environments. Positioned at the intersection of the European, Asian, and Middle Eastern floristic regions, it offers favorable conditions for the evolution and persistence of numerous endemic and relict species. The botanical-geographical regions within the Azerbaijani sector of the South Caucasus-namely, the Greater Caucasus, Lesser Caucasus, Kura-Araz Lowland, Talysh, and Nakhchivan-exhibit distinct geomorphological and ecoclimatic features. These regional differences serve as key determinants influencing the spatial distribution of species belonging to the *Brassicaceae* family. In recent decades, the flora of the South Caucasus has undergone significant structural transformations due to global climate change, increasing anthropogenic pressures, and widespread landscape modification.

The family *Brassicaceae* Burnett (commonly known as the mustard or cabbage family) is among the largest and most widely distributed plant families globally, noted for its high species diversity and pronounced ecological plasticity. Many species within this family exhibit remarkable adaptability to anthropogenic influences and are capable of thriving across a broad spectrum of geographic and climatic conditions. Members of the *Brassicaceae* frequently constitute dominant elements in both natural ecosystems and agroecosystems. A geographical analysis of the *Brassicaceae* family is essential not only for understanding the current state of regional flora but also for informing biogeographical modeling and guiding the development of effective conservation strategies.

Based on recent achievements in phylogenetic studies of the *Brassicaceae*, a novel infrafamilial classification is proposed that includes major improvements at the subfamilial and supertribal levels. Herein, the family is subdivided into two subfamilies, Aethionemoideae (subfam. nov.) and Brassicoideae. The Brassicoideae, with 57 of the 58 tribes of *Brassicaceae*, are further partitioned into five supertribes, including the previously recognized Brassicodae and the newly established Arabodae, Camelinodae, Heliophilodae, and Hesperodae [2].

Mitotic chromosomes of crucifer species are generally very small, spanning only a few micrometers in size. As noted before, larger chromosomes are frequently observed in species with low chromosome numbers (n = 4–7) and large genome sizes (e.g., Bunias, Matthiola, Physaria). Chromosome morphology and structure in most of the crucifer species are closely linked to the discrete distribution of repetitive DNA elements along a longitudinal chromosome axis [3]. Chromosome numbers in *Brassicaceae* vary over 32-fold, with the lowest chromosome number of n = 4 found only in Physaria (Physarieae) and Stenopetalum (Camelineae); five chromosome pairs (n = 5) have been observed in A. thaliana (Camelineae), one Matthiola (Anchonieae), five Stenopetalum and 21 Physaria species. The highest chromosome numbers have been reported by Montgomery (1955), Easterly (1963), and Harriman (1965) in North American polyploid Cardamine (formerly Dentaria) species (Cardamine angustata, Cardamine concatenata, Cardamine diphylla, Cardamine dissecta, and Cardamine maxima). Among these polyploid species, the highest counts were obtained in Cardamine concatenata (Delphinula laciniata; 2n = ±240 by Montgomery 1955 and 2n = 256 by Easterly 1963) and C. diphylla (2n = ca. 256, Harriman 1965). However, the counts have to be considered a priori as approximate and inaccurate due to the clumping of numerous very small chromosomes (Harriman 1965). This is illustrated by more than a threefold variation in chromosome number (2n = 74–256) between counts in different root tips in C. diphylla. Base chromosome numbers vary from x = 4–17, with more than one-third of the taxa having karyotypes based on x = 8, implying that x = 8 is most likely an ancestral chromosome number of the whole family. Base chromosome numbers are useful in recognizing diploids (2x) from higher ploidy levels (3x, 4x, etc.) within a given taxon [4].

The aim of this study is to investigate the distribution dynamics of *Brassicaceae* species across the botanical-geographical regions of the Azerbaijani sector of the Southern Caucasus and to assess their interactions with various ecological factors. Furthermore, the study aims to compare species diversity and areal composition among these regions.

2. Materials and Methods

The study area encompasses the botanical-geographical regions of the Azerbaijani part of the Southern Caucasus, namely the Greater Caucasus, Lesser Caucasus, Kura-Araz Lowland, Talysh, and Nakhchivan. The research focuses on species belonging to the family *Brassicaceae*. The analysis is based on both herbarium specimens and field observations, and the results have been evaluated in conjunction with data from relevant literature sources. Research materials include data collected during field expeditions, available floristic literature, and herbarium collections. Field investigations were conducted between 2022 and 2024. In preparing the tables, summarized data based on the botanical-geographical regions were used, and the regional distribution of species was presented according to sources [5,6]. Taxonomic identification of *Brassicaceae* genera and species was carried out using authoritative works by Azerbaijani botanists [5,6]. In the course of the study, major floristic publications covering the flora of the Caucasus, including Azerbaijan, Armenia, and Georgia, as well as articles published in peer-reviewed scientific journals, were consulted [7–11]. Information on endemic, subendemic, and Red List species of the *Brassicaceae* family was compiled based on relevant literature sources [5,12–15].

3. Ecological Conditions and Species Analysis

The climatic conditions and soil characteristics of the study area were described, as these factors play a fundamental role in understanding the ecology of species distribution ranges. The research focused on all species of the *Brassicaceae* family within the flora of Azerbaijan. Species adaptation indicators to their habitats were evaluated through statistical analyses.

4. Results

According to the research, the Azerbaijani sector of the South Caucasus is represented by 59 genera (76.62%) and 152 species (59.60%) in the Greater Caucasus; 29 genera (37.66%) and 73 species (28.62%) in the Lesser Caucasus; 26 genera (33.76%) and 44 species (17.25%) in the Kura-Araz Lowland; 29 genera (37.66%) and 66 species (25.88%) in the Talysh region; and 62 genera (80.51%) and 185 species (72.54%) in the Nakhchivan botanical-geographical region. Considering species number dynamics, the Greater Caucasus and Nakhchivan botanical-geographical regions demonstrate higher species diversity relative to other regions, whereas the Kura-Araz Lowland exhibits the lowest species richness (**Figure 1**).

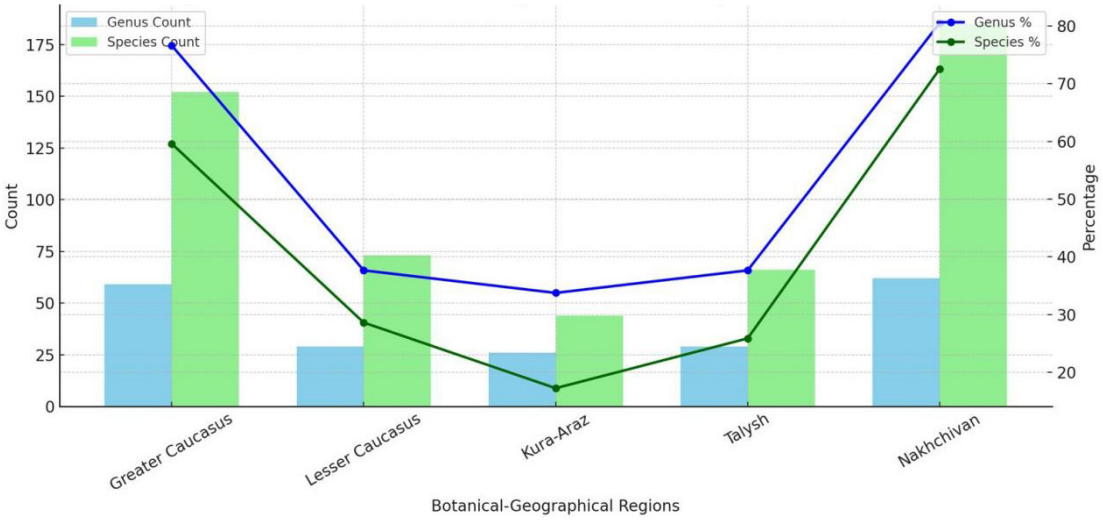

Figure 1. Regional Distribution and Percentage of Genera and Species of *Brassicaceae*.

The ecological and geomorphological diversity of the Nakhchivan Autonomous Republic, characterized by the coexistence of mountain forests, semi-deserts, and alpine meadows, is a major factor contributing to the region's rich *Brassicaceae* flora. A subset of species recorded in this area is exclusively adapted to arid conditions and displays

endemic traits, underscoring the region's significance in terms of both species richness and phytogeographical importance. Conversely, comparatively lower species diversity in the Lesser Caucasus, Kura-Araz Lowland, and Talysh regions may be attributed to a combination of anthropogenic pressures such as intensive agricultural activities and land cover transformation, and selective environmental factors, including soil composition and moisture availability. In forested habitats, the *Brassicaceae* family is predominantly represented by shade-tolerant species.

Statistical analyses (Magurran, 2004) reveal both similarities and differences in species composition across the studied regions [16]. A higher degree of similarity is observed between the botanical-geographical regions of the Greater Caucasus and Lesser Caucasus, whereas significant differences characterize the species composition of the Nakhchivan and Kura-Araz regions. These patterns are attributable not only to geographical isolation, climatic variation, and soil conditions but also to evolutionary processes and migration dynamics within the bioregion. The distribution of *Brassicaceae* species is influenced by a complex interaction of geographical and ecological factors, alongside anthropogenic impacts, historically established agricultural practices, and environmental changes. The numbers and percentage ratios of genera and species of the *Brassicaceae* family across the regions are summarized in **Table 1** below.

Certain representatives of the *Brassicaceae* family exhibit highly restricted distribution ranges, occurring exclusively within specific botanical-geographical regions. These species have adapted to the unique ecological conditions of their respective habitats and are absent from other regions. **Table 2** below presents data on species that are characteristic of a single region.

Table 1. Regional Distribution and Percentage of Genera and Species of the *Brassicaceae* Family.

№	Botanical-Geographical Regions	Number of Genera	Percentage (%)	Number of Species	Percentage (%)
1.	Greater Caucasus	59	76.62%	152	59.60%
2.	Lesser Caucasus	29	37.66%	73	28.62%
3.	Kura-Araz	26	33.76%	44	17.25%
4.	Talysh	29	37.66%	66	25.88%
5.	Nakhchivan	62	80.51%	185	72.54%

Table 2. Locally Distributed Genera and Species of the *Brassicaceae* Family.

Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
Alliaria taurica (Adams) V.İ.Dorof.	*Alyssum globosum* Grossh.	*Alyssum dagestanicum* Rupr.	*Aethionema Levandovskyi* N.Busch.	*Aethionema cardiophyllum* Boiss. & Heldr.
	Alyssum minutum Schltdl ex DC.			*Aethionema cordatum* (Desf.) Boiss.
Alyssum andinum Rupr.	*Alyssum schirwanicum* Rupr. (*A.tortuosum* var. Schirv.)	*Isatis Grossheimii* N.Busch.		*Aethionema diastrophis* Bunge
	Alyssum schirwanicum Rupr.	*Isatis Boissierana* Reichenb.	*Alyssum trichostachyum* Rupr.	*Aethionema edentulum* N.Busch
Arabis mollis Stev.	*Arabis nepetifolia* Boiss.	*Rorippa ampullicarpa* V.İ. Dorof.		*Aethionema fimbriatum* Boiss.
Barbarea grandiflora N.Busch			*Alyssopsis mollis* (Jacq.) O.Schulz (*Arabis secunda* N.Busch)	*Aethionema sagittatum* Boiss. (İberidella sagittata Boiss.)
				Aethionema salmasium Boiss.
Cardamine seidlitziana Albov		*Rorippa x anceps* (Wahlenb.) Reichenb.	*Cardamine parviflora* L.	*Aethionema trinervium* (DC.) Boiss. [İberidella trinervia (DC.) Boiss.]
Cakile euxina Pobed.	*Didymophysa aucheri* Boiss.		*Carpoceras hastulatum* (DC.) Boiss.	*Alyssum dasycarpum* Steph.
Crambe gibberosa Rupr.				*Alyssum persicum* Boiss.

Table 2. *Cont.*

Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
Crambe tatarica Sebeok.	*Draba hispida* Willd.		*Erophila krocheri* Andrz.	*Arabidopsis parvula* (Schrenk.) O.E. Schulz
Draba incompta Stev.	*Erysimum strictisiliquum* N.Busch		*Erysimum argyrocarpum* N.Busch	*Anchonium elichrysifolium* (DC.) Boiss.
Draba longisiliqua Schmalh.				*Arabis armena* N.Busch
Draba mollissima Stev.	*Sobolewskia clavata* (Boiss.) Fenzl.		*Raphanus rostratus* DC.	*Arabis carduchorum* Boiss.
Draba sibirica (Pall.) Thell.				
Draba stylaris J.Gay ex Koch	*Thlaspi longistylum* (Sosn.) O.E. Schulz.			*Apterigia rosrtata* (N.Busch) Galushko (*Thlaspi rostratum* N.Busch, *Atropatenia rosrtata* (N. Busch) F.K. Mey)
Erysimum ancept Steven ex Ledeb.				*Apterigia zangezura* (Tzvel.) V.İ.Dorof
Erysimum babadagense Prima				*Asperuginoides axillaris* (Boiss ex Hohen) Rauschert
Erysimum capsicum N.Busch				
Hesperis sibirica L.				
Hesperis tristis L.				*Barbarea inregrifolia* DC.
Lepidium pinnatifidium Ledeb.				*Brassica oleracea* L.
Lobularia maritima (L.) Desv.				*Brachyus suffruticosa* (Vent.) V.İ. Dorof. [*Fibigia suffruticosa* (Vent.) Sweet]
Matthiola daghestanica (Conti) N.Busch				*Clypeola dichotoma* Boiss.
Matthiola incana (L.) R.Br.				*Coluteocarpus vesicaria* (L.) Holmboe
Pachyphragma macrophyllum (Hoffm.) N.Busch				*Crambe Grossheimii* İ.Khalilov
Pseudovesicaria digitata (C.A.Mey.) Rupr.				
Raphanus niger Mill.				*Cymatocarpus Grossheimii* N. Busch
Sobolewskia caucasica (Rupr.) N.Busch.				*Diptychocarpus strictus* (Fisch. ex Bieb.) Trautv.
Sobolewskia truncata N.Busch.				*Draba diversifolia* Boiss. et A. Huet
				Drabopsis nuda (Belanger) Stapf (*D.verna* C.Koch)
				Erysimum brachycarpum Boiss.
				Erysimum sisymbrioides C.A. Mey.
				Erysimum subulatum J.Gay
				Erysimum Wagifii M.Kassumov
				Fibigia macrocarpa (Boiss.) Boiss.
				Fibigia macroptera (Kotschy et Boiss. Ex E. Fourn.) Boiss.
				Isatis ornithorhynchus N.Busch.
				Isatis glauca Aucher ex Boiss.

Table 2. *Cont.*

Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
				Isatis Karjaginii Schischk.
				Isatis brachycarpa C.A.Mey.
				Isatis Bungeana Seidl.
				Lepidium persicum Boiss.
				Litwinowia tenuissima (Pall.) Woronow ex Pavl.
				Peltariopsis Grossheimii N.Busch
				Physoptychis caspica (Habl.) V. Boczantzeva [*Ph. gnaphalodes* (DC.) Boiss.]
				Sterigmostemum acanthocarpum Fisch. & C.A. Mey.
				Thlaspi armenum N.Busch
				Thlaspi platycarpum Fisch. Et C.A.Mey.
				Thlaspi Huetii Boiss.

Species belonging to the genera *Cakile* Mill., *Lobularia* Desv., *Pachyphragma* (DC.) Reichenb., and *Pseudovesicaria* (Boiss.) Rupr. are characteristic of the Greater Caucasus; *Didymophysa* Boiss. is characteristic of the Lesser Caucasus; and species from the genera *Alyssopsis* Boiss. and *Carpoceras* (DC.) Link. are characteristic of the Talysh region. Species belonging to the genera *Asperuginoides* Rauschert (syn. *Buchingera* Boiss. & Hohen.), *Brachypus* Ledeb., *Coluteocarpus* Boiss., *Cymatocarpus* O.E. Schultz, *Diptychocarpus* Trautv., *Drabopsis* C.Koch, *Fibigia* Medik., *Litwinowia* Woronow, *Peltariopsis* N. Busch, and *Physoptychis* Boiss. are exclusively characteristic of the Nakhchivan botanical-geographical region.

Analysis of the table titled "Locally Distributed Genera and Species of the *Brassicaceae* Family" reveals that 27 species from 17 genera are confined to the Greater Caucasus, 10 species from 7 genera to the Lesser Caucasus, 5 species from 3 genera to the Kura-Araz region, 8 species from 7 genera to the Talysh region, and 46 species from 26 genera to Nakhchivan. In other words, species endemic to each of these botanical-geographical regions do not occur in the others. Notably, the genus *Alyssum* L. includes characteristic species present across all regions, whereas the genus *Erysimum* L. has characteristic species in all regions except the Kura-Araz.

In the flora of the South Caucasus (Azerbaijani part), there are also representatives of the *Brassicaceae* family that are cultivated in agriculture. These include species such as *Armoracia rusticana* (Lam.) G. Gaertn., B. Mey. & Scherb. [*A. macrocarpa* (Waldst. & Kit.) Kit. ex Baumg.] from the genus *Armoracia* G. Gaertn., B. Mey. & Scherb., nom. cons., *Brassica napus* L., *Brassica oleracea* L., and *Brassica rapa* L. from the genus *Brassica* L., *Erysimum cheiri* (L.) Crantz (*Cherianthus cheiri* L.) from the genus *Erysimum* L., *Lepidium sativum* L. from the genus *Lepidium* L., and *Raphanus sativus* L. from the genus *Raphanus* L. The *Brassicaceae* family includes many economically important edible and industrial oilseed, condiment, fodder crop species, and vegetables. Canola or oilseed rape (Brassica napus) is the most important oil crop of the family [17,18].

Taxonomic analysis by botanical-geographical regions of the Azerbaijani part of the South Caucasus revealed that some genera are widespread across all regions. Specifically, species of the genera *Alyssum* L., *Arabis* L., *Brassica* L., *Camelina* Crantz, *Cardamine* L., *Dichasianthus* Ovcz. & Yunusov, *Isatis* L., *Lepidium* L., and *Sisymbrium* L. are distributed throughout all botanical-geographical regions [5,19,20]. This indicates that these genera possess wide phytogeographical distribution ranges. Representatives of these genera also act as common components, reflecting floristic connections among the regions. Among the species of the genera *Armoracia* (Gaertn.) C.A. Mey. & Scherb., *Brassica* L., *Lepidium* L., and *Raphanus* L. within the *Brassicaceae* family, there are representatives of cultivated flora.

The flora of the South Caucasus, particularly within

the Azerbaijani sector, is characterized by a notable presence of endemic and subendemic plant species. These taxa reflect the floristic richness and distinctive biogeographical attributes of their respective regions. Endemic and subendemic species contribute significantly to ecosystem stability and represent valuable genetic resources for scientific research. Within this context, the *Brassicaceae* family occupies a prominent position among the endemic and subendemic flora of the South Caucasus.

The family includes the following subendemic species: *Isatis Karjaginii* Schischk., *Isatis ornithorhynchus* N. Busch, *Isatis Steveniana* Trautv., *Isatis latisiliqua* Stev. from the genus *Isatis* L.; *Sameraria glastifolia* (Fisch. & C.A. Mey.) Boiss. from *Sameraria* Desv.; *Thlaspi Szovitsianum* Boiss. from *Thlaspi* L.; *Carpoceras hastulatum* (DC.) Boiss. from *Carpoceras* (DC.) Link.; *Raphanus raphanistrum* L. from *Raphanus* L.; *Crambe armena* N. Busch and *Crambe gibberosa* Rupr. from *Crambe* L.; *Cardamine tenera* S.G. Gmel. ex C.A. Mey. from *Cardamine* L.; *Arabis armena* N. Busch from *Arabis* L.; *Pseudovesicaria digitata* (C.A. Mey.) Rupr. from *Pseudovesicaria* (Boiss.) Rupr.; *Draba incompta* Stev. and *Draba mollissima* Stev. from *Draba* L.; *Erophila minima* C.A. Mey. and *Erophila praecox* (Stev.) DC. from *Erophila* DC., nom. cons.; *Alyssum desertorum* Stapf., *Alyssum Szovitsianum* Fisch. & C.A. Mey., *Alyssum schirvanicum* Rupr. from *Alyssum* L.; *Strigosella intermedia* (C.A. Mey.) Botsch. from *Strigosella* Boiss.; *Moricandia meyeri* (Boiss.) V.I. Dorof. from *Moricandia* DC.; *Sterigmostemum acanthocarpum* Fisch. & C.A. Mey. from *Sterigmostemum* Bieb.; and *Erysimum crassipes* Fisch. & C.A. Mey., *Erysimum chazarjurti* N. Busch, and *Erysimum babadagense* Prima. from *Erysimum* L. [5].

Several studies have documented the presence of endemic species within the *Brassicaceae* family [5,12–14]. Endemic species of the family include *Thlaspi armenum* N. Busch from the genus *Thlaspi* L.; *Apterigia rostrata* (N. Busch) Galusko from the genus *Apterigia* Galusko; *Dishasianthus eldaricus* (Grossh.) Sojak from the genus *Dishasianthus* Ovcz. & Yunusov; *Cymatocarpus Grossheimii* N. Busch from the genus *Cymatocarpus* O.E. Schultz; and *Erysimum caspicum* N. Busch from the genus *Erysimum* L. The *Brassicaceae* family in Azerbaijan comprises 26 subendemic species across 16 genera and 5 endemic species representing 5 genera.

The identification of rare and endangered species is crucial for the effective conservation of genetic diversity in natural ecosystems. This study revealed that several species within the *Brassicaceae* family are listed in Azerbaijan's Red Book. Serving as a catalog of species that constitute essential components of the country's natural heritage, the Red Book forms the basis for strategic conservation planning. Species of the *Brassicaceae* family distributed in the Azerbaijani part of the South Caucasus are also represented in this list. Detailed information on these species and their respective distribution areas is presented in **Table 3** below.

Table 3. Species of the *Brassicaceae* Family Included in the Red Book of Azerbaijan and Their Distribution Regions.

№	Species	International Assessment According to IUCN Categories and Criteria	National Assessment According to IUCN Categories and Criteria	Botanical-Geographical Region of Distribution
1	*Arabis Gerardii* Besser	–	VU A2ad+B2ab(ii,iii	Greater Caucasus, Lesser Caucasus, Talysh
2	*Alyssum andinum* Rupr.	–	NT	Greater Caucasus
3	*Aethionema trinervum* (DC.) Boiss.[İberidella trinervia (DC.) Boiss.]	–	CR B2a	Nakhchivan
4	*Dichasianthus torulosus* (Desf.) Sojak [*Neotorularia torulosa* (Desf.) Hedge & J. Leonard; *Torularia torulosa* (Desf.) O.E. Schultz]	–	VU C2a(ii);D2	Lesser Caucasus, Talysh, Nakhchivan
5	*Physoptychis caspica* (Hablizl) Botsch. (= *P. gnaphalodes* Boiss.)	–	CR B2ac(i);C2a(i)	Nakhchivan
6	*Pseudovesicaria digitata* (C.A.Mey.) Rupr.	–	VU D2	Greater Caucasus
7	*Moricandia Meyeri* (Boiss.) V.İ. Dorof. [*Zuvanda Meyeri* (Boiss.) Askerova; *Malcolmia Meyeri* Boiss.]	–	EN B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Talysh, Nakhchivan

The study of rare *Brassicaceae* species revealed that seven species, each representing a different genus and distributed within the Azerbaijani part of the South Caucasus, are listed in the Red Book of Azerbaijan (**Figure 2**) [15].

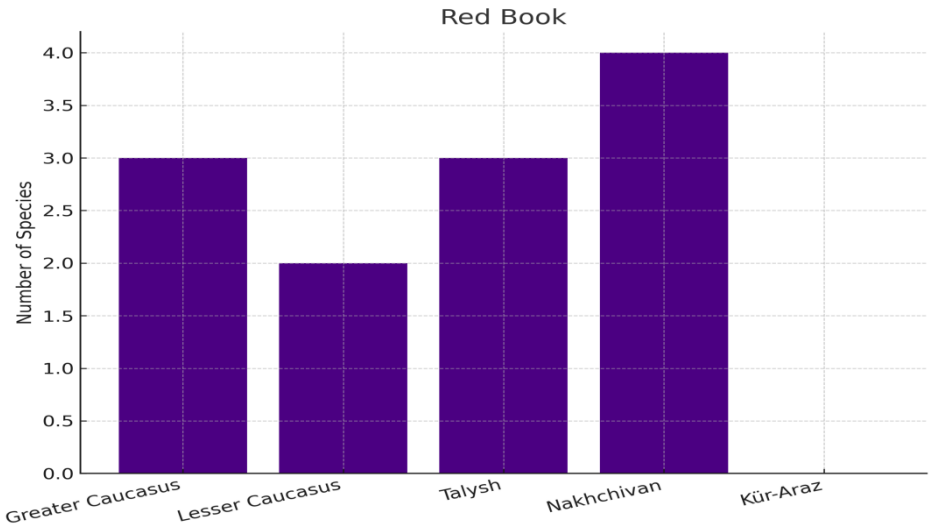

Figure 2. Red Book of Azerbaijan.

Species of this family listed in the Red Book have been documented in the botanical-geographical regions of the Greater Caucasus (3 species), Lesser Caucasus (2 species), Talysh (3 species), and Nakhchivan (4 species). Notably, no Red Book-listed *Brassicaceae* species have been recorded in the Kura-Araz region.

The study is primarily limited to the Azerbaijani part of the South Caucasus, which imposes certain constraints on the generalizability of the results to the entire region. Additionally, the impacts of ecological and anthropogenic factors were not always measured with precise quantitative indicators. Nevertheless, despite these limitations, the research provides a theoretical contribution to the understanding of the regional phytogeographical characteristics and species diversity of the *Brassicaceae* family. From a practical perspective, the findings serve as a fundamental knowledge base for biodiversity conservation, protection of rare and endemic species, and for the sustainable development of ecotourism and agriculture. This study identifies important directions for future research aimed at the scientific assessment and management of the flora of the Azerbaijani sector of the South Caucasus.

5. Discussion

The distribution of species belonging to the *Brassicaceae* family in the Azerbaijani sector of the Southern Caucasus is closely linked to both the ecoclimatic characteristics of the botanical-geographical regions and anthropogenic influences. The high ecological plasticity exhibited by most *Brassicaceae* species enables them to thrive under a wide range of environmental conditions. This adaptability has facilitated their widespread occurrence in both natural and human-modified habitats. Notably, the prevalence of ruderal and synanthropic species in urban areas, along roadsides, and in agricultural landscapes underscores the ecological significance of the family within transitional (ecotonal) zones between ecosystems. A variety of ecogeographical factors govern the distribution patterns of *Brassicaceae* species across the region. The Southern Caucasus exhibits pronounced regional variation in humidity and temperature regimes. For instance, alpine and subalpine ecosystems have developed in the middle and high mountain belts of the Greater Caucasus, where *Brassicaceae* species adapted to cold and humid conditions are commonly found [21–23]. In contrast, semi-desert and arid climate types predominate in parts of Nakhchivan and the Lesser Caucasus, favoring xerophytic ecological groups that dominate under these harsh conditions [24]. The Kura-Araz botanical-geographical region encompasses vast plains along the Kura and Araz Rivers in central Azerbaijan, characterized by semi-desert and dry-steppe climates.

In this region, the distribution of *Brassicaceae* species is shaped by a combination of ecological and anthropogenic factors. The Talysh zone, distinguished by its humid and subtropical climate, provides favorable conditions for the proliferation of hygrophilous *Brassicaceae* species [25,26]. In sandy and gravelly soils, particularly prevalent in the Kura-Araz Lowland and parts of Nakhchivan, many *Brassicaceae* species demonstrate stress tolerance and an ability to persist in nutrient-poor substrates. In river valleys, where clayey and alluvial soils dominate, more moisture-dependent species tend to prevail [27]. In mountainous regions, the presence of carbonate-rich and peaty soils supports the development and persistence of endemic and subendemic *Brassicaceae* species.

Human activities significantly affect the natural distribution and floristic composition of the *Brassicaceae* family. Agricultural practices, overgrazing, and infrastructure development have contributed to the restriction of the distribution ranges of certain species.

Brassicaceae (Cruciferae) is a relatively large family, currently comprising approximately 4140 species. This family is economically important for numerous vegetable crops, ornamentals and a source of vegetable oils and condiments, in addition to including ~130 species of widespread or noxious cosmopolitan weeds. It has numerous economically significant decorative and crop species [2,28–30].

The plants of *Brassicaceae*, characterized by features such as pungent odor (glucosinolates), cruciform corolla, tetradynamous stamens, and siliques, are an important natural family and a globally significant plant family [31,32]. The mustard family (*Brassicaceae* or Cruciferae) belongs to the order Brassicales and is readily distinguished from other flowering plant families by a cruciform (cross-shaped) corolla, six stamens (the outer two shorter than the inner four), a capsule often with a septum and a pungent watery sap [33,34]. *Brassicaceae* vegetables are important crops consumed worldwide due to their unique flavor, and for their broadly recognized functional properties, which are directly related to their phytochemical composition. [35].

Within the territory of Georgia, the *Brassicaceae* family comprises 64 genera and 182 species (due to the limited number of recent studies in this field, data are based primarily on classical sources) [11]. In Armenia, the family is represented by 68 genera and 203 species [10], while in Azerbaijan it includes 77 genera and 255 species [5,6]. The distribution of these species across the botanical-geographical regions of the Azerbaijani part of the South Caucasus is summarized in **Table 4** below.

Table 4. Distribution of *Brassicaceae* Species across the Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus.

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
1	***Aethionema* R.Br.**		*Ae. arabicum* (L.) Lipsky	*Ae. carneum* (Banks et Sol.) B. Fedtsch[*Campyloptera carnea* (Banks & Soland.) Botsch & Vved.]	*Ae. Levandovskyi* N. Busch Lipsky	*Ae. arabicum* (L.) Lipsky
2			*Ae. carneum* (Banks et Sol.) B. Fedtsch		*Ae. virgatum* (Boiss) Hedqe	*Ae.cardiophyllum* Boiss. & Heldr.
3						*Ae. carneum* (Banks et Sol.) B. Fedtsch
4						*Ae.cordatum* (Desf.) Boiss.
5						*Ae.diastrophis* Bunge
6						*Ae.edentulum* N.Busch
7						*Ae.fimbriatum* Boiss.
8						*Ae. sagittatum* Boiss. . (İberidella sagittata Boiss.)
9						*Ae. salmasium* Boiss.
10						*Ae. trinervum* (DC.) Boiss. . [İberidella trinervia (DC.) Boiss.]

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	**Lesser Caucasus**	**Kura-Araz**	**Talysh**	**Nakhchivan**
11						*Ae. virgatum* (Boiss.) Hedge (*A. elengatum* auct., *A. Szowitsii* Boiss.)
12						*Ae.. pulchellum* Boiss. & Huet.
13	***Acachmena* H.P. Fuchs**		*A. cuspidata* (Bieb.) H.P. Fuchs. [*Erysimum cuspidatum* (Bieb.) DC.]	*A. cuspidata* (Bieb.) H.P. Fuchs. [*Erysimum cuspidatum* (Bieb.) DC.]	*A. cuspidata* (Bieb.) H.P. Fuchs. [*Erysimum cuspidatum* (Bieb.) DC.]	*A. cuspidata* (Bieb.) H.P. Fuchs. [*Erysimum cuspidatum* (Bieb.) DC.]
14	***Alliaria* Heist. ex Fabr.**	*A. petiolata* (Bieb.) Cavara & Grande (*A. officinalis* Andrz. ex Bieb.)				*A. petiolata* (Bieb.) Cavara & Grande (*A. officinalis* Andrz. ex Bieb.)
15		*A. taurica* (Adams.) V.İ.Dorof. (*A. brachycarpa* Bieb.)				
16	***Alyssum* L.**	*A.alyssoides* (L.) L. *(A. calycinum* L.)	*A.globosum* Grossh.	*A. dagestanicum* Rupr.	*A. murale* Waldst. & Kit.	*A.alyssoides* (L.) L. *(A. calycinum* L.) .
17		*A.andinum* Rupr.	*A.minutum* Schltdl. ex DC.		*A. rothmaleri* Galushko	*A.dasycarpum* Steph.
18		*A. desertorum* Stapf	*A. rothmaleri* Galushko		*A. Stapfii* Vierh.(*A. Buschianum* Grossh.)	*A. desertorum* Stapf (*A. turkestanicum* Regel & Schmalh.)
19		*A.Gehamense* Fed.	*A. schirwanicum Rupr. (A. tortuosum var. Schirv.)*		*A. strigosum* Banks & Soland.	*A.Gehamense* Fed.
20		*A.hirsutum* Bieb.	*A. Stapfii* Vierh.(*A. Buschianum* Grossh.)		*A.Szovitsianum* Fisch. & C.A. Mey.	*A.hirsutum* Bieb.
21		*A.muraleWaldst. et* Kit.	*A. strictum* Willd		*A. trichostachyum* Rupr.	*A. parviflorum* Fisch. ex Bieb. (*A.campestre* auct.p.p.)
22		*A. parviflorum* Fisch. ex Bieb. (*A.campestre* auct. p.p.)	*A. strigosum* Banks & Soland.			*A.persicum* Boiss. (*A. muelleri* Boiss. & Buhse)
23		*A. rothmaleri* Galushko	*A. schirvanicum Rupr.*			*A. Muelleri* Boiss. ex Buhse
24		*A. strigosum Banks et* Soland.				*A. strictum* Willd
25		*A. tortuosum* Waldst. & Kit. ex Willd. (*A. bracteatum* auct.)				*A. tortuosum* Waldst. & Kit. ex Willd. (*A. bracteatum* auct.)
26						*A. Stapfii* Vierh. (*A. Buschianum* Grossh.)
27						*A. strigosum* Banks & Soland.
28						*A. Szovitsianum* Fisch. & C.A. Mey.
29						*A. murale* Waldst. & Kit. var. murale.
30	***Alyssopsis* Boiss.**				*A. mollis* (Jacq.) O. Schulz (Arabis secunda N. Busch)	
31	***Arabidopsis* (DC.) Heynh.**	*A.Thaliana* (L.) Heynh.				*A. parvula* (Schrenk) O.E. Schulz
32						*A.Thaliana* (L.) Heynh.
33	***Anchonium* DC.**		*Anchonium persicum* (DC.) Bornm.			*A.elichrysifolium* (DC.) Boiss.
34						*A.persicum* (DC.) Bornm.

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	**Lesser Caucasus**	**Kura-Araz**	**Talysh**	**Nakhchivan**
35	***Arabis* L.**	*A. brachycarpa* Rupr.	*A.caucasica* Schlecht.	*A.laxa* Sibth. et Sm.	*A.caucasica* Schlecht.	*A. armena* N.Busch
36		*A.caucasica* Schlecht.	*A.dolichothrix* (N. Busch) N.Busch	*A. sagittata* (Bertol.) DC.	*A. flaviflora* Bunge.	*A. brachycarpa* Rupr.
37		*A. dolichothrix* (N. Busch) N.Busch	*A. flaviflora* Bunge.		*A.Gerardii* (Bess.) Koch *(A.hirsuta* (L.) Scop. subsp. *Gerardii* (Bess.) C.Harrtm. f.)	*A. carduchorum* Boiss.
38		*A. flaviflora* Bunge.	*A.Gerardii* (Bess.) Koch		*A.laxa* Sibth. et Sm.	*A.caucasica* Schlecht.
39		*A.Gerardii* (Bess.) Koch	*A.nemorensis* (Wolf ex Hoffm.) W.D.J.Koch		*A.nemorensis* (Wolf ex Hoffm.) W.D.J.Koch	*A. flaviflora* Bunge.
40		*A. glabra* (L)Bernh.	*A.nepetifolia* Boiss.			*A. glabra* (L) Bernh. (*Turritis glabra* L.)
41		*A.laxa* Sibth. et Sm.				*A. recta* Vill. (*A. auriculata* auct. non Lam.)
42		*A.mollis* Stev. (A.chiristiani N.Busch)				*A. sagittata* (Bertol.) DC.
43		*A.nemorensis* (Wolf ex Hoffm.)				
44		*A. recta* Vill. (*A. auriculata* auct.				
45	***Armoracia* G. Gaertn., B. Mey. et Scherb., nom. cons.**	*A.rusticana* (Gaertn.) C.A. Mey. & Scherb. (*A.macrocarpa* (Waldst. & Kit.) Baumg.)				*A.rusticana* (Gaertn.) C.A. Mey. & Scherb. (*A.macrocarpa* (Waldst. & Kit.) Baumg.)
46	***Asperuginoides* Rauschert (*Buchingera* Boiss. & Hohen.)**	-	-	-	-	*A. axillaris* (Boiss. & Hohen.) Rauschert (*Buchingera axillaris* Boiss. & Hohen.)
47	***Apterigia* Galusko *(Atropatenia* F.K. Mey.)**	*A. pumila* (Steven) Galushko (*Thlaspi pumilum* (Steven) Ledeb.)		*A. pumila* (Steven) Galushko		*A. rosrtata* (N.Busch) Galushko (*Thlaspi rostratum* N.Busch, *Atropatenia rosrtata* (N. Busch) F.K. Mey)
48						*A. zangezurica* (Tzvel.) V.İ. Dorof (*Atropatenia zangezura* (Tzvel.) F.K. Mey., *Thlaspi zangezura* Tzvel)
49	***Barbarea* R.Br. (Campe Dulac)**	*B. arculata* (Opiz ex J. & C.Presl.) Reichenb.	*B. arculata* (Opiz ex J. & C.Presl.) Reichenb.		*B. arculata* (Opiz ex J. & C.Presl.) Reichenb.	*B. arculata* (Opiz ex J. & C.Presl.) Reichenb.(*B. vulgaris* auct. non W.T. Aiton)
50	***Brassica* L.**	*B. grandiflora* N.Busch	*B. minor* C.Koch		*B. minor* C.Koch	*B. inregrifolia* DC.
51		*B. minor* C.Koch	*B.plantaginea* DC.		*B.plantaginea* DC.	*B. minor* C.Koch
52					*B.stricta* Andrz	*B.plantaginea* DC.
53						*B.stricta* Andrz
54	***Berteroa* DC.**	*B. incana* (L.) DC.	*B. incana* (L.) DC.			
55		*B. campestris* L.	*B. juncea* (L.) Crern.	*B. sisymbrioides* (Fisch.) Grossh.	*B. juncea* (L.) Crern.	*B. campestris* L.
56		*B. napus* L	*B. nigra* (L.) W.D.J. Koch		*B. sisymbrioides* (Fisch.) Grossh.	*B. oleracea* L.
57		*B. rapa* L.				*B. napus* L.
58		*B. sisymbrioides* (Fisch.) Grossh.				*B. rapa* L.
59						*B. nigra* (L.) W.D.J. Koch

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
60	***Brachypus* Ledeb.**					*B. suffruticosa* (Vent.) V.İ. Dorof. [*Fibigia suffruticosa* (Vent.) Sweet]
61	***Bunias* L.**	*B.orientalis* L.	*B.orientalis* L.		*B.orientalis* L.	*B.orientalis* L.
62	***Calepina* Adans.**	*C. irregularis* (Asso) Thell.				*C.irregularis* (Asso) Thell.
63	***Camelina* Crantz**	*C. rumelica* Velen. (*C. albiflora* (Boiss.) N.Busch	*C. laxa* C.A. Mey.	*C. pilosa* (DC.) N. Zing.	*C. microcarpa* Andrz.	*C. laxa* C.A. Mey.
64		*C. microcarpa* Andrz.	*C.sativa* (L.) Crantz		*C. pilosa* (DC.) N. Zing.	*C.rumelica* Velen. (*C. albiflora* (Boiss.) N.Busch
65		*C. pilosa* (DC.) N. Zing.	*C. silvestris* Wallr.			*C.sativa* (L.) Crantz
66		*C. sativa* (L.) Crantz				
67		*C. silvestris* Wallr.				
68	***Capsella* Medik.**	*C.bursa - pastoris* (L.) Medik				*C.bursa - pastoris* (L.) Medik
69	***Cardamine* L.**	*C. hirsuta* L.	*C. impatiens* L.	*C. hirsuta* L.	*C. hirsuta* L.	*C. uliginosa* Bieb.
70		*C. impatiens* L.	*C. ochroleuca*Stapf.		*C. impatiens* L.	*C. ochroleuca* Stapf.
71		*C. pectinata* Pall. ex DC.	*C. tenera* S.G.Gmel. ex C.A.Mey.		*C. ochroleuca*Stapf.	
72		*C. seidlitziana* Albov			*C. parviflora* L.	
73		*C. uliginosa* Bieb.			*C. pectinata* Pall. ex DC.	
74					*C. tenera* S.G.Gmel. ex C.A.Mey.	
75	***Cardaria* Desv.**	*C. draba* (L.) Desv. (*Lepidium draba* L.)	C. *chalepensis* (L.) Hand. - Mazz.	*C. propinqua* (Fisch. & C.A. Mey.) N.Busch (*L. propinqum* (Fisch. & C.A. Mey.)		C. *chalepensis* (L.) Hand. - Mazz. (*C. Boissieri* (N. Busch) Soo, *Lepidium chalepensis* L., *Lepidium Boisseri* N. Busch)
76		*C. propinqua* (Fisch. & C.A. Mey.) N.Busch (*L. propinqum* (Fisch. & C.A. Mey.)				*C. draba* (L.) Desv. (*Lepidium draba* L.)
77						*C. propinqua* (Fisch. & C.A. Mey.) N.Busch (*L. propinqum* (Fisch. & C.A. Mey.)
78	***Carpoceras* (DC.) Link**				*C. hastulatum* (DC.) Boiss. (*Thlaspi hastilatum* Steven)	-
79	***Cakile* Mill.**	*C.euxina* Pobed.				
80	***Chorispora* R. Br. ex DC.**	*Ch. iberica* (Bieb.) DC.	*Ch. tenella* (Pall.) DC	*Ch. tenella* (Pall.) DC		*Ch. iberica* (Bieb.) DC.
81						*Ch. tenella* (Pall.) DC
82	***Clypeola* L.**	*C. jonthlaspi* L. (*C. microcarpa* C. Moris)				*C. dichotoma* Boiss. [*Pseudo-anastatica dichotoma* (Boiss.) Grossh.]
83						*C. jonthlaspi* L. (*C. microcarpa* C. Moris)
84	***Coluteocarpus* Boiss.**					*C. vesicaria* (L.) Holmboe
85	***Conringia* Heist. ex Fabr.**	*C. orientalis* (L.) C. Presl	*C. austriaca* (Jacq.) Sweet		*C. orientalis* (L.) C. Presl	*C. orientalis* (L.) C. Presl
86		*C. planisiliqua* Fisch. & C.A. Mey.	*C. orientalis* (L.) C. Presl		*C. persica* Boiss.	*C. planisiliqua* Fisch. & C.A. Mey.
87					*C. planisiliqua* Fisch. & C.A. Mey.	*C. persica* Boiss.
88					*C. austriaca* (Jacq.) Sweet	
89	***Coronopus* Zinn, nom. cons**	*C.squamatus* (Forssk.) Aschers (*C. procumbens* Gilib. nom.illeg.)		*C.squamatus* (Forssk.) Aschers		

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
90	***Crambe* L.**	*C.orientalis* L.	*C. juncea* Bieb. [*C. aculeolata* (N. Busch) Czerniak]		*C.orientalis* L.	*C.orientalis* L.
91		*C. armena* N. Busch			*C. juncea* Bieb. [*C. aculeolata* (N. Busch) Czerniak]	*C. armena* N. Busch
92		*C. juncea* Bieb. [*C. aculeolata* (N. Busch) Czerniak]				*C. Grossheimii* İ.İ. Khalilov
93		*C. tatarica* Sebeok ieb.				*C. juncea* Bieb. [*C. aculeolata* (N. Busch) Czerniak]
94		*C. gibberrosa* Rupr.				
95	***Cymatocarpus* O.E. Schultz**					*C. Grossheimii* N. Busch
96	***Dentaria* L.**	*D. bulbifera* L.	*D. bulbifera* L.		*D. bulbifera* L.	
97		*D. quinquefolia* Bieb.			*D. quinquefolia* Bieb.	
98	***Descurainia* Webb & Berth. nom. cons**	*D. Sophia* (L.) Webb. ex Prantl				*D. Sophia* (L.) Webb. ex Prantl
99	***Diptychocarpus* Trautv.**					*D. strictus* (Fisch. ex Bieb.) Trautv
100	***Didymophysa* Boiss.**		*D.aucheri* Boiss.			
101	***Dichasianthus* Ovcv. et Yunusov**	*D. eldaricus* (Grossh.) Sojak (*T.eldarica* Grossh.)	*D. contortuplicatus* (Stephan ex Willd.) Sojak	*D. eldaricus* (Grossh.) Sojak (*T.eldarica* Grossh.)	*D. contortuplicatus* (Stephan ex Willd.) Sojak	*D. contortuplicatus* (Stephan ex Willd.) Sojak [*Neotorularia contortuplicata* (Stephan ex Willd.) Hedge & J. Leonard; *Torularia contortuplicata* (Stephan ex Willd.) O.E. Schulz]
102		*D. Ledebouri* (Boiss.) V.İ.Dorof. (*Malcomia Ledebouri* Boiss.)	*D. eldaricus* (Grossh.) Sojak (*T.eldarica* Grossh.)	*D. Ledebouri* (Boiss.) V.İ.Dorof.(*Malcomia Ledebouri* Boiss.)	*D. runcinatus* (Lag. Ex DC.) V.İ.Dorof.(*Sisymbrium runcinatum* Lag. ex DC.)	*D. torulosus* (Desf.) Sojak [*Neotorularia torulosa* (Desf.) Hedge & J. Leonard; *Torularia torulosa* (Desf.) O.E. Schultz].
103		*D. runcinatus* (Lag. ex DC.) V.İ.Dorof. (*Sisymbrium runcinatum* Lag. ex DC.)		*D. torulosus* (Desf.) Sojak		
104		*D. torulosus* (Desf.) Sojak				
105	***Diplotaxis* DC.**	*D. muralis* (L.) DC.	*D. muralis* (L.) DC.			
106	***Draba* L.**	*D. bruniifolia* Stev. (*D. globifera* Ledeb.)	*D. bruniifolia* Stev. (*D. globifera* Ledeb.)		*D. Huetii* Boiss.	*D. bruniifolia* Stev. (*D. globifera* Ledeb.)
107		*D. bryoides* Willd.	*D. bryoides* Willd.		*D. muralis* L.	*D. bryoides* Willd.
108		*D. incompta* Stev.	*D. hispida* Willd.			*D. diversifolia* Boiss. et A. Huet
109		*D. longisiliqua* Schmalh.	*D. muralis* L.			*D. polytricha* Ledeb.
110		*D. mollissima* Stev.	*D. polytricha* Ledeb.			*D. siliquosa* Bieb.
111		*D. nemorosa* L.	*D. siliquosa* Bieb.			*D. Huetii* Boiss.
112		*D. sibirica* (Pall.) Thell.				*D. muralis* L.
113		*D. siliquosa* Bieb.				*D. nemorosa* L.
114		*D. stylaris* J. Gay ex Koch (incl. *D.incana* Bieb.).				
115	***Drabopsis* C.Koch**					*D. nuda* (Belanger) Stapf (*D. verna* C. Koch)

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
116	***Eunomia* DC.**	*E.rotundifolia* C.A.Mey.	*E.rotundifolia* C.A.Mey.			
117	***Erophila* DC.**	*E. verna* (L.) Bess.		*E. verna* (L.) Bess.	*E. minima* C.A.Mey.	*E. verna* (L.) Bess.
118		*E. minima* C.A.Mey.		*E. praecox*(Stev.) DC.	*E. praecox* (Stev.) DC.	
119		*E. praecox* (Stev.) DC.			*E. krockeri* Andrz.	
120	***Eruca* Mill.**	*E. sativa* Mill.				*E. sativa* Mill.
121	***Erucastrum* C. Presl**	*E. armoracioides* (Czern. ex Turcz.) Cruchet (*Brassica elongata* Ehrn.)		*E. armoracioides* (Czern. ex Turcz.) Cruchet	*E. armoracioides* (Czern. ex Turcz.) Cruchet	*E. armoracioides* (Czern. ex Turcz.) Cruchet
122	***Erysimum* L.**	*E.anceps* Steven ex Ledeb.	*E. aureum* Bieb.		*E. argyrocarpum* N.Busch	*E. brachycarpum* Boiss.
123		*E. aureum* Bieb.	*E. chazarjurti* N. Busch		*E. collinum* (Bieb.) Andrz.	*E. crassipes* Fisch. & C.A. Mey.
124		*E. babadagense* Prima	*E. collinum* (Bieb.) Andrz.		*E. crassipes* Fisch. & C.A. Mey.	*E. collinum* (Bieb.) Andrz.
125		*E. caspicum* N.Busch	*E. gelidum* Bunge		*E. Szowitsianum* Boiss.	*E. chazarjurti* N. Busch
126		*E. cheiri* (L.) Crantz (*Cherianthus cheiri* L.)	*E. ibericum* (Adams) DC.			*E. cheiri* (L.) Crantz (*Cherianthus cheiri* L.)
127		*E. ibericum* (Adams) DC.	*E. leucanthemum* (Steph.) B. Fedtsch.			*E. ibericum* (Adams) DC.
128		*E. leptophyllum* (Bieb.) Andrz.	*E. pulchellum* (Willd.) J. Gay			*E. pulchellum* (Willd.) J. Gay
129		*E. leucanthemum* (Steph.) B. Fedtsch. (*E. passgalense* Boiss.)				*E. lilacinum* Steinb.
130		*E. repandum* L.	*E. krynitzkii* Bordz.			*E. repandum* L.
131			*E. strictisiliquum* N.Busch.			*E. leucanthemum* (Steph.) B. Fedtsch.
132			*E. substrigosum* (Rupr.) N. Busch			*E. gelidum* Bunge
133			*E. Szowitsianum* Boiss.			*E. krynitzkii* Bordz.
134						*E. leptophyllum* (Bieb.) Andrz.
135						*E. subulatum* J. Gay (*E. persicum* Boiss.)
136						*E. sisymbrioides* C.A. Mey.
137						*E. substrigosum* (Rupr.) N. Busch
138						*E. Szowitsianum* Boiss.
139						*E. Wagifii* Kassumov
140	***Euclidium* R.Br.**	*E. syriacum* (L.) W.T. Aiton				*E. syriacum* (L.) W.T. Aiton
141	***Fibigia* Medik.**					*F.macrocarpa* (Boiss.) Boiss.
142						*F. macroptera* (Kotschy et Boiss. ex E. Fourn.) Boiss.
143	***Goldbachia* DC.**			*G. torulosa* DC.		*G. torulosa* DC.
144	***Hesperis* L.**	*H. matronalis* L.	*H. hirsutissima* (N. Busch) Tzvel.		*H. persica* Boiss. (*H. karsiana* N. Busch)	*H. matronalis* L.
145		*H. sibirica* L.	*H. transcaucasica* Tzvel.		*H. pycnotricha* Borbas et Degen	*H. hirsutissima* (N. Busch) Tzvel.
146		*H. tristis* N. Busch (*Sperihedium triste* (L.) V.İ.Dorof)				*H. persica* Boiss.
147		*H. Voronovii* N. Busch (*H. armena* auct. non Boiss.)				*H. pycnotricha* Borbas et Degen
148						*H. transcaucasica* Tzvel.
149						*H. Voronovii* N. Busch

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
150	***Hirschfeldia* Moench**	*H. incana* (L.) Lagr. Foss.			*H. incana* (L.) Lagr. Foss.	
151	***Hymenolobus* Nutt. ex Torr. & Gray**	*H. procumbens* (L.) Nutt. ex Torr. & A. Gray		*H. procumbens* (L.) Nutt. ex Torr. & A. Gray		*H. procumbens* (L.) Nutt. ex Torr. & A. Gray
152	***Isatis* L.**	İ. latisiliqua Steven (İ. nummularia Trautv.)	İ. iberica Stev.	İ. Boissierana Reichenb. f.	İ. Steveniana Trautv. (İ. anceps N. Busch)	İ. brachycarpa C.A. Mey.
153		İ. subradiata Rupr.	İ. subradiata Rupr.	İ. Buschiana Schischk.		İ. Bungeana Seidlitz
154				İ. Grossheimii N.Busch		İ. Buschiana Schischk.
155						İ. iberica Stev.
156						İ. ornitho*rhynchus* N. Busch
157						İ. Karjaginii Schischk.
158						İ. latisiliqua Steven (İ. nummularia Trautv.)
159						*İ. glauca* Aucher ex Boiss.
160						İ. subradiata Rupr.
161						İ. Steveniana Trautv. (İ. anceps N. Busch)
162	***Lepidium* L.**	*L. campestre* (L.) R.Br.	*L. campestre* (L.) R.Br.	*L. cartilagineum* (J.C. Mayer.)Thell.	*L. ruderale* L.	*L. campestre* (L.) R.Br.
163		*L. cartilagineum* (J.C.Mayer.)Thell.	*L. lyratum* L.	*L. crassifolium* Waldst. et Kit.		*L. crassifolium* Waldst. et Kit.
164		*L. crassifolium* Waldst. et Kit.		*L. latifolium* L.		*L. ruderale* L.
165		*L. latifolium* L.		*L. perfoliatum* L.		*L. latifolium* L.
166		*L. perfoliatum* L.		*L. ruderale* L.		*L. lyratum* L.
167		*L. pinnatifidum* Ledeb.		*L. sativum* L.		*L. persicum* Boiss.
168		*L. ruderale* L.				*L. perfoliatum* L.
169		*L. sativum* L.				*L. sativum* L.
170		*L. vesicarium* L.				*L. vesicarium* L.
171	***Leptaleum* DC.**	*L. filifolium* (Willd.) DC.				*L. filifolium* (Willd.) DC.
172	***Litwinowia* Woronow**					*L. tenuissima* (Pall.) Woronow ex Pavlov.
173	***Lobularia* Desv.**	*L. maritima* (L.) Desv.				
174	***Matthiola* W.T. Aiton, nom. cons.**	*M. Boisseri* Grossh.		*M. caspica* (N.Busch) Grossh.	*M. robusta* Bunge	*M. Boisseri* Grossh.
175		*M. caspica* (N.Busch) Grossh.		*M. odoratissima* (Pall. ex Bieb.) W.T. Aiton		*M. odoratissima* (Pall. ex Bieb.) W.T. Aiton
176		*M. daghestanica* (Conti) N.Busch		*M. robusta*Bunge		
177		*M. incana* (L.) R. Br.				
178		*M. odoratissima* (Pall. ex Bieb.) W.T. Aiton				
179	***Maresia* Pom.**	*M.nana* (DC.) Batt.		*M.nana* (DC.) Batt.	*M.nana* (DC.) Batt.	
180	***Meniocus* Desv.**	*M. linifolius* (Stephan ex Willd.) DC.				*M. linifolius* (Stephan ex Willd.) DC.
181	***Murbeckiella* Rothm.**	*M. Huetii* (Boiss.) Rothm.	*M. Huetii* (Boiss.) Rothm.			*M. Huetii* (Boiss.) Rothm.

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	Lesser Caucasus	Kura-Araz	Talysh	Nakhchivan
182	***Moricandia* DC.**		*M. perfoliata* (C.A. Mey.) V.İ. Dorof. [*Conringia perfoliata* (C.A. Mey.) N. Busch, *Conringia clavata* Boiss.]		*M. Meyeri* (Boiss.) V.İ. Dorof. [*Zuvanda Meyeri* (Boiss.) Askerova; *Malcolmia Meyeri* Boiss.]	*M. Meyeri* (Boiss.) V.İ. Dorof.
183					*M. perfoliata* (C.A. Mey.) V.İ. Dorof.	*M. perfoliata* (C.A. Mey.) V.İ. Dorof.
184	***Myagrum* L.**	*M. perfoliatum* L.				*M. perfoliatum* L.
185	***Nasturtium* W.T. Aiton, nom. cons.**	*N. offisinale* W.T. Aiton, nom. cons.				*N. offisinale* W.T. Aiton, nom. cons.
186	***Neslia* Desv., nom. cons.**	*N. apiculata* Fisch., C.A. Mey. et Ave-Lall.				*N. apiculata* Fisch., C.A. Mey. et Ave-Lall.
187		*N. paniculata* (L.) Desv.				*N. paniculata* (L.) Desv.
188	***Pachyphragma* (DC.) Reichenb.**	*P. macrophyllum* (Hoffm.) N.Busch				
189	***Peltariopsis* N.Busch**					*P. Grossheimii* N. Busch
190						*P. planisiliqua* (Boiss.) N. Busch
191	***Physoptychis* Boiss.**					*Ph. caspica* (Habl.) V. Boczantzeva [*Ph. gnaphalodes* (DC.) Boiss.]
192	***Pseudovesicaria* (Boiss.) Rupr.**	*P. digitata* (C.A.Mey.) Rupr.				
193	***Raphanus* L.**	*R. niger* Mill.		*R. raphanistrum* L.	*R. rostratus* DC.	*R. raphanistrum* L.
194		*R. raphanistrum* L.				*R. sativus* L.
195		*R. sativus* L.				
196	***Rapistrum* Crantz, nom. cons.**	*R. rugosum* (L.) All.				*R. rugosum* (L.) All.
197	***Rorippa* Scop.**	*R. austriaca* (Crantz) Bess.		*R. amphibia* (L.) Bess.	*R. austriaca* (Crantz) Bess.	*R. amphibia* (L.) Bess.
198		*R. palustris* (L.) Bess.		*R. ampullicarpa* V.İ.Dorof.	*R. palustris* (L.) Bess.	*R. austriaca* (Crantz) Bess.
199				*R. x anceps* (Wahlenb.) Reichenb. (*R.x prostrata* (J.P.Bergeret) Schinz et Thell. nom. ambig.)		*R. palustris* (L.) Bess.
200	***Sameraria* Desv.**	*S. armena* (L.) Desv.		*S. armena* (L.) Desv.		*S. armena* (L.) Desv.
201		*S. cardiocarpa* Trautv.		*S. cardiocarpa* Trautv.		*S. cardiocarpa* Trautv.
202		*S. glastifolia* (Fisch. & C.A. Mey.) Boiss.		*S. glastifolia* (Fisch. & C.A. Mey.) Boiss.		*S. glastifolia* (Fisch. & C.A. Mey.) Boiss.
203	***Sobolewskia* Bieb.**	*S. caucasica* (Rupr.) N.Busch	*S. clavata* (Boiss.) Fenzl			
204		*S. truncata* N.Busch				
205	***Sinapis* L.**	*S. arvensis* L.				*S. arvensis* L.

Table 4. *Cont.*

№	Genera	Botanical-Geographical Regions of the Azerbaijani Part of the Southern Caucasus and the Number of Species				
		Greater Caucasus	**Lesser Caucasus**	**Kura-Araz**	**Talysh**	**Nakhchivan**
206	***Sisymbrium* L.**	*S. altissimum* L.	*S.erucastrifolium* (Rupr.) Trautv.	*S. altissimum* L.	*S. officinale* (L.) Scop. (*Velarum Tzvelevii* V.İ.Dorof)	*S. altissimum* L.
207		*S.erucastrifolium* (Rupr.) Trautv.	*S. orientale* L.	*S. officinale* (L.) Scop. (*Velarum Tzvelevii* V.İ.Dorof)	*S. septulatum* DC. [*S. bilobum* (C. Koch) Grossh.]	*S. İrio* L.
208		*S. İrio* L.				*S. Loeselii* L.
209		*S. Loeselii* L.				*S. septulatum* DC. [*S. bilobum* (C. Koch) Grossh.]
210		*S. officinale* (L.) Scop. (*Velarum Tzvelevii* V.İ.Dorof)				
211		*S. orientale* L.				
212	***Sterigmostemum* Bieb.**	*S. incanum* Bieb. [*S. torulosum* (Bieb.) Stapf]				*S. acanthocarpum* Fisch. & C.A. Mey.
213		*S. tomentosum* (Willd.) Bieb.				*S. incanum* Bieb. [*S. torulosum* (Bieb.) Stapf]
214						*S. tomentosum* (Willd.) Bieb.
215	***Strigosella* Boiss. (*Malcolmia* aict. p. p.)**	*S. africana* (L.) Botsch.		*S. intermedia* (C.A. Mey.) Botsch. (*Malcolmia taraxafolia* Balb.)		*S. africana* (L.) Botsch. [*Malcolmia africana* (L.) W.T. Aiton]
216		*S. intermedia* (C.A. Mey.) Botsch.				*S. intermedia* (C.A. Mey.) Botsch. (*Malcolmia taraxafolia* Balb.)
217	***Thlaspi* L.**	*T. arvense* L.	*T. longistylum* (Sosn.) O.E.Schulz [*Thlaspi Freynii* N. Busch]		*T. umbrellatum* Steven ex DC.	*T. arvense* L.
218		*T. perfoliatum* L. [*Microthlaspi perfoliatum* (L.) F.K. Mey.]	*T. Tatianae* Bordz. [*Carpoceras Tatianae* (Bordz.) Grossh., *Noccaea Tatianae* (Bordz.) F.K. Mey.]			*T. armenum* N. Busch [*Neurotropis armena* (N. Busch) Czer.]
219		*T. umbrellatum* Steven ex DC.	*T. Szowitsianum* Boiss.			*T. perfoliatum* L. [*Microthlaspi perfoliatum* (L.) F.K. Mey.]
220						*T. platycarpum* Fisch. et C.A. Mey. [*Neurotropis platycarpa* (Fisch. & C.A. Mey.) F.K. Mey.]
221						*T. Huetii* Boiss.
222						*T. Szowitsianum* Boiss.
223						*T. Tatianae* Bordz. [*Carpoceras Tatianae* (Bordz.) Grossh., *Noccaea Tatianae* (Bordz.) F.K. Mey.]
224	***Thellungiella* O.E. Schultz**	*T. pumila* (Steph.) V.İ. Dorof. [*Arabidopsis pumila* (Steph.) N. Busch]		*T. pumila* (Steph.) V.İ. Dorof. [*Arabidopsis pumila* (Steph.) N. Busch]		*T. pumila* (Steph.) V.İ. Dorof. [*Arabidopsis pumila* (Steph.) N. Busch]

6. Conclusion

The aim of this study is to identify the distribution patterns of *Brassicaceae* species within five major phytogeographical regions of the Azerbaijani sector of the Southern Caucasus and to assess their relationships with ecological factors and anthropogenic impacts. A comparative analysis across all botanical-geographical regions revealed that, with respect to species diversity, the number of endemic taxa, and ecological variation, the flora of the Nakhchivan region holds a leading position within the *Brassicaceae* family. The region's complex orography, sharply continental climate, and pronounced environmental heterogeneity have fostered the development of a rich taxonomic assemblage. Furthermore, the higher abundance of rare species relative to other regions underscores the phytogeographical importance of Nakhchivan as a significant center of biodiversity.

Based on the data obtained from this study, the distribution of the *Brassicaceae* family is strongly influenced by ecogeographical factors such as temperature, humidity, soil type, and climate. The high ecological plasticity of these species enables them to persist across a wide range of natural and anthropogenic habitats. However, human activities, including agriculture, overgrazing, and infrastructure development, constrain their distribution and affect ecosystem dynamics. Consequently, understanding the distribution patterns of the *Brassicaceae* family is vital for the sustainable management of soil and natural resources, with important implications for both ecological conservation and economic development.

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Conflicts of Interest

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