Distribution of ephemeral species of Fabaceae family in the flora of Fergana Valley of the Republic of Uzbekistan

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Abstract. The article describes the species belonging to the Fabaceae family and the ephemeral species belonging to the ecological groups found in the flora of the Fergana Valley, their distribution, coordinates, centers of origin, flowering, fruiting, and a comparative analysis of the species. According to the literature analysis, there are 2526 species belonging to 97 families in the Fergana Valley, of which 64% are endemic species of the Fabaceae family, and as a result of field research conducted in 2019-2023, it was found that there are 17 species of ephemerals belonging to 5 genius in the Fergana Valley.

1 Introduction

The Fergana Valley is distinguished from other regions by its wealth of plant species. Representatives of the bottom and high plant families occupy large areas. Among dicots, ephemeral species of Brassicaceae, Fabaceae and Poaceae family form associations and formations. But nowadays, the number of species is decreasing sharply as a result of the destruction of the ecological environment and anthropogenic effects. In recent years, as a result of land acquisition, establishment of industrialized zones, construction of transport and railways, and extensive grazing of livestock in the valley regions, there are changes taking place in the flora cover and its species composition in the natural areas.

Botanists have been interested in the flora of the Fergana Valley for a long time, and field experiments have been carried out several times. Research on plant cover: Z.A. Minkwitz, O.E. Knorring (1912); Z.A. Minkwitz (1917); V.P. Drobov (1925); O.N. Bondarenko (1950); M.M.Arifkhanova (1967); We can see in the works of Wernick, T. Rakhimova (1982); In these studies, the family of plants belonging to a certain group, including ephemeral and ephemeroid, is not fully disclosed. Only Sh.Shonazarov (1967) conducted research on ephemerals in the flora of the western part of the Aloy Range. He mainly focused on aspects such as the distribution of ephemerals and ephemeroids in the Aloy Range, their place in the flora cover, and distribution along the altitude regions [1, 2]. This research work was evaluated as one of the main motivations for conducting research on ephemera in the flora of Ferghana Valley [2-7].

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2 Material and methods

The object of research is ephemeral flora of the territory of the Fergana valley of the Republic of Uzbekistan.

In carrying out field research, herbarium specimens collected during field research conducted in different regions of the Fergana Valley in 2019-2023. These specimens have been compared to the samples collected between 1907-2022, which are stored in the National Herbarium of Uzbekistan (TASH) and the herbarium base of Moscow State University (MW). To identify the distribution region of species, their life form and total area have been used next sources: " Определитель растений Средней Азии VI " (1974), The Plant List www.theplantlist.org, Plant of the world online https://powo.science.kew.org/results, Global Biodiversity Information Facility https://www.gbif.org/ru/species/ website was used. During field research, MAPS.ME (version: 12.04.4-Google) mobile application and Google Earth Pro software were used to determine the distribution coordinates of species [8-12].

3 Discussion and results

There is no accurate information about the flora of the Fergana Valley, only M.M. Arifkhanova (1967) recorded that there are 2526 species belonging to 97 families, 64% of the Fabaceae family are endemic species . However, no information was given about the composition of the species. M.M. Arifkhanova The work "Plant cover of the Fergana Valley" by M.M. Arifkhanova is a study dedicated to the plant cover of the whole area. In the article "Ephemeretum of the Fergana Valley" by M.M. Arifkhanova, she was not agree with the opinion that the Fergana Valley is not rich in ephemerals and ephemeroids. Scientist explained it by the low percentage of the species in their plant cover, the high level of substrate and external factors. The group scientist exclaim that ephemeral and ephemeroid are not belongs to desert and grassland of Fergana Valley. However M.M.Arifkhanova "Vegetation of the Fergana Valley" (1967) emphasizes the richness of ephemeral and ephemeroid plant species of Fargana Valley. According to the results of his field research, she concludes that the ephemeral species of wheatgrass and cabbage are in the leading position in terms of geographical distribution, and the ephemeral species of the Fabaceae family are in the next place. In particular, Astragalus commixtus, Astragalus filicaulis, Astragalus campylotrichus, Astragalus ritylobus, Astragalus schmalhausenii, Astragalus diptera, Trigonella lapulina, Trigonella garndiflora of the Trigonella family are found in Fergana Valley. Names of ephemeris distributed in the valley within polymorphic families for the mountainous part of Central Asia are given by the scientist. Among them, the following species from the *Fabaceae family:* Medicago lupulina L , Astragalus filicaulis Fisch. & C.A.Mey. ex Kar., Astragalus harpilobus Boiss., Medicago meyeri Gruner, Medicago monantha (C.A.Mey.) Trautv. given. M.M.Arifkhanova in the data provided by Arifkhanova (1967), *the Fabaceae family* is [6]. listed among polymorphs in the flora of the valley, and Trigonella geminiflora Bunge, Trigonella verae Širj, Astragalus campylotrichus Bunge, Astragalus compositus Pavlov, Astragalus contortuplicatus L.,Vicia cinerea M. Bieb. Later, in the book "Winter growing plants of Uzbekistan" (1975) by V.A. Burygin and L.E.Markova, the area of ephemeral and ephemeroid plants in the territory of Uzbekistan, the time of flowering and fruiting, and the centers of origin were highlighted. 50 ephemeral species of the Fabaceae family have been studied [7] (Table 1).

Table 1. 1- Western Tien-Shan hills, 2- Turkestan and Nurota hills, 3- South-western Kyzylkum, 4- South-western Kyzylkum gypsum desert, 5- Zarafshan mountain plain, 6- Khisor mountain flat, 7- Flowering and fruiting time, 8-Center of origin (1-Endemic species of Central Asia, 2-Central Asia, Iran and Afghanistan, 3-Eastern Mediterranean, 4-Central Asia and Western Mediterranean, 5-Mediterranean Sea, 6-Central Asia, 7 - North Euro Asia, 8-Euro Asia).

No	Species name	1	2	3	4	5	6	7	8
1	Trigonella radiate (L.) Boiss	+	+			+	+	IV-V	1
2	Trigonella garndiflora Bunge	+	+			+	+	III-V	2
3	Trigonella arcuata C.A.M						+	V-VI	3
4	Trigonella geminiflora Bunge	+	+			+	+	III-V	2
5	Trigonella noeana Boiss	+	+					V-XII	3
6	Medicago lupulina L.	+	+			+	+	V-XII	8
7	Medicago orbicularis All.	+	+					III-IV	3
8	Medicago lanigera C.Winkl.et B.Fedtsch						+	III-IV	1
9	Medicago regidua Desr.	+	+			+	+	IV-V	3
10	Medicago denticulate Willd.					+	+	IV-V	3
11	Medicago minima Grufberg	+	+			+	+	IV-V	8
12	Medicago meyeri Gruner	+						IV-V	3
13	Melilotus officinalis Desr.		+			+	+	V-VI	8
14	Trifolium campestre Schreb	+	+			+	+	IV-V	5
15	Astragalus contortuplicatus.L	+	+						3
16	Astragalus campylotrichus Bge.	+	+			+	+	IV-V	1
17	Astragalus campylorrhynchus F. et M	+	+			+	+	IV-V	3
18	Astragalus drobovii M.Pop.et Vved						+	IV-V	1
19	Astragalus schmalhausenii Bge.	+	+			+	+	IV-VI	2
20	Astragalus composites N.Pavl	+					+	IV-VI	1
21	Astragalus vicarious Lipsky	+	+					IV-VI	1
22	Astragalus thlaspi Lipsky	+	+				+	IV-V	1
23	Astragalus commixtus Bge	+	+			+	+	IV-V	3
24	Astragalus stalinskyi Sir	+	+			+	+	V-VI	2
25	Astragalus bungei C.Winkl.et B.Fedtsch	+	+			+	+	IV-VI	3
26	Astragalus sesamoides Boiss	+	+			+	+	V-VI	2
27	Astragalus filicaulis F. et M	+	+			+	+	IV-VI	2
28	Astragalus rytilobus Bge	+	+			+	+	IV-VI	2
29	Astragalus oxyglottis Stev	+	+			+	+	IV-VI	3
30	Astragalus cornu-bovis Lipsky			+				IV-VI	1
31	Astragalus tribuloides Delil	+		+		+	+	IV-VI	3
32	Astragalus dipelta Bge	+				+	+	V-VI	2
33	Onobrychis pulchella Schrenk	+	+			+	+	IV	2
34	Onobrychis micrantha Schrenk	+	+			+	+	IV-VI	2
35	Onobrychis tavernierifolia Stocks				+			IV-VI	2
36	Vicia sativa L	+	+					V-VI	8
37	Vicia angustifolia L	+	+			+	+	V-VI	8
	Vicia narbonensis L	+						IV-V	5
38	Vicia turkitanica Vassilkovsk	+						IV-V	1
39	Vicia michauxii Spreng	+	+			+	+	IV-V	3
40	Vicia peregrine L.	+	+			+	+	IV-V	3
41	Vicia gracillior M.Pop.et B.Fedtsch	+						IV-V	1
42	Vicia hyrcanica F.et M.	+	+			+	+	IV-V	3
43	V.ervilia Willd	+	+				+	IV-V	3
44	Vicia calcarata Desf	+				+	+	IV-V	3
45	Vicia villosa Roth	+	+			+	+	IV-V	3
46	Lens orientalis Hand.-Mazz.	+	+			+	+	IV-V	3
47	Lathyrus aphaca L	+	+			+	+	IV-V	3
48	Lathyrus inconspicuous L	+	+			+	+	IV-V	3
49	Lathyrus cicera L	+	+					IV-V	5
50	Lathyrus hirsutus L	+	+			+	+	V-VI	5

In conducted research during 2019-2023 in Fergana Valley found 60 species belonging to the Fabaceae family. From these 60species separated 17 species of ephemeral according to comparative analysis by using herbarium plants of the Institute of Botany of the Republic of Uzbekistan. Furthermore the point of distribution was determined (Fig. 1). These are the following:

Medicago monantha (C.A.Mey.) Trautv (Index Seminum (KIEV, Kioviensi) 1840: vi (1841) - 39.968617° 71.149972° ; 41.009505 71.476059; 40.012982° 71.149301°; 39.958947° 71.834411°; 40.925416° 72.615325°; 40.986618° 71.127649°; 41.142245° 71.193946°; 40.541250° 72.626437°. ***Medicago minima (L.) Bartal. (Cat. Piante Siena: 60 (1776))*** - 39.968617° 71.149972°, 41.236196° 71.485369°, 40.419535° 71.987921°, 40.940956° 71.252978°, 40.280272° 71.930674°, 40.5233 19° 72.204435°, 40.823743° 72.427972°, 40.650554° 72.309393°, 40.945569° 70.780890°, 41.130094° 71.700973° . ***Onobrychis micrantha Schrenk ex Fisch. & CAMey. (Enum. Pl. Nov. 1: 85 (1841))*** - 41.275974° 71.525044°, 41.270601° 71.525271°, 39.939668° 71.751631°, 39.962634 71.743714. ***Onobrychis pulchella Schrenk ex Fisch. & CAMey.(Enum. Pl. Nov.: 87 (1841))*** - 41.043602° 70.915607°, 39.979711 71.787531, 39.985278 71.798509, 41.121924° 71.964062°, 39.966863° 71.812910°, 41.531237 71.705436. ***Trigonella grandiflora Bunge (Arbeiten Naturf. Vereins Riga 1: 218 (1847))*** - 40.564778° 72.247214°, 40.560297° 72.646080°. ***Vicia peregrina L. (Sp. Pl.: 737 (1753))*** - 40.984805° 71.195955°, 40.988908° 71.199528°, 40.992447° 70.846928°, 40.748072° 72.952424°. ***Astragalus ammophilus Kar. & Cyrus. (Bull. Soc. Imp. Naturalistes Moscou 15: 335 (1842))*** - 40.921844° 70.982849°, 40.533912° 72.226720°, 39.989041 71.815467, 39.989317 71.79104, 40.385149 71.669611, 41.150986 71.083171. ***Astragalus arpilobus subsp. Arpilobus*** - 40.389333 71.603794 ; 40.549603° 72.006214° ; 40.732761° 71.457194° ; 40.170726° 70.591224° ; 40.509784° 71.901215° ; 40.735611° 71.428777° ; 40.704170° 71.467259° . ***Astragalus camptoceras Bunge (Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 12 (1868))*** - 40.006315° 71.165084°. ***Astragalus campylotrichus Bunge (Izv. Imp. Obshch. Lyubit. Estestv. Moskow. Univ. 26(2): 207 (1880))*** - 40.978091° 71.185888°; 41.291150° 71.905474°; 39.924756 71.201094; 41.050809 72.118232; 40.688753 72.388595; 40.599467 71.88496; 40.760299 72.273784. ***Astragalus commixtus Bunge (Arbeiten Naturf. Vereins Riga 1: 246 (1847))*** - 41.129443° 71.197012°; 41.144448° 71.222407°; 40.928117 71.040409; 40.999970° 71.146721°; 40.946316° 71.110419°; 41.069320° 71.720354°; 40.939577° 71.283672°; 40.939451° 71.006592°; 41.019108° 71.015655°; 41.071342° 71.162770°. ***Astragalus dipelta Bunge (Trudy Imp. S.-Peterburgsk. Bot. Sada 7: 368 (1880))*** - 39.987484 71.812894; 39.981244 71.782207; 39.977129° 71.786806°; 39.981244 71.782207; 39.985308 71.795893; 39.910509° 71.209316°. ***Astragalus filicaulis Fisch. & CAMey. ex Ledeb (Fl. Ross. 1: 637 (1843))*** - 41.017133° 70.922463°; 40.954637° 71.038518°; 41.063504° 71.598112°; 41.029288 72.433418; 40.158889 71.730303; 41.124607 72.076667; 41.105253° 71.974208°; 40.950955° 72.304774°; 40.171634 71.727573; 39.971052 71.806812; 39.953978 71.77338; 40.265177° 71.561699°. ***Astragalus ophiocarpus Benth. ex Bunge (Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 11(16): 10 (1868))*** - 40.770409 71.797845; 40.414784 71.62476; 39.975966 71.806894; 41.096071 72.134840. ***Astragalus oxyglottis Steven ex M. Bieb (Fl. Taur.-Caucas. 2: 196 (1808))*** - 41.230979° 71.837234°; 40.905520° 71.097087°; 40.970984° 71.310882°; 40.978091° 71.185888°; 40.865114° 70.803885°; 40.267636° 71.606352°; 40.316729 71.671092. ***Astragalus stalinskyi Sirj. (Feddes Repert. Spec. Nov. Regni Veg. 53: 75 (1944))*** - 40.998288° 71.177990°; 41.205669° 71.667795°; 41.017133° 70.922463°; 40.977643° 71.001843°; 40.055858 71.060615; 41.253474 71.656595; 39.984447 71.798089; 41.042313 72.121730. ***Astragalus vicarius Lipsky (Trudy Imp. S.-Peterburgsk. Bot. Sada 18: 25 (1901))*** - 40.149109° 71.727508°.

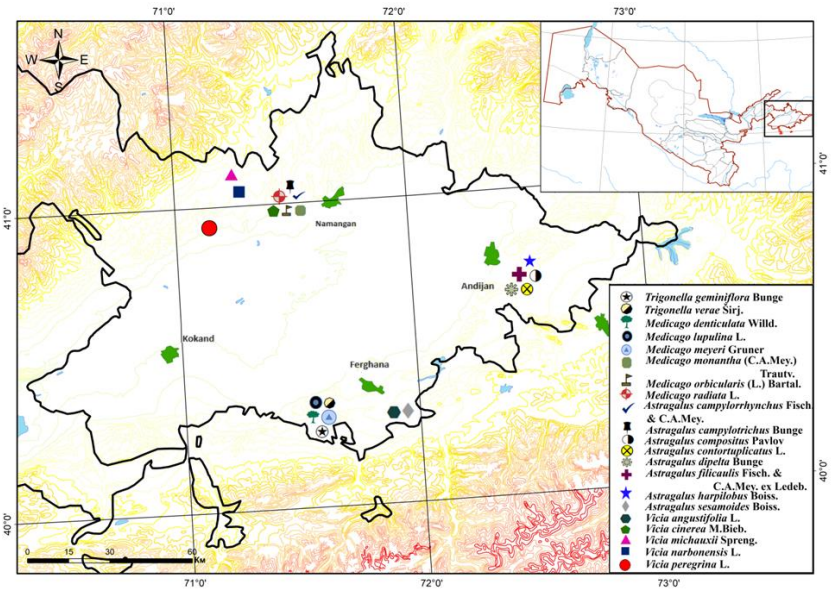

Fig. 1. The point of distribution of 60 species belonging to the Fabaceae family in Fergana Valley.

4 Conclusion

In conclusion during fold research it is identified that there are 60 species of Fabaceae family in Fergana Valley. 17 of them belongs to ephemeral [8, 13-29]. We identified that Fergana Valley consists from 5x5km^2 areas which account, such areas about 907. 42 of them contains 17 species of ephemeral of Fabaceae family and distributed in 104 coordinates.

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