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## RESULT OF GRID MAPPING: THE SPECIES OF FABACEAE IN URGUT BOTANICAL-GEOGRAPHICAL REGION

Dilarom Tajetdinova

*Institute of Botany, Academy of Sciences of the Republic of Uzbekistan, Uzbekistan*

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### Abstract

This study presents a grid mapping analysis the species of *Fabaceae* distribution in the Urgut botanical-geographical region, Uzbekistan. Based on herbarium data and field surveys, 126 species were mapped across 90 (38,46%) indexes. The highest species richness and collection density were observed in mountainous zones, with several new regional records identified. These findings provide valuable insights for biodiversity and conservation research in Central Asia.

**Keywords:** *CD; herbarium; index, SR; TASH*

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### 1. Introduction

The Urgut botanical-geographical region is bordered in the north by Middle Zarafshan, in the east by the Republic of Tajikistan, in the west by Ziawiddin– Zirabulak, in the southwest by Qarshi–Qarnapchul, and in the south by the Kashkadarya botanical-geographical regions. The highest point of the Urgut region reaches 2,510 m above sea level (Mount Allayoron) [7, 5, 6]. This region is notable for its unique flora and includes 19 endemic species of the Kuhistan mountain region, particularly within the Kitab State Nature Reserve, which is located at the junction of the Zeravschan and Hissar ranges (Kodirov, 2020). Within the Mountainous Central Asia province, the family Fabaceae, along with polymorphic genera of other local floras, ranks among the top three dominant families characteristic of the Ancient Mediterranean floras [2, 1]. According to the data reported by U.H. Qodirov (2020), the flora of the Urgut botanical-geographical region includes 125 species of the family Fabaceae, representing 18 genera, which occupies the third position among polymorphic families.

### 2. Materials and Methods

The increasing number of recorded taxa over the years, along with the forthcoming large-scale floristic studies planned for Central Asia and the grid mapping of the flora of Samarkand Province (by botanical-geographical regions), highlight the necessity of revisiting and conducting a more detailed analysis of Fabaceae species data within the flora of the Urgut botanical-geographical region.

As part of the state research program “Development of a new map of the botanical-geographical region of Central Asia and grid mapping of plant biodiversity” (2025–2029) of the “Flora of Uzbekistan” laboratory at the Institute of Botany, Academy of Sciences of the Republic of Uzbekistan, a grid floristic mapping of the Samarkand region (Central Uzbekistan) has been initiated. The research materials were also

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\*Corresponding author. Tel.: (+998) 55 512 14 24  
E-mail address: [t-dilyia@mail.ru](mailto:t-dilyia@mail.ru)

uploaded to the international database Grid Mapping of Central Asia Plants [3]

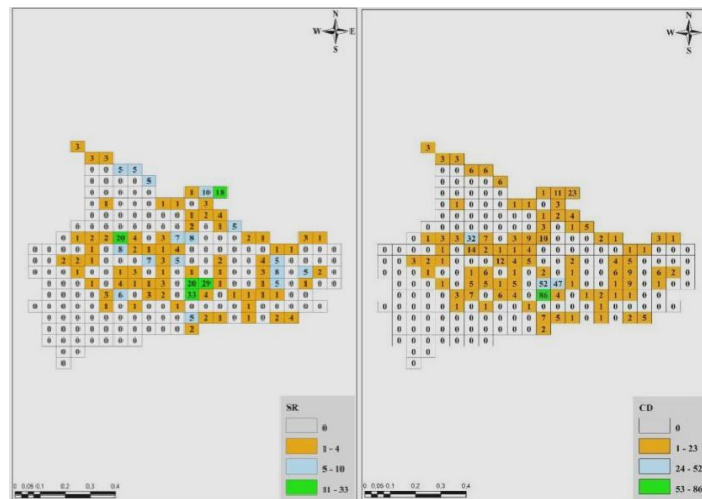
Accepted scientific names of taxa and authors were checked using POWO [4, 5]. For this study, the area was divided into 234 grid indexes with alphanumeric codes, using the WGS 1984 (World Geodetic System) projection in ArcGIS version 10.6.1. Each grid indexes of 5× 5 km. Considering that *collection density* (CD) is expressed as the total number in each index [8], *species richness* (SR) was defined as the total number of recorded species.

### 3. Results and Discussion

The collection of the Uzbekistan National Herbarium (TASH) was examined for grid mapping of species belonging to the family Fabaceae within the Urgut botanical- geographical region. This investigation aimed to spatially visualize species distribution and identify areas of high *species richness*. Based on the herbarium specimen analysis, the main contributors of geo-referenced collections for Fabaceae in this region include M.G. Popov (1914–1941), V.P. Drobov et al. (1929–1933), A. Pyataeva (1954–1956), as well as M.M. Nabiev and U. Pratov (1972–1980). The first recorded specimen from the study area was collected in 1913 by N.V. Androsov in the vicinity of the Siyob River, near the city of Samarkand. This specimens were identified as *Astragalus filicaulis* Fisch. & C.A.Mey. (Samarkand. Clay hills along the Siyob River. 18.04.1913. N.V. Androsov), *Hedysarum amankutanicum* B. Fedtsch. (Ad pagum Aman-Kutan in montibus ad viam inter Samarkand er Kitab. 00.04.1913. A.T. Michelson) and is currently preserved in the Central Asian section of the Uzbekistan National Herbarium (TASH).

In total, 526 herbarium specimens representing 126 species of *Fabaceae* were analyzed, sourced from 90 (38,46%) indexes based on herbarium records from TASH and supplementary field investigations. As a result of this comprehensive survey, several species were newly recorded for the flora of the Urgut botanical-geographical region. These include: *Alhagi pseudalhagi* subsp. *persarum* (Boiss. & Buhse) Takht. (*A. persarum* Boiss. & Buhse), *A. ammophilus* Kar. & Kir., *A. atrovinosus* Popov, *A. krauseanus* Regel, *A. lasiophyllus* Ledeb., *A. ophiocarpus* Benth. ex Bunge, *A. substipitatus* Gontsch., *Cullen drupacea* (Bunge) C.H. Stirt., *Lotus krylovii* Schischk. & Serg., *Medicago polymorpha* L. (*M. denticulata* Willd.), *M. sativa* subsp. *sativa* (*M. transoxana* Vassilcz.), *Ononis arvensis* L. (*O. hircina* Jacq.), *Trifolium lappaceum* L., *T. resupinatum* L. and *Vicia peregrina* L.

A grid map of distribution was created to illustrate species richness and collection density of Fabaceae in the study area (Fig. 1).



**Fig.1.** Grid map of the species of Fabaceae in the Urgut botanical- geographical region

The grid mapping results revealed that the *species richness* of Fabaceae was relatively low (1–4 species) in 69 grid indexes, moderate (5–10 species) in 16 indexes, and high (11–33 species) in 5 indexes. Notably, grid index AT192 demonstrated the highest collection density (862 specimens) and the greatest *species richness*, indicating it as a potential biodiversity hotspot within the Urgut botanical- geographical region.

### 4. Conclusions

According to the study findings, the taxonomic composition of the family of *Fabaceae* in the Urgut

botanical-geographical region is highly diverse. This diversity enhances opportunities for understanding the ecological roles of plant species within local ecosystems. The dominance of this family in the regional flora is primarily attributed to the high number of species in the genera *Astragalus* (58 species), *Oxytropis* (11 species), and *Medicago* (9 species). Geo-referenced data made it possible to pinpoint the primary distribution centers of various species, which holds significant value for ecological and biodiversity research. For example, the endemic species *Astragalus chrysomallus* Bunge was found in grid indexes AT192, AU192, and AY186, while *Hedysarum amankutanicum* B. Fedtsch. was recorded in grid index AU193.

Geospatial analysis of herbarium collections indicated that most field surveys were conducted in the mountainous and foothill zones of the region, which also coincided with areas of highest species richness and collection density.

Overall, the grid mapping of *Fabaceae* species in the Urgut botanical- geographical region provides valuable scientific and practical insights into spatial patterns of plant distribution in Uzbekistan and Central Asia. These results contribute to our broader understanding of floristic diversity and can support future ecological, conservation, and biogeographical studies.

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