



**DISTRIBUTION OF *ROSA PERSICA* MICHX. EX JUSS. IN CENTRAL AND
WESTERN ASIA**

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<https://doi.org/10.5281/zenodo.15596978>

Abstract: *Rosa persica* Michx. ex Juss. is a wild rose species native to arid and semi-arid regions from Iran to Central Asia and western Afghanistan. This study aims to analyze the spatial distribution and biogeographic patterns of this species using georeferenced occurrence data. A total of 453 records were compiled from GBIF and visualized using gridded heat maps and detailed topographic overlays. Results reveal the species' strong association with temperate montane and steppe habitats, especially in northeastern Iran, southern Kazakhstan, and Uzbekistan.

Key words: *Rosa persica*, spatial distribution, Uzbekistan

Аннотация: *Rosa persica* Michx. ex Juss. — вид дикой розы, произрастающий в засушливых и полувасушливых регионах от Ирана до Центральной Азии и западного Афганистана. Целью данного исследования является анализ пространственного распределения и биогеографических закономерностей этого вида с использованием данных о встречаемости с географической привязкой. Всего было собрано 453 записи из GBIF, которые были визуализированы с использованием тепловых карт с сеткой и подробных топографических наложений. Результаты показывают сильную связь вида с умеренными горными и степными местообитаниями, особенно на северо-востоке Ирана, юге Казахстана и Узбекистана.

Ключевые слова: *Rosa persica*, пространственное распространение, Узбекистан

Annotatsiya. *Rosa persica* Michx. sobiq Juss. yovvoyi Namatak turi Erondan O'rta Osiyo va G'arbiy Afg'onistongacha bo'lgan qurg'oqchil va yarim qurg'oqchil hududlarga xosdir. Ushbu tadqiqot georeferents hodisasi ma'lumotlaridan foydalangan holda ushbu turning fazoviy tarqalishi va biogeografik tarqalishi tahlil qilishga qaratilgan. GBIF dan jami 453 ta nuqtalar to'plangan va batafsil topografik qoplamalar yordamida vizuallashtirilgan. Natijalar turning mo'tadil tog'li va dashtli yashash joylari, ayniqsa Eronning shimoli-sharqi, janubiy Qozog'iston va O'zbekiston bilan kuchli aloqadorligini ko'rsatadi.

Kalit so'zlar: *Rosa persica*, prostranstvennoe rasprostranenie, Uzbekistan

Introduction. *Rosa persica* Michx. ex Juss. is a morphologically distinct and ecologically specialized wild rose found across Iran, Central Asia, and western Afghanistan (POWO, 2025). This species, characterized by its yellow flowers and unique dark center (Figure 1), is of botanical and phylogenetic interest due to its divergence from typical *Rosa* species and its adaptation to dry, continental climates (Lack et al. 2024, Zhang et al. 2025). These peculiar traits give it a unique taxonomic status and high breeding value in the genus *Rosa*. Due to the adverse effects of urban development, such as road construction, canalization, and agricultural expansion, the distribution of *R. persica* has been drastically reduced and fragmented, and the future climate warming is expected to drive its migration to higher latitudes and altitudes. (Zhang et al., 2021). In 2021, China has listed *R. persica* as a national second-class key wild plant for regulatory protection (Zhang et al. 2025). Understanding the species' distribution is crucial for taxonomic research, conservation planning, and predictive ecological modeling, particularly under increasing climate and land-use pressures. The goal of this study is to visualize the spatial distribution of *Rosa persica* and identify its biogeographic hotspots and environmental preferences.



Figure 1. Flower of *Rosa persica* photo by Natalya Beshko

Materials and Methods. Occurrence data for *Rosa persica* were compiled from multiple reputable sources to ensure comprehensive geographic coverage and data reliability. The primary dataset was obtained from the Global Biodiversity Information Facility (GBIF, 2024), a widely used open-access platform that aggregates biodiversity records from herbaria, museums, and citizen science initiatives worldwide. Additional records were retrieved from iNaturalist, a community-based platform where verified users contribute georeferenced biodiversity observations with photographic evidence. To supplement these, data were also collected from Plantarium.ru, a Russian-language online flora portal that provides expert-verified species occurrence records and herbarium images, particularly valuable for the Central Asian region. Furthermore, regional distribution data were incorporated from the recent floristic and biogeographic work by Ismonova et al. (2024). A total of 453 georeferenced records were cleaned and filtered for accuracy. Two complementary mapping approaches were employed: Heatmap Visualization (Figure 2): A $1^\circ \times 1^\circ$ grid was applied across Central and Western Asia. The number of records per grid cell was calculated and color-coded from low (yellow) to high (blue) occurrence density using ArcGIS. Topographic Biogeographic Overlay (Figure 3): A high-resolution elevation and ecoregion map of Uzbekistan and adjacent areas was overlaid with precise occurrence points (green circles). This approach enabled fine-scale spatial analysis in relation to named physiographic units and ecological zones.

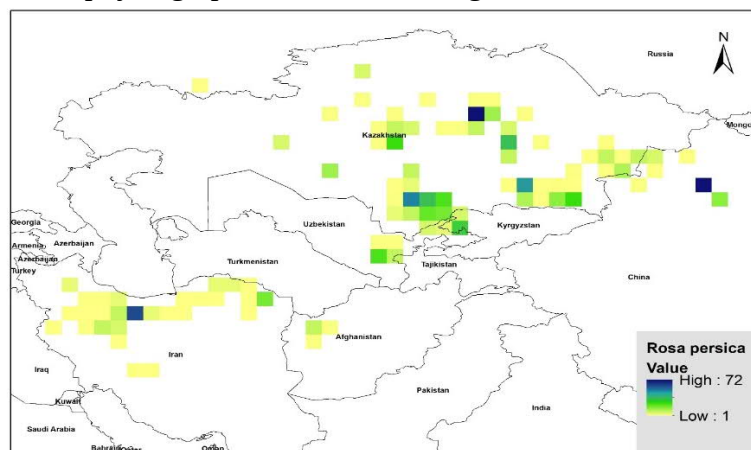


Figure 2. Occurrence density of *Rosa persica*

Results and Discussion. The spatial distribution of *Rosa persica* exhibits a broad but fragmented range extending from northeastern Iran to western regions of China, encompassing parts of Central Asia. The species displays a notably heterogeneous pattern of occurrence, with several regions emerging as centers of high density. Prominent concentrations of occurrence records are observed in northeastern Iran and the neighboring areas of Turkmenistan. These regions represent the westernmost part of the species' natural distribution and likely serve as ecological refugia, supporting stable populations in arid and semi-arid landscapes. Further east, the foothills of the Tien Shan mountain range, spanning parts of Kazakhstan and Kyrgyzstan, harbor substantial occurrences of *R.*

persica. The environmental heterogeneity and elevation gradients in these areas may contribute to suitable microhabitats that support the species' persistence. Additionally, a relatively high density of records is noted in the western portion of Xinjiang Province in China. This extension into western China underscores the species' ability to colonize suitable temperate habitats across geopolitical boundaries, especially in regions with comparable climatic and edaphic conditions.

Conversely, moderate to sparse occurrence densities are evident across much of Afghanistan, Tajikistan, and Uzbekistan, suggesting either genuine ecological rarity in these regions or potential undersampling due to logistical and political limitations. Notably, large continuous areas such as the central Iranian Plateau, the Karakum Desert in Turkmenistan, and the Kyzylkum Desert in Uzbekistan and southern Kazakhstan show an absence of records. These areas are characterized by extreme aridity and saline soils, which may represent physiological and ecological barriers to the establishment and survival of *Rosa persica* populations. Overall, the observed distribution pattern highlights the species' preference for temperate, semi-arid montane, and steppe ecosystems while avoiding hyper-arid lowland deserts and high alpine zones.

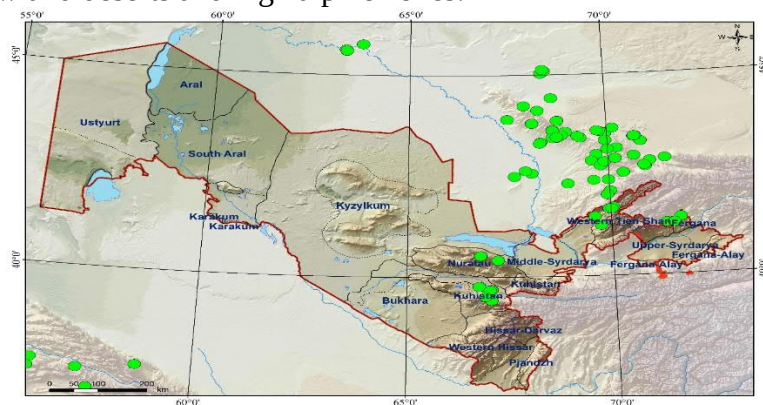


Figure 3. Distribution *Rosa persica* in phytogeographic regions of Uzbekistan

The distribution of *Rosa persica* aligns closely with temperate steppe and montane biomes, especially those with seasonal precipitation and well-drained soils. High occurrence in regions such as the Western Tien Shan, Fergana, and northeastern Iran suggests these are ecological strongholds for the species. The underrepresentation in deserts and high mountains reflects both natural limits and potential sampling gaps. For instance, the species is likely absent in the hyper-arid Karakum and Ustyurt due to extreme climatic conditions, but may be under-recorded in parts of Afghanistan or southern Tajikistan due to accessibility issues.

The concentration of populations in ecotonal areas (e.g., Nuratau Mountains, Syrdarya corridor) highlights their possible role as refugia or corridors of gene flow. These areas warrant further research, particularly with molecular tools, to assess intraspecific variation and conservation priorities.

Conclusion. This study reveals that *Rosa persica* has a fragmented but ecologically coherent distribution across Central and Western Asia. It thrives in semi-arid montane and steppe habitats, with notable centers of occurrence in Iran, Kazakhstan, and Uzbekistan. The spatial patterns identified can guide future research in ecology, taxonomy, and conservation of this evolutionarily significant species. Further studies using ecological niche modeling and genetic sampling are recommended to understand habitat limits, predict responses to climate change, and explore potential cryptic diversity within this species.

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