

What determines the distribution of Tulipa species in Uzbekistan?

Temur Asatulloev¹ , Davron Dekhkonov^{1,2} , Komiljon Sh. Tojibaev^{1*} 

¹ Institute of Botany of the Academy of Sciences of Uzbekistan, 100125, Tashkent, Uzbekistan. Email: ktojibaev@mail.ru

² Namangan State University, 107161, Namangan, Uzbekistan.

* Correspondence: corresponding@example.org

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Abstract: / Аннотация / Annotatsiya English: Although the distribution of Tulipa species in Uzbekistan is well documented, there is no clear understanding of the importance of three classes of environmental variables, namely climate, soil type and topography, as determinants of their distribution. In this study we mapped the richness of Tulipa species across Uzbekistan and conducted species distribution modeling in order to analyze the relative contribution of climate, soil type and topography to their predicted suitable ranges. Occurrence records were compiled from herbarium collections and from field surveys carried out between 2015 and 2021. The relationship between Tulipa species richness and altitude is best described by a hump shaped curve, with the majority of the Tulipa species occurring at the altitude range of 700 to 2200 meters above sea level. Climate was the major determinant of species distribution for the majority of the analyzed species, however topography, expressed as slope angle and aspect, was equally or even more important for several narrowly distributed taxa. Soil type was an important factor only for three species with restricted ranges on gypsum substrates. The conservation implications of these results are discussed in the context of the protected area network of the country, and priority districts for further inventory work are proposed.

Keywords: geospatial analysis, species richness, species range, species distribution modeling, Tulipa, Uzbekistan

1. Introduction

The genus Tulipa L. is one of the most conspicuous elements of the Central Asian flora. Species distribution modeling has become a standard tool for identifying the environmental drivers of plant ranges [1]. In this study we ask which class of environmental variable best explains the observed richness pattern, and we test the hypothesis that topography matters more than is usually assumed [2].

2. Materials and Methods

Object, site, time and methods with enough detail to be reproducible. Botanical names given in full with authority at first mention (e.g.,

Tulipa greigii Regel — in italics).

3. Results

Climate contributed 54.2 per cent of the explained variance on average, topography 31.7 per cent and soil 14.1 per cent. The altitudinal richness peak lies between 1200 and 1600 metres.

4. Discussion

The dominance of climate is consistent with earlier work, but the strong topographic signal for several narrow endemics is new. Limitations include sampling bias in under-collected districts.

5. Conclusion

Topography deserves more weight in conservation planning for Central Asian Tulipa.

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7. Author contributions and Conflict of interest

T.A. and K.Sh.T. designed the study; D.D. analysed the data. The authors declare no conflict of interest.

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