

Project Title
Status survey, eco-taxonomy and ecological modelling of *Dactylorhiza hatagirea* (D. Don) Soo. in Jammu and Kashmir

FINAL TECHNICAL REPORT

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Funding Agency
Jammu and Kashmir Science Technology and Innovation Council

Implementing Department
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RESULTS OF THE RESEARCH CONDUCTED

Survey and documentation: Extensive field surveys have been conducted in the UT of Jammu and Kashmir to collect the field data for the species. It has been observed that the species is sparsely distributed in the Union Territory of Jammu and Kashmir except few locations like Badal Ghatti in Bhaderwah, Kabban area in Padder and Gurez Valley in Kashmir. During the current study species is collected from 30 different sites (Human Observation) whereas 14 occurrence records are procured either from published literature or from Global Biodiversity Information Facility GBIF.org. The collected specimens are deposited to the Herbarium of Department of Botany, University of Jammu, Jammu (HBJU).

Taxonomic evaluation: Botanical illustrations are drawn for those specimens wherein variation has been observed in the pattern of spots on the petals. On the basis of pattern of spots in the petals following three types of morphotypes are observed in the species:

- (1) Morphotype 1
- (2) Morphotype 2
- (3) Morphotype 3



IUCN Threat status: Extent of Occurrence and Area of Occupancy of species was calculated using geoCAT the data was further utilized to analyzed threat status. Extent of Occurrence value and Area of Occupancy at cell width of 5km scale suggests that *D. hatagirea* falls under **VULNERABLE** category the study area.

Phyto-sociology and community analysis: Field survey have revealed that there were only few locations wherein the population of the species has been observed with more than 10 individuals. Such habitats were thoroughly investigated for community analysis using biological diversity indices for alpha diversity. Four different habitats were selected for understanding the community structure of *D. hatagirea*. Since *D. hatagirea* was the target species under study therefore bias

sampling was done keeping in view the positive presence of the species in the sampling unit. These communities were named as:

1. *Juncus - Dactylorhiza* community at Guraz
2. *Ranunculus - Dactylorhiza* community at Guraz
3. *Sibbaldia - Dactylorhiza* community at Badal Ghatti
4. *Sibbaldia - Polytrichum - Dactylorhiza* community at Badal Ghatti

Importance Value Index (IVI) of *D. hatagirea* in *Juncus – Dactylorhiza* community at Guraz has been calculated as 24.35, in *Ranunculus - Dactylorhiza* community at Guraz as 23.36 whereas at Badal Ghatti in *Sibbaldia - Dactylorhiza* community, IVI of *D. hatagirea* has been calculated as 20.7 and *Sibbaldia - Polytrichum - Dactylorhiza* community it has been calculated as 14.20 . The data determine that the species *D. hatagirea* is an important species in Guraz as compare to Badal Ghatti.

Ecological Niche Modelling: The suitable habitat for three climatic scenarios that is 2000, 2050, 2070 were predicted using MaxENT models (Figure 5-7). The highly suitable habitat for *D. hatagirea* according to model is ca 3271.0429 km² (5.88%) in current climatic scenario which is estimated to increase in the future by 7.58% and 6.84% in 2050 and 2070, respectively.

SUMMARY

The research highlights the significance of *Dactylorhiza hatagirea*, an orchid species native to the Himalayas, due to its medicinal properties. However, its population is declining, primarily due to increasing demand and unsustainable harvesting from its natural habitat. To better understand its current status, the researchers conducted extensive surveys across 30 different sites in Jammu and Kashmir, employing human observation methods. Additionally, they gathered 14 occurrence records from online databases and literature sources.

During these surveys, the researchers identified three distinct morphotypes of *D. hatagirea* based on variations in the spots present on their petals. They created illustrations to visually represent these morphotypes. Morphotype 1 exhibited elongated spots on its petals, while morphotype 3 had circular spots. Morphotype 2, however, lacked spots altogether.

To further assess the species' conservation status, the study utilized geoCAT to determine its Extent of Occurrence (EOO) and Area of Occupancy (AOO). The EOO was calculated to be 18,760.548 square kilometers, while the AOO was determined to be 775 square kilometers. These metrics were then used to analyze the threat status of *D. hatagirea* according to the IUCN classification system.

The findings revealed that *D. hatagirea* falls within the vulnerable category on the IUCN Red List, indicating the urgent need for conservation efforts to safeguard its population and habitat.

The distribution of *Dactylorhiza hatagirea* in Jammu and Kashmir is notably sparse, with only a few locations, such as Badal Ghatti in Bhaderwah, Kabban area in Padder, and Gurez Valley in Kashmir, hosting more than 10 individuals. To assess the diversity within these communities, biological diversity indices were employed for both alpha and beta diversity.

The Simpson index revealed that the Gurez I site exhibited higher diversity, indicating a lesser dominance by any single species compared to other locations. Conversely, the Shannon Index highlighted Badal Ghatti II as the most diverse site, boasting a high value of 2.777. Furthermore, Gurez I and II displayed greater species evenness compared to Badal Ghatti I and II, as evidenced by their respective evenness values of 0.8973, 0.8988, 0.6892, and 0.8039.

The Importance Value Index (IVI) analysis shed light on the significant influence of *Dactylorhiza hatagirea* within various plant communities. Notably, in *Juncus-Dactylorhiza*, *Ranunculus-Dactylorhiza*, *Sibbaldia-Dactylorhiza*, and *Sibbaldia-Polytrichum-Dactylorhiza* communities, *D. hatagirea* exhibited substantial IVI values, indicating its ecological importance.

Comparatively, the data underscored the greater significance of *D. hatagirea* in the Gurez area compared to Badal Ghatti. This suggests varying ecological dynamics and potentially differing conservation needs between these regions, emphasizing the importance of tailored conservation strategies.

UTILIZATION CERTIFICATE

Certified that out of Rs. 7,72,000.00 (Rupees Seven lakh seventy-two thousand only) of grant sanctioned during the year 2021-24 for carrying out short term research on the topic "*Status survey, ecotaxonomy and ecological modelling of Dactylorhiza hatagirea (D.Don) Soo. in J&K*" vide order no: JKST&IC ORDER NO. 80 OF 2021 dated: 29-09-2021 and sanction letter No:- JKST&IC/SRF/935-37 dated 29-10-2021 of JK Science , Technology and Innovation Council, a sum of Rs. 7,18,423.00 (Rupees Seven lakh eighteen thousand four hundred twenty three only) has been utilized for the year 2021-24 for which it was sanctioned. An amount of Rs. 53,845.00 (Rupees Fifty Three thousand eight hundred forty five only) out of the funds allotted for the period 2021-24 is lying unspent in the bank account and the interest accrued during the period 2012-2024 is (Rs. 24,698.00) (Rupees Twenty Four thousand six hundred ninety eight only).

H. Jullt
12/4/24
Signature of
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University of Jammu
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