

## **Determination of the Floral Diversity and Conservation Value of the Valleys of Hell with Focus on the Range-Restricted Endemic *Jacobaea mouterdei* (Asteraceae)**

Application ID: 32258-1

### **Summary of the project 25-12-2021**

The extension of the project for the exploration of the Valleys of Hell (Wadi Jahannam) yielded more than 5000 new observations of plant species. It allowed the collection of information about occurrences and threats for 9 endemic species, including *Jacobaea mouterdei*, and contributed to the assessment of their conservation status according to the IUCN guidelines and criteria.

The exploration also resulted in the rediscovery of the one rare Euxinian element, *Daphne pontica* that was thought extinct for 70 years. It was nationally assessed under the category critically endangered. It also contributed to the collection of additional data about the distribution of two other new occurrences for the flora of Lebanon, *Atropa belladonna* and *Euonymus latifolius*, both assessed as nationally critically endangered (1).

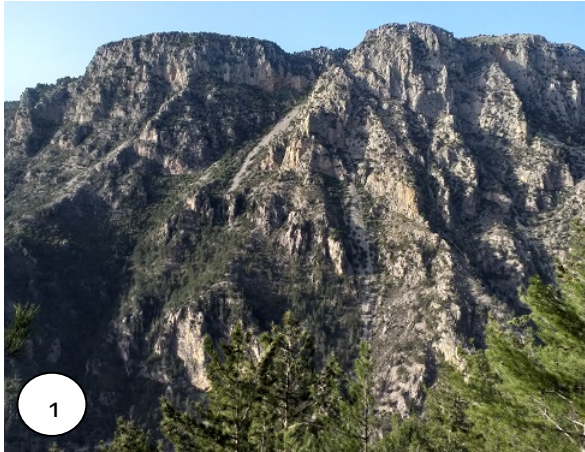
The unprecedented socio-economic-political crisis that has been affecting Lebanon since October 2019 has enhanced many threats on the natural habitats of the valleys, namely illegal logging and man-made forest fires. Although the difficulty to access some areas of the valleys, loggers do not hesitate to reach the steepest slopes and settle camps for the production of charcoal and firewood.

From 2020 to 2021, 234 plots were surveyed in addition to the plots previously surveyed in 2019. Many areas were visited, and diverse habitats were described in the Valleys of Hell, such as riparian galleries, *Styrax officinalis* sparse woodlands on screes, limestone screes, *Pinus brutia* forests, *Abies cilicica* woodlands, mixed *Cedrus libanii* and *Juniperus excelsa* woodlands, *Quercus coccifera* woodlands or rocky grasslands and shrublands.

Spatial analyses were performed with a Geographic Information Systems (GIS) to calculate and map the geographic range of the species using the georeferenced plots. The floral diversity and endemism rate in the study site was used to identify areas of importance for conservation. Areas with the highest density of *J. mouterdei* and the lower threats were considered as priority areas for the establishment of a protected area.

1. El Zein H, Bou Dagher-Kharraat M (2021) New records of vascular plants for the flora of Lebanon: a rare species rediscovered after seventy years, *Daphne pontica* L. (Thymelaeaceae), and three new occurrences, *Atropa bella-donna* L. (Solanaceae), *Circaea lutetiana* L. (Onagraceae) and *Euonymus latifolius* (L.) Mill. (Celastraceae). Check List 17 (2): 655–667. <https://doi.org/10.15560/17.2.655>

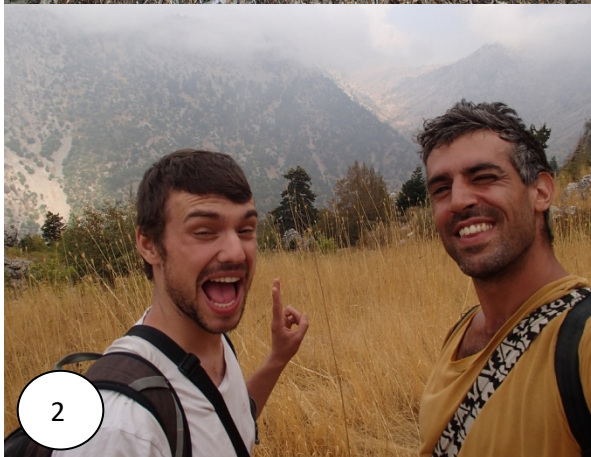
















**Photos © Hicham El Zein**

1. One of the cliffs of Jurd Mechmech, June 2018
2. From Jurd Hrar, June 2019
3. Wadi el-Qattara, April 2019
4. Threatened Forest of cedars, junipers and firs on Jurd Hrar, June 2019
5. *Jacobaea mouterdei*, endemic species to Wadi Jahannam, July 2019
6. View on Jabal Makmel from the valley, May 2019
7. Diversity of forest types in Qelle slopes, May 2019
8. Mist hydrating the vegetation in Wadi el-Qattara, June 2019
9. Descending steep slopes Wadi Jhannam 04-06-2021
10. Surveys of *Jacobaea mouterdei* populations in Wadi Jhannam 04-06-2021
11. Exploring the valley Wadi Jhannam 04-06-2021
12. Reaching up to the highest of one of the valleys 06-07-2021
13. The last walk in the forest of Qemmamin one week before it got devastated by fire 06-07-2021
14. Village of Qemmamin 10-08-2021
15. Filling up water from the source 10-08-2021
16. Counting individuals of *Jacobaea mouterdei* 10-08-2021
17. Hearing the pulse of centenarian *Juniperus excelsa* 11-08-2021
18. Crossing the fog on the high plateaus of Wadi Jhannam 11-08-2021
19. Crossing rivers in Wadi Jhannam 12-08-2021
20. Sadly discovering illegal logging of Junipers and Cedars in remoted plateaus Wadi Jhannam 22-09-2020
21. Centenarian *Juniperus excelsa* freshly cut Wadi Jhannam 22-09-2020
22. Illegal logging in *Juniper excelsa* forest Wadi Jhannam 22-09-2020

- 23. Plateau of Wadi Jhannam 23-09-2020
- 24. Crossing screes in steep conifer forest 23-09-2020
- 25. Meeting globally endangered *Montivipera bornmuelleri* 23-10-2020
- 26. Fog arrival in conifer forests Wadi Jhannam 23-10-2020
- 27. Finding *Pernis apivorus* killed by poachers Wadi Jhannam 24-09-2020
- 28. Sea of clouds at dusk over Wadi Jhannam 24-06-2020