

Internship offer for M2 / Engineer in spring 2023

IMCISE : Quantification de l'**IM** pact de la Cueillette sur la dynamique des populations des plantes Sauvages / Quantifying the impact of harvesting on the population dynamics of wild plants

I. Project summary

The internship will take place at the UMR AMAP in Montpellier (<https://amap.cirad.fr/>), a laboratory specialising in studying plants and vegetation.

Keywords: plant biodiversity, monitoring method, resource exploitation, conservation, wild flora

Supervisors:

Guillaume Papuga (lecturer, University of Montpellier - AMAP laboratory)

Co-supervised by Aurélien Besnard (professor EPHE - CEFE laboratory)

Duration of the internship: February to July 2023, 6 months. Adaptable period. The internship will be rewarded according to the legislation.

Fieldwork: the experimental areas will be located in the Occitanie region (travel to be planned in the region).

II. Internship project

The commercial collection of wild plants is an ancestral practice whose modalities vary according to the crops, the times and the biological characteristics of the plants collected (Cunningham, 2014). However, the impact of these practices on population dynamics remains little studied, as the human footprint is a complex factor to integrate into population monitoring. However, monitoring plant species subject to harvesting is becoming an important issue for biodiversity conservation (Cambecèdes & Garreta 2018, Wilson et al. 2005).

The diversity of harvesting in metropolitan France constitutes a challenge in the development of monitoring protocols due to the differences in practices, the diversity of plant biological types, and the abundance of these species (Bonnet et al. 2015, Gauthier et al. 2019). Material and technical problems limit the deployment of monitoring, often calibrated for rare and threatened flora. Thus, it is necessary to develop new approaches to quantify 1. the distribution and abundance of the resource on the territory (Cambecèdes & Garreta 2018) and 2. the temporal dynamics of populations.

The course is structured around three key objectives:

The first is to improve knowledge of wild plant gathering through a review of the scientific literature and technical documents on gathering. This work aims to highlight the pressures and threats that weigh on the plants collected and their habitats, as well as an assessment of current harvest practices.

The second part will aim to quantify the harvesting resource at the regional level and will be based on spatial models of flora occurrence and abundance. These models will integrate climatic envelopes (resolution ~1000 m) coupled with high spatial resolution variables derived from remote sensing to characterise vegetation at a fine scale (<50 m) (Lee-Yaw et al. 2022). In the second step, the student will analyse these models' transferability to estimate the taxon's abundance. Field tests will be carried out in the Montpellier region.

The third part (optional) will aim to develop methods for local monitoring of the impact of harvesting on a set of wild species. The student will work on adapting a field monitoring protocol by quadrats and cells, allowing for multi-species integration independently of the taxon and habitat biology. These methods, based on the frequency of occurrence analyses, raise fundamental questions about population monitoring, particularly concerning adapting the size of the presence grid to detect population trends. These approaches will be addressed through numerical simulations.

The project is designed on the scale of metropolitan France (including Corsica) and therefore integrates different biomes (Mediterranean, temperate, montane) as well as a gradient of habitats, from the most open (grassland) to forest environments. The project is inherently multi-species, although target species will be used to test the protocols (e.g. Common Thyme, Mountain Arnica, Yellow Gentian). The internship will be carried out in collaboration with the National Botanical Conservatories (CBN) and the French Office for Biodiversity. In addition, partnerships with various protected natural areas (National Parks and Regional Natural Parks, Regional and National Natural Reserves, CEN) will be developed.

Bibliography

- Cambecèdes & Garreta (2018). The harvesting of wild plants: exploitation of natural resources and conservation of a natural heritage. Journal of new sciences, Agriculture and Biotechnology
- Cunningham (2014). Applied ethnobotany: people, wild plant use and conservation. Routledge.
- Gauthier et al. 2019. Assessing vulnerability of listed Mediterranean plants based on population monitoring. Journal for Nature Conservation
- Lee-Yaw et al. (2022). Species distribution models rarely predict the biology of real populations. Ecography.
- Pearce & Boyce (2006). Modelling distribution and abundance with presence-only data. Journal of applied ecology
- Wilson et al. 2005. Measuring and incorporating vulnerability into conservation planning. Environmental Management

III. Student profile

The student recruited will have a Master's degree (or equivalent) in ecology. He/she will have a good knowledge of ecology, with interest in the conservation of flora. The project involves a significant amount of data analysis and modelling, and we are looking for a student comfortable with statistics. The use of the R language is a prerequisite. The study also includes an important field component, and the student should therefore be able to set up experimental protocols. Finally, an interest in the field of botany would be a plus.

The internship project falls within the field of applied research, and the person recruited will therefore have to combine curiosity, creativity and initiative with a capacity for dialogue to take into account the feedback from the field. The project could be extended to include thesis work.

Application

Applicants should send a CV (1-page recto), their M1 transcript and a letter of motivation (1-page recto) to Guillaume Papuga (guillaume.papuga (at) umontpellier.fr) no later than midnight on 4 December 2022, with the subject "Internship - IMCISE project – English student". An answer will be given during the following week. Every document can be written in English or French at convenience.

The cover letter will detail your skills and the reasons why you are interested in this project. Please also include the email address of someone you have worked with (e.g. your previous supervisor) who would be happy to be contacted if you are shortlisted.