Report on the outcomes of a Virtual Mobility[1]

Action number: CA18201

Grantee name: Ana Sofia dos Santos Afonso

Virtual Mobility Details

Title: Unveiling the Pollination Networks of Endangered European Flora: New Perspectives and In-Depth Analyses

Start and end date: 07/03/2024 to 10/04/2024

Description of the work carried out during the VM

Description of the virtual collaboration and activities carried out during the VM, with focus on the work carried out by the grantee. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

The main goal of this VM Grant was to improve the knowledge on pollinator communities of threatened plants. In order to improve this knowledge, in 2022 and 2023 ConservePlants launched the activity "Fatal attraction" where participants were asked to contribute with their own field observations and published information on pollinator communities of threatened plant (including Critical endangered, Endangered and Vulnerable plant taxa) both at European and national levels. The 2º call of Fatal attraction reached even more participants after the presentation of the preliminary results in the conference meeting of Conserveplants in February 2024 we received important information from new participants that needed to be compiled and revised. Furthermore, it is currently in course a systematic review of the Pollinators of European Endangered Plants based on literature review, and I have collaborated directly with Sara Lopes (WG Member in CA18201) that is leading this activity. In this activity, endangered plant species were selected from the European Red List of Vascular Plants and only species categorised as Critically endangered (CR), Endangered (EN) and Vulnerable (VU) were considered. A total 453 species were selected and bibliographic search was preformed using Web of Science (WoS), Scopus and Google Scholar. More than 800 documents were compiled (including research papers, thesis and books).

I proposed two main lines of work: Task 1. Database cleaning and data analyses; and Task 2.Systematic review of the Pollinators of European Endangered Plants based on literature review.

In the first task, the new information received were compiled and plant taxonomy and geographical information were revised. After this, I homogenised pollinator taxonomy and corrected taxonomy errors in data provided by the participants in order to analyse the pollinator communities of threatened plants

[1] This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

for each endangered status categories. In the end, we had 56 participants from 8 countries and gathered 3037 pollinator entries from 16 different countries.

In the second task, in each work a systematic screening was made for words like 'pollin(…)', 'pollen', 'visit', 'insect', 'bee', 'fly' or 'flies'. When there were data on the interactions, the information extracted include the identification of the endangered plant species, the identification of the flower visitor/pollinator species, the geographical location and the date of the observation. More than 800 documents were revised and information were compiled and homogenised.

In total, with data from Fatal Attraction and literature information, we were able to compile information from 23 European countries with 3532 pollinator observations from 290 species of threatened plants. The database were added to the existing data and analysed statistically by extracting all descriptive statistics that describe the database and by compiling a formal list of pollinators of European threatened plants (Deliverable 2). Then, analyses were performed to correlate pollinator communities with endangered status.

The compiled database included pollinator observations for 57 families of threatened plants (Figure 1). The percentage of pollinator observations by category were: 9% for Critical Endangered, 23% for Endangered, 35% for Vulnerable, 17% for Near Threatened, and 16% for Least Concern plants (Figure 2).

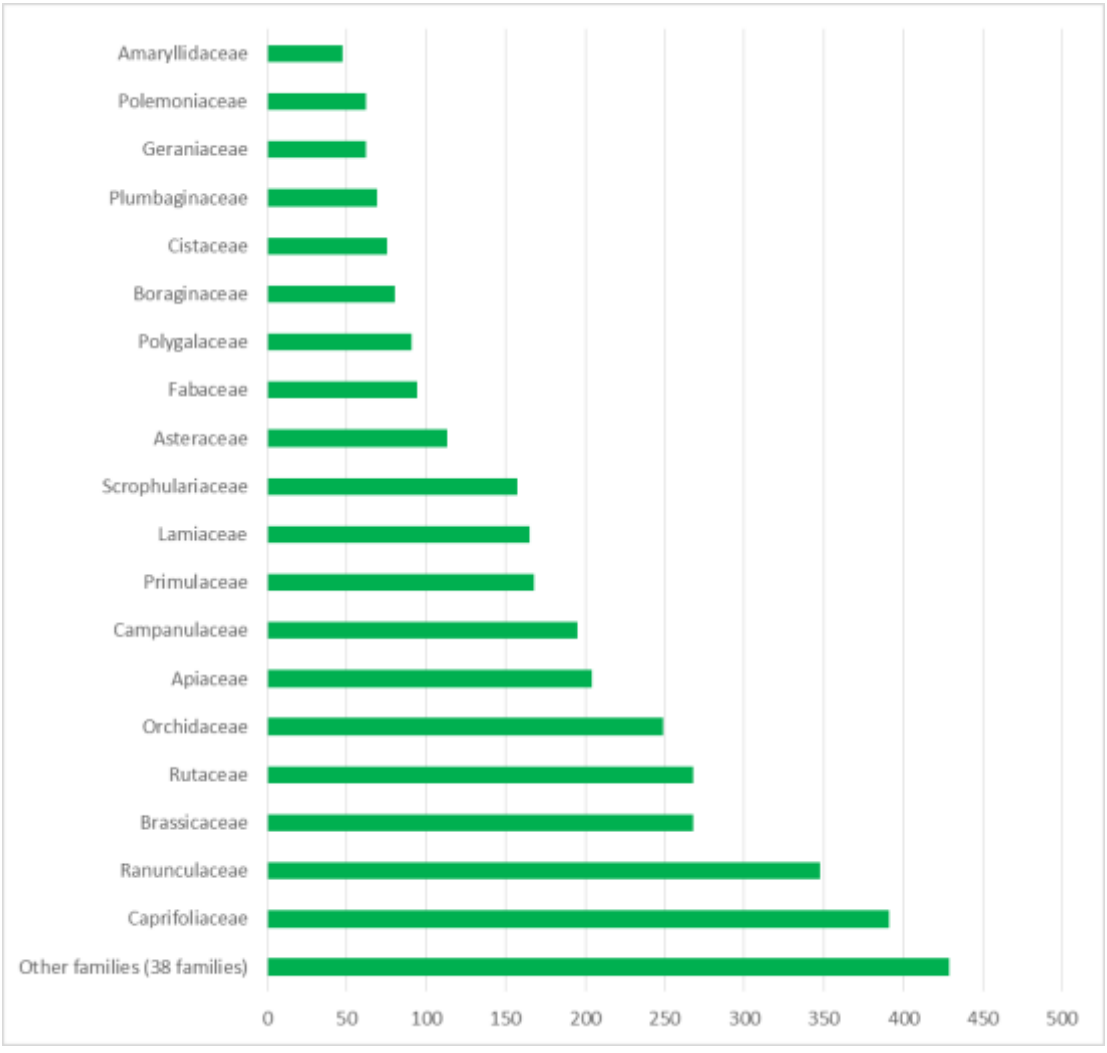


Figure 1. Number of species of families of threatened plants with pollinator observations.

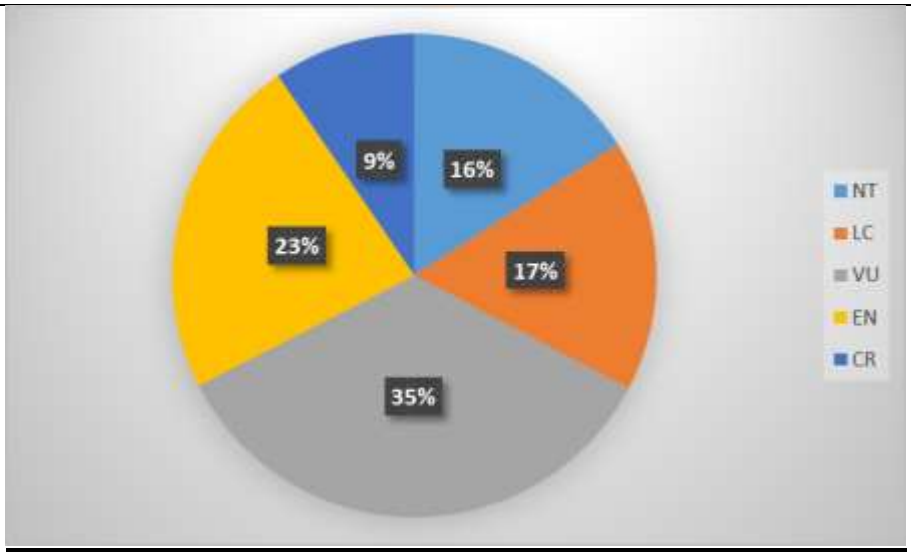


Figure 2. Percentage of pollinator observations in each endangered status category.

Description of the VM main achievements and planned follow-up activities

Description and assessment of whether the VM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the VM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

A significant threat to biodiversity is the declining number of pollinators, which disrupts plant-pollinator interactions, plant health, and ecosystem functions. This decline is particularly worrisome for endangered plants reliant on pollinators for reproduction. Targeted conservation efforts are necessary due to limited resources, yet hindered by a lack of data on pollinator communities for many threatened European plant species. Through the Virtual Mobility Grand, I addressed this gap by compiling a database of pollinator information for European endangered plants.

Most pollinators were identified up to the family level (97%), with a high percentage identified up to the genus (91%) and species (76%, Figure 3). Overall the most represented classe is, as expected, classe Insecta (98%) but other classes were observed in endangered plants (eg. Aves: 1.2%). Concerning pollinators the plant status with lower number of different pollinator families, genera and species were the CR and LC. In contrast the high numbers could be found in VU plants (Figure 4).

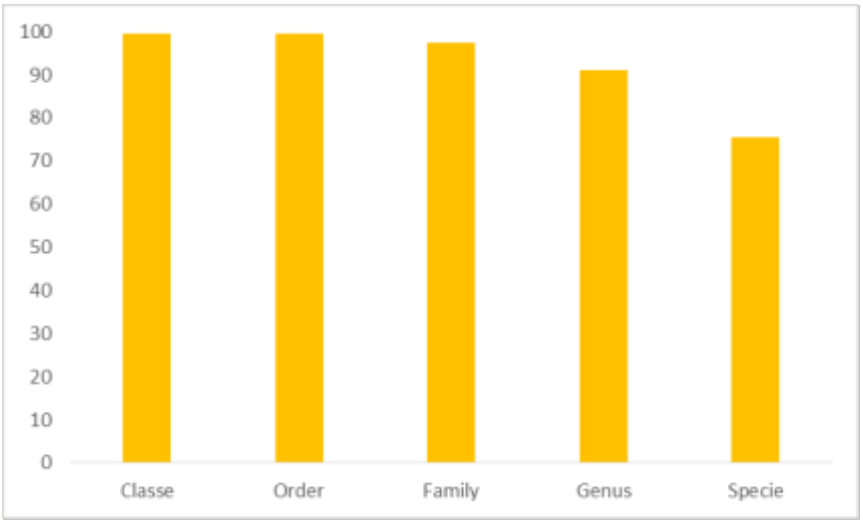


Figure 3. % of pollinator observations identified until classe (100%), order (100%), family (97%), genus (91%) and species (76%).

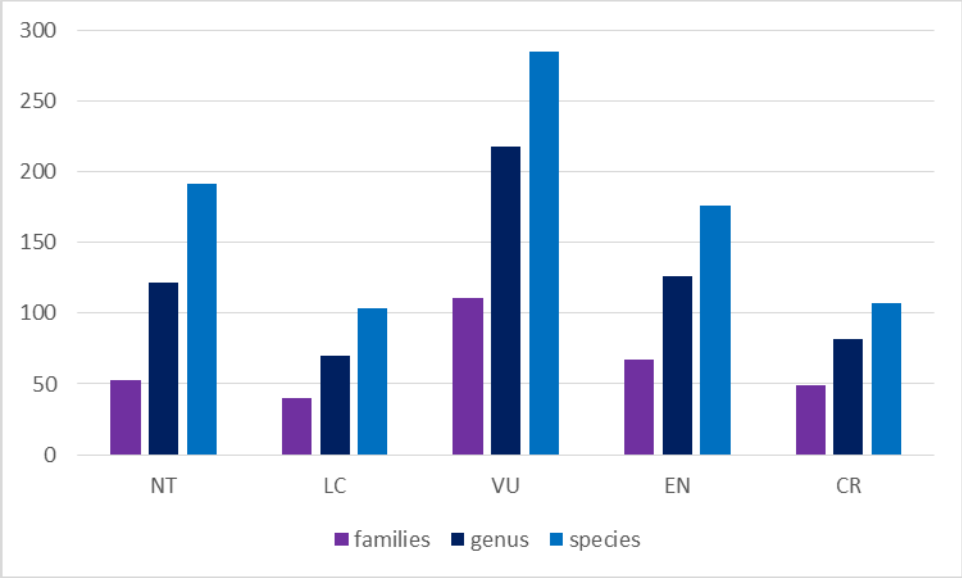


Figure 4. Number of families (purple), genera (dark blue) and species (light blue) of pollinators observed in each endangered status categories.

Observations were made of 180 pollinator families, with the most prevalent being Apidae (23%), Syrphidae (9%), Halictidae (8%), Megachilidae (7%), Bombyliidae (5%), Formicidae (5%), and Andrenidae (4%, Figure 5). Despite the presence of 468 different genera and a substantial number of genera and species across all threatened status categories (Figure 4), the most common genera were Bombus (13%), Lasioglosum (6%), Bombylius (5%), Apis (4%), Andrena (4%), Anthophora (4%), and Osmia (4%), with the remaining 461 genera each representing 2% or less (Figure 6).

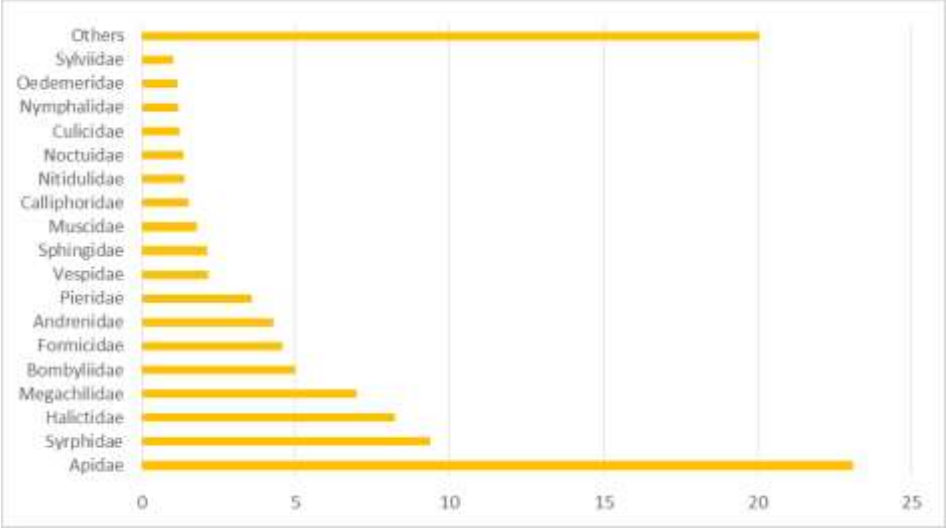


Figure 5. Percentage of the most represented pollinator families.

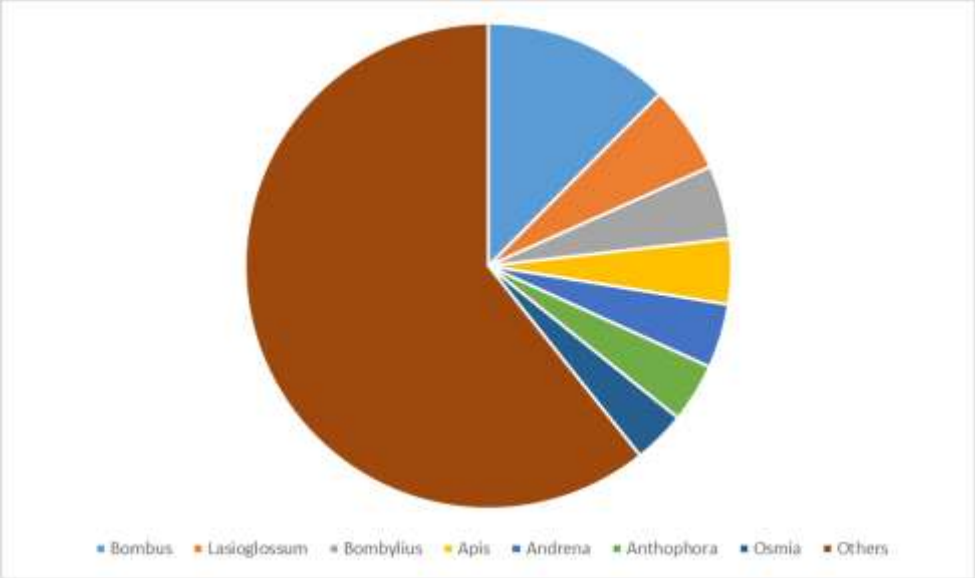
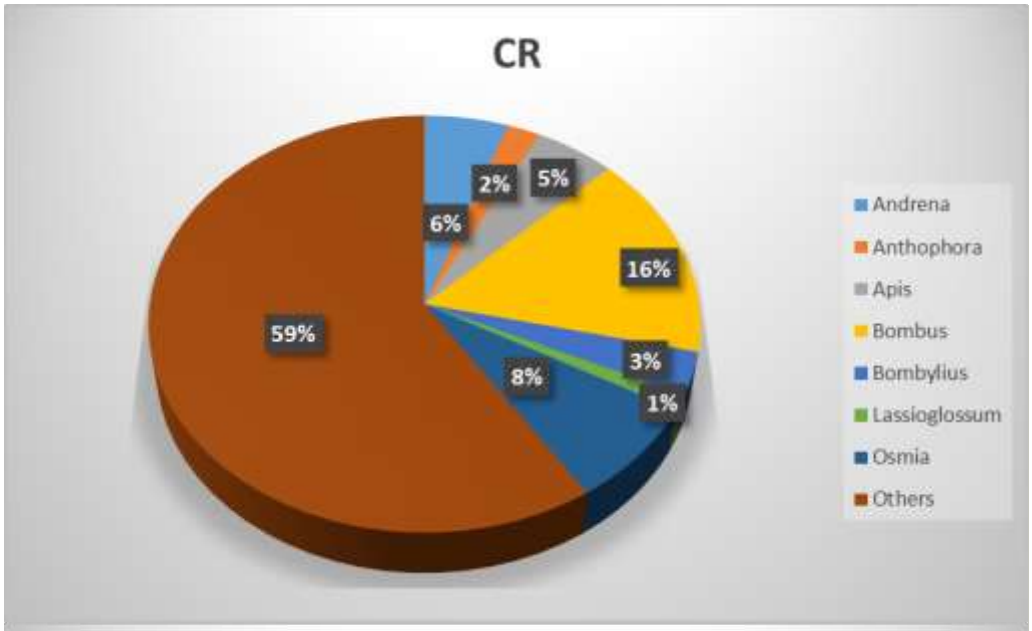
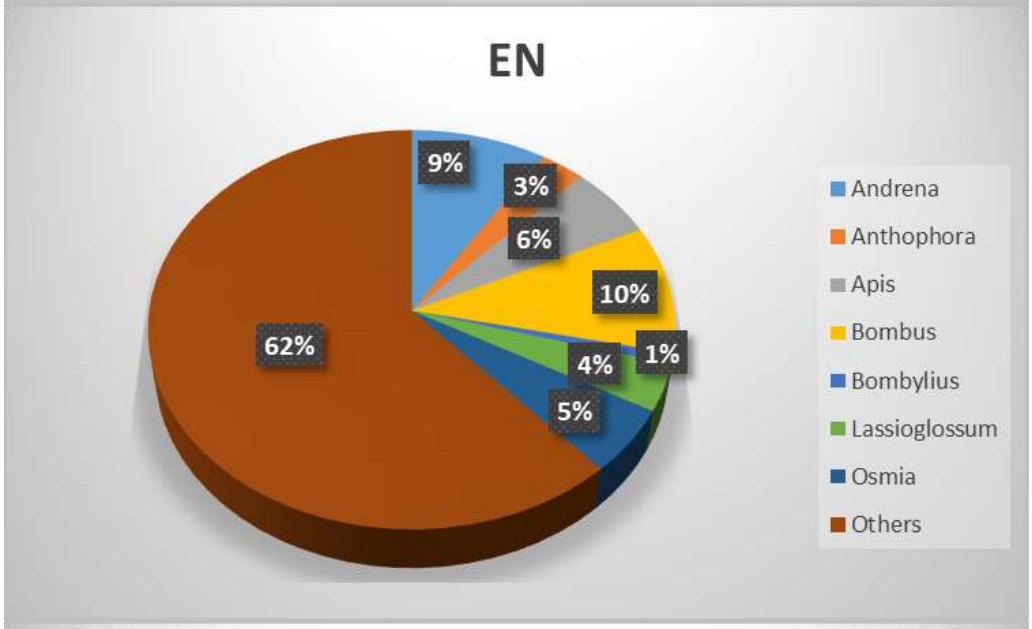
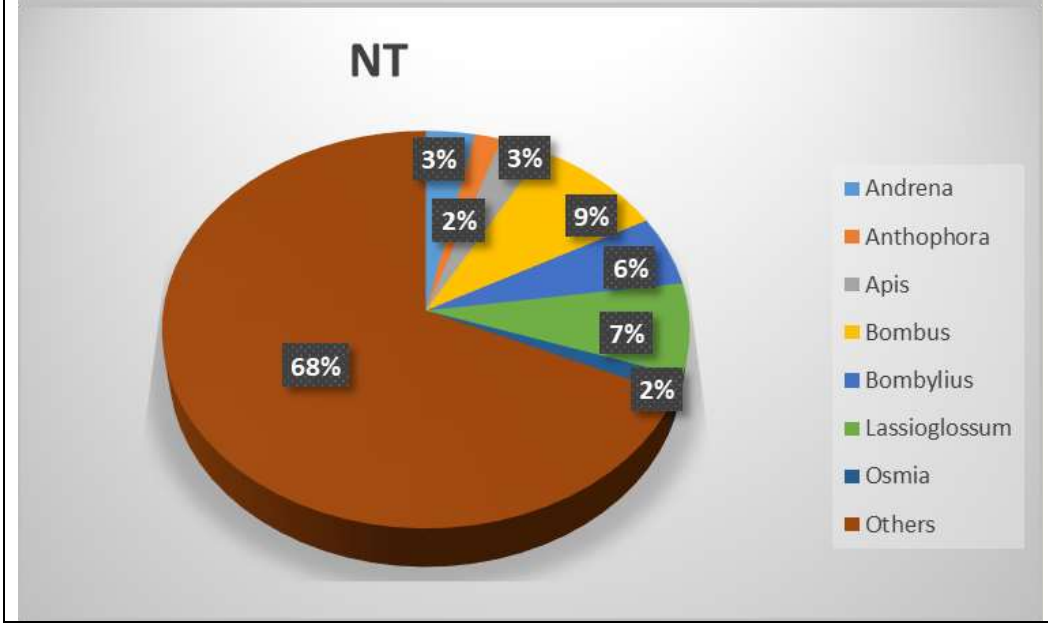


Figure 6. Percentage of the most represented genera: *Bombus* (13%), *Lasioglosum* (6%), *Bombylius* (5%) *Apis* (4%), *Andrena* (4%), *Antophora* (4%), *Osmia* (4%) and other (468 genera: 61%).

Within each plant category, the Apidae family consistently emerged as the most prevalent among pollinators, with the exception of plants categorized as NE. In the EN, VU, and NT categories, both Apidae and Syrphidae were the families with the highest number of observations. Despite the notable presence of various other genera in all categories, when considering each category individually, *Bombus* emerges as the most prevalent genus, demonstrating a significant presence in CR and LC plants in particular. CR and LC plants also exhibit notable occurrences of *Osmia* and *Bombylius*, respectively. Conversely, the remaining categories demonstrate slightly high genus heterogeneity (Figure 7).


CR
2%
5%
6%
16%
59%
3%
8%
1%
Andrena
Anthophora
Apis
Bombus
Bombylius
Lassioglossum
Osmia
Others


EN
9%
3%
6%
10%
62%
4%
1%
5%
Andrena
Anthophora
Apis
Bombus
Bombylius
Lassioglossum
Osmia
Others


NT
3%
3%
2%
9%
6%
7%
68%
2%
Andrena
Anthophora
Apis
Bombus
Bombylius
Lassioglossum
Osmia
Others

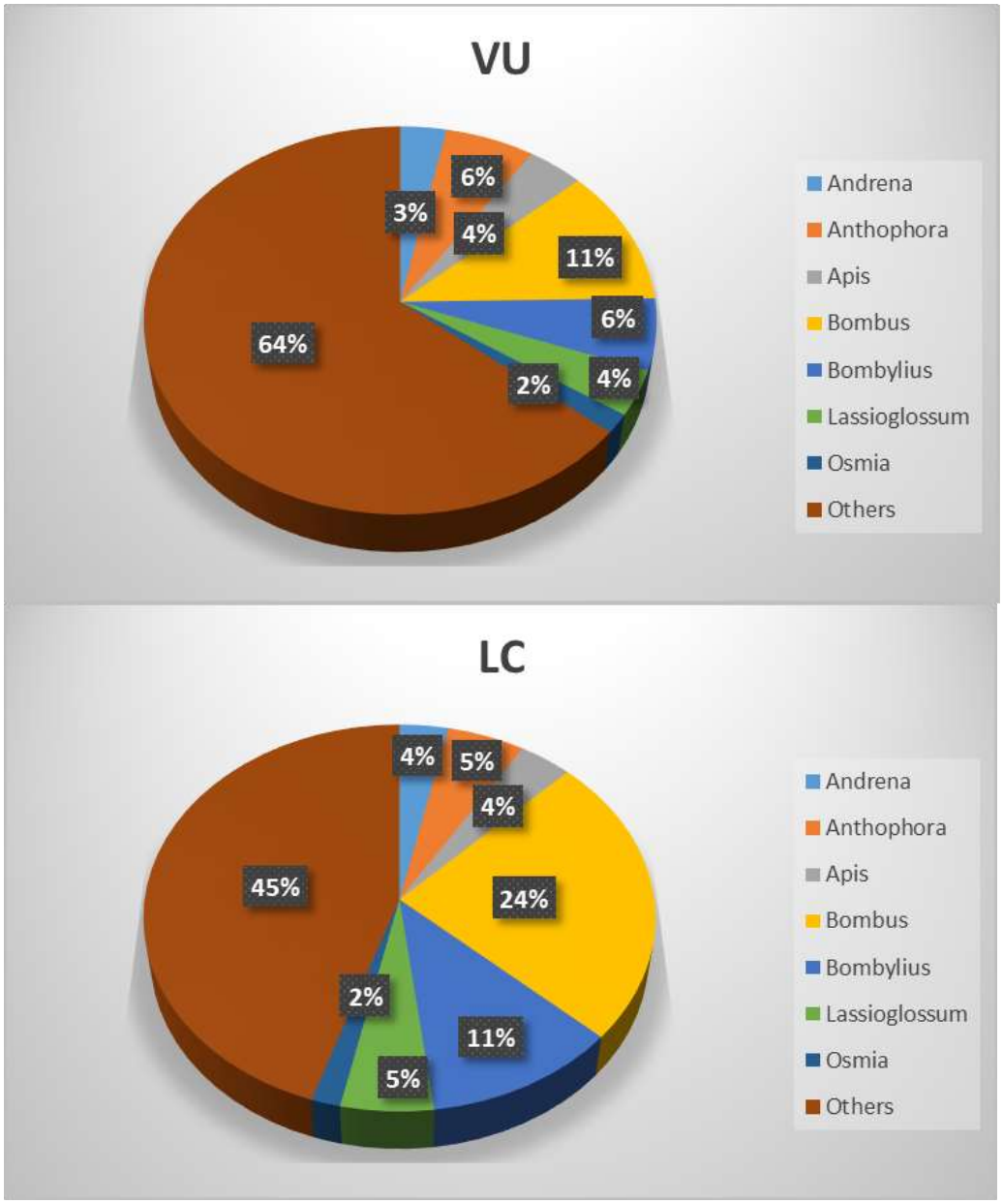


Figure 7. Percentage of representation of pollinator genera observed in each endangered status categories.

The results are currently being reviewed in detail and compiled. In addition, general considerations are still in preparation, being an ongoing work. However, a list of pollinators of threaten plants was already made available and can be found in:

https://www.conserveplants.eu/en/resources/files//project-outputs/fatal-attraction-endangered-plants-lovers/fatal-attractionpreliminary-pollinator-database.pdf

Additionally, a manuscript is being prepared with all these results to be submitted to a high impact scientific journal. This will allow to achieve the main goal of this Virtual Mobility Grant: to improve the knowledge on pollinator communities of threatened plants.