ENDEMIC AND THREATENED MEDICINAL PLANTS IN NORTH-EASTERN IBERIAN PENINSULA:

Prioritization for species conservation and Potencial effects of harvesting in two populations of *Ramonda myconi* and *Prunus lusitanica*

Final Grade Project. June 2013. **Sonia Herrando Moraira**

INTRODUCTION AND OBJECTIVES

Abusive collection arises as one of the major threats to Catalan flora with medical interest. Some of them are threatened, declining or endemic, and require some protection or conservation (Sáez *et al.*, 2010).

The **objectives** of this study aim to learn about endemic and threatened medicinal species of Catalonia:

1. Evaluate to what extent collection activities threat to plant species with medical interest.
2. Determine which physiographic regions of Catalonia have most of these species.
3. Obtain two lists of species (endemic and threatened) to prioritize conservation measurements.

Viability population analyses (PVA) emerged as key tool for management and conservation of protected species (Akçakaya *et al.*, 2004; Morris & Doak, 2002). PVA provide data for sustainable harvesting of species with medical interest.

The **objective** is:

4. Study the potential demographic effects of harvesting in two populations of two species:

Ramonda myconi

- Catalonia subendemic from Catalonia
- Collected locally for medicinal use
- Data from Picó & Riba (2002)
- Population data analyzed in Cerdanya

Prunus lusitanica

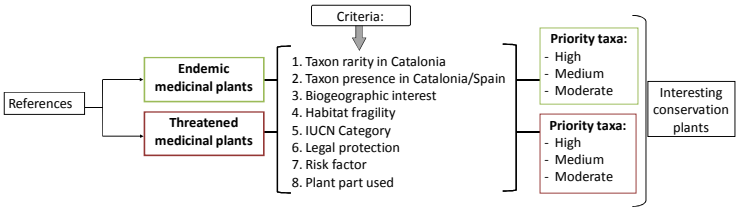
- Threatened (Vulnerable)
- Not currently collected, but with medicinal potential
- Data from Calleja (2012) and pers. com.
- Population data analyzed in Arbúcies (Girona)

MATERIAL AND METHODS

1 st Aim: performing a pondered analysis of the main threats to these species.

2 nd Aim: sum of the number of species present in each physiographic region.

3 rd Aim: using 8 criteria (with different relevance levels) to prioritize species conservation.



4 th Aim: Lefkovitch matrix (Lefkovitch, 1965) has been used, specifically a discrete stochastic matrix model with combined features of the logistic model.

Parameters which **increase** with the collection
Parameters which **decrease** with the collection

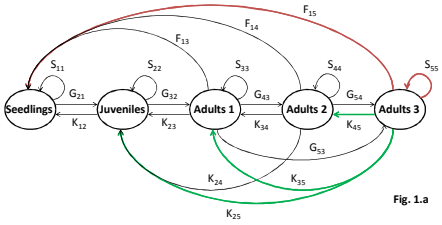


Fig. 1.a

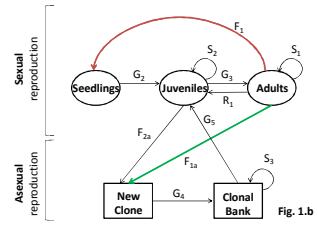
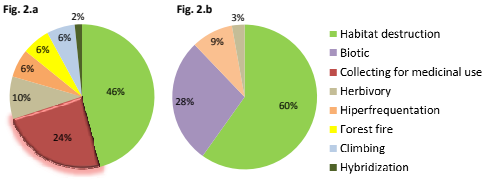


Fig. 1.b

Figure 1. Life-cycle graph of *Ramonda myconi* (1.a) and *Prunus lusitanica* (1.b). Circles refer to different plant stages and arrows show the transitions among stages which are also indicated by letters with subscripts. The transitions are: fecundity expressed as the mean number of seedlings produced per stage (F_i), growth to larger categories (G_i), survival in the same category (S_i) and retrogression categories (K_i). Red arrows indicate the parameters negatively affected by harvesting, and green ones show a positve effect.

RESULTS AND DISCUSSION

1 st Aim: Collection as a risk factor



Habitat destruction stands out as the major threat for both groups of species (Figure 2). Collection arises as the second risk factor for endemic species. However, it does not affect endangered species since its exploitation is not profitable.

Figure 2. Pie chart showing the risk factors and the percentage (%) of the endemic (2.a) and threatened (2.b) medicinal plants.

2 nd Aim: Prioritary physiographic areas for conservation

The the eastern Pre-Pyrenees (Ppe) home most of the endemic medicinal species (Figure 3.a), since endemicity is generally associated with the mountainous component. The presence of five threatened medicinal species in the regions of central Pyrenees (Pc) and in the "Territori Catalanídic Sud" (Cs) stand out (Figure 3.b). As a general pattern, endangered species richness is higher in coastal areas where habitat destruction is fairly common.

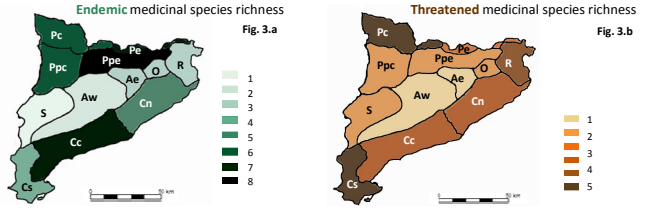
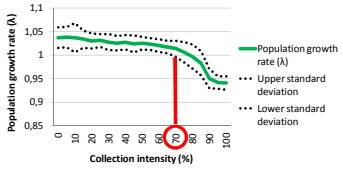


Figure 3. Representation of physiographic areas in Catalonia and their richness of endemic (3.a) and threatened (3.b) medicinal species.

4 th Aim : Study the potential demographic effects of harvesting in *Ramonda myconi*



The negative impact on λ would appear under higher collecting intensities, at 70% (Figure 4). Two factor might explain this result: i) The design of the conceptual model, which considers only one collected class ("Adults 3"); ii) The longevity of *Ramonda myconi*. Adults may live for decades (Pico & Riba, 2002), so model projections should go beyond 100 years to evaluate the effects of harvesting on population dynamics.

Figure 4. Fluctuations of the finite rate of population growth (λ) according to the collecting intensity of *Ramonda myconi* in percentage (%). The λ is the average of 100 years, of 100 random replications of the model.

4 th Aim : Study the potential demographic effects of harvesting in *Prunus lusitanica*

The categories "Juveniles", "Adults" and "Seedlings" decrease significantly the average number of individuals as increased harvesting intensity, but as shown in Figure 5, the "New clon" and "Clonal Bank" increase. Collection, and other external factors, promote sprouting. Moreover, the potential harvesting of *Prunus lusitanica*, resulting in a genetic impoverishment of the population. *Prunus lusitanica* can ensure its persistence through asexual reproduction.

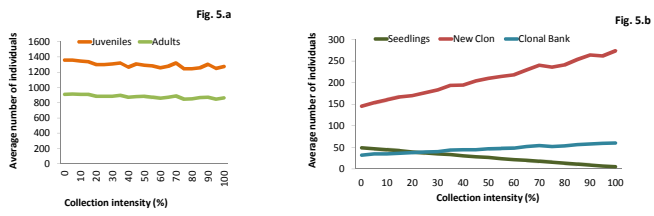


Figure 5. Fluctuations in the average number of individuals *of Prunus lusitanica* of each age classes according to the collecting intensity (%). The number of individuals is the average of 100 years, of 100 random replications of the model.

CONCLUSIONS

- **Quantitative assessments** of species in a specific geographical area are a useful tool to prioritize and focus efforts.
- In Catalonia, the use of endemic or threatened plants as **medicinal is very low**.
- Matrix modeling without enough data might be inappropriate for PVA analysis under **harvesting pressures**. However, modeling may yields **theoretical basis** to apply to collected species. This would be very useful and could be used to promote **sustainable collection of wild species**.

LIMITATIONS

- More precise methods and data are needed to **calculate *k***.
- Relationships between **environmental factors or anthropogenic factors**, mortality or population growth should be studied.
- Harvesting could **affect more stages** than those detected ("Adults 3" in *Ramonda myconi*, and "Adults" in *Prunus lusitanica*).
- Once collection/harvesting is taking place, **demographic parameters might be different** and change in time (for example, probabilities to pass from "Adult 3" to the others stages).
- Changes (in %) of the demographic parameters affected by the collection may not be **directly proportional to the intensity of harvesting** activities.
- More demographic data of these species are needed to test or calibrate the **validity of the model**.

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