

IAPT Research Grants Program in Plant Systematics

Project title: *Taxonomic revision of the genus Silene (Caryophyllaceae) in North Africa*

Introduction

Silene is the taxonomically largest genus of the family *Caryophyllaceae*, It estimated to contain about 870 species world-wide (Oxelman et al., 2013, Jafari et al. 2020). Its diversity is mainly allocated to the temperate region of northern hemisphere particularly in the Mediterranean area and the Middle East (Greuter, 1995).

In North Africa, *Silene* is floristically the most diverse of all plant genera (Quezel, 1982). It is represented by 144 taxa with 56 strictly endemic to Marrocco, Algeria, Tunisia, Libya or the Canary Islands (Dobignard & Chatelain, 2011). These taxa are not or very little studied from taxonomic, phylogenetic and biogeographic points of view. Thus, a taxonomic revision is urgently needed to develop new identification tools for North African *Silene* species.

Various partial works on the genus in the western Mediterranean have shown its taxonomic complexity and the difficulty in interpreting the phylogenetic signal in this genus with an often-reticulated evolution. However, despite many general and more geographically and/or taxonomically phylogenetic studies the phylogenetic and biogeographic history of the North African taxa remain largely unexplored (e.g., Oxelman & Lidén 1995, Oxelman et al. 1997, Oxelman et al. 2001, Popp et al. 2005, Eggens et al. 2006, Rautenberg et al. 2010, Naciri et al. 2010, Greenberg, et al. 2011, Petri & Oxelman 2011, Aydin et al. 2014, Naciri et al. 2017, Jafari et al. 2020). To date, about half of the currently accepted species of the genus have been sequenced for at least the nuclear ribosomal internal transcribed spacer (ITS) region, and the plastome *rps16* gene intron, but the proportion for North African taxa is much lower (Naciri, 2010). These regions provide a useful baseline for putting taxa into the right infrageneric group (Jafari et al. 2020), and thus provide a good baseline for furthermore detailed multi-locus studies at the species level (e.g., Popp et al. 2005, Aydin et al. 2014, Toprak et al. 2016)

Objectives:

- 1) Put all currently recognized species and most subspecific taxa from North Africa in phylogenetic framework based on sequence data from the ITS and *rps16* regions.
- 2) Put the results into the context of the novel infrageneric classification of *Silene* proposed by Jafari et al. (2020), while taking morphological features into consideration.
- 3) Trace key morphological characters and provide accurate descriptions and identification tools for all North African taxa.

Material and methods

As a baseline for this research the, multiple alignments of c. 1700 ITS and c. 1100 *rps16* sequences generated since before. In addition to these, I am currently extracting DNA from 142 specimens of North African *Silene* collected in the field by myself, or obtained from various herbaria was using NucleoSpin Plant II or QIAGEN PlantDNA kits or CTAB extraction (Doyle 1991, Naciri et al. 2010, Naciri et al. 2017).

Two ITS and *rps16* regions are widely used to infer phylogenetic relationships in *Caryophyllaceae* (e.g Oxelman & Lidén, 1995; Oxelman & al., 1997; Pirani & al., 2012;

Sadeghian & al., 2015. These genes will be amplified using PCR and Sanger sequenced. Multiple alignments is generated using MAFFT v.7 (Kato & Standley, 2013). Gene and species trees are together with morphological data used to derive novel taxonomic delimitations and circumscriptions.

Additional Relevant information

Preliminary phylogenetic results including 45 North African species suggests that there are several strong incongruencies to previous infrageneric classifications. In order to recognize only monophyletic groups, taxonomic and nomenclatural studies are being developed to propose a new circumscription to these groups. However, before proposing a new circumscription, it is crucial to analyze the type materials . In addition, locality information from labels is very important to infer distribution areas and formulate biogeographic hypotheses.

I am currently carrying out a nine month internship (during 2020) at the department of Biological and Environmental Sciences, University of Gothenburg, Sweden. This internship is supported by a PhD fellowship from the Algerian governmental funding, an award from the Exceptional National Program (PNE). University of Gothenburg is covering the costs of the molecular work.

Finally, it is important to cite that, being a part of the *Silene* project teamwork based at the University of Gothenburg (<http://www.sileneae.info/>), have reinforced my knowledge about systematics, taxonomy, evolution and biogeography of this genus.

Goals for the funding provided by IAPT Research Grants Program in Plant Systematics:

The amount applied for, will cover costs for visits to three major herbaria hosting important North African collections of *Silene*; the National herbarium of Paris (MNHN), the herbarium of Montpellier (MPU), and the herbarium of the botanical garden in Geneva (G).

In conclusion, the IAPT Research Grants Program in Plant Systematics certainly will contribute to achieve the goals of my research, and the award will be used for supporting the travel and the accommodation to visit three herbaria in order improve the quality of my work and accelerate manuscript preparation about the taxonomy of *Silene* in North Africa.

Literature citations

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Total budget requested US\$ 2,000.

Costs estimated based on the dollar rated on 24 Fabriury, 2020 (US\$ 1.00 = EUR 0,920731).

Item Description Total **US\$ 2,000.**

Description	Itinerary	Total
Air ticket	Algers– Montpellier	US\$230.00
Air Ticket	Montpellier-Paris	US\$229.00
Air Ticket	Paris-Geneva	US\$194.00
Air Ticket	Geneva-Algers	US\$187.00
Accomodatont for 45 days (20 days in Montpellier 20 days in Paris 5 days in Geneva)		US\$ 1160.00