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Conservation programme for *Narcissus cavanillesii* (*Amaryllidaceae*) in Portugal

Abstract

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Narcissus cavanillesii A. Barra & G. López (*Amaryllidaceae*) is distributed in the Iberian Peninsula and North Africa. The only two plant localities of *N. cavanillesii* recorded in Portugal will be affected by the construction of the Alqueva dam (Alentejo region) and one of them will be lost if no conservation action is taken.

Therefore, a conservation programme was designed to minimise the extinction risk of *N. cavanillesii* in Portugal as well as guarantee the survival of its populations. First results regarding this conservation programme are presented.

Introduction

Narcissus cavanillesii A. Barra & G. López is an autumnal geophyte mainly distributed in SW Spain but rare in Portugal, Algeria and Morocco. This species is included in Annexes II and IV of the European Community Habitat and Species Directive (Council Directive - 92/43/EEC). There are reported two plant localities of this taxon in Portugal (Malato-Beliz 1977; Rosselló-Graell & al. 2003) both affected by the construction of the Alqueva dam at the Guadiana basin. One of the localities will be completely flooded and the other will be affected by changes in habitat and in human activities.

This species should be classified as Critically Endangered [CR B2ab (II, IV)] in Portugal (IUCN 2001).

With this scenario, a conservation programme has been planned with the main goal focused on to avoid the extinction of *N. cavanillesii* in Portugal as well as guarantee the survival of its populations. This programme also pursues to modify the threatened category of CR to Endangered (EN) or Vulnerable (VU).

The conservation programme

This conservation programme is an integrated project gathering several subjects on conservation biology. As a first step, a four years project has been initiated with the following main goals:

- a) The TRANSLOCATION of the population that was going to be flooded.
 A rescue has planned to save the population to be flooded so its translocation has been designed. This operation has been proposed as a mitigation action to avoid the loss of this population by its translocation to a new place with a high suitability for this species. This kind of plant conservation action has never been performed before in Portugal. The first step in a translocation process is to select the receptor-site. This selection is one of the critical steps in restoring diversity through rare plant introductions (Fiedler & Laven 1996) and needs an accurate and specific survey. The fitness of this approach will be crucial for the success of the translocation. Three items are being taken into account for the selection of the new location for this population: I) suitability of the habitat, II) historical range of the species and III) protection status of the area. However if we aim to conserve species for a long-term, it is essential to consider how the global change will affect the receptor-site.
 The final pursue would be the RE-ESTABLISHMENT of the translocated population in an appropriate habitat and within the historic range of the species. This action will be performed based on the results obtained through this project.
- b) To acquire the "BASE-LINE" INFORMATION of this species.
 Translocations based on a sound understanding of the species requirements are likely to be much more successful (Birkinshaw 1991; Primack 1996). Thus, ecological requirements, population size, spatial, demographic and genetic structure will be assessed for the two Portuguese populations of *N. cavanillesii*. Studies regarding breeding system, dispersal and competition are also carried through. These studies will provide the information needed to manage this populations in order to maximise their survival. In that sense, a study of pollination vectors was started during the flowering season of Autumn 2000 with the following goals:
 I) to identify the insect flower visitors and characterise their behaviour patterns during the visits; II) to determine the daily insect activity on flowers; III) to characterise abiotic (temperature and humidity) and biotic factors (co-blooming plant species) that may influence the pollinator-plant interaction and IV) to assess the contribution of the insects visits on plant reproductive success.
- c) Determine the MINIMUM VIABLE POPULATION (MVP).
 The MVP size necessary for the survival of a species for a given period varies between species according to their life histories, distribution, genetic variation, and unpredictability of their environment (Gilpin & Soulé 1986).
- d) MONITORING the dynamics of the populations.
 A monitoring programme will evaluate the dynamics of the populations, life history processes and reproductive success.
- e) CORRECTIVE ACTIONS.
 According to monitoring results corrective actions will be implemented as need in order to maximise the survival of *N. cavanillesii* populations. Therefore, several techniques regarding plant multiplication will be developed. The plant material obtained through these protocols should be used in re-inforcements actions if an alarming decline of the population would be verified thorough the monitoring programme.

The re-inforcement of small population is recommended if the species has such low fecundity or poor dispersal abilities that the population would recover so slowly that it would be at risk of extinction due to chance fluctuations in its recruitment and mortality rates (Birkinshaw 1991).

First results

Nowadays, studies regarding base-line information had been initiated. Following, the first results are presented:

- The population that will be translocated has a total number of 1200 individuals and it is structured in 11 small patches from 0,5 m² to 8 m². The exact location and orientation of the several patches and individual were geo-referenced by a GPS with differential correction accuracy.
- Ecological requirements of *N. cavanillesii* have been gathered based on the two Portuguese populations as well as on nine Spanish localities visited in Autumn 2000. The first results indicate that this taxon has not any specific edaphical requirements. The majority of the visited populations were very located, with a low coverage and a number of individuals never superior to 10000.
- Regarding pollination vectors, the most important result of first year of observations was a preliminary list of insect visitors of *N. cavanillesii* flowers (Table 1). Insect visitor taxa are coincident in the two Portuguese localities. Individuals of Halictidae and Syrphidae have been distinguished as main visitors.

Table 1. List of insect flower visitors and respective % of visits (n= 339 visits).

<u>Insect visitor</u>	% OF VISITS
Halictidae (Hymenoptera)*	44,54%
Halictidae (Hymenoptera)*	26,25%
<i>Epicyrchus balteatus</i> /Syrphidae (Diptera)	18,29%
<i>Aricia cramera</i> /Lycaenidae (Lepidoptera)	4,72%
Other Diptera	2,94%
<i>Apis mellifera</i> /Apidae (Hymenoptera)	0,006%

*Specimens under identification.

There have been recorded 339 insect visits (visitation rate = 0,03 visits/flower/hour) in 35 hours of observation of 294 *N. cavanillesii* flowers. These visits were mainly registered between 12 - 15 hours. In despite of the low visitation rate, the majority of the flowers have been visited, at least one time, during each day of observation.

Data field supports the hypothesis that flowers of *Narcissus serotinus* L. distributed around *N. cavanillesii* could influence the visits to these flowers. However, more studies are needed to confirm a facilitation/competition phenomenon.

From now, is very important to conduct the study to the evaluation of the potential of each insect visitor as a functional pollinator.

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