

# *Amaryllis belladonna* L. (Amaryllidaceae, Amaryllidoideae), first record as naturalized geophyte in Tunisia and continental North Africa

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**Ključne besede:** novi zapisi, tujerodne vrste, čebulice, Sejnane, Severna Afrika.

## Abstract

*Amaryllis belladonna* L. is recorded for the first time as a naturalized non-native geophyte new to Tunisian and continental North African flora. Additional information on its current distribution and habitat, a brief morphological description, as well as some taxonomic notes, are provided.

## Izvleček

*Amaryllis belladonna* L. je prvič zabeležena kot naturalizirani tujerodni geofit, nov za tunizijsko in celinsko severnoafriško floro. Predstavljene so dodatne informacije o trenutni distribuciji in habitatu, kratek morfološki opis, kot tudi nekaj taksonomskih zapiskov.

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## Introduction

Extensive botanical surveys have been carried out by the first author between the years 2010 to 2020 and allowed to update and improve the botanical knowledge about Tunisian flora (e.g. El Mokni et al. 2010, El Mokni & El Aouni 2011, El Mokni et al. 2012, 2013a, 2013b, 2014, 2015a, 2015b, 2015c, El Mokni & Iamonico 2017, 2018a, 2018b, 2019, El Mokni & Verloove 2019, El Mokni & Domina 2019, 2020, El Mokni 2018, 2020, Domina & El Mokni 2019). During one of these field surveys in 2016 a naturalized population of *Amaryllis* L., previously non recorded in the country, was found.

*Amaryllis* L. is the only genus in the subtribe Amaryllidinae, tribe Amaryllidoideae (Brenzel 2001). It is a small genus of flowering bulbs, with only two species (*A. belladonna* L. and *A. paradisicola* Snijman). In particular, *A. belladonna* L. is native to the Western Cape region of South Africa (Bond & Goldblatt 1984). This species occurs as a naturalized alien in several Mediterranean countries, where its degree of invasiveness is reported with “status unknown” (WCSP 2020). As for North Africa, the species has been previously reported only for the Canary Islands (Dobignard & Chatelain 2011, WCSP 2020, APD 2020). Our finding represents the first record for Tunisia and continental North Africa where it was found as naturalized in the Sejnane region (Northern Tunisia). This paper provides additional information on the naturalized population, as well as a review on the global distribution and ecology of the species. Moreover, a detailed morphological description of the plant, supported by numerous detailed photographs, is provided.

## Material and methods

The present work is based on field botanical surveys carried out by the first author (REM) in Northern Tunisia (North Africa), going with analysis of relevant literature and data about both known species of the genus (*A. belladonna* L. and *A. paradisicola* Snijman) available at [https://www.wikizero.com/en/Amaryllis#cite\\_note-Biodiveristyexp-2](https://www.wikizero.com/en/Amaryllis#cite_note-Biodiveristyexp-2) and [https://www.wikizero.com/en/Amaryllis\\_paradisicola](https://www.wikizero.com/en/Amaryllis_paradisicola) and personal collection of the first author (REM) which is deposited in the Herbaria of the Faculty of Pharmacy of Monastir (not yet listed in Index Herbariorum, Thiers 2020). The description is in part original based on direct observations of Tunisian specimens.

## Research area

The Sejnane area belongs to the Mogods Hills (Northern Tunisia), at the eastern boundary of the region Kabyliya–Numidia–Kroumiria, recently shown to constitute a high hotspot of plant diversity within the Mediterranean basin (Véla & Benhouhou 2007). Its eroded hills are made of nummulitic sandstone and culminating around 400 m a.s.l. From a geologic point of view the area is mostly characterized by a succession of reddish sandstone and silty clays (Crampon 1971). Each sandstone horizon is approximately 100 m thick and consists of fine to medium-grained sand with some lenses of coarse conglomerate (250–300 mm in diameter). The interbedded clayey layers are generally greenish to greyish in colour and about 300 mm thick (Castany 1953, Rouvier 1977). The mean annual rainfall is comprised between 600 and 900 mm in the plains and reaches 1200 mm on the surrounding hills (Dimanche & Schoenenberger 1970). The woody vegetation of the Sejnane region is dominated by patches of degraded and discontinuous woodland dominated by cork oak woods (*Quercus suber* L.), intermingled with many other woody species typical to maquis and garrigue communities, such as *Erica arborea* L., *Arbutus unedo* L., *Pistacia lentiscus* L., *Myrtus communis* L., *Cistus salvifolius* L., *C. monspeliensis* L., *Lavandula stoechas* L. Many species of *Eucalyptus* have been planted in the region, mostly for beekeeping purposes.

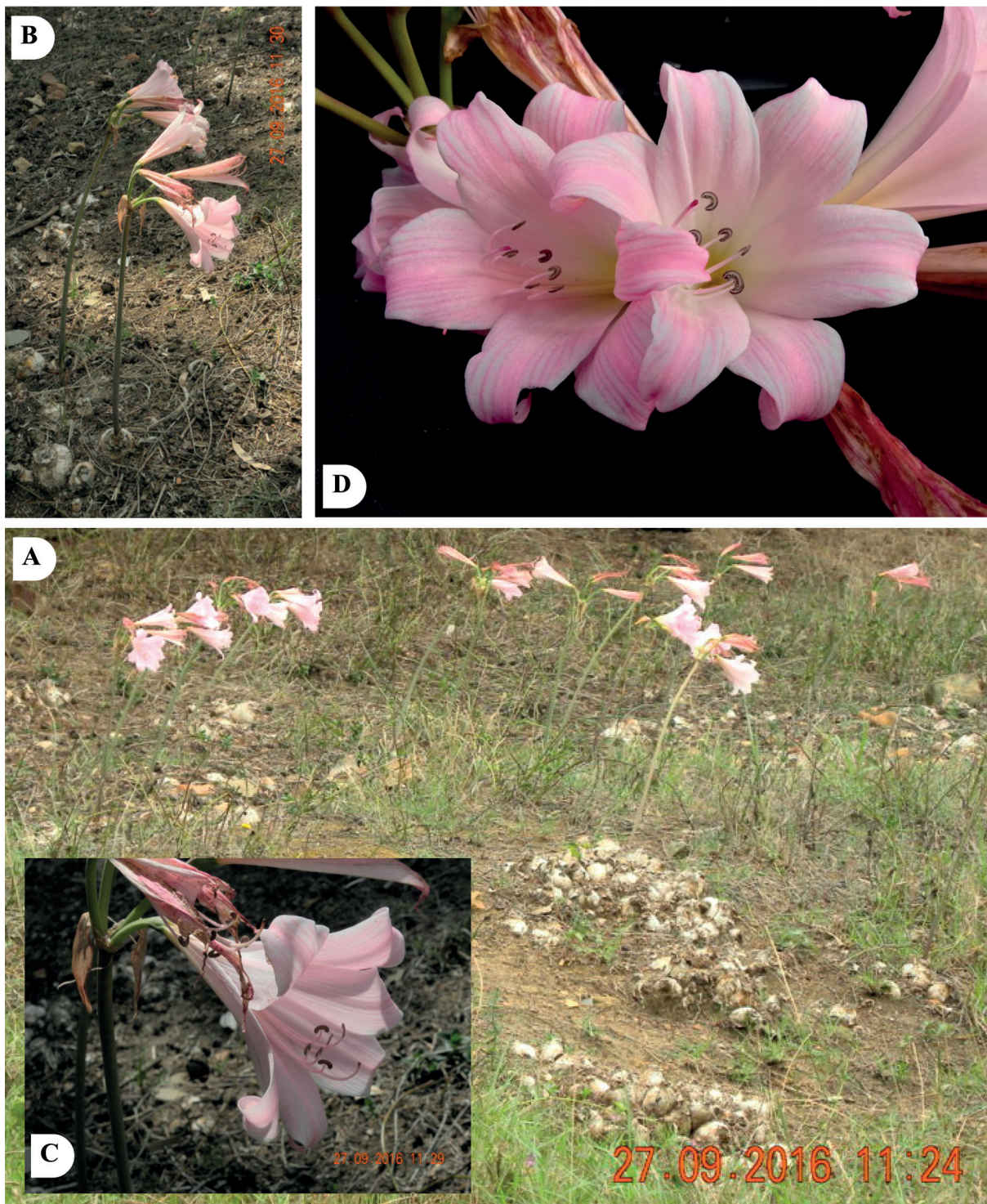
## Results and discussion

A population counting more than one hundred individuals was observed growing wild over an area of about 100 m<sup>2</sup> together with several thermo-xerophilous herbs and grasses forming the undergrowth of a plantation of *Cupressus sempervirens* L.

**Morphological description based on living plants** (Figure 1): The plant has large brownish **bulbs** 5–10 cm in diameter (Figure 1-A) and bears long, distichous, bright green **leaves** of 30–50(–60) cm long and about 2–3 cm in width. The basal tuft of leaves can spread over 60 cm, when bulb is divided. Each bulb produces one or two leafless **stems**, red-brown (Figure 1-B), up to 75 cm high with ca. 2–12 crown flowers in its top. **Flowers** are trumpet-shaped with pink-lilac or white with crimson-veined tepals, somehow recalling Lily flowers’ (Figure 1-D), generally slightly bent towards the sun (Figure 1-C); **corollas** are about 6–10 cm long and 3–8 cm wide.

**Phenology:** flowering starts in September whilst fruiting time ends at November.



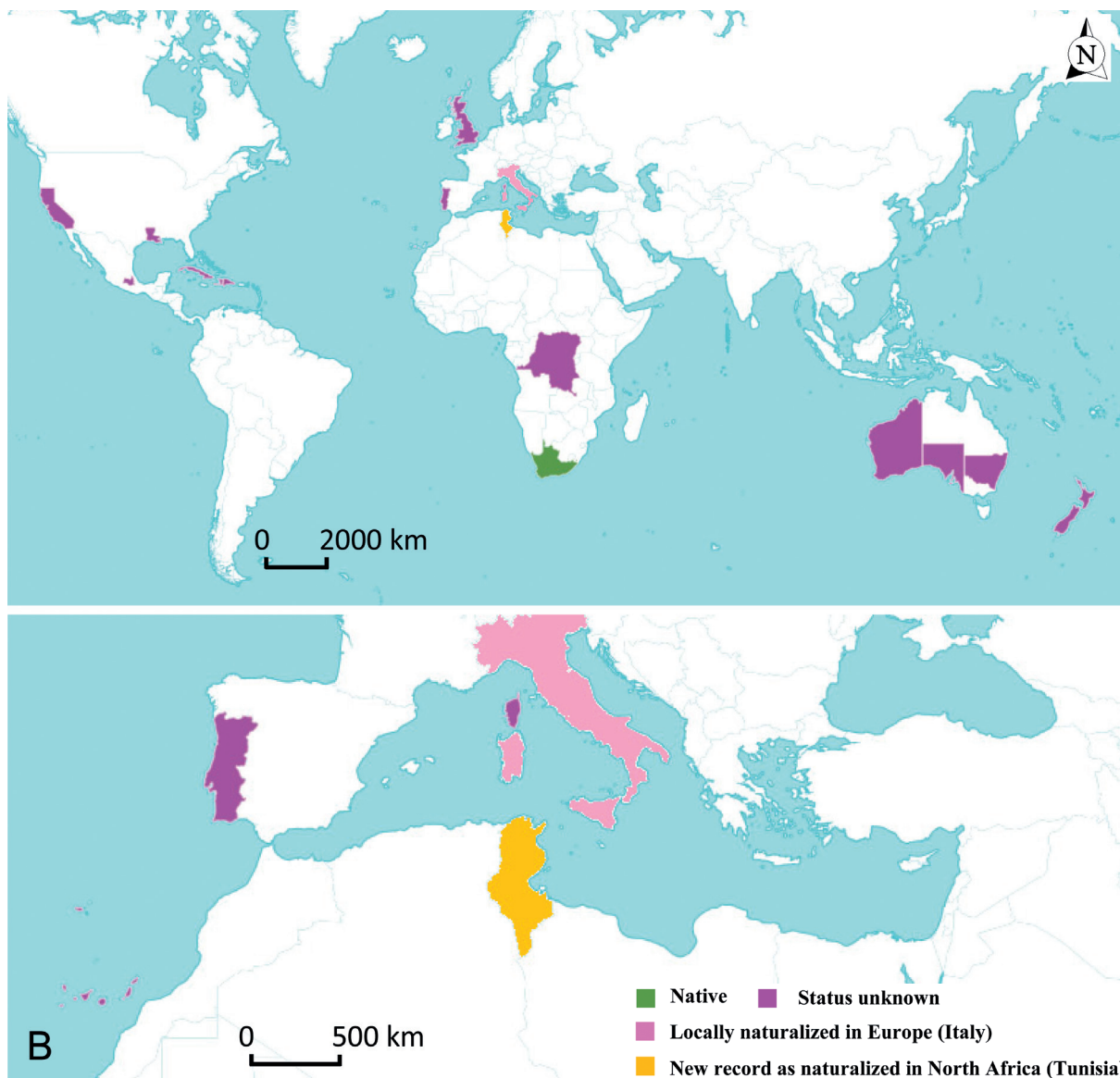


**Figure 1:** A) *Amaryllis belladonna* L. in its habitat with flowering stems emerging from the bulbs of the extended population (Sejnane region, Northern Tunisia), B) habit of the Belladonna Lily, C) detail of a pedicellate flower (lateral view), D) detail of flowers with pink-lilac tepals and medifixed anthers (top view). Photo credits: R. El Mokni (27.09.2016).

**Slika 1:** A) *Amaryllis belladonna* L. v svojem habitatu s cvetočimi stebli, ki izhajajo iz čebulic v proučevani populaciji (regija Sejnane, Severna Tunizija), B) habitus vrste *Amaryllis belladonna*, C) detajl cveta (stranski pogled), D) detajl cvetov z roza-lilastimi perionovimi listi in prašniki (pogled od zgoraj). Fotografija: R. El Mokni (27.09.2016).

**Native habitat and distribution range** (Figure 2): *A. belladonna* is endemic to the Western Cape region of South Africa, being particularly common on the rocky southwest area between the Olifants River Valley and Knysna (Bond & Goldblatt 1984). *A. belladonna* has been widely cultivated outside its natural habitat in several countries all over the world due to its ornamental value and responding to its climate needs (Johnson & Snijman 1996). In fact, the over-wintering foliage is not frost-tolerant; moreover, flowering in this species is strictly

dependent on a dry resting period between leaf growth and flower production (Johnson & Snijman 1996). The species has become naturalized in many temperate countries, including the Mediterranean Basin, where it is reported for Portugal and Corse (WCSP 2020), Western and Southern Australia, California and New Zealand (Duncan 2004) where it is locally escaped from abandoned gardens and cut-flower cultivations (Duncan et al. 2016) and as casual to locally naturalized in Italy (cf. Galasso et al. 2018).



**Figure 2:** Current distribution range of *Amaryllis belladonna* L. with new localities in Tunisia, North Africa: A) global range, B) occurrence in Mediterranean countries (from <http://plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:62705-1>, modified).

**Slika 2:** Trenutna razširjenost vrste *Amaryllis belladonna* L. z novimi nahajališči v Tuniziji, Severna Afrika: A) globalna razširjenost, B) pojavljanje v Sredozemlju (od <http://plantsoftheworldonline.org/taxon/urn:lsid:ipni.org:names:62705-1>, spremenjeno).



## Nomenclatural remarks

*Amaryllis belladonna* L., Sp. Pl.: 293. 1753 ≡ *Coburgia belladonna* (L.) Herb., Bot. Mag. 47: t. 2113 (1819) ≡ *Leopoldia belladonna* (L.) M. Roem., Fam. Nat. Syn. Monogr. 4: 129 (1847)

Since its creation in 1753, the genus *Amaryllis* L. has been object of several taxonomic revisions. From 1938 to 1984, controversy ensued over the lectotypification of the name *A. belladonna*, type of the genus *Amaryllis* L., and thus involving a lively debate on the correct application of the Linnean generic name. Goldblatt (1984) and Meerow et al. (1997) reviewed the history of the controversy in detail. Despite prior general consensus that *A. belladonna* applies to the species from South Africa known as the Cape Belladonna (Dandy & Fosberg 1954), Uphoff (1938) launched the contrary argument that the Linnean binomial must be applied to the neotropical south american *Hippeastrum equestre* Herb. [= *H. puniceum* (Lam.) Kuntze]. This position was refuted by Sealy (1939). Uphoff (1938, 1939) insisted that *Amaryllis* should stand for *Hippeastrum*, and his position was defended by Traub and his supporters (Traub & Moldenke 1949, Traub 1954, 1983, Tjaden 1979, 1981a, 1981b). Nomenclatural proposal supported by Jarvis (1984), and accepted at the 14<sup>th</sup> International Botanical Congress held in 1987, that *Amaryllis* L. should be maintained, as a monotypic genus based on a specimen currently preserved in the Clifford Herbarium (the British Museum, Natural History). This specimen unquestionably represents the South African plant commonly known as the Cape Belladonna and agrees perfectly with Linnaeus definition of *A. belladonna*.

**Taxonomic notes:** Besides *Amaryllis belladonna* L., the genus *Amaryllis* includes *A. paradiscicola* Snijman, a species described from the succulent Karoo (Northern Cape) discovered in the Richtersveld National Park (Snijman & Williamson 1998).

Although these two species have large, trumpet-shaped flowers, *A. paradiscicola* generally bears more flowers per inflorescence than *A. belladonna*, and its flower stems spread in all directions. In *A. belladonna* the leaves are narrow, longer and hairless while being much wider and covered with hairs (especially when young) than in *A. paradiscicola*. The color of the flowers varies in many shades from pink to dark pink or almost burgundy, rarely pure white, always with a creamy yellow throat, which are generally strongly oriented on one side in *A. belladonna*, whereas the color of flowers of *A. paradiscicola* are light pale pink to dark pink, without a creamy yellow throat. Moreover, *A. belladonna* shows longer stamens and a more deeply divided trifold stigma (Snijman & Williamson 1998). In both species, the color of the flowers darkens with age and *A. belladonna*

emits an overwhelming and sweet scent which intensifies at night, attracting the butterflies that visit them. The fragrance of flowers is much less intense in *A. paradiscicola*.

**Specimina visa:** TUNISIA. Bizerta: Sejnane, Northern Tunisia, coordinates 37°04'03.84" N, 09°07'40.94" E, co-occurring together with several thermos-xerophilous herbs and grasses in the undergrowth of an evergreen cypress plantation, at c. 120 m a.s.l., 27 September 2016, *R. El Mokni s.n.* (Herb. El Mokni!), *R. El Mokni s.n.* (Herb. Univ. Monastir). Some bulbs were brought and cultivated at the Faculty of Pharmacy of Monastir (Univ. Monastir).

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