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***Zantedeschia aethiopica* (Araceae) a new species naturalized in the Northwest of Tunisia**

Abstract

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Zantedeschia aethiopica (L.) Spreng. (Araceae), originating from S Africa, was found naturalized in many sites of the Kroumiria region (Northwest of Tunisia). This report represents the first record for the Tunisian flora. Distribution and ecological notes are also given.

Key words: Alien flora, N Africa, aroid species.

Introduction

Zantedeschia Spreng. the classic white calla lily or arum lily is a genus of the *Araceae* Juss. It is an important ornament grown worldwide (Kuehny 2000; Snijder & al. 2004; Wright & al. 2005; Ni & al. 2009, 2010), with about eight species in two sections, all native to Africa (Letty 1973; Singh & al. 1996). The genus name *Zantedeschia* was given in honor to Giovanni Zantedeschi (1797-1873) (Fournier 1977), an Italian botanist, priest, physicist and professor. Diploid plants in all *Zantedeschia* Spreng. sp. pl. contain 32 chromosomes, $2n=2x=32$ (Yao & al. 1994). This very attractive plant has been described in 1753, by Carl Linnaeus as *Calla aethiopica* and it has been commonly known as the calla lily ever since. In 1826, Sprengel transferred it to a new genus which he called *Zantedeschia* Spreng. (Letty 1973). The present work confirms the naturalization of *Zantedeschia aethiopica* and give an idea about its actual distribution within the Tunisian territory. The discovery of this new naturalized aroid constitutes up to now the first record for the Tunisian flora.

Native habitat and distribution area

Zantedeschia aethiopica (L.) Spreng. [Syn. *Calla aethiopica* L., *Richardia aethiopica* (L.) Spreng., *Arodes aethiopicum* (L.) Kuntze, *Colocasia aethiopica* (L.) Spreng. ex Link., *Otosma aethiopica* (L.) Raf., *Richardia africana* Kunth., *Z. aethiopica* var. *minor* Engl.,

Pseudohomalomena pastoriensis A. D. Hawkes] (Arnold & De Wet 1993; Dobignard & Chatelain 2011) is native to Southern Africa: Lesotho; South Africa - Cape Province, Free State, KwaZulu-Natal, Transvaal; Swaziland (Maire 1957; Guillarmod 1971; Keay & Hepper 1953–1972; Compton 1976) was largely naturalized in Macaronesia: Portugal - Azores, Madeira Islands; Spain - Canary Islands, Western Indian Ocean: Reunion, Australia: Australia, New Zealand: New Zealand, Europe: United Kingdom, Italy, Sardinia, Sicily, North-Central Pacific: United States - Hawaii, South America, Philippines and elsewhere (Celesti-Grapow & al. 2010; Hansen & Sunding 1993; BSBI 2012; Parsons & Cuthbertson 1992; Weber 2003).

In North Africa, only Maire (1957) cited the genus as most frequently cultivated on the coast and naturalized in the neighborhood of Tanger (Morocco), of Bône and of the Calle (Algeria). Neither *Calla* nor *Zantedeschia* were reported in any North-African flora (Quèzel & Santa 1963; Valdés & al. 2002) even in some recent index floristic updating (Le Floc'h & al. 2010; Dobignard & Chatelain 2011).

Description

Description of the different parts of the plant was based on morphometric measurements with reference to some previous works including those of Maire (1957), Letty (1973), Fournier (1977), Singh & al. (1995), Fennane & Ibn Tattou (1998), Macfarlane & al. (2000), Germishuizen & Meyer (2003).

Vegetative apparatus and life form

The white or common arum lily, *Zantedeschia aethiopica* (L.) Spreng. is a perennial, laticiferous, robust, evergreen or deciduous, erect and clump-forming plant with thick rhizomes and white fleshy roots, growing usually to 0.6 – 1.0 m high in sunny positions but getting up to 1.5 m high if growing in shade. The leaves, without a persistent basal meristem, are large and leathery and having a laminae sagittate or ovate-cordate form with ovate to orbicular blades; parallel-pinnate veined, growing to 15 – 45 cm × 10-25 cm, glossy dark green with somewhat lighter green very fine veins, on 40-100 cm long succulent petioles of lighter green colour, spongy, white on the inside and purplish on outside. The scape is of similar height as the leaves, of green colour and stout.

Vegetative anatomy

Plants without silica bodies. *Leaf anatomy*. Guard-cells not “grass type”. Hairs absent. *Stem anatomy*. Secondary thickening absent.

Inflorescence and flower features

The flower has a very distinctive structure; what appears to be a large petal is actually a modified leaf called spathe of ivory-white colour but bright green at the base on outside. The spathe is up to 25 cm long, funnel shaped narrowing towards the tip with a small recurved apex; inside it contains the actual flower which is a 10 - 12 cm long spadix of bright yellow colour having a basal female zone of $\frac{1}{4}$ - $\frac{1}{2}$ of the spadix continued with an upper male zone. Fertile flowers functionally male and functionally female.

Reproductive type and pollination

Plants monoecious. The unisexual flowers aggregated in different parts of the same inflorescence. Female flowers with staminodes (interspersed among the ovaries in some species), sometimes without staminodes. Entomophilous. Pollination mechanism conspicuously specialized. Flowers aggregated in ‘inflorescences’; in spikes. Inflorescence simple (solitary). The terminal inflorescence unit seemingly racemose. Inflorescence with long and stout peduncle and numerous flowers, males above females, lacking sterile sections. *Flowers* ebracteate; ebracteolate; small; (these or the spadix) fragrant, or malodorous; cyclic. Perianth absent. Fertile stamens present, or absent (when female). Androecium 2-3; 1-whorled. Androecium exclusively of fertile stamens. *Pollen* shed in aggregates; in long beaded strings. Ovary usually 3 locular with several anatropous ovules in each locule, placentation axile. Gynoecium shortly stylate. Styles apical. Stigmas discoid; wet when receptive; non-papillate; Group II type. Placentation axile. Ovules 1–8 per locule; attached dorsally to the central placenta; orthotropous, or hemianatropous, or anatropous.

Fruit and seed features

The fruits are fleshy, berry-like, up to 1 cm in diameter and green or orange to yellow; indehiscent (berries clustered, usually surrounded by, and contained within, the withering spathe). Fruit contains few to numerous subglobose or ovoid starchy seeds. Embryo straight (linear). Seeds with copious endosperm.

The Tunisian findings

Plants of *Z. aethiopica* were observed on the 10th of April 2011, for the first time, during an extended field excursion on the commune of Aïn Draham within the Kroumiria region (North-West of Tunisia) where it grows as spontaneous in the underwood of a planted pine forest (Fig. 1). It is probably introduced by way of ornamental plants in surroundings and reaching the area of its found (geographical coordinates: Lat. 36° 46'56.06" N, Long. 08° 41'12.70" E and an elevation about 716 meters, above sea level) by through some small waterways. Vegetation of this area was constituted essentially of *Pinus* sp. pl., *Eucalyptus* sp. pl., *Rubus ulmifolius* Schott, *Nerium oleander* L., *Pteridium aquilinum* (L.) Kuhn. subsp. *aquilinum*, *Mentha suaveolens* Ehrh. subsp. *suaveolens*, *Mentha pulegium* L. subsp. *pulegium*, *Bellis annua* L., *Rumex pulcher* L., *Rumex tuberosus* L. *Smyrniolum olusatrum* L., *Cirsium scabrum* (Poir.) Bonnet & Barratte, *Ophrys bombyliflora* Link., *Ophrys tenthredinifera* Willd.

Subsequent observations (February 2012) show that *Z. aethiopica* (L.) Spreng. still present, behaves as a perennial species and continue to reproduce and spread gradually; two new sites were recorded (Tabarka with the following geographical coordinates: Lat. 36° 57'05.45" N, Long. 08° 45'48.75" E and an elevation about 1 meter, above sea level and Bni Mtir with the following geographical coordinates: Lat. 36° 44'23.34" N, Long. 08° 44'02.67" E and an elevation about 526 meters, above sea level). Its spread and distribution as a naturalized plant is so far strictly linked to the Kroumiria region.

Specimina visa:

Tunisia: Aïn Draham, the underwood of a planted pine forest, 36° 46'56.06" N 08° 41'12.70" E, 716 m a.s.l., 10.4.2011, R. El Mokni (TUN); Tabarka, 36° 57'05.45" N 08° 45'48.75" E, 1 m a.s.l., 5.2.2012, R. El Mokni (TUN); Bni Mtir, 36° 44'23.34" N, 08° 44'02.67" E, 526 m a.s.l., 5.2.2012, R. El Mokni (TUN).

Ecological interest and ethnobotanical activities

Z. aethiopica may be useful in artificial wetland systems to clean waste water and prevent algal growth (Belmont & Metcalfe 2003), a prompt idea that can be exploited for the cleaning up of some contaminated soils. The trouble is that this aroid plant smothers ground layer preventing regeneration of native flora and might become hard to control at times, especially when forming dense populations in swamps and moist river banks. The dispersal is quite slow and is mostly vegetative, with the rhizomes exploring and occupying the nearby patches and giving ultimately birth to new shoots, but also seed dropped nearby parent plant or spread by birds is a secondary mean of dispersal. Although few good uses are known for the plant; parts of the plant have an ethnobotanical use (traditionally this plant is boiled and eaten, especially the rhizomes or tuberous roots; leaves are also traditionally used as a poultice and a treatment for headaches), the raw plant is regarded as being highly toxic due different chemicals. Usually it causes discomfort (mostly swelling of the throat) but reportedly if eaten in big quantities it may be even fatal (cf. Aubrey 2001). In conclusion, with this addition the flora of Tunisia is enriched of one genus and one species.



Fig. 1. First observation, with flowers, of naturalized *Zantedeschia aethiopica* in the Kroumiria (Government of Jendouba, North-West of Tunisia) on the 10th April 2012 (Photo R. EL MOKNI).

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References

- Arnold, T. H. & De Wet, B. C. (eds) 1993: Plants of southern Africa: names and distribution. – Mem. Bot. Surv. S. Africa **62**.
- Aubrey, A. 2001: *Zantedeschia aethiopica*. – <http://www.plantzafrica.com>
- Belmont, M. A. & Metcalfe, C. D. 2003: Feasibility of using ornamental plants (*Zantedeschia aethiopica*) in subsurface flow treatment wetlands to remove nitrogen, chemical oxygen demand and nonylphenol ethoxylate surfactants – a laboratory-scale study. – Ecol. Engin. **21**: 233-247.
- Botanical Society of the British Isles 2012: BSBI taxon database (on-line resource). (BSBI). – <http://rbg-web2.rbge.org.uk/BSBI/taxonsearch.php>
- Celesti-Grapow, L., Alessandrini, A., Arrigoni, P. V., Assini, S., Banfi, E., Barni, E., Bovio, M., Brundu, G., Cagiotti, M. R., Camarda, I., Carli, E., Conti, F., Del Guacchio, E., Domina, G., Fascetti, S., Galasso, G., Gubellini, L., Lucchese, F., Medagli, P., Passalacqua, N. G., Peccenini, S., Poldini, L., Pretto, F., Prosser, F., Vidali, M., Viegi, L., Villani, M. C., Wilhalm, T. & Blasi C. 2010: Non-native flora of Italy: Species distribution and threats. – Pl. Biosyst. **144(1)**: 12-28. doi: 10.1080/11263500903431870
- Compton, R. H. 1976: The flora of Swaziland. – S. African J. Bot. **Suppl. 11**.
- Dobignard, A. & Chatelain, C. 2010–2011: Index synonymique et bibliographique de la flore d’Afrique du Nord, **1**. Consultable en ligne sur <http://www.ville-ge.ch/musinfo/bd/cjb/afrika/index.php?langue=fr> [accessed 17/01/2012]. – Genève.
- Fennane, M. & Ibn Tattou, M. 1998 plantes vasculaires rares, menacées ou endémiques du Maroc. – Bocconea **8**.
- Fournier, P. 1977: Les quatre flores de la France Corse comprise (Générale, Alpine, Méditerranéenne, Littorale). – Paris.
- Germishuizen, G. & Meyer, N. L. 2003: Plants of southern Africa: an annotated checklist. – Pretoria.
- Guillarmod, A. J. 1971: Flora of Lesotho. – New York.
- Hansen, A. & Sunding, P. 1993: Flora of Macaronesia: checklist of vascular plants, ed. 4. – Sommerfeltia **17**: 1-295.
- Keay, R. W. J. & Hepper, F. N. 1953-1972: Flora of west tropical Africa, ed. 2. – London.
- Kuehny, J. S. 2000: Calla history and culture. – Hort. Technology **10**: 267-274.
- Le Floc’h, E., Boulos, L. & Vela, E. (eds.) 2010 : Catalogue synonymique commenté de la flore de Tunisie. – Tunis.
- Letty, C. 1973: The genus *Zantedeschia*. – Bothalia **11(1&2)**: 5–26.
- Macfarlane, T. D., Watson, L. & Marchant, N. G. (eds) 2000: Western Australian Genera and Families of Flowering Plants. – Taxon **57**: 179-200.
- Maire, R. 1957 : Flore de l’Afrique Du Nord, **4**. – Paris.
- Ni, L., Guo, L., Custers, J. B. M. & Zhang, L. 2010: Characsoft rot caused by *Pectobacterium carotovorum* subsp. *carotovorum* ZT0505: Bacterium growth and pectate lyase activity under different conditions. – J. Plant Pathol. **92**: 421-428.
- Ni, L., Li, X., Custers, J. B. M., Zhang, K. & Zhang, L. 2009: Response of arum lily calli to culture filtrate of *Pectobacterium carotovorum* subsp. *carotovorum*. – Afr. J. Biotechnol. **8**: 5362-5366.
- Parsons, W. T. & Cuthbertson, E. G. 1992: Noxious weeds of Australia. – Melbourne, Sydney.

- Quézel, P. & Santa, S. 1963: Nouvelle Flore de l'Algérie et des régions désertiques méridionales, **1**. – Paris.
- Singh, Y., Van Wyk, A. E. & Baijnath, H. 1995: Know your Arums: an easy guide to identify members of the genus *Zantedeschia*. – Veld & Flora **81**: 54-55.
- , Van Wyk, A. E. & Baijnath, H. 1996: Taxonomic notes on the genus *Zantedeschia* Spreng. (Araceae) in southern Africa. – S. African J. Bot. **62**: 321-324.
- Snijder, R. C., Lindhout, P. & Tuyl, J. M. V. 2004: Genetic control of resistance to soft rot caused by *Erwinia carotovora* subsp. *carotovora* in *Zantedeschia* spp. (Araceae), section *Aestivae*. – Euphytica **136**: 319-325.
- Valdés, B., Rejdali, M., El Kadmiri, A. A., Jury, S. L. & Montserrat, J. M. 2002 : Catalogue des plantes vasculaires du nord du Maroc, incluant des clés d'identification, **1**. – Madrid.
- Wang, M., Bergen, S. V. & Duijn, B. V. 2000: Insights into a key developmental switch and its importance for efficient breeding. – Pl. Physiol. **124**: 523-530.
- Weber, E. 2003: Invasive plant species of the world: a reference guide to environmental weeds. – Potsdam.
- Wright, P. J., Triggs, C.M., Burge, G. K. 2005: Control of bacterial soft root of *Calla* (*Zantedeschia* spp.) by pathogen exclusion, elimination and removal. – N. Z. J. Crop Hort. Sci. **33**: 117-123.
- Yao, J. L., Rowland, R. E. & Cohen D. 1994: Karyotype studies in the genus *Zantedeschia* (Araceae). –S. African J. Bot. **60**: 4-7.

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