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## Rediscovery of *Eulophia guineensis* Lindl. (Orchidaceae) in Fogo, Cape Verde Islands

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RESUMEN: La orquídea *Eulophia guineensis* Lindl. ha sido localizada nuevamente en la isla de Fogo (islas de Cabo Verde), donde está catalogada como especie “extinta” porque no se había vuelto a encontrar desde 1934. En este trabajo aportamos los datos de localización y algunos comentarios sobre su hábitat, ecología y estado de conservación en el archipiélago. Palabras clave: *Eulophia guineensis*, Orchidaceae, Fogo, islas de Cabo Verde.

ABSTRACT: The orchid *Eulophia guineensis* Lindl. has been rediscovered on the island of Fogo (Cape Verde Islands), where it is catalogued as “extinct” species because it had not been found again since 1934. In this work we report the location data and some comments on its habitat, ecology and conservation status in the archipelago.

Key words: *Eulophia guineensis*, Orchidaceae, Fogo, Cape Verde Islands.

### INTRODUCTION

*Eulophia guineensis* Lindl. is a terrestrial orchid with a wide geographical distribution, being present on the Cape Verde Islands, almost the entire tropical Africa — from Senegal to Angola, on the west coast, to Sudan, Eritrea, Ethiopia, Somalia, Kenya and Tanzania, to the East, and until Zambia, Malawi, Zimbabwe and Botswana, to the South — and in the

Arabian Peninsula, including Saudi Arabia, Yemen and Oman (Govaerts, 2013). Phyto-geographically it is a paleotropical element from the Sahelian-Sudanian, Somalian-Ethiopian, Guinean-Congolian, Namibian-Zambezian and Omani-Sindian regions (biogeographical classification follows Rivas-Martínez *et al.*, 1999).

In the Cape Verde archipelago the species was reported for the first time by Béguinot (1917) in Brava, between 500-700 meters of altitude, after having been identified by this author from two inflorescence samples collected in that island by the explorer, naturalist and Italian zoologist Leonardo di Fea, in September 1898. This naturalist, in a letter addressed to the President of the Italian Geographical Society Giacomo Doria, included a drawing of the flower (Fea, 1899), which Béguinot (1917) also identified as *E. guineensis*.

Later Chevalier (1935) added new records of the species for the island of Fogo, mentioning it in Espia near Mosteiros at 500 m altitude, Curral Fundo at 800 m and at Curral Grande. Also, this author made collections in the first two localities. However, these were the only known records for this orchid in the archipelago and, subsequently the species has been considered as extinct in the Cape Verde Islands (Leyens & Lobin, 1996). In the same way, these records are the only references that have motivated its inclusion in the successive lists of plants from Macaronesia, and more specifically in Cape Verde (Eriksson *et al.*, 1974; Hansen & Sunding, 1979-1985-1993; Sánchez-Pinto *et al.*, 2005).

## MATERIAL AND METHODS

Since 2001 we have been engaged in several individual and professional initiatives focusing on plant exploration on the Cape Verde Islands. Some of these activities have been linked to projects from the Jardín Botánico Canario “Viera y Clavijo”, like BIOMABANC (03/MAC/4.1/C7), CAVEGEN (04/MAC/3.5/c34) or BIOCLIMAC (MAC/1/CO67). In 2009, during our single visit to the island of Brava, we found a small population of this orchid on a rocky escarpment of Monte Fontainhas oriented to the Northwest, at an altitude between 800-900 m (Marrero & Almeida, 2013). This recent finding confirmed the late 19<sup>th</sup> century collections made by Leonardo di Fea, and demonstrated that this species was not extinct and that it still occurs on the Cape Verde Islands. This initial rediscovery encouraged us to expand our searches to the island of Fogo, where Chevalier found this plant in 1934. In 2013 and 2014 we carried out two new visits to the archipelago. It is worth mentioning, that during these two years the main focus of our research was obtaining additional data to complete our study on the distribution of the Cape Verdean dragon tree, which we have described as a new subspecies (Marrero & Almeida, 2012).

## RESULTS

It was during our last expedition to the archipelago, conducted in the first half of July 2014, when we rediscovered *Eulophia guineensis* in Fogo. On July 12, during an excursion to an area near the northern town of Ribeira do Ilhéu, we found this species in nine different sites located on Ribeira Portadinha (figures 1 and 2), Ribeira Pedra Choupana (figure 3),

Ribeira Grande, Ribeira Monteverde and Ribeira Ilhéu. As a whole, these localities cover three UTM grids of 1 x 1 km: 26P 782/1662, 26P 782/1663 and 26P 783/1662. In all of these sites we found both vegetative and blooming individuals. Herbarium specimens were collected and they are deposited in the LPA herbarium of the Jardim Botânico Canario “Viera y Clavijo”. Demographic, geographical and ecological data from these nine locations are shown in Table I.

**Table I.-** Data of the localities of *Eulophia guineensis* Lindl. in Fogo.

Localities	Alt. (m)	Orient.	UTM (WGS84)	Number of plants <sup>(1)</sup>	Description of the places
<b>R<sup>a</sup>. Portadinha</b> ( <i>Exsiccata</i> )	797	E	26P 782085 1662116	34 fl. 125 veg.	On rock ledges next to the path, in the left side of a small tributary gully, close to the confluence with the main bed of the ribeira.
<b>R<sup>a</sup>. Portadinha</b>	683	E-SE	26P 782021 1662670	48 fl. ? veg.	In the escarpments of the eastern slope of Monte Piorno, on the left side of the ribeira. In small terraces and rock ledges located about 25-30 m above the bed of the ravine.
<b>R<sup>a</sup>. Pedra Choupana</b>	652	O-NO	26P 782203 1662778	13 fl. 157 veg.	Near the path. On the top edge and on a rock ledge of a small escarpment next to the bed, on the right side of the ribeira.
<b>R<sup>a</sup>. Grande</b>	640	SE	26P 782381 1662795	8 fl. 28 veg.	On rocks of the left hillside of the ribeira, about 20 m opposite the path that goes down to the bed of the ravine.
<b>R<sup>a</sup>. Grande</b>	625	N-NO	26P 782476 1662755	6 fl. 21 veg.	On rocks next to the bed of the ribeira, on the left side, and distant about 20 m upstream from the point where the path crosses the bed of the ravine.
<b>R<sup>a</sup>. Grande</b>	600	E-SE	26P 782391 1662945	5 fl. ? veg.	In the escarpments of the left side of the ribeira, on rock ledges located about 10 m above the riverbed.
<b>R<sup>a</sup>. Monteverde</b>	760	SO	26P 783246 1662940	12 fl. ? veg.	In the rock faces of the waterfall located at the foot of Monte Estevão. On rock ledges located to the right of the cascade.
<b>R<sup>a</sup>. Ilhéu</b>	512	N-NO	26P 782609 1663759	3 fl. 19 veg.	On rocks of the left hillside of the ribeira, about 5-10 m below the path that goes down towards Ribeira do Ilhéu.
<b>R<sup>a</sup>. Ilhéu</b>	465	SO	26P 782617 1663676	3 fl. ? veg.	In the escarpments of the right side of the ribeira, opposite the previous place, on rock ledges located about 15-20 m above the bed of the gully.
(1) <i>fl.</i> = flowering / <i>veg.</i> = vegetative plants					

EXSICCATA: *Eulophia guineensis* Lindl., Cape Verde Islands, Fogo, Conselho dos Mosteiros, area of Ribeira do Ilhéu, Ribeira Portadinha (Pedra Choupana), 797 m, in the left hillside of a small tributary gully, close to the confluence with the main bed of the ribeira,

growing next to the path, on rock ledges with a thin covering of soil rich in humus, UTM 26P 782085 /1662116, orient.: East, Leg. R.S. Almeida, VII.12.2014, LPA: 31633. Det. R.S. Almeida & A. Marrero.

## DISCUSSION AND COMMENTS

Our field studies confirm the occurrence of *Eulophia guineensis* Lindl. on the Cape Verde archipelago, where it is a native plant only known in the islands of Brava (Marrero & Almeida, 2013) and Fogo. Also, these studies corroborate the earlier records of this orchid in both islands: 1898 for Brava (Fea, 1899; Béguinot, 1917) and 1934 for Fogo (Chevalier, 1935). In accordance with the zones of humidity defined for the archipelago by Teixeira & Barbosa (1958) and later by Brochmann & Rustan (1987), the species is confined to the subhumid and humid zones, which correspond to the Mesotropical dry-subhumid bioclimatic belt (Rivas-Martínez, 2009). Therefore we can classify this species as a montane southern hygrophYTE (*sensu* Brochmann *et al.*, 1997).

According to the previous records and our own field observations, the species mostly occurs on a narrow zone between 500 and 900 m altitude in both islands. In Brava it seems to be restricted to the northern slope of the central massif, where it is only found in a few spots. In contrast, in Fogo it appears to have a wider distribution on the insular northern slope, along an arc that spreads between Ribeira Espia (or perhaps farther away toward the northeast) and Currall Grande, to the west-northwest. The species lives in the escarpments and abrupt hillsides of ravines (called “ribeiras”) and mountain slopes. It grows on rock ledges and small platforms or terraces with a thin covering of soil that is rich in humus, and usually, it forms isolated stands of different sizes. Syn-taxonomically the species is integrated into shrublands of *Periploca chevalieri-Sarcostemalia daltonii* [Rivas-Martínez, Lousã, J.C. Costa & C. Duarte].

In Fogo, *Eulophia guineensis* commonly occurs inside of a semi-natural shrubby-bushy vegetation not too dense, where it remains partially protected from direct sunlight. Among the accompanying vegetation we noted several invasive alien species, as *Lantana camara* L., *Furcraea foetida* (L.) Haw., *Dichrostachys cinerea* (L.) Wight & Arnold and *Momordica charantia* L., and different native plants, such as *Sarcostemma daltonii* Decne., *Euphorbia tuckeyana* Steud., *Lavandula rotundifolia* Benth., *Tornabenea tenuissima* (A. Chev.) A. Hansen & Sunding, *Periploca chevalieri* Browicz, *Sideroxylon marginata* (Decne.) Cout., *Dracaena draco* (L.) L. subsp. *caboverdeana* Marrero Rodr. & R.S. Almeida, *Campanula bravensis* (Bolle) Chev., *Globularia amygdalifolia* Webb, *Artemisia gorgonum* Webb in Hook., *Diplotaxis hirta* (Chev.) Rustan & L. Borgen, *Lotus purpureus* Webb in Hook., *Polycarpaea gayi* Webb, *Notholaena marantae* (L.) Desv., *Pteris vittata* L., etc.

In the area of Ribeira do Ilhéu, this orchid appears in scattered places along the middle courses of the ribeiras listed in Table I. From our field observations of the habitat where the species was found, we believe that, almost certainly, it grows also in the contiguous ravines located both towards the East (e.g., Ribeira Monte Suja, Ribeira Fundão, Ribeira Tagunda...) as the West (e.g., Ribeira Amador, Ribeira Zória, Ribeira Boga...). Another

fact that reinforces our belief that the species is not rare in this area is that it is locally known with the common name of “Orelha rato”. Clearly the plant is well known by the residents of this area, as local people to whom we showed this species recognized the orchid immediately and informed us that it mostly blooms during the rainy season, during the months of August and September.

The conservation status of this species can be assessed using the red-listing criteria set out by the IUCN (2012). This orchid should be considered as “Critically Endangered” [CR B2ab (iii); C2a (ii); D] for Brava. On this island *Eulophia guineensis* has a limited area of occupancy (<1 km<sup>2</sup>) with a single known population that has less than 50 mature individuals. For the island of Fogo (and therefore for the whole archipelago), additional distribution data are needed (see above). However, based on our field observations we propose the species to have the “Vulnerable” conservation status (V D2) because on this island it has a restricted area of occupancy (<20 km<sup>2</sup>) and a low number of locations, with a reasonable chance of being affected by future threats that could drive the taxon to “Critically Endangered” (CR) or even “Extinct” (EX) in a very short time.

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**Figure 1.-** *Eulophia guineensis* Lindl. in its natural habitat in Ribeira Portadinha (Pedra Choupana), island of Fogo. Partial view.



**Figure 2.-** Detail of the flower. Ribeira Portadinha (Pedra Choupana). July 12, 2014.



**Figure 3.-** *Eulophia guineensis* Lindl. in the locality of Ribeira Pedra Choupana (July 12, 2014). Partial view.