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Callisia fragrans (Lindl.) Woodson, a Little Known Succulent in Cuba

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Abstract

Context: The presence of Commelinaceae plants in a park in the city of Camagüey, which does not correspond to any species of this family previously recorded in Cuba, created the need to study its identity, origin, and properties.
Aim: To reveal the nomenclature, taxonomy, and description of the taxon, provide an illustration of the plant, and comment on the main qualities that determine its usefulness.
Methods: Botanical research methods were used, such as work with collections, comparison of collections and keys recorded in catalogs, as well as the description and scientific illustration.
Results: The presence of *Callisia fragrans* (Lindl.) Woodson in Cuba was corroborated. Precisions were made as to the nomenclature; the taxon was described, and an analytical key was established to distinguish it from the rest of the members of the same genus already reported in the country. Aspects related to the usefulness for gardening and medicine were referred to.
Conclusions: *Callisia fragrans* (Lindl.) Woodson should be included in the catalogs and scientific journals on Cuban flora. The usefulness of the plant for gardening and tropical medicine, and its antiviral, antibacterial, and antioxidant properties will be have to be considered by the Cuban economic botanic.

Key words: Commelinaceae, Cuban flora, flora from Camagüey, ornamental plants.

Introduction

Field floristic-physiognomic characterization studies done in 2017 in Casino Campestre, a symbolic urban park in the city of Camagüey, Cuba (Méndez, Guerra & Morales, 2018), found a specimen of the Commelinaceae family, which at first, was not identified due to the lack of correspondence to any of the taxons recorded in Cuba by Greuter & Rankin (2017).

This was an interesting situation, since, on one hand, it was a commonly found taxon cultivated in Cuban gardens; and on the other, a preliminary analysis demonstrated that, in fact, none of the relevant works that characterize the plants growing in the country refers to any correspondence. Thus, it demanded a particularized analysis that exceeded the time foreseen in the original project, and its objectives.

The aim of this paper is to present the results of studies done to reveal the identity of the species, determine the presence and records in the country, provide a description of the plant, and an analytical key to distinguish it from akin taxons, and to compile related elements in terms of use, and the main properties.

Materials and Methods

This study is part of one of the tasks of an institutional research program: Contribution to Knowledge and Sustainable Management of Groups Selected from Camagüeyan Biodiversity, developed by the Center for Environmental Studies, Ignacio Agramonte University of Camagüey. Reflections linked to plant chemistry and usefulness of the taxon also contributed to project Installing a Center of Excellence in the Central-Eastern Region of Cuba to Enhance Production and Research of Bioactive Plants, a collaboration between Cuban and Belgium universities, funded by the VLIR-OUS program from the Council of Flamingo Universities.

The *in situ* study included digitalized images, morphological evaluation of vegetative and

reproductive structures of the plant, and the collection of propagules to foster cultivation under control conditions. A specimen was planted in the author's garden, to observe the different phenological phases, from which a representative sample was herborized at Herbarium Julián Acuña Galé, University of Camagüey (HIPC, according to Thiers, 2020). The measurements were made using a measure tape and a caliper gauge.

The species was identified by comparing with the aid og descriptors, keys, and images in Faden (2000) and Proctor (2005). Additionally, digitalized samples from MO (according to Thiers, 2020), available at http://www.missouribotanicalgarden.org/, were consulted. The Font Quer Terminology (2001) was used for description.

The search for possible documentary evidence of its presence in Cuba included the review of material deposited in herbariums: HAC, HAJB, HIPC, and ULV (according to Thiers, 2020), and bibliographic review.

Results and discussion

It was demonstrated that the plant in the study belongs to species Callisia fragrans (Lindl.) Woodson (Commelinaceae). The data referring to its nomenclature, description, distribution, etnobotany, and performance in Cuba are the following:

Callisia fragrans (Lindl.) Woodson Ann. Missouri Bot. Gard. 29(3): 154. 1942 ≡ *Spironema fragrans* Lindl. Edwards's Bot. Reg. 26: pl. 47. 1840. Lectottype (D.R. Hunt in Davidse et al., Fl. Mesoamer. 6: 168. 1994): Lindley, Edward's Bot. Reg., 26: t. 47. 1840, based on plants original from Mexico that were cultivated. **Fig. 1**.

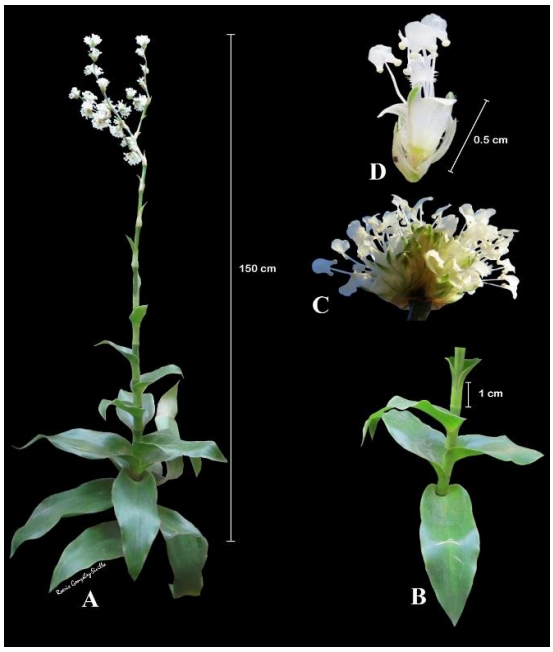

Fig. 1. *Callisia fragrans* (Lindl.) Woodson (Commelinaceae), photos by Isidro Eduardo Méndez Santos. Photographic composition: Roeris González-Sivilla. A-Fully blossomed plant. B-Arrangement of leaves on the stem. C-Flower fasciculates subtended by reduced pod-like leaves. D-flower.

Perennial, robust, decumbent, stoloniferous, succulent herb. Fleshy stems rooted at the knots, with some branches erected to 1 m (1.5 m while flowering). *Leaves:* simple, alternate leaves, arranged in a spiral; whole concave, oblong-lanceolate to narrowly elliptical sheets, 8-25 (-28) × 2.5-4.5 cm, somewhat succulent, dark green, and glabrous on both faces; acute apex; pod-like base forming a 1 cm tube around the stem; entire leaf margin. *Inflorescence*: in 30-40 cm terminal panicles. *Flowers*: small, fragrant, actimorph, bisexual, arranged in sessile fascicles subtended by pod-like leaves. *Bracts*: whitish, ovate or 3-lobulate, up to 1 cm long. *Calyx*: diasepal; hyaline, erect, oblong, boat-shaped 3 sepals, up to 4-5.5 mm long, which are persistent in the fruit. *Corolla*: dialipetal; white to slightly rose petals, oblong, lanceolate, deciduous, up to 4.5-5.5 mm long. *Androecium*: made of 6 stamens, lively, free, white, exert lengthwise; filiform glabrous filaments; 2-locular elliptical anthers located on the edge of abroad laminar connective perpendicularly inserted in the filament. *Gynecium*: 3-locular super ovary with 2 ova per locule; 4 mm long style; hairy conspicuous stigma. *Fruit*: 3-locular and 6-seminate, in a small capsule. *Seed*: having a point-shaped thread. Chromosomal number: 2n = 11 (Alam & Sharma, 1984).

It is native to Mexico; widely distributed as a crop, and frequently naturalized in several countries of North America (Dave's Garden, 2014; Florida Natural Areas Inventory, 2018; Wunderlin, Hansen, Franck & Essig, 2020), West Indies (Proctor, 2005; Acevedo & Strong, 2012), Europe (Mairapetyan, Karapetyan, Alexanyan, Galstyan & Stepanyan, 2014; Boycheva & Zahariev, 2018), Asia (Kim & Thị, 2015), and the Pacific (Proctor, 2005). In the Greater Antilles, it is recorded as an exotic species in Jamaica, La Espanola, and Puerto Rico (Proctor, 2005; Acevedo & Strong, 2012). It has been cultivated in all the Cuban provinces.

The most frequently known common name is *mala madre* (bad mother), which makes reference to the capacity to issue propagules at the end of the stolons, commonly interpreted as a trend to stay away from the offspring, to expel them. Inquiries done with the people who cultivate the plant showed that, at least in Camagüey, it is known as *big cockroach*. In Mexico it is named *basket* or *spider* (https://telmajr.wordpress.com/2011/09/13/ canasta-o-planta-arana-callisia-fragans/). In English speaking countries, it is known as *basketplant* (CAB International, 2020).

The information regarding the date and way of introduction of *C. fragrans* in Cuba is inaccurate. However, given the preponderance of its presence in gardens, and the extension throughout the country, the likelihood that it was transported anonymously by ornamental plant fans since several decades ago is high (perhaps 50 ago or more).

Despite the above consideration, *C. fragans* is not recorded either in the most relevant catalogs on Cuban flora (De la Sagra, 1845, 1850; Grisebach, 1860, 1864 y 1866; Sauvalle, 1873; Gómez de la Maza, 1889 y 1897; Gómez de la Maza & Roig, 1914; Agete, 1939; Seifriz, 1943; Leon, 1946; Anonymous, 1958; Roig, 1965; Boldo & Estévez, 1990; Esquivel, Knüpffer & Hammer, 1992; Herrera, 1993; Oviedo, 1994; Greuter & Rankin, 2017). Additionally, no herborized specimens were found in HAC, HAJB, HIPC, and ULV (according to Thiers, 2020). It has only been recorded by García (2016), in Trinidad and Sancti Spiritus.

The results of this research are not conclusive in that the plant has been naturalized in Cuba so far, which is in keeping with the fact that it is not recorded among the invading exotic species in the national territory (Oviedo & González-Oliva, 2015). However, the plant behavior in this sense should be permanently monitored, since it manages to establish and propagate by itself in nearby locations (Proctor, 2005), and to push away many indigenous species on the island of Saint Lucia (CAB International, 2020). García (2016) recorded it growing on facilities in the historic center of the cities of Trinidad and Sancti Spiritus, Cuba, which interferes with the preservation of the architectonic heritage.

Specimens observed: Camagüey, City of Camagüey, Florat Quarter (21.394815, –77.919064), a plant cultivated in gardens, 1-20-2020, I. Méndez, HPC-12488 (HIPC).

C. fragrans is mostly used as an ornamental plant in Cuba. It is easy to cultivate in pots and hanging baskets; it is easily adapted to the shade, making it very popular to decorate patios and interiors. As part of this research, it was observed in the Dominican Republic, used to cover the soil in coffee and cocoa plantations, to maintain moisture, and prevent the proliferation of undesirable species. The people have given it a broad reputation as a medicinal plant in Mexico (Blog Garden Center Ejea, 2018), and other regions of the world (Boycheva & Zahariev, 2018). In folk medicine, it is used to heal burns, to treat dental ailments, cancer, and arthritis (Kim & Thị, 2015; Le et al., 2018).

The antiviral properties of the plant have been demonstrated (Yarmolinsky, Zaccai, Ben-Shabat & Huleihel, 2010), along with antibacterial (Lee, Jin, Yeng, Yan, & Mae, 2014; Kim & Thị, 2015; Le et al., 2018), and antioxidant properties (Lee et al., 2014). Phytochemical studies reveal that in this species, the presence of phospholipids and fatty acids (Chernenko, Ul'chenko, Glushenkova & Redzhepov, 2007; Olennikov, Ibragimov, Zilfikarov & Chelombit, 2008), carotenoids, anthoancines, ascorbic acid, phenolic compounds (Olennikov et al., 2008; Kim & Thị, 2015; Le, et al.,2018), flavonoids (Kim & Thị, 2015; Le et al., 2018), and polysaccharides (Olennikov, Nazarova, Rokhin, Ibragimov & Zilfikarov, 2010), among others. These qualities explain why, at least in Armenia, it is intensively cultivated, in order to produce raw materials for the pharmaceutical industry (Mairapetyan et al., 2014).

The confirmation of *C. fragrans* presence in Cuba makes it the third the species of this genus found in Cuba (Greuter & Rankin, 2017). They can be distinguished with this analytical key (adapted from Faden, 2000):

1 Robust, stoloniferous plants, with erected stems of up to 1 m high; 15-30 cm oblong-lanceolate leaves; fragrant flowers. *C. fragans*

1* Totally prostrated plants that cover the surface where they grow; 1-3.5 cm lanceolate-ovate leaves; flowers lacking fragrance. 2

2 Sessile inflorescence in the axillary buds of distal shoots; sessile or subsessile flowers; inconspicuous petals; 0-6 stamens; 2-locular ovary and capsule *C. repens*

2* Pedunculated inflorescence; variably pedicellate flowers; conspicuous petals; 6 stamens; 3-locular ovary and capsule *C. cordifolia*

Conclusions

The presence of Callisia fragrans (Lindl.) Woodson in Cuba was demonstrated. This species should be included in the catalogs and scientific journals on the Cuban flora.

The plant usefulness for gardening and traditional medicine, and antiviral, antibacterial and antioxidant properties should be studied in the Cuban context.

Conflicts of interest

No conflict of interest has been declared.

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