

PLANT&FOREST

## Two new records of *Spiradiclis* (Rubiaceae) from Vietnam

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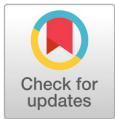
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### Abstract

*Spiradiclis hainanensis* H.S. Lo and *S. purpureocaerulea* H.S. Lo (Rubiaceae) are reported as new additions to the flora of Vietnam. In Vietnam, the genus *Spiradiclis* has been represented by only two species, *S. leptobotrya* (Drake) Pit. and *S. caespitosa* Blume. During our field investigations in the Lao Cai and Ninh Binh Provinces of northern Vietnam, we collected two interesting specimens of *Spiradiclis* that were earlier known only from China and unknown in Vietnam. Here, we report *S. hainanensis* and *S. purpureocaerulea* as previously unrecorded species from Vietnam. Detailed descriptions and color photographs are provided along with a taxonomic key for *Spiradiclis* species in Vietnam.

**Key words:** extended distribution, Lao Cai, Ninh Binh, Ophiorrhizeae



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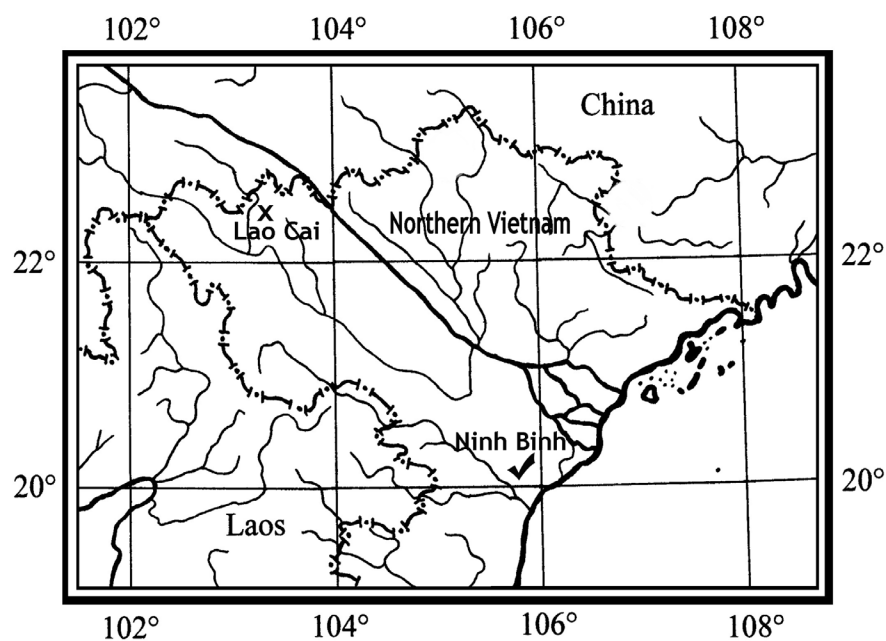


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### Introduction

The genus *Spiradiclis* Blume belongs to the tribe Ophiorrhizeae in the subfamily Rubioideae of the family Rubiaceae (Bremekamp, 1952; Bremer and Manen, 2000). It comprises about 47 species and is distributed in tropical and subtropical regions of Asia (Chen and Taylor, 2011; Wang *et al.*, 2015; POWO, 2018). In Vietnam, the genus was hitherto represented by only two species, *Spiradiclis leptobotrya* (Drake) Pit. and *S. caespitosa* Blume (Pitard, 1923; Merrill, 1942; Pham, 2000). During our field investigations in Lao Cai and Ninh Binh Provinces of Vietnam during 2002, 2016, and 2017, we collected two interesting specimens of *Spiradiclis* (Fig. 1), which after critical morphological examination and consulting the relevant literature and type specimens (Pitard, 1923; Merrill, 1942; Pham, 2000; Ninh, 2005; Chen and Taylor, 2011; Pan *et al.*, 2016) identified as *S.*

*hainanensis* H.S. Lo, and *S. purpureocaerulea* H.S. Lo. These species were hitherto known only from China but never from Vietnam. A detailed description and color photographs are provided for the newly recorded species.



**Fig. 1.** Map showing the distribution localities of *Spiradiclis hainanensis* (X) and *Spiradiclis purpureocaerulea* (✓) in Vietnam.

## Materials and Methods

All the specimens of *Spiradiclis* housed in important Vietnamese herbaria such as HN, VNM etc. were critically examined using light microscope. Photographs of the type specimens housed in the virtual herbaria (IBSC, IBK K, L, NY, and P) were also studied. Morphological characters were studied consulting the relevant literature (Pitard, 1923; Merrill, 1942; Pham, 2000; Ninh, 2005; Chen and Taylor, 2011; Pan et al., 2016).

## Results

### Taxonomic treatment

#### Key to *Spiradiclis* species in Vietnam

1. Inflorescences cymose, unbranched 2- or 4-flowered
  2. Calyx densely villosulous to glabrescent, hypanthium, ca. 1.5 mm; lobes 1.2 - 1.5 mm  
..... *S. hainanensis*
  2. Calyx pubescent; hypanthium, ca. 2 mm; lobes, 4 - 4.5 mm, acuminate  
..... *S. purpureocaerulea*
1. Inflorescences cymose, dichasially branched many flowered

3. Leaf blade elliptic to elliptic-ovate, 1 - 6.5 × 1 - 3 cm; secondary veins 3 - 7 pairs.

Inflorescence cymose, puberulent to strigillose, unbranched or dichasially branched one time.....

..... *S. caespitosa*

3. Leaf blade elliptic, 4 - 15 × 2 - 3 cm; secondary veins 8 - 12 pairs. Inflorescences cymose, strigillose, unbranched or dichasially branched 5 - 6 times .....

*S. leptobotrya*

***Spiradiclis hainanensis* H.S. Lo** Acta Bot. Yunnan. 9: 301. (1987); C. Tao & C.M. Taylor In: Wu C.Y. & Raven P.H. (eds.). Fl. China, 19: 330-339 (2011). **Type:** China: Hainan: Ya Xian, Si-feng-shan. C.Wang 34588 (IBSC photo!).

Perennial herbs, 20 - 30 cm tall; stems densely villosulous, terete, rooting at nodes 5 - 8 mm long. Petiole 0.3 - 0.6 mm, densely villosulous; leaf blade thinly papery, adaxially greyish black, abaxially pale grey, cordiform-orbicular to ovate, 0.8 - 1.5 × 0.7 - 0.9 cm, both surfaces hispidulous at least on principal veins to glabrescent, base cordulate to subtruncate, apex obtuse; secondary veins 3 or 4 (- 5) pairs; stipules narrowly triangular, 1.5 - 2.5 mm glabrescent or glabrous. Inflorescences cymose, 2 - 3 (- 4) flowered, glabrescent, dichasial; peduncle 7 - 8 mm. Flowers subsessile. Calyx glabrescent or glabrous; hypanthium portion subglobose to oblanceoloid, 1 - 1.5 mm; lobes narrowly lanceolate, 3 - 5 × 1.5 - 2 mm. Corolla pinkish to white, salverform, abaxially pubescent, purple outside glabrous; tube ca. 8 - 10 mm; lobes 5, oval, 4 - 6 × 3 - 4 mm, Stamens 5; anthers elliptic-oblong, 1.5 - 2 mm long. Stigma lobes linear; ovary 2, ovules many. Long-styled flowers: stamens included; filaments adnate to the lower corolla tube, ca. 1.5 mm long; styles 6 - 8 mm long; stigma ca. 1.5 mm long, white, extended to corolla throat, not exerted. Short-styled flowers: stamens extended to corolla throat, not exerted; filaments adnate to upper corolla tube, ca. 0.3 mm long; styles ca. 6 mm long; stigmas 1 mm long, included. Capsules ellipsoid-ovoid, 2 - 3 mm in diam., with persistent calyx lobes, dehiscent septically and loculicidally; valves 4, ovate, 3 - 5 mm long. Seeds 8 - 10 per capsule, ca. 0.3 mm long, brown (Fig. 2).

**Distribution:** **Vietnam:** Lao Cai Province (Sa Pa, Bat Xat). **China:** Hainan (Sanya) and Yunnan

**Ecology and habitat.** Lowland broad-leaved evergreen forests.

**Specimens examined:** **Vietnam,** Lao Cai Province, Sa Pa Dist., (2500 - 2900 m. a.s.l.), 21<sup>th</sup> October 2016 B.H.Quang 230 (HN!), Bat Xat Dist., N 22° 24' 28.5"E 103° 44'58.1" (2547 m. a.s.l.), 6<sup>th</sup> July 2017 B.H.Quang 234 (HN!).

***Spiradiclis purpureocaerulea* H.S. Lo**, Bull. Bot. Res., Harbin. 6(4): 39. (1986); C. Tao & C.M. Taylor In: Wu C.Y. & Raven P.H. (eds.). Fl. China, 19:330-339 (2011). **Type:** China: Guangxi: Longzhou, Shangjin, roadside, on limestone, 15<sup>th</sup> Aug. 1935. S.P.Ko 55507. (SCBI, Isotype- IBK photo!).

Perennial herbs, 10 - 15 cm tall; stems stout densely brown pubescent. Leaves subsessile; the blade drying papery, adaxially dark green, abaxially pale green, elliptic, obovate, 4 - 5 (- 8) × 1.5 - 3 (- 5) cm, adaxially densely strigose-hispidulous, abaxially densely pubescent to glabrescent, base rounded or obtuse, apex obtuse or acute; secondary veins 8 - 10 (- 12) pairs; stipules subulate, 1 - 3 mm, wide at base, pubescent, caudate-acuminate. Inflorescence a terminal cyme, 2 - 3 cm, densely pubescent; peduncles very short. Flowers subsessile purple. Calyx tubes ca. 2 mm, hypanthium portion obconic-globose, pubescent; lobes 6, as long as the tube, narrowly lanceolate, 4 - 4.5 mm, acuminate. Corolla purple-violet, slenderly salverform; tube 19 - 20 (- 25) mm; lobes 5 subovate, 7 - 9 × 4 - 6 mm, obtuse. Stamens 5; anthers linear-oblong, 2 - 1.2 mm long, linear. situated

at the throat of the tube Stigma bilobed, lobes ovoid; ovary 2-celled, ovules many, axile. Long-styled flowers; stamens included; filaments adnate to the lower corolla tube, ca. 1 mm long; styles 2 - 3 mm long; stigma ca. 0.4 mm long, white, extended to corolla throat, not exerted. Short-styled flowers: stamens extended to corolla throat, not exerted; filaments adnate to upper corolla tube, ca. 0.2 mm long; style 1 - 3 mm long; stigma ca. 1 mm long, included. Capsules subglobose, 4 - 4.5 mm in diam., pubescent with persistent calyx lobes, ovate, 3 - 5 mm long, valves 4. Seeds 10 - 20 per capsule, ca. 0.6 mm long, brown (Fig. 3).

**Phenology:** Flowering in June; fruiting in August.

**Distribution:** **VIETNAM:** Ninh Binh Prov., Nho Quan Dist., Cuc Phuong Municipality, Cuc Phuong National Park, Dang locality, about 1 km WNW of Dang Forest Control point, N20° 16' 28", E105° 40'57". Secondary closed evergreen seasonal broad-leaved lowland forest on limestone hills at elev. about 400 m a.s.l. **CHINA:** Guangxi.

**Ecology and habitat.** Terrestrial lowland broad-leaved evergreen forests on alluvial soils derived from limestone.

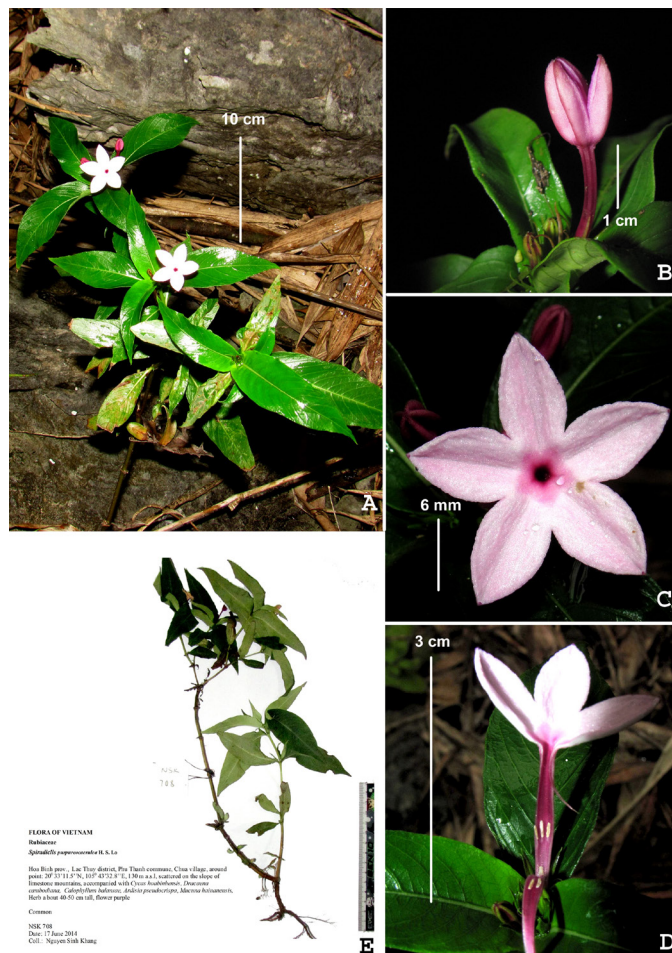


**Fig. 2.** *Spiradiclis hainanensis*. A, habit; B, Adaxial and abaxial view of leaf; C, stem; D, stipules; E, inflorescence; F, calyx; G, corolla; H, flower; I, stamen & anther; J, long-styled flower.

**Specimens examined:** Vietnam, Ninh Binh Province, Nho Quan District, Forest Control Point, N20° 16'28", E105° 40'57" on limestone hills at elev. about 400 m a.s.l., 17<sup>th</sup> June 2014, N.S.Khang 708 (HN!).

**Conservation status:** *Spiradiclis hainanensis* in Vietnam is known only from two populations growing in the primary broad-leaved evergreen closed forest at an elevation range of ca. 2500 - 2900 m a.s.l.). It was found associated with *Acer*, *Magnolia*, *Photinia*, *Polyspora*, *Polystichum*, *Rhododendron*, *Rhodoleia*, *Schefflera*, *Schima*, *Strobilanthes*, *Utricularia*, *Vaccinium* and *Vittaria* species. We observed 50 - 100 mature individuals in the field at two sites which are prone to habitat destruction due to the anthropogenic activities. Therefore, we propose this species to be designated under 'Vulnerable' category under criterion D2 (VU D2) (IUCN, 2016).

Despite of our continuous surveys and observations, we could find *Spiradiclis purpureocaerulea* only in a single locality in Vietnam. This was found growing on slopes, secondary closed evergreen seasonal broad-leaved lowland forest on limestone hills at an elevation of ca. 400 m a.s.l., in association with *Acer*, *Actinidia*, *Altingia*, *Ardisia*, *Arisaema*, *Asplenium*, *Burmannia*, *Daphniphyllum*, *Euonymus*, *Impatiens*, *Lyonia*, *Magnolia*, *Oreocharis* species. We could observe approximately ten individuals growing in the area, therefore, proposing a



**Fig. 3.** *Spiradiclis purpureocaerulea*. A, habit; B, inflorescence; C, flower; D, corolla; E, herbarium specimen housed at HN.

preliminary status of Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2016).

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