

Indigofera tritavar. Subulata (Fabaceae= Papilionaceae): A New Record to the Flora of Yemen

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Abstract: The taxon *Indigofera trita* L. f. var. *subulata* (Vahl ex Poir.) Ali (Fabaceae=Papilionaceae), is recorded as an alien for the flora of Yemen. The specimen was collected from Al-Kaud village, Abyan governorate altitude 20 m a.s.l. and a description, habitat, distribution, key to three varieties of *I. trita* L. f. and figures of this taxon are provided.

Keywords: Taxon, New record, Fabaceae=Papilionaceae, Yemen

1. Introduction

Fabaceae is one of the largest families of flowering plants, with about 440 genera and 12,000 species widely distributed in most parts of the world, but with the greatest diversity in tropical and subtropical regions(1). In Yemen this family is one of the six largest families with 59 genera and 205 species, over 24 species of Fabaceae are endemic to this country(2-4). *Indigofera* is one of the largest genera in Fabaceae, including about 700 species, thought widespreading the tropical and subtropical regions of the world, but absent from the Mediterranean region(1). In Yemen *Indigofera* has not been comprehensively reviewed, except in the previous works such as that of(3, 5-7).

In Yemen, *Indigofera* is represented by 35 species and three varieties (excluding the new record variety) (3, 4). his paper supplements seven recent contributions by Boulos (6) of 15 new records for flora of South Yemen from (Abyan, Aden, Lahej, Shabwa and Hadhramout), Thulin et al. (8) of 50 new records for Yemen among them three species belong to genus of *Indigofera*, Kilian et al. (9) of 110 new records of vascular plants for mainland Yemen, for the southern governorates of Yemen or larger parts of them, in particular from Hadhramout and Al-Mahrah, Kilian et al. (10) added 20 new records for mainland Yemen from Abyan and Shabwa, Mohamed et al. (11) of *Syzygium jambos* (L.) Alston as a new record for Yemen from Tuban district, Lahej governorate, Al-Hawshabi (12) added *Allium subhirsutum* L. (Alliaceae) and *Justicia ladanoides* Lam. (Acanthaceae), as new records for Arabian Peninsula from Toor Al-Baha district, Lahej province, southwestern Yemen. *Euphorbia dracunculoides* Lam. (Euphorbiaceae) reported as a new record for the flora of Yemen from Al-Kaud village, Abyan governorate, Yemen (13).

The author first collected some very interesting specimen belonging to the genus *Indigofera* from Al-Kaud village, Abyan governorate. The specimen collected was compared with the related taxa in the herbaria of Biology Department, Faculty of Education, Aden University and Center for Environmental studies and Research, Aden University (Yemen), and the relevant data in the literature (3, 4, 14-18). As a result of all these comparisons, the specimen collected was found to be a new record for the Yemeni flora.

2. Study Area

The Republic of Yemen lies in the southwestern corner of the Arabian Peninsula. It extends between latitudes 12° 40' to 19° 00' N. and between longitudes 42° 30' to 53° 05' E. It is bordered by Kingdom of Saudi Arabia in the north, the Arabian Sea and the Gulf of Aden in the south, Sultanate of Oman in the east, and the Red Sea in the west. The climate of Yemen is generally ranging from semi-humid to semi-arid until reach to regions that have arid tropical climate. Temperatures in Yemen are changing from region to region and from season to season, also the relative humidity varies greatly in the different regions. It is ranging from 30% in the arid zones of the eastern region to above 80% in coastal areas. The average annual rainfall varies from less than 50 mm in the coastal areas to up to 1000 mm in the Southern uplands mainly around Ibb (19).

Republic of Yemen consists of twenty one governorates. The study area (Abyan governorate) is one of them. It extends between latitudes 13° 00' to 14° 20' N. and between longitudes 45° 00' to 47° 00' E., with an area of about 28187 sq. km. The central of Abyan governorate (Zingbar) distances from Sana'a (the capital of Yemen) about 427 km south, while it distances from Aden about 60 km east. Abyan governorate is bounded from the east by Shabwa governorate, from the west by Aden and Lahej governorates, from the south by the Gulf of Aden and from the north by Al-Bayda governorate and parts of Shabwa governorate (Fig. 1).

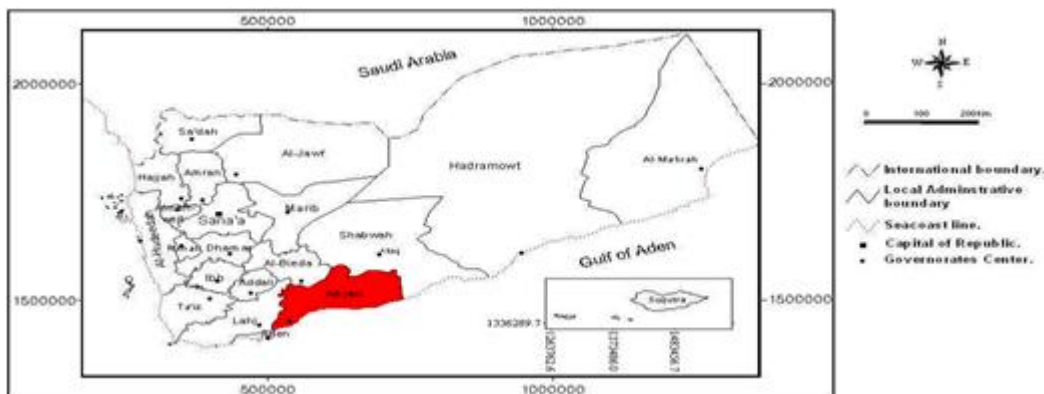


Figure 1: Map of Yemen(modified after [http://www.worldatlas.com/web image/ country's/ asia/ye.htm](http://www.worldatlas.com/web_image/country/s/asia/ye.htm)), showing political map of Abyan governorate

According to Nagmouh (20)Wadi Abyan delta, where *Indigofera trita* L. f. var. *subulata*(Vahl ex Poir.) Ali grows,the climate of the studied area ranges from arid to semi-arid, the temperatures, rainfall as well as the relative humidity are variable during the different seasons of the year. The temperature is however moderate due to its proximity to the sea, only occasionally rising above 41.5 °C or falling below 7.5 °C. The humidity is high throughout the year, particularly at night and in the early morning. In the summer the relative humidity is frequently over 82%. The annual rainfall ranges from 30 mm up to 150 mm. small showers may occur in January on the coast.

3. Materials & Methods

The field work was carried out between December 2010 and February 2013. The identification work was finished in January 2014. The specimen upon whom this study is based was collected from Al-Kaud village, in south-western Yemen, near Zingbar. It is located in the Abyan governorate and lies on the Gulf of Aden, approximately 40 kilometers by road east of Aden. The collected specimen was first compared with similar species from flora of Yemen and then flora of Kingdom of Saudi Arabia, flora of Oman, flora of Somalia and flora of Ethiopia in order to identify it.

The collected specimen from different parts of study area was studied and identified as *Indigofera trita* L. f. var. *subulata*(Vahl ex Poir.) Ali, using corresponding papers and flora (1, 14-18). The collected specimen is deposited in the herbaria of Biology Department, faculty of Education, Aden University (Yemen). Morphological characteristics and other information like distribution and habitats were studied for the new record, and key is also done for three varieties of *Indigofera trita*.

4. Results & Discussion

Indigofera trita L. f. var. *subulata* (Vahl ex Poir.) Ali in Bot. Notiser 3: 558 (1958) **Fig. 2.**

Synonyms:*I. subulata* Vahl ex Poir.;*I. subulata* Vahl ex Poir.var. *subulata*; *Anila subulata* (Vahl ex Poir.) Kuntze; *I. tephrosiopsis* Baill.;*I. tetragonoloba* E. Mey.

Type:Ghana, Thonning (P, holo.)

Description:

Subscandent woody herb, up to 0.5-1 m tall; stems ridged, strigose, branched. Leaf-rhachis 8-10 cm long including a petiole of up to 33 mm. all leaves 3-foliolate,leaflets opposite, elliptic, 35-50 x 15-20 mm, strigose on both sides, more coarsely so beneath and with prominent midrib on the lower surface. Racemes many-flowered, long, peduncle up to 30 cm long. Calyx up to 6 mm long, strigose; lobes triangular-subulate, much longer than the tube. Standard white strigose outside, caduceus. Stamens 4 mm long. Pods up to 10 cm long, deflexed, straight or curved at the tip, whitestrigose, 21-24-seeded.

Flowering and Fruiting time:December – March.

Habitat:Known only from a single locality in Al-Kaud village, Abyan governorate, at distance about 60 km east of Aden, where it grows as a weed of irrigated fields in clay soil and around cultivation at alt. 20 m a.s.l.

Previous report from Yemen:None.

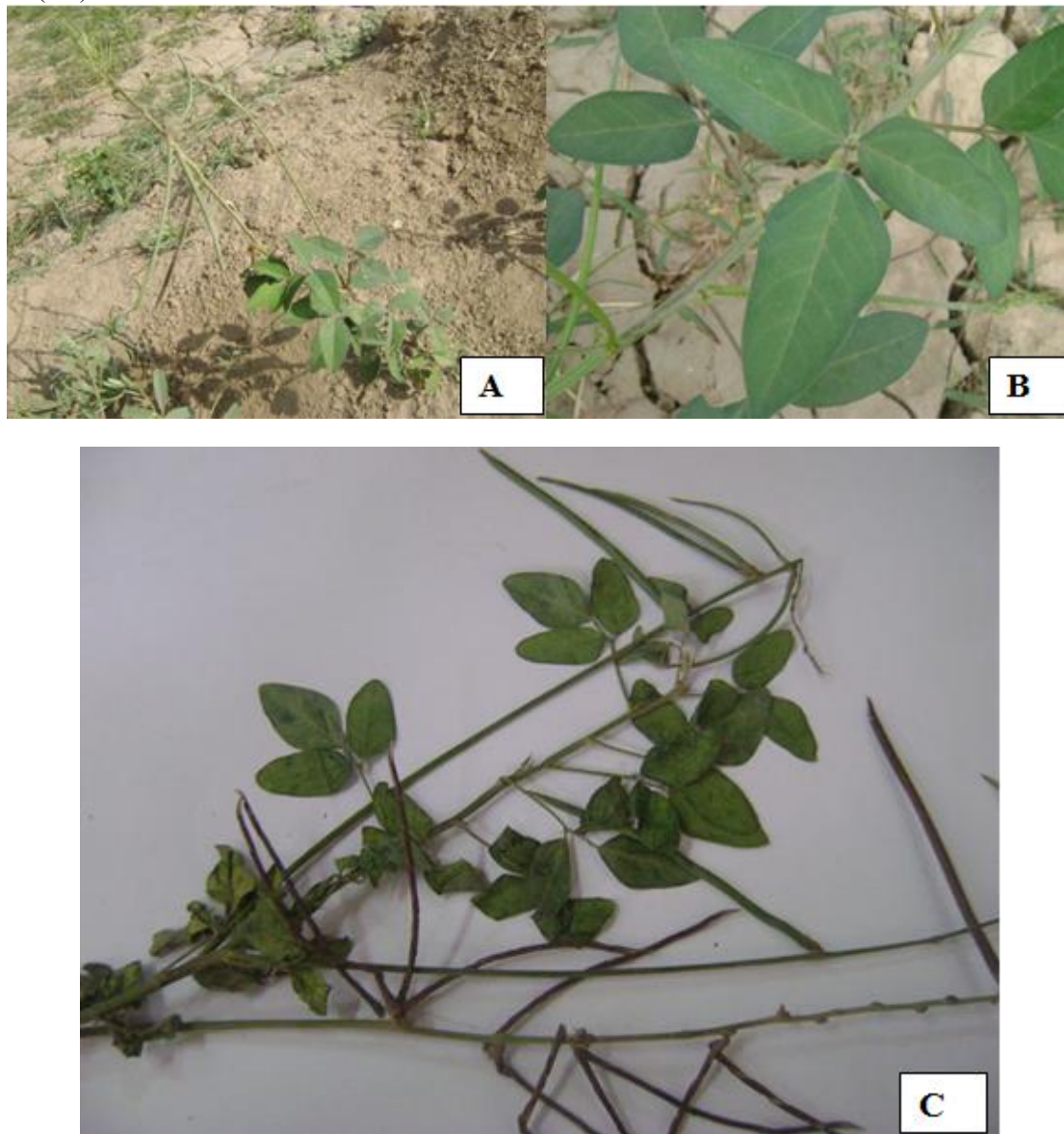
Specimens examined: *Indigofera tritavar. subulata* - Yemen, Al-Kaud village, Abyan governorate, on alt. 20 m a.s.l., 13° 05' 521" N, 45° 21' 668" E, 2. 2. 2011, Othman 5023.

The *Indigofera* specimens collected from Al-Kaud village, Abyan governorate, Yemen, were first compared with the related species in flora of Yemen, then the specimens were identified by comparison of the floras of the neighboring countries (15-18), and it was found that the morphological characteristics of the collected species were identical to those of *Indigofera trita* L. f. var. *subulata* (Vahl ex Poir.) Ali, and thus a new record taxa for the flora of Yemen, with this new record, the total number recorded varieties of *Indigofera trita* L. f. in Yemen has reached three. This variety is distribution in Saudi Arabia, Somalia, Ethiopia and Egypt (14, 15, 17, 18).

Key to the three varieties of *Indigofera trita* in Yemen; Modified after Thulin (1)

1. Pod spreading stiffly outwards from a sharply bent base; stamens c. 3 mm long; leaflets 3 var. *maffeii*
1. Pod hanging alongside inflorescence-axis, straight or curved at the tip; stamens c. 4 mm long 2
2. Leaflets 3 var. *subulata*

2. Leaflets 5-9(-13) var. *scabra*



All photos taken by the first author

Figure 2: *Indigofera trita* var. *subulata*, -A: Habit, -B: Leafy branch showing three leaflets, -C: Branches showing leaves (3-leaflets) and pods axis.

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