A NEW RECORD OF THE GENUS AND SPECIES *TEPHROSIA NUBICA* (PAPILIONACEAE) FROM IRAQ

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ABSTRACT

This study was recorded a new genus and species of Iraq, *Tephrosia nubica* (Boiss.) Baker during the field trips in the Western Desert District, specifically in Al- Walaj valley, which cutting the Iraq- Jordan highway (75 km. West of Rutba) in winter and spring seasons of the year 2019. The species was identified depending on Flora of neighboring and nearby countries with a comprehensive morphological description as well as some drawing and photos for vegetative and floral (reproductive) parts with a distribution map of the species. Some plant samples of the species collected in the Iraqi national herbarium were deposited in numbers 60038,60039, and 60040, in addition to Anbar University herbarium in numbers 4329, 4330 and 4331 after confirming that there is no specimens of genus and species in all Iraqi herbaria.

Key words: Desert, Flora, Morphological study, National herbarium, Wild plants.

تسجيل جديد للجنس والنوع *Tephrosia nubica* من العائلة الفراشية Papilionaceae في العراق

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المستخلص

تم في هذه الدراسة تسجيل جنس ونوع جديدين في العراق هما *Tephrosia nubica* (Boiss.) Baker خلال الجولات الميدانية في مقاطعة الصحراء الغربية، وبالتحديد في وادي الولج، الذي بتقاطع مع طريق المرور والسريع بين العراق والأردن (75كم غرب الرطبة) ، خلال فصلي الشتاء والربيع من العام2019. شُخص النوع اعتماداً على فلورا الدول المجاورة والقريبة، مع وصفه وصفاً مظهرياً شاملاً، فضلاً عن بعض الرسوم التخطيطية والصور الفوتوغرافية والمجهرية للأعضاء الخضرية والزهرية (التكاثرية)، مع خريطة توضح مكان انتشار النوع. تم إيداع بعض العينات النباتية للنوع التي جُمعت في المعشب الوطني العراقي بالأرقام 60038, 60039 و60040 ومعشب جامعة الانبار بالأرقام 4329, 4330 و4331 بعد التأكد من عدم وجود أية عينة معشبيه للجنس والنوع في المعاشب العراقية كافة.

كلمات مفتاحية: الصحراء، الموسوعة النباتية، دراسة مظهرية، المعشب الوطني، نباتات برية.

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INTRODUCTION

The genus *Tephrosia* Pers. Belongs to Papilionaceae family which comprises trees, shrubs, herbs. This family is also known to be cosmopolitan (13). One of the largest families of flowering plants in Iraq is Papilionaceae that involves 590 genera and about 12200 species found in both temperate and tropical regions (15). Represented in Iraq by 40 genera and about 300 species (26). The genus *Tephrosia* comprises about 400 species distributed in tropical and subtropical regions of the world (27). In the Flora of Kingdom of Saudi Arabia, there are about 11 taxa of genus, which are mainly distributed in the northwest region (9). Al-Ghamdi (3) was added a taxonomic key to isolate 9 species in Saudi Arabia based on morphological characters. Six species growing in Egypt were described by Boulus (8), one of them is *Tephrosia nubica* (Boiss.) Baker. In the Flora of United Arab Emirates (15), there are 4 species, which grows in gravel plains (16). It was also the species distributed in Qatar (21). *Tephrosia nubica* is one of the medicinal plant in Saudi Arabia (1, 11). In Malaysia (18), there are many studies that have been interested in the chemical content of some species of *Tephrosia*, where it was found important results proved that the active content acts as antimicrobial, antioxidant and anticancer (25). One of the common names of the *T. nubica* in Saudi Arabia (17) is shamea kheat, while in the United Arab Emirates (15) it is called zafra. The valley of Walaj is one of the important natural plant sources, with a length of about 190 km, which starts from the north of Anaiza mountain heading north to end at the Iraqi-Syrian border (5, 12).

MATERIALS AND METHODS

Three field trips were made to the different regions of Western Dessert District of Iraq, for the valleys that intersect the highway between Rutba and the Iraqi-Syrian border, including the limited areas of Wadi (Valley) Al-Walaj (75 km. West of Rutba) during winter and spring seasons of the year 2019 for plant specimens' collection. The identification of the specimens has been done by using some taxonomic keys in Flora of Saudi Arabia and Egypt, then the specimens were treated herbarially and placed in the Herbarium of Anbar University- Center of Desert Studies (AUH). Some field characters such as corolla color, flowering period, plant height and environment nature were studied. Microscopic characters were obtained by using Japanese compound microscope (Olympus) and canon camera was used for photographing the floral and vegetative parts, the pollen grains were studied after obtained from the anthers depending on the methods of Purvis *et al.*, (22) and Johanson (14). This study also depended on some scientific references (7, 23) of taxonomic terms. All measurements of the vegetative and reproductive organs of the species under study as well as taxonomic treatment were completed (Table 1). A map of species distribution was also organized (Figure 1). Herbarium specimens were prepared and deposited in Iraqi National Herbarium (BAG).

RESULTS AND DISCUSSION

The most important results in this study are a new recording of the genus *Tephrosia* Pers. and the species *T. nubica* (Boiss.) Baker for the first time in Iraq, after confirmation of that exactly where a comprehensive review of all the scientific references for the Flora of Iraq, which includes the Flora of Lowland Iraq (24), wild plants of Iraq (6) and Flora of Iraq (26), as well as conducted survey of all Iraqi Herbarium to make sure.

Table 1. Vegetative and Reproductive characters of the studied *Tephrosia nubica*. *

Cauline leaves (cm.)	**Lower cauline leaves size**	**Leaflet size**	**Upper cauline leaves size**	**Leaflet size**	**Numbers**	**Surface**
	7.3 x 4.4	**2.9 x 0.4**	**5.4 x 3.3**	**2.1 x 0.32**	**5-9**	**Pannose**
	Stipule size	**Bracts size**	**Inflorescence length**	**Number of flowers**	**Peduncle length**	**Pedicel length**
Stipules and Inflorescences (mm.)	**4.2 x 0.6**	**1.8 x 0.7**	**170**	**13**	**38**	**3.9**
	Calyx tube size	**Calyx lobed size**	**Standard size**	**Wings size**	**Keel size**	**Sepals**
Calyx and Corolla (mm.)	**3.1x 3.5**	**4.5 x 1.3**	**10.4 x 7.4**	**9.2 x 2.5**	**10.4 x 4.2**	**unequal**
	Anther size	**Length of free stamens**	**Length of stamens tube**	**Ovary size**	**Style size**	**Stigma size**
Androecium and Gynoecium (mm.)	**0.55 x 0.25**	**2.6**	**7.1**	**4.7 x 2.1**	**5.3 x 0.46**	**0.31 x 0.48**
	Fruit size (mm.)	**Shape**	**Seed size (mm.)**	**Shape**	**Polar axis (µm.)**	**Equatorial axis (µm.)**
Fruit, Seed and pollen grains	**12.1 x 5.7**	**Narrowly ovoid**	**4.8 x 2.5**	**Reniform**	**15.5**	**16.1**

*** The values in the table represent the mean of the measurements taken from 22 plants speciments of *Tephrosia nubica.***

Tephrosia nubica (Boiss.) Baker in Oliv., Fl. Trop. Afr. 2:125(1871); Gillet in K.B. 13:122(1958); Migahid &Hammouda, Fl. Saudi Arab. 1:341 (1978); Boulos, Fl. Egypt 1: 315 (1999); Karim & Fawzi, Fl. U.A.E. 1: 356 (2007). Perennial, subshrub, woody at the base (plate 1), branches many, 60-75 cm., stems ascending, glabrous, dull greenish yellow, 35-48x0.4-0.7 cm. (plate 2). Leaves alternate, imparipinnate, petiolate, leaflets 5-9, terminal ones the largest, lorate or very narrowly elliptic-narrowly lanceolate, margin entire, apex apiculate, base acute, pannose, dark green, lower cauline leaves 6.6-7.8 x3.8-4.8 cm., leaflets 1.8-3.7x 0.3-0.5 cm., upper cauline leaves 4.7- 5.8 x3.0- 3.8 cm., leaflets 1.3- 3.2 x 0.3-0.4 cm., venation is pinnately reticulate (plate 3). Stipules very narrowly subulate, margin entire, apex spiny, glabrous, yellowish brown, 3-5 x0.5 -0.7 mm. . Bracts triangular, very small (1.3-2.2 x0.5-0.9mm.). Flowers in terminal and axillary pseudo-racemes, 22-28x3.5-5.5 cm., peduncles glabrous, pedicels densely villous, dark green, 3.5-4.5x 0.4-0.5 cm. Calyx of 5 in unequal sepals, base-united, very narrowly lanceolate-linear, margin entire, apex acuminate, base truncate, pilose- tomentose, dark green, calyx tube 2.5-3.4x 3.2-3.7mm., lobed 3.6-5.2x 1.1-1.4 mm.. Corolla papilionaceous, standard orbicular, margin entire, apex rounded, bate attenuate, purplish, puberulent, 9.7-10.8 x 7.2-7.8 mm., wings 2, narrowly oblong with lateral claw, apex obtuse, base truncate, 8.8-9.5x 2.3-2.7mm., keel partelly united of 2 petals, broadly oblanceolate, apex rounded, base attenuate, 10.3-10.5 x 3.8-4.6mm. . Stamens 10, united in the longer part (about 75%), cylindrical, surrounded by a pistil, 6.8-7.2 x 1.3- 1.5 mm., free parts of stamens filiform, white- cream, 2.0-2.9x0.12-0.15mm., anthers broadly ellipsoid, cream- brownish yellow, basal attachment with the filaments, 0.42-0.69 x0.18-0.28 mm. (plate 4). Pollen grains white-cream, tricolporate, triangular in polar view, very broadly obovate in equatorial view, small size, polar axis 14.8-16.0 µm., equatorial axis 15.3-16.8 µm. (plate 5). Pistil simple, unicarpous, ovary superior, narrowly obovoid, densely villous - tomentose, white, 4.3-5.0 x1.8-2.2 mm., style terminal, linear, glabrous, white, 4.7-5.8 x 0.4-0.5 mm., stigma discoid, 0.30-0.33 x 0.45-0.52mm.. Fruit pod, narrowly ovoid, wooly, dull yellow-brown, 11-13x 5-6 mm.. Seed only one in each fruit, reniform, chestnut, glabrous, 4.5-5.3 x 2.3-2.8 mm..

Type: Sudan, Kordofan, Kotschy 44 (G, holo., BM, K, iso.!) The most important characteristics of *T. nubica* that are distinguished from other species are: Leaflets 5-9, densely villous-tomentose, fruit (pod) wooly, narrowly ovoid, 11-13x5-6mm. seed

solitary, reniform, chestnut, 5.0x2.5mm.. The seeds have proved their taxonomic importance through persistence, which is confirmed by Al-Ghamdi and Al-Zahrani (4) by studying the same genus. The importance of seeds continues through their transition to new areas. It is expected that the distribution of plant species will change under climate change such as dust storms and temperatures (10). Therefore, this diversity needs to be recent studies to benefit from in the fields of medicine, Such as the study of Al-Badri and Al-Janabi (2) of *Capparis spinosa*, and the study of Obeid and Jaber (20) of *Pelargonium graveolens*. One of the results of the rainy years in the desert region of Iraq is increase of plant diversity and the emergence of new species in the region such as *Lotus garcinii* (Papilionaceae) which was recorded last year in the desert area of Iraq (19).

DWD: Intersection of Wadi Al-Walaj with the highway (75km. west of Rutba to Jordan), 815 alt., 14.4. 2019, M.O. Mousa, 60038 (BAG). The species was studied and categorized by morphological description of vegetative and floral parts as well as some schematic diagrams and microscopic photos of micro organs (Plate 3-5) and (Figure 2).

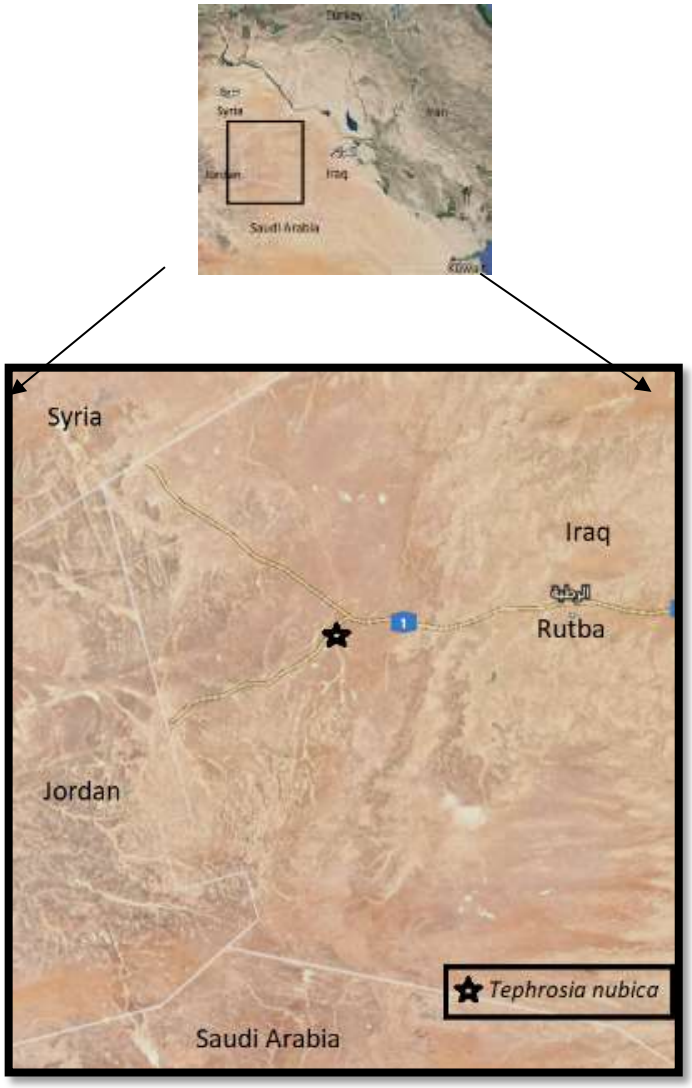
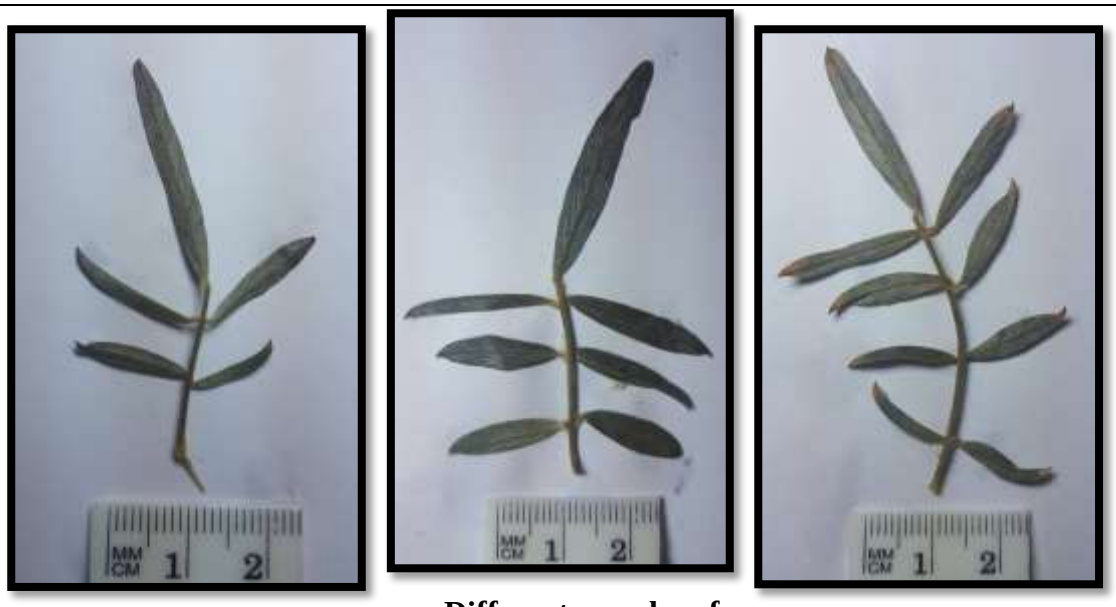


Figure 1. Satellite image of western desert of Iraq

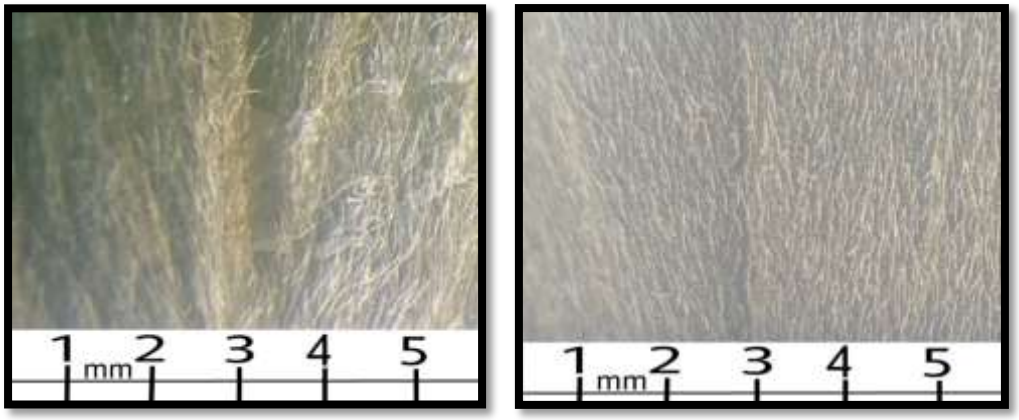
Plate 1. Plant samples shows the woody stems of *Tephrosia nubica*

Plate 2. Herbarium plant samples of *Tephrosia nubica*



Different samples of

cauline leaves



cauline leaf: abaxial **cauline leaf: adaxial**

Pinnately reticulate venation in cauline leaf

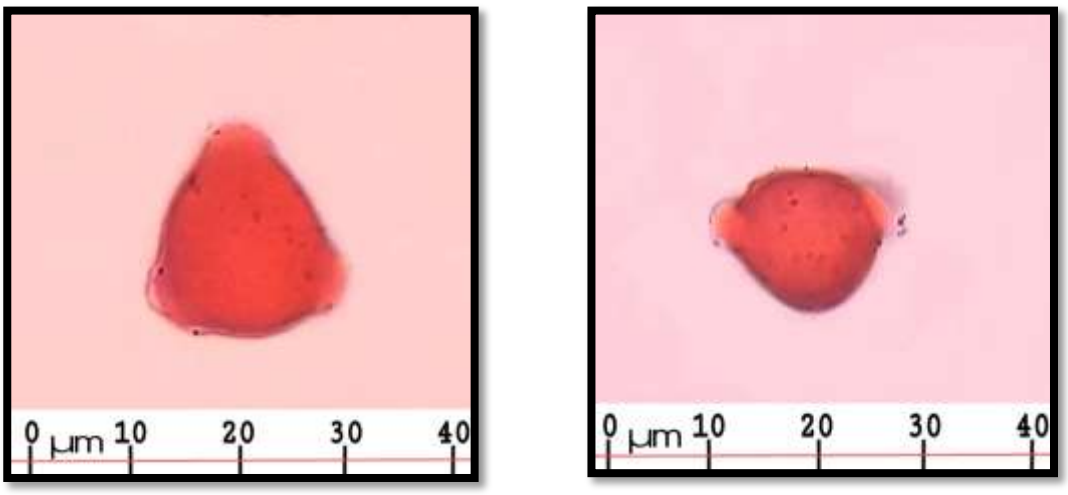
Plate 3. Vegetative parts of *Tephrosia nubica*.

Bracts **Calyx** **Calyx and stamens**

Standard **Two wings** **Keel**

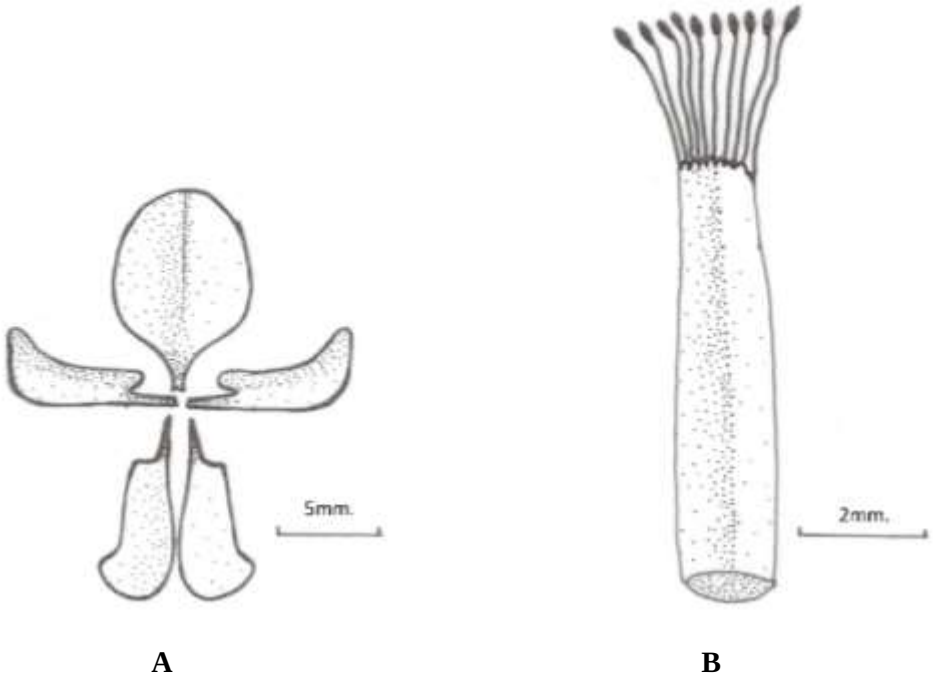
Pistil **Fruit and Seed**

Plate 4. Reproductive parts of *Tephrosia nubica.*



Polar view **Equatorial view**

Plate 5. Pollen grain of *Tephrosia nubica.*



A **B**

Figure 2. Schematic diagrams for some reproductive parts of *T. nubica*: A-Section in papilionaceous corolla. B-Monadelphous stamens

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