

A new record of *cyclotrichium* species (lamiaceae) for Flora of Iraq

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ABSTRACT

Keywords:

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Cyclotrichium straussii (Bornm.) species of Lamiaceae recorded for first time of Iraqi flora in Qupy Qaradagh (Su District) in Iraqi Kurdistan, preserved in National Herbarium of Iraq (Baghdad) as (58917 herbarium number). The general and micro morphology, pollen grain and anatomical were studied. According to the taxonomic references detail study for the morphology. Pollen grains are Polyporate (hexporate), anatomical study investigated the different tissue systems of shoot parts and noted the uniform indumentum of the epidermis including very long non-glandular trichome 1000-3500 µm and three cells stalked glandular trichome 250-495 µm long, also a few sessile glandular trichome which composed of eight cells glandular head, petiole and midrib of leaves showed flat arc vascular bundles.

تسجيل جديد للنوع *Cyclotrichium* من العائلة الشفوية للفلورا العراقية

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الخلاصة

استهدف البحث الحالي تسجيل النوع *Cyclotrichium straussii* (Bornm.) من العائلة Lamiaceae لأول مرة والنامية بصورة طبيعية في كردستان العراق في منطقة قوبي قراغ ضمن مقاطعة السليمانية الطبيعية، وحفظت عيناتها المعشبية في المعشيب الوطني العراقي في بغداد تحت رقم 58917 وقد تناول البحث الجوانب المظهرية العامة وحبوب اللقاح وكذلك الجوانب التشريحية. تم الاستفادة من المصادر ذات العلاقة المرسله من الخارج، و شخص النوع بعد اجراء الدراسة المظهرية، و اظهرت الدراسة بان حبوب اللقاح سداسية الفتحات.

أظهرت الدراسة التشريحية وجود نمط واحد من الكساء الشعري لبشرة الاجزاء الخضراء للنبات متمثلة بشعيرات لاغدية طويلة 1000-3500 مايكروميتر وشعيرات غدية معنقة ثلاثية الخلايا ذات طول 250-495 مايكروميتر وشعيرات غدية جالسة مؤلفة من ثمان خلايا ذات رأس غدي واحتوت اعناق الاوراق والعروق الوسطي حزمة وعائية بشكل هلال في المقطع العرضي.

الكلمات المفتاحية:

تسجيل جديد، *Cyclotrichium*،
العائلة الشفوية، الفلورا العراقية.

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Introduction:

The genus *Cyclotrichium* Bioss belongs to Lamiaceae family, and contains about 100 species distributed through all parts of the world (11). Although *Cyclotrichium* has been established as a separate genus since 1953 (16). South-west Asia is a speciation centre for *Cyclotrichium* (14, 15; 17, 18; 6, 7 and 10). *Cyclotrichium* species contain aromatic essential oils and hence they are

often utilized as spices. They are also consumed as herbal tea in Turkey (3). *Cyclotrichium* Boiss. with 6 species in the genus *Calamintha* by Boissier in *Flora Orientalis* (5). While Davis (8) divided the genus *Cyclotrichium* in (Turkey) into 5 species that the genus *Cyclotrichium* belongs to the family Lamiaceae which supported by (18) in (Flora of Iran) and the genus is with 6 species including the species grow in Iraq, while according to (2, 21 and 4) *Cyclotrichium stamineum* grow in Iraq. Therefore, this study aims to report the occurrence of this species in flora of Iraq for the first time, and described its distribution and habitat in Iraq along with its morphological, palynology and anatomical characters.

Materials and methods:

1-Morphological study:

Cyclotrichium specimen was collected during the field survey in July 2011 and saved in BAG herbarium could not be identified by using flora of Iraq. The specimen was studied in detail and all plant parts by Dissecting Microscope and the Compound Microscope and diagnosed correctly in the laboratory, the sample was given an identity label indicating the scientific name, number, date, place of collection, soil type and height above sea level measured by (GPS) Global positioning system of the type (Garmin GPS-72) and recorded some environmental observations as well as the name of the collector. Through what has collected during field trips as well as on installed on herbarium species, and the species was photographed in the field during trips so as to indicate the type of environment in which they live for the General Authority for plants.

2-Palynological study:

During the field trips, pollen grains of the plant which is under study was collected from anthers of mature floral buds in the field and saved in ethanol 70%. Anthers placed in a watch glass and added some drops of Glycerin Safranin pigment to it (20 and 1). These anthers were opened by anatomical needle for two minutes and crushed to get the pollen grain and exposed them to the pigment. The pollens had been crushed by dropper for species and placed on a clean glass slide. After that the cover placed gently and examined under the power zoom (400X and 1000X) of a compound light microscope type (Meiji 4300L, Japan)

Pollen grains studied for species were 25-30 and the dimensions of each grain in the (P) Polar view and the (E) Equatorial view and exile thickness were measured and range value was recorded for each measurement using the Ocular micrometer of the same provider company. The shape of Pollens was described in detail and pictured using oil lenses of compound light microscope type Meiji 4300L.

3-Anatomical study:

The different parts of the present species including stem, leaf and petioles was collected and preserved in F.A.A solution (Formalin, Acetic acid, Alcohol), cross sections prepared directly by Razor blade as hand free section, leaves sectioned by Freezing microtome (SLEE Model *mtc*-Germany), samples stained with Safranin O (provided by Sharlu of Spain) while leaves and it is epidermis checked directly. Prepared sections examined by light microscope (Meiji 4300L, Japan), prepared slides documented by (Canon Camera Kiss model) different cells, tissue and tissue systems detected.

Results and discussion:

1-Morphological study:

Cyclotrichium straussii (Bornm.) Rech.f., Fl. Iran. 150: 516 (1982).

Synonyms: *Calamintha Straussii* BORN. Beih. Bot. Centrbl. 22, 2: 119 (1907).

Calamintha straussii Bornm., Beih. Bot. Centrbl. 22(2): 119 (1907).

Suffrutescent herbs. Stem erect or ascending, 9-23 cm long, simple, with dense eglandular white pilose-villose and dense glandular minute hairs. Leaves ovate-suborbiculate, 10-13 × 7-9 mm, apex acute, base obtuse-rounded, margin blade obsolescent serrulate, with dense white non-glandular pilose-villose hairs and sessile glands on abaxial; petiole 1-3 mm. long. Verticillaster 2-many flowered; peduncle 2-4 mm long. Bract ovate, 4-11 × 2-9 mm, apex acute, petiole c. 1mm, bracteolate lanceolate-linear, 3-5 × 1 mm, eglandular white villose hairs with sessile glands.

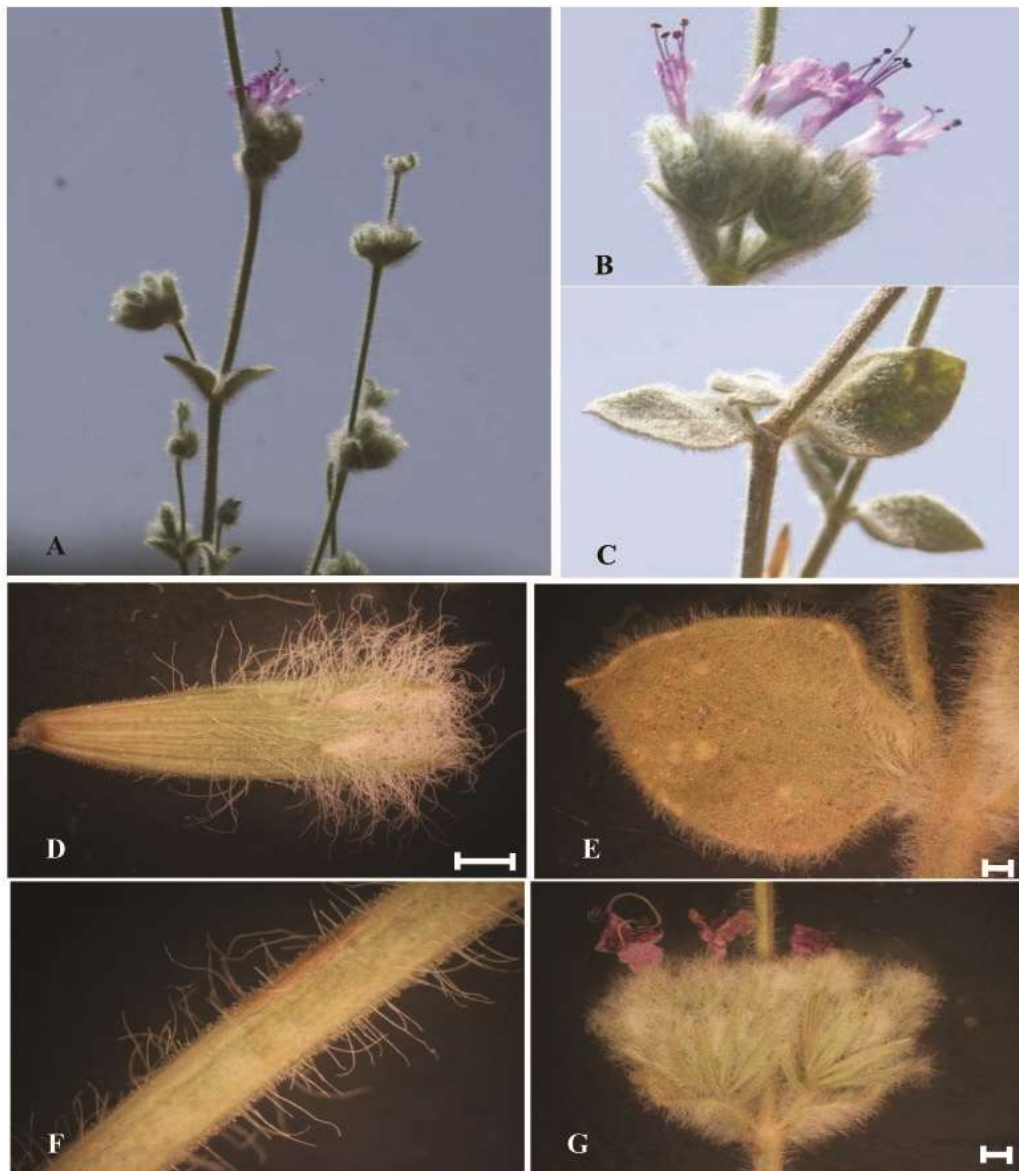



Plate 1: *Cyclotrichium straussii*, A-C: sample in field; D-G: specimen in herbarium ( 1mm).

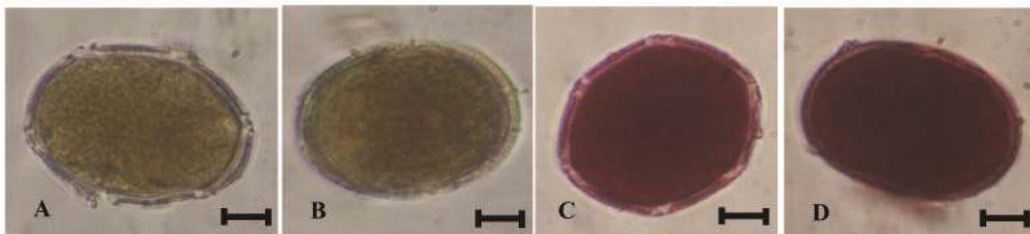



Plate 2: The shapes and dimensions of pollen grain of the species; A&C polar view, B&D Equatorial view ( 10µm)

Pedicle 0.5-1 mm long. Calyx bilabiate, tubular, straight, 5.5-6 mm long, 13-veined, tube 3-4 mm long, throat with very dense non-glandular pilose hair, limb 5 toothed, subulate-lanceolate, 3-upper shorter than 2-lower, upper teeth 1-1.25 mm long, lower teeth 2 mm long, with spreading non-glandular villose and dense minute glandular hairs outside. Corolla bilabiate, c. 10 mm long, in dry specimen pale pink, upper lip

2-lobed, apex emarginated, lower lip 3-subequal lobed, tube resupinate (twisted in base) which make upper lip site lower (abaxial), lower lip site upper (adaxial), tube exerted, with hair ring in throat. Stamens 4, exerted out corolla, didynamous, posterior pair (lateral pair) slightly longer than anterior pair (inner pair), the posterior pair c. 13 mm long, the anterior pair c. 12 mm long, anther 2-parallel celled, c. 1 mm long. Style exerted almost longer than stamens, 14-14.5 mm long, stigma 2-lobed, unequal, subulate.

Specimen seen. Iraq:Sulaimania;Qupy Qaradagh , 15/7/2011, Khalid F. Darweesh, 58917 in BAG (Plate 1 A-G).

Habitat: Clay soil between rocks on mountain slope;

Alt. N 35° 16.022, E 045° 21.593.

Elevation 1110-1120 m.

Distribution: Iran (Edmondson, 1982; Rechinger, 1982)

2-Palynological study:

The pollen grains of *Cyclotrichium straussii* are Isopolar, medium sized, simple apertures and hexaporate (9). Polar axis (P) is between 32.7-35.0µm, equatorial axis (E) 28.0-28.8 µm, and P/E rate 1.19. The shape of pollen grain is Ovate to sub ovate in the Polar view and equatorial view. The exine thickness is between 0.2 – 0.3 µm. The ornamentation is Reticulate (Plate 2).

3- Anatomical study:

Structure of plant organs as taxonomic evidence restricted mainly on stem, leaf and petioles also some structures as stomata (12). Our investigation showed that stem have the typical anatomy of family Lamiaceae , the elongated quadrangular cross section with four corner occupy by a few layers of lamellar collenchyma (Plate 3, A-D), the cross section of stem showed a single layer epidermis with regular shape and size ,under the epidermis a thick layer of uninterrupted chlorenchyma were lie as in most green grasses , uniform indumentum of the epidermis in green parts(Shoot) an accumulation of very long granulated non-glandular trichome 1000-3500 µm (Plate 1 D-G and Plate3, A,C,Q)three cell stalked glandular trichome 250-495 µm long , a few sessile glandular trichome disc like composed of eight cells (Plate 3, M-R).

Completed vascular cylinder of stem, the vascular bundles distributed mainly in two opposite sides also small bundles in between joined with four main bundles by a thick layer of sclerenchyma of xylem in two other sides of stem, the ground tissue (Pith) consisting a number paranchyma mixed with the elements of xylem which showed cells with pitted walls(Plate3,F), cross section of petiole showed crescent arc vascular bundles and variable collenchyma around the bundle also the anatomy of leaf midrib seem to be continue to the petiole (Plate3G,H), the mesophyll dorsiventral differentiated to palaside and spongy layers , Both Adaxial and Abaxial face with irregular cells in shape with wavy moniliform margin (pits) and scattered anisocytic stomata also dense common uniform indumentum (Plate1E, Plate3 I-M).

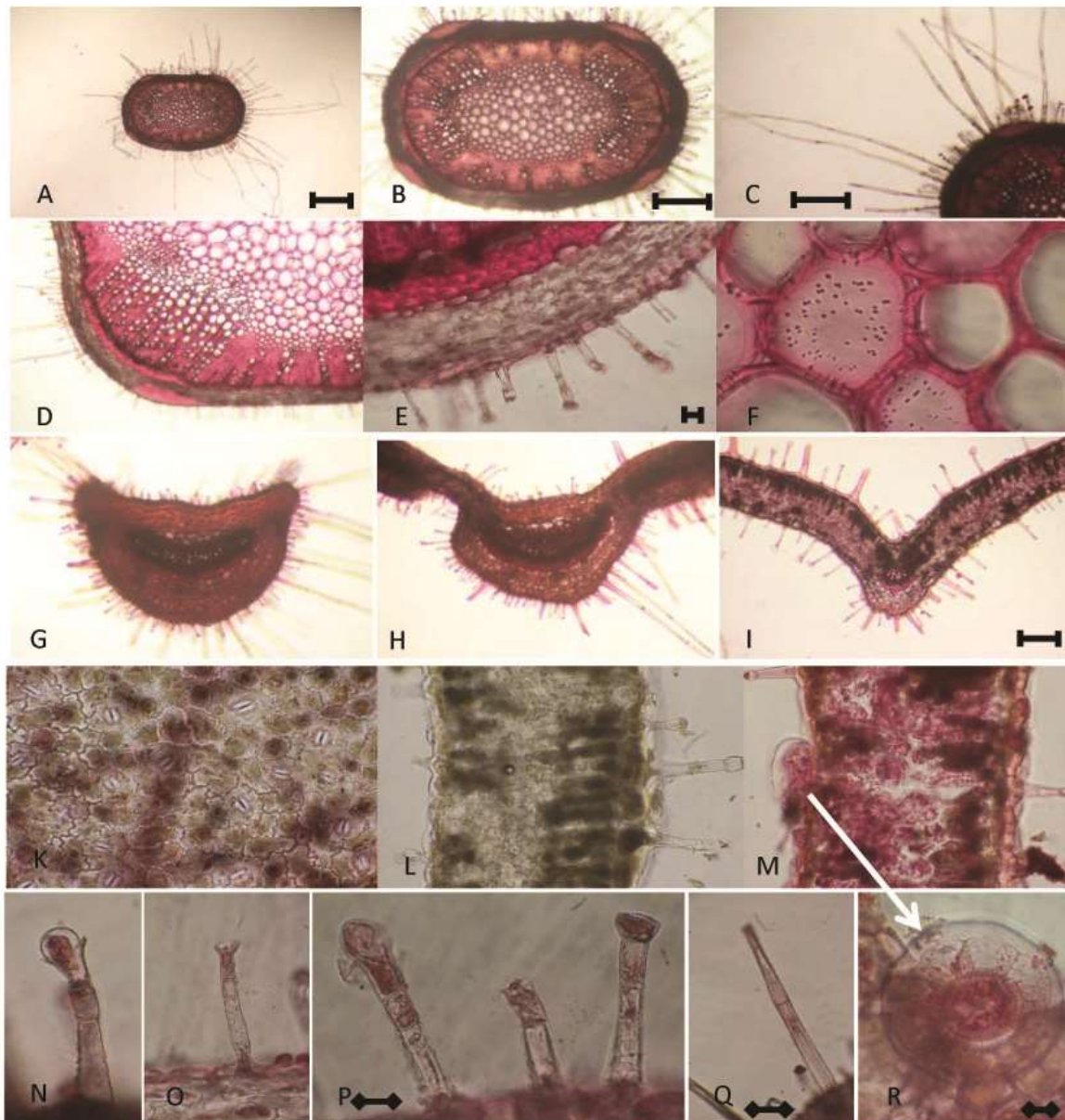


Plate 3: Anatomy of *Cyclotrichum starussii*, **A:** Cross section of stem near inflorescence; **B:** Cross section of late stem; **C:** Trichomes on stem; **D, E:** Part of cross section of stem; **F:** Collenchyma and Sclerenchyma of Cortex; **G:** Cross section of Petiole; **H, I:** Cross section of leaf midrib; **K:** Stomata and normal epidermal cells; **L, M:** Cross section of leaves; **N-P:** Common glandular trichome; **Q:** Non-glandular trichome; **R:** Sessile glandular trichome. (**┃** 1mm)(**◄►** 100μm).

References :

- Abdul-Razaq, R. T. (2008). A Comparative Systematic Study of Taxa of Subfamily Pomoideae (Rosaceae) in Iraqi Kurdistan. Ph.D. Dissertation. College of Agriculture, Horticulture, University of Sulaimani.
- Al-Rawi, A. (1964). Wild Plants of Iraq with their distribution, Tech . Bull. 14, Dir Gene of Agr. Res. Proj. Ministry of Agriculture, Government Press, P.151.
- Baser KHC, Kirimer N, Kurkcuoğlu M, Ozek T & Tumen G (1996). Essential oil of *Cyclotrichium origanifolium* (Labill.) Manden. & Scheng. From Turkey. *J Essent Oil Res* 8: 569-570.
- Blacklock, R. A.(1948). The Rustam herbarium, Iraq. - Part 1 Kew Bull., 4: 517-553.
- Boissier E (1879). *Flora Orientalis*, Vol 4, pp. 575-583. Basel/Geneve:
- Davis PH, Mill RR & Tan K (1982). *Flora of Turkey and the East Aegean Islands*, Vol. 7. Edinburgh: Edinburgh University Press.
- Davis PH, Mill RR & Tan K (1988). *Flora of Turkey and the East Aegean Islands* (Suppl. 1). Edinburgh: Edinburgh University Press.
- Davis, P. H. (1982). *Flora of Turkey and the East Aegean Islands* Edinburgh, Univ. Press. 7: 346-349.
- Edmondson ,L. (1974). The Calaminthoid genera in Turkey: New names in *Acinos* and *Cylotrichium*, including a new species from N. Iraq. *Bitki* 1: 403-408.
- Edmondson ,L. (1982). *Cyclotrichium* (Boiss.) Manden. & Scheng. In: PH Davis, (ed.) *Flora of Turkey and the East Aegean Islands*, Vol. 7. pp. 346-349. Edinburgh University Press.
- Erdtman, G. (1971). Pollen morphology and plant taxonomy, Angiosperms. European. Volume 2 Rosaceae to Umbelliferae, Cambridge University Press. Vol 2: 469 pp.U.K.
- Guner A, Ozhatay N, Ekim T & Baser KHC (2000). *Flora of Turkey and the East Aegean Islands* (Suppl. 2). Edinburgh: Edinburgh University Press.
- Harley RM, Atkins S, Budantsev AL, Canlino PD, Conn BJ, Grayer R, Harley MM, De Kok R, KresLovskaja T, Morales R, Palon AJ, Ryding O & Upson T (2004). Labiatae. In: Kadereit JW, Ed. *The families and genera of vascular plants*, Vol. VII. – Flowering plants: dicotyledons (Lamiales except Acanthaceae including Avicenniaceae). Berlin and Heidelberg: Springer Verlag, 167–275.
- Judd, W. S., Campbell, C. S., Kellogg, E. A., and Stevens, P. F. (2002). *Plant Systematic*. Sinauer associates, Inc., Sun – derland, Massachusetts. U.S.A.
- Labiatae. In: JW Kadereit, (ed.) *The Families and Genera of Vascular Plants, VII, Flowering Plants-Dicotyledons, Lamiales, except Acanthaceae including Avicenniaceae*. pp. 167-229. Berlin: Springer-Verlag.
- Mandenova I & Schengelia E (1953). Novum genus *Labiatarum Antasiaticum*. *Not Syst* 15: 332-337.
- Rechinger KH (1952). *Calamintha leucotricha* Stapf., *Cyclotrichium glabrescens* Boiss. & Kotschy. *Oesterreichische Bot Zeit* 10: 62- 64.
- Rechinger KH (1982). *Flora Iranica*, Vol. 150. Graz: Verlagsanstalt.
- Rechinger, K. H. (1982). *Scutellaria* L. in: Rechinger, K. H. .*Flora Iranica*. vol. 150 Akademische Drucks Verlagsantalt ,GrazAustria. P.514517.
- Sass, J. E. (1958). *Botanical micro technique*. 3rd. Edition the Iowa stat University press.228 p.
- Zohary, M. (1946). *The Flora of Iraq and its Phytogeographycal subdivision*. Iraq. Dept. Agr. Bull. 3-Baghdad. 130pp.