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Taxonomic Study for the New Record *Helichrysum orientale* (L.) DC. (Asteraceae) in Iraq

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Abstract

Helichrysum orientale (L.) DC.is a new plant record within Asteraceae family in Iraq,from Kani-Masi (north-east of Duhok) within Amadiya district (MAM).Identification and morphological study have been done, these illustrated by graphs. In addition, Pollens character have been clarified like shapes, colors, sizes, surface ornamentation and numbers. As well as, some features of the stem anatomy have been examined.

Introduction

Asteraceae is one of the families in Iraq, includes 22750 species of 1528 genera over the world [1], in Iraq consist of 382 species within 49 genera [2]. [3] Indicated 16 species of the genus in Turkey including *H. orientale*. [4] stated 16 species of the genus *Helichrysum*in Europe, *H. orientale* is one of them. [5] mentioned that 20 species of the genus present in Iran.In the low lands of Iraq [6] pointed out 1 species.Whilst [2 and 7] stated 5 species in Iraq.[8 and9] indicated 1 species in Pira magrun mountain andChoman region separately. [10 and 11] mentioned 2 species of the genus in Sinjar and Hawraman mountains respectively. [12, 13 and 14] did not stated the genus *Helichrysum*in Haibat Sultan mountain,DarbandGomaspan and Hujran Basin correspondingly. In all the available references, the study did not find any species refer to *H. orientale*, therefore the studied specimens regarded as a new record in Iraq.
The purpose of the current study is to confirm the presence of *H. orientale* in Iraq and to study the morphological characters as well as some pollen grains characters, with stem anatomy of the species

Materials and Methods

For plant specimen's collection, various scientific trips were made to the different regions of northern districts (Kurdistan region) of Iraq in 2017, during spring and summer seasons. Identification of the specimens has been done by using the key in the Flora of Turkey, the specimens were treated herbarially to become formal specimens, and preserved in herbarium of Education College-University of Salahaddin, Erbil (ESUH). Kruss dissecting microscope has been used in the examining of the collected specimens that belong to *H. orientale*. Some environmental notes have been mentioned, and a map (figure 1) was used. For the pollens, anthers fixed in FAA (Formalin-glacial acetic acid-ethyl alcohol) solution, then a single anther

removed and placed in a drop of water or 50% glycerol (the latter to prevent the material from drying out) and dissected with a scalpel to extrude the pollens; the anther wall material removed and a cover slip applied. Then, the pollens stained with safranin [1].A mobile camera (Sumsung-A5) has been used for photographing the different plant partsand the scientific terms that used in the study have been taken from[15], [16] and [17]. For the stem anatomy, the procedure in [18]has been used and the information in [19] were utilized.

Results and Discussion

A. Morphological Study

Helichrysumorientale(L.) DC., Prodr. 6: 183 (1838). Syn: *Gnaphalium. orientale*L., Sp. Pl. 853 (1753). Ic: Sibth. & Sm., Fl. Graeca 9: t. 858 (1839); Fl. RPR 9: t. 47 f.2 (1964); Fl. Turkey, Davis and Kupicha, 5: 84 (1975).

Perennial, herbs, suffruticose, lanate, (14-21) cm. Stem branched (6-11 branches), bearing rosettes, green-yellow, branches (70-100)x(1.0-1.5) mm. Leaves sessile,alternate-spiral, margin entire, apex acute or acute-acuminate, base truncate, green, basal leaves oblanceolate or narrowly oblanceolate, (12-16)x(2.3-4.8) mm, lower cauline leaves narrowly oblanceolate or narrowly oblanceolate-cultrate, (15-18)x(2.8-3.2) mm, upper cauline leaves cultrate, (11-14)x(2.6-3.3) mm. Inflorescencea hemispherical or hemispherical-spherical capitulum, (6-10)x(9-10) mm, phyllaries imbricate, 5-6 rows, outer ones ovate, narrowly ovate, margin entire, apex and base obtuse, lower part erect, upper part recurved outwardly, glabrous, bright yellow, light green in lower part, (6.0-7.5)x(2.5-4.2) mm, inner ones narrowly oblanceolate linear or narrowly oblanceolate-linear, margin entire, apex acute or obtuse, base obtuse, glabrous, yellow, (5.1-7.0)x(0.8-1.6) mm, receptacle flat and naked. Flowers numerous, discoid, hermaphrodite,Calyx pappus of about 22-25 hair like structures, yellow, (6.2-7.5)x(0.03-0.04) mm, Corolla tubular, of tube and limb, yellow, tube (4.0-5.5)x(0.3-0.4) mm, limb of 5 lobes, triangular, margin entire, apex acute, (0.45-0.60)x(0.50-0.70) mm, Stamens 5, epipetalous, syngenesious, exerted, filaments filiform, inserted on the middle of corolla tube, yellow, (2.0-2.5)x(0.15-0.25) mm, anthers linear, yellow, basifixed attachment with the filaments, (1.8-2.4)x(0.20-0.30) mm.Ovary inferior, narrowly oblong, yellow, (1.0-1.4)x(0.30-0.35) mm, style 1, filiform, swollen at base, bi-branched at apex, yellow, (4.0-4.7)x(0.12-0.20) mm, stigma 2, (0.60-0.75)x(0.12-0.15) mm. Fruit simple, dry, achenial, cypsela. (Plates 1-4).

Type: Described from the Orient(Hb. Cliff.!).

Studied samples

MAM: ESUH/ Kani-Masi (north-east of Duhok) within Amadiya district, 900 m, 10.6.2017, 7597.

Environment notes

The plant was found as individuals within the area, in the rocky soils**;** altitude: 900 m; flowering: June. (Figure 1).

B. Palynological study

Pollens yellow, single, angular, tricolporate, oblate-subspheroidal with obtuse ends in equatorial view, triangular-subspheroidal with obtuse angles and convex sides in polar view, small size according to [20], equatorial axis 15-19 µm, polar axis 14-17 µm, echinate surface ornamentation, numerous. (Plate 5).

C. Anatomical Study

A cross section of the middle of a flowering stem has been taken to be the material of the stem anatomy. The epidermis was a single continuous layer of elongate or irregular cells, having different sizes; The thickness of the epidermis depending on the differences in the cell sizes. have two projections in the ends, sinuate radial walls, straight or convex external and internal walls, 5.00-12.5 µm. The cuticle layer was 2.50-5.00 µ.The cortex consists of 2-3 layers of parenchymal tissue, outer thicken walled, inner thin walled, the cells of different shapes and sizes, oblong, semi-circular, 17.5-37.5 µm. The vascular tissue as a ring, of xylem and phloem, xylem of vessels, phloem involving sclerenchymal elements, 50-75 µm. The pith consists of parenchymal cells, thick or thin walled, polygonal (5-8 faces), with intercellular space, 300-350 µm. (Plate 6).

The current work studied the new plant record *H. orientale*from Asteraceae family in Iraq, and included some features as the morphological characters and the environment. Within the literature review about the genus *Helichrysum*in Iraq, involving the plant specimens of National Herbarium of Iraq (BAG), College of Science Herbarium, University of Salahaddin-Erbil, Iraq (ARB) and College of Education Herbarium, University of Salahaddin-Erbil, Iraq (ESUH), the researcher did not find any specimens belongs to *H. orientale*, therefore the study regarded the studied plant specimens as a new record for the Flora of Iraq from Kani-Masiregion.

*H. orientale*has some characters differ from the related species which is *H. arenarium*(L.) Moench that present in Iraq and has the following characters: Plant suffruticose, lanate; stem branched, bearing rosettes; phyllaries imbricate,outer one's apex and base obtuse, inner one's apex acute or obtuse, base obtuse;receptacle flat and naked.Pollens were single, tricolporate, oblate-subspheroidal in equatorial view, triangular-subspheroidal in polar view, small size according to [20], echinate surface ornamentation, numerousin number; the stem anatomy showed that the cortex consist of 2-3 layers of parenchymal tissue, outer thicken walled, inner thin walled, the vascular tissue as a ring, xylem of vessels, phloem involving sclerenchymal elements, the pith consists of parenchymal cells, thick or thin walled, polygonal, with intercellular space.(Plate 6).

Figure- 1: A map of Iraq shows the location of *H. orientale*●

Plate- 1: Photograph of *H. orientale*

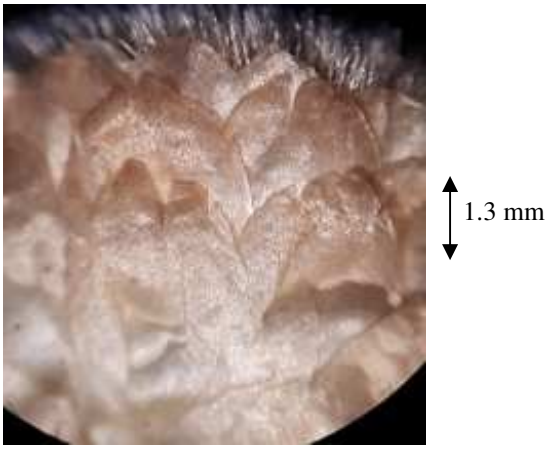
Plate- 2: Stem rosettes of *H. orientale*

Basal leaves

Lower cauline leaves

Upper cauline leaves

Lanate hairs



Phyllaries

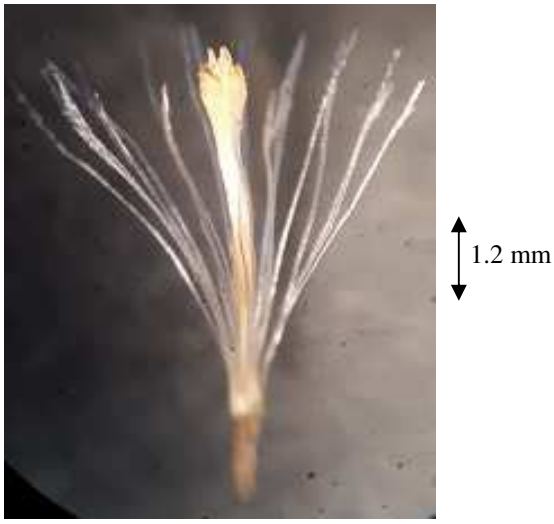
Receptacle

5 mm

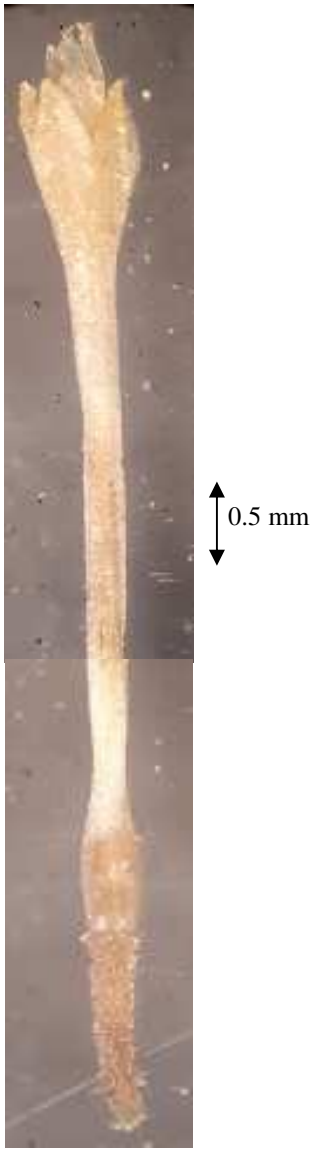
Plate- 3: Different parts of *H. orientale*

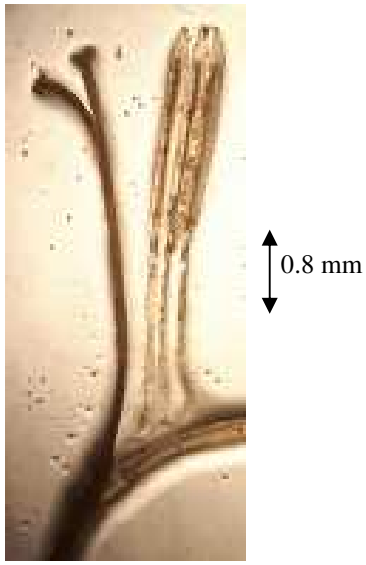
Outer phyllaries

Inner phyllaries



Flower

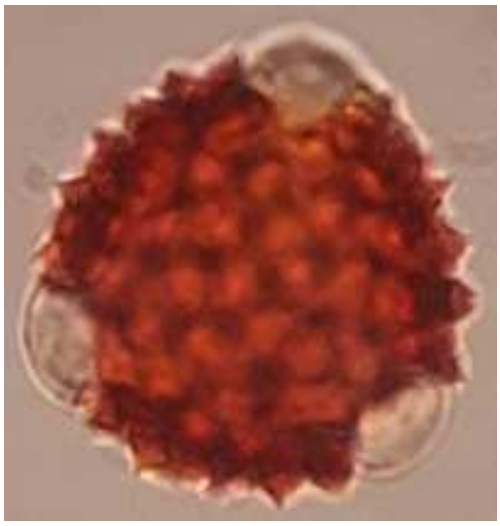




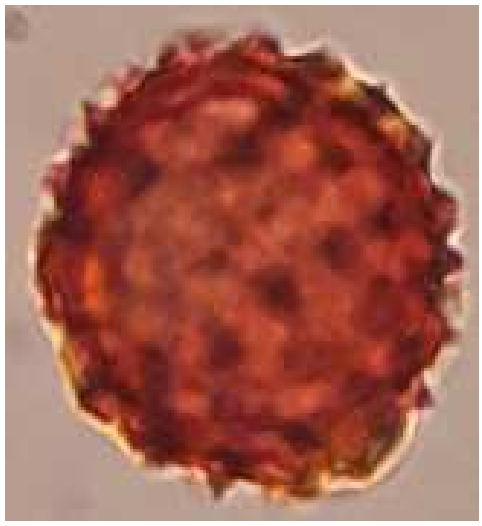
Stamens, Style & Stigma

Flower without calyx

Plate (4): Reproductive parts of *H. orientale*

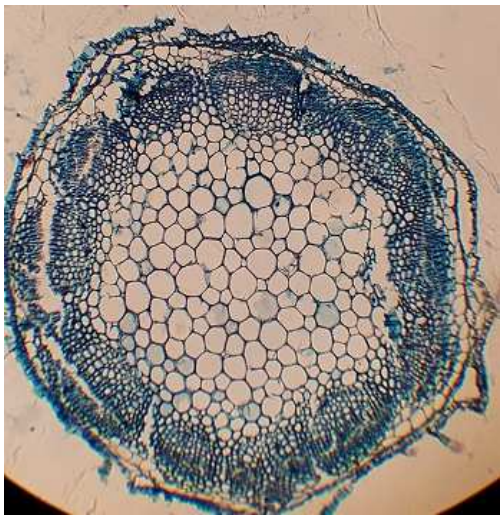


Polar view

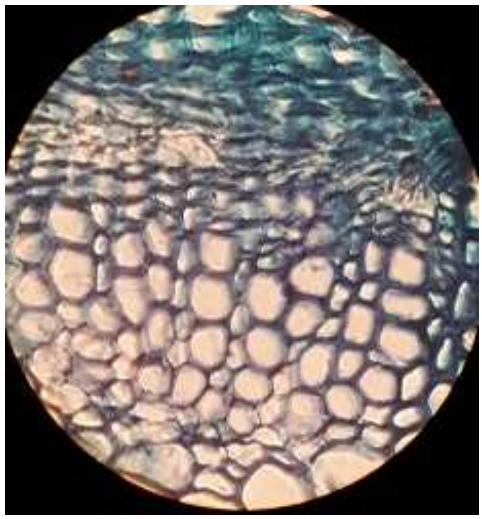


Equatorial view

Plate (5): Pollens of *H. orientale*X1000



Whole section X100



Vascular bundle X1000

Plate (6): C.S. of the stem of *H. orientale*

Conclusions

The present studyconfirmed the presence of the plant *H. orientale*from Asteraceae family as a new record for the Flora of Iraq which collected from Kani-Masiregion (north-east of Duhok), as well as, morphological, palynological and anatomical studies have been conducted for the plant under study.

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