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STUDIES IN GUNDELIA: 1
A NEW SPECIES FROM IRAQ*

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ABSTRACT. *Gundelia rosea* Hossain & Al-Taey (Compositae) is described from Iraq. It was previously only recognized as a form of *G. tournefortii* L.: *G. tournefortii* f. *purpurascens* Bornm. Chromosome counts of 2n = 18 are recorded from root-tips of *G. rosea* and *G. tournefortii*.

INTRODUCTION

According to Al-Rawi's *Wild Plants of Iraq* (1968) the genus *Gundelia* is represented in Iraq by two species: *G. tournefortii* L. and *G. purpurascens* Bornm., the former occurring over a wide area covering lower Jezira, the Western Desert, Sinjar, Amadiya, Rawanduz, Erbil, Kirkuk, Sulaimaniya and the Persian Foothill districts, and the latter, in a limited area in the Erbil and Rawanduz districts (see map, fig. 1). Of these, *G. tournefortii* is a well-known species, which also occurs in Cyprus, Syria, Turkey, N Iran and the Transcaucasian and Transcaspian regions. But the taxonomy and nomenclature of plants referred to as *G. purpurascens* Bornm. have, however, never before been critically examined.

In *Index Kewensis* (Suppl. X, 102) *G. purpurascens* is recorded as follows: *'Gundelia purpurascens Bornm. in Beih. Bot. Centralbl.* lx. B. 197 (1939), in obs., pro syn.: G. tournefortii L. forma purpurascens *Bornm.'* In the original publication in *Beih. Bot. Centralbl.* loc. cit., it appears in the following context:

Gundelia tournefortii L. Boiss. fl. Or. III, 421.

Sudöstl. Persien: Prov. Kerman, im Gebirge bei Deh-bala (Umgebung der Stadt Kerman), 2300 m (25.IV.1892; no. 4057).

Kurdistan (Assyrien): Erbil (Arbela) im Gebirge Kuhsefin, beim Dorfe Schaklava, 900 m (16.V.1893; no. 1407 f. *purpurascens,* capitulo necnon bracteis flosculas purpureas subduplo superantibus intense purpureotinctis; distrib. sub. '*G. purpurascens* Bornm. ad. int.').

Clearly, in this original publication, the author himself not only did not accept the name *G. purpurascens* but rejected it in favour of *G. tournefortii* L. f. *purpurascens* Bornm. According to Art. 34 of the *International Code of Botanical Nomenclature* (1972), therefore, the name *G. purpurascens* Bornm. is not validly published, and has no standing. The correct name for the taxon represented by *Bornmüller* 1407 (isotype K, photo!), therefore, is *G. tournefortii* L. forma *purpurascens* Bornm. Bornmüller does not seem to have been the first to discriminate the purple-flowered gundelias. In his protologue of *G. tournefortii* (*Sp. Pl.* 814, 1753), Linnaeus included the following phrase-name under *β* 'Gundelia orient-

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alis, acanthi aculeati folio, floribus intense purpureis, capite araneosa lanugine obsito. *Tournef. cor.* 51.', but no formal name or epithet was given to var. *β*. Bornmüller distinguished f. *purpurascens* on the basis of the deep purple colour of the outer surface of the corolla and of the floral bracts. Observations in the field show that the inner surface of the corolla in these plants varies from bright to light pink in colour and is never yellow as in the other gundelias. Since the corolla closes on drying, detection of this colour difference in herbarium specimens needs careful examination, or dissection of flower.

The gundelias vary considerably in the degree of incision of the leaf-blade, length of bracts subtending capitula, flower-colour, etc. Three varieties are recognized in the literature under the only accepted species, *G. tournefortii,* on the basis of specimens from Syria and Turkey: var. *tenuisecta* Boiss., with subpinnatipartite leaves, var. *armata* Freyn & Sint., with markedly long bracts subtending capitula, and var. *tournefortii,* with characters intermediate between the other two. Plants corresponding to these variants also occur commonly in Iraq, but observations in the field show that they represent extremes of a continuous range of variation, so that, although the extremes look distinct, many intermediates occur which are impossible to assign to a variety. It may be recalled here that during a recent examination of the genus, Kupicha (in Davis (ed.) *Fl. Turk.* 5:326, 1975) also found a number of intermediates between these varieties. In Iraq, in every local population examined so far, the extremes and the intermediates have been found to occur intermingled. However, when considered against *G. tournefortii* f. *purpurascens,* these three varieties stand out by the following common features: the corolla is always bright to light yellow inside, never pink, and rusty brown, or sometimes purple, outside.

Plants of *G. tournefortii* f. *purpurascens* also show exactly the same kind of variations in leaf incisions and bract lengths as do the varieties mentioned above, so that the forma cannot be assigned to any one of these varieties.

The present paper summarises some of the data obtained from a detailed study of the two types of plants hereafter called 'tournefortii' and 'purpurascens'. The study included morphology, anatomy, cytology, pollen morphology, etc., but only results which show taxonomic significance are reported here. Table 1 summarizes the morphological differences discovered.

Important differences in the habitat and distribution of 'tournefortii' and 'purpurascens' also occur. In Iraq 'tournefortii' occurs in the plains and at the lower altitudes (c.500 m) of the foothills of the country's northern hump (see map, fig. 1) and 'purpurascens' in the mountains of the north-east at altitudes around 900 m. Of the two kinds of plants, the 'tournefortii' are by far the commoner and the more widely distributed. They have been collected from Sinjar in the west to the foothills near Aqra in the east and from the valley near Zakho in the north to the subdesert plains near Sammara in the south. On the small hills, in the plains, in waste lands, fallow fields and among cultivated grain crops throughout the hump of the country, the 'tournefortii' plants grow

TABLE 1.
Diagnostic characters of 'tournefortii' and 'purpurascens'

	'tournefortii' (*G. tournefortii*)	'purpurascens' (*G. rosea*)
Corolla	Bright to light yellow inside, rusty brown or sometimes purple outside	Bright to light pink inside, never yellow, deep purple outside, never rusty brown
Exposed parts of anterior capitular bracts	Usually green, sometimes purple	Purple
Fruit shape (Fig. 2)	Obconical, sometimes longitudinally furrowed, usually ± polygonal in TS	Obovoid, never longitudinally furrowed, always round in TS
Fruit colour (when dry)	Pale to dirty brown	Whitish
Fruit length	Usually 1·0–1·5 cm	Usually 1·5–2·0 cm
Fruit wt*	Usually 0·1–0·3 g	Usually 0·3–0·6 g
Kernel wt*	0·06–0·1 g	0·09–0.15 g
Cotyledons	Usually 1·0–6·0 × 0·5–0·9(–1·2) cm	Usually 0·2–1·0(–1·5) × 0·7–1·2(–1·4) cm

*Obtained from 25 fruits and their kernels of each type of plant

abundantly in spring. They are particularly luxuriant in cultivated and fallow lands and are a common noxious weed in barley and cornfields.

The 'purpurascens' plants, on the other hand, are not so ubiquitous. They have been encountered so far only in three areas: around Atrush (c.800 m), Aqra (c.800 m) and Shaqlawa (900 m) respectively (see map, fig. 1). Near Atrush, these plants grow mainly in the pine woodland on red rocky soil. Between Aqra and Gullyzanta, on the other hand, they occur on small exposed hills, although the soil here too is rather red and rocky. Although it has not been possible to explore more localities in the northern mountains, it seems possible that 'purpurascens' is more widespread in this region than appears at present. It may also be that the gundelias in the higher altitudes of the adjacent mountains of E Turkey and NW Iran belong to 'purpurascens' group.

Near Aqra and near Atrush populations of the two kinds of plants occur in close proximity, but neither in these localities nor elsewhere are there any signs of hybridization in the form of plants of intermediate morphology. This suggests that a reproductive barrier may be operative which together with the morphological, habitat and distributional differences gives a strong case for recognizing 'tournefortii' and 'purpurascens' as separate species. Accordingly the 'purpurascens' plants are described here as *Gundelia rosea*.

Gundelia rosea Hossain & Al-Taey, **sp. nov.** Figs 1 & 2.

Syn.: *Gundelia tournefortii* var. *β* L., Sp. Pl. 814 (1753).

G. tournefortii L. f. *purpurascens* Bornm. in Beih. Bot. Centralbl. 60 B:197 (1939).

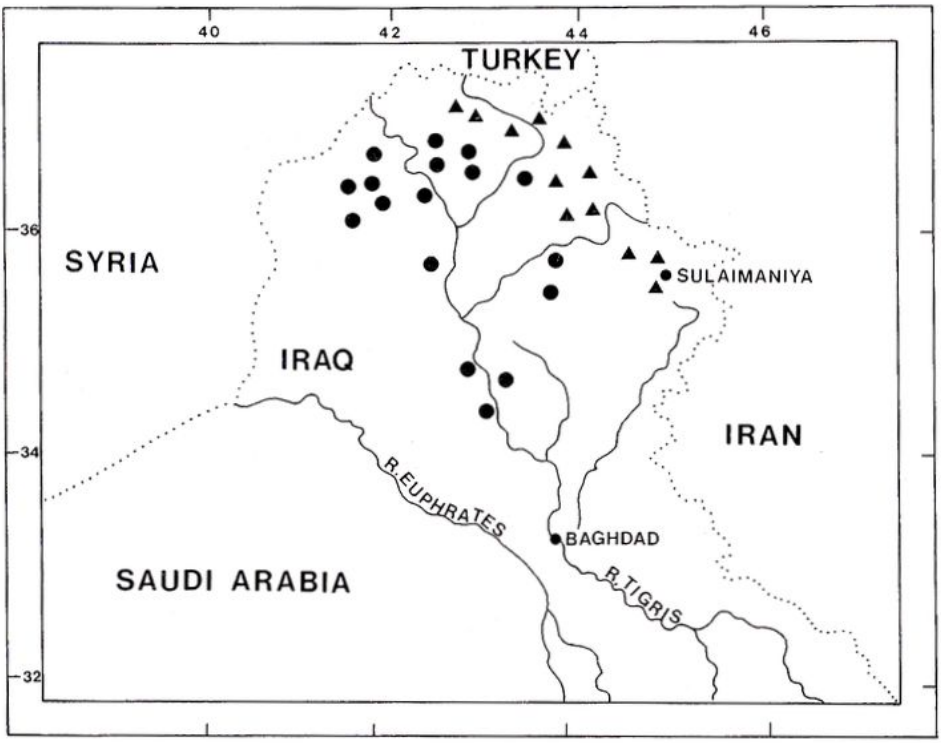

FIG. 1. Map of Iraq showing distributions of ● *Gundelia tournefortii* ('tournefortii'), and ▲ *G. rosea* ('purpurascens').

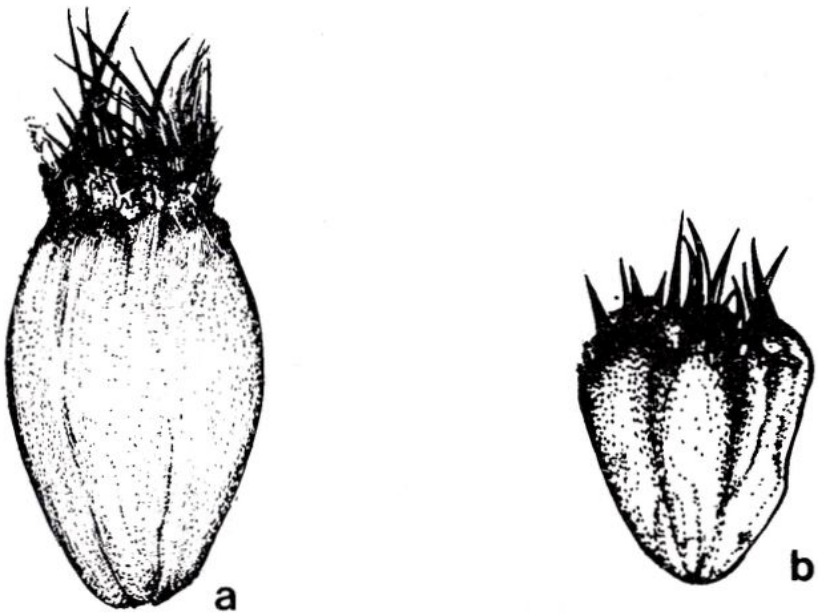

FIG. 2. Fruits of (a) *Gundelia rosea ('purpurascens')*, and (b) *G. tournefortii* ('tournefortii').

[*G. purpurascens* Bornm. fide Index Kewensis Suppl. 10:102 (1947) & in Al-Rawi, Wild Plants of Iraq (1968)—nom. inval.]

Affinis *G. tournefortii* L. sed corolla extus intense purpurea intus rosea haud flava, fructibus majoribus obovoideis nec obconicis differt.

Herba perennis 30–65 cm alta, latice copioso albo. Caulis flexuosus erectus ramosus, 1·5–2·5(–2·8) cm diam., pallide viridis, inferne glaber superne pilis araneosis vel moniliformibus obsitus. Folia simplicia alternata estipulata, superficiebus ambabus ± similaribus manifeste purpurea vel viridi-nervosis coriacea. Folia basalia prostrata longe petiolata ambitu ± oblanceolata, pinnatipartita vel ± pinnatisecta, lobis terminalibus et lateralibus pungentibus et aculeatis; folia superiora minora sessilia manifeste decurrentia, dentata vel pinnatifida, marginibus aculeatis et lobis lateralibus pungentibus. Flores (unusquisque est unum capitulum) in capitula 5–8(–11)-flora heterogama aggregati superne discreti et inferne connati. Capitula 12–45(–50) in glomerulos compactos terminales ovoideos vel ± oblongos 7–10 × 5–6 cm (spinis inclusis) agglomerata, omnia bracteis 4 (bractea antica bracteis posticis et lateralibus longiora) rigidis liberis superne intense purpureis pungentibus inferne incoloratis ± carinatis subtenta. Flos centralis capituli hermaphroditus 15–19 mm longus, corolla actinomorpha 16–18 mm longa, 5-fida, ± infundibuliformis, extus intense purpurea et intus rosea haud flava. Stamina 5, inferne corollae adnata superne libera, antheris paulo connatis, ad basin hastatis sine caudis obtusis vel truncatis, granis pollinis tricolpatis sphericis spinosis. Ovarium receptaculo liberum, c.0.5 × 0.3 mm, obovoideum, pappo denticulato c.2 mm longo coronatum. Stylus simplex glaber. Stigma stylo paulo crassiore, c. 6 mm longum, clavatum extus papillosum superne lobis divergentibus crispis c.3 mm longis bilobatum. Achenia in cavum induratum receptaculi inclusa, distincte obovoidea nec obconica, albogrisea, 15–20 × 10–14 mm. Flores peripherales capituli masculini praeter ovarium abortivum florem centralem hermaphroditum omnino similes. Fl. Mai.–Jun. 2n = 18.

IRAQ: North of Atrush, c.60 km NE of Mosul, pine woodland, perennial herb with petals purple outside and pink inside, c.900 m, 10 v 1978, *Mosharraf Hossain* (holotype Biol. Dept. Herb., Univ. Mosul; iso. BAG, E, K); N Iraq, c.2 km N of Zawita, grassy mountain-slope, perennial herb with petals purple outside and pink inside, c.800 m, 10 v 1978, *Mosharraf Hossain* ; nr. Koi-Sanjak, E of Erbil, grassy mountain-slope, perennial herb with petals purple outside and pink inside, c.900 m, 12 iv 1978, *Mosharraf Hossain.*

CYTOLOGY

Chromosome counts of 2n = 18 were obtained for root-tips of both *Gundelia rosea* and *G. tournefortii.* The root-tips were pretreated with 0·1% colchicine solution for one hour, fixed in 3:1 alcohol: acetic acid for one and a half hours, hydrolysed in N HCl at 60°C for 15–20 minutes, stained in Schiff's reagent for one hour, washed in distilled water for one hour and then squashed on a slide in 45% acetic acid with a drop of acetocarmine.

A difference in size between the chromosomes of the two species was observed: 6–14 μm in *G. rosea* and 4–10 μm in *G. tournefortii.* Whether

this difference is significant or is merely the result of chance variations in pretreatment, or other technique, is not known. Most chromosomes in *G. rosea,* and probably in *G. tournefortii,* are metacentric.

Our chromosome count of $2n=18$ for *G. tournefortii* agrees with the count by Waisel (1962) of $n=9$ from pollen mother cells of specimens from Palestine.

References

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