

# A REVISION OF *SENECIO* L. (ASTERACEAE, SENECTIONEAE), IN IRAN

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The genus *Senecio* L. is reviewed based on the literature and available herbarium materials. A synopsis and identification key is provided to the 22 accepted taxa. Diversity centers and distribution maps of *Senecio* species in Iran are presented. Also the checklist of accepted species and synonyms including selected studied specimens are given. Furthermore, *Senecio erucifolius* subsp. *erucifolius* which has been collected from Azerbaijan province is reported as a new subspecies to Iran. This subspecies is compared with closely related subspecies *S. erucifolius* subsp. *grandidentatus*.

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**Key words.** *Senecio*, synopsis, Iran, taxonomy, new record, flora.

بازنگری جنس *Senecio* L. (Asteraceae, Senecioneae) در ایران

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جنس *Senecio* براساس منابع و نمونه‌های هرباریومی مورد بازنگری قرار گرفته‌است. کلید شناسایی ۲۲ تاکسون پذیرفته‌شده تهیه شده‌است. مراکز تنوع و نقشه پراکنش گونه‌های این جنس در ایران نشان داده می‌شود، همچنین ترتیب گونه‌ها به همراه اسامی مترادف و برخی نمونه‌های دیده شده ارائه می‌گردد. به علاوه زیر گونه‌ی *S. erucifolius* subsp. *erucifolius* که از شمال غربی ایران جمع‌آوری شده، برای اولین بار از ایران گزارش می‌شود. این زیر گونه با زیر گونه‌ی نزدیک خود *S. erucifolius* subsp. *grandidentatus* مقایسه می‌شود.

## INTRODUCTION

The first author has been revising the tribe *Senecioneae* in Iran for her M. S. thesis and also draft of Flora of Iran (Assadi 1989). *Senecio* L. (Asteraceae, Senecioneae) is the largest genus of *Asteraceae* in the world with about 1500 species and with worldwide distribution (Matthews 1975). The species are distributed all over the world, especially in South Africa, Mediterranean floristic region and in temperate areas of Asia and America (Schischkin 1961). Nordenstam (1989) transferred some species of *Senecio* into the genus *Iranecio* B. Nord. and introduced 4 sections and 17 taxa including species and subspecies of this genus in Iran. The genus *Senecio* after Nordenstam (1989) draft of Flora Iranica has been subject of several studies, partly circumscription of the genus have been changed. Jeffrey (1992) based on anatomy character transferred species that belonged to

*Senecio* Sect. *Quadridentati* Boiss. to the genus *Iranecio*. Also Pelsner et al. (2006) and Nordenstam (2006) based on molecular systematic studies and Pelsner et al. (2007) based on ITS phylogeny studies regarded the section *Jacobaea* (Mill.) Dumort. as a distinct genus, but as the circumscription of these groups are not quite clear and it has not been stabilized yet, in this paper only the genus *Senecio* sensu Nordenstam (1989) has been subject of studies and the genus *Jacobaea* Mill. is included in the genus *Senecio*.

Phytogeographically, the majority of the species of *Senecio* are found in Irano-Turanian region, a few species are found in Saharo-Sindian region and one species is found in Hyrcanian province of Euro-Siberian region. Some species of this genus have a limited distribution in Iran and grow individually or in the small isolated patches. These species are usually very rare or can be endangered. But some species, such

Table 1. Comparison of the number of species and endemics of *Senecio* L. in Iran and some neighboring countries.

Country	No. of species	No. of endemics
Iran	21	6
Iraq	6	-
Turkey	42	15
Turkmenistan	3	-
Pakistan	7	-
Afghanistan	8	-
Armenia	2	-

as *S. glaucus* L., *S. vulgaris* L. and *S. vernalis* Waldst & Kit. (sect. *Senecio*), have widespread distribution in the country.

The aim of this paper is to revise the taxonomy of the genus in Iran, to present an identification key to the known taxa to Iran, and to give the sequence of the species and to report a new record of *Senecio* for Iran.

## MATERIAL AND METHODS

By using existing Floras about 700 herbarium specimens in the herbarium of Research Institute of Forests and Rangelands (TARI), herbarium of Iranian Research Institute of Plant Protection (IRAN), herbarium of Ferdowsi University of Mashhad (FUMH), herbarium of Research Center of Natural Resources of Isfahan, herbarium of Tarbiat Moallem University (FAR) and herbarium of Department of Biology of Isfahan University were examined and were determined (taxonomically and morphologically).

## RESULTS

In this paper the number of *Senecio* taxa increasing to 22, among them 6 species are endemic to Iran. The number of species and endemics of this genus in Iran and other neighboring countries are compared in table 1. The name of three species are excluded from the list of flora of Iran.

### Checklist of *Senecio* L. species

Sect. *Crociseris* (Reichenb.) Hall & W. D. Koch, Syn. Deut. Schweiz. Fl. ed. 3: 1486 (1897).

Syn.: *Senecio* L. sect. *Crociserides* DC., Prodr. 6: 357 (1838).

Plants perennial. Leaves oblanceolate or lanceolate, entire or pinnatifid. Capitula radiate or only with tubular flowers; tubular flowers with 5 teeth. Pappus persistent.

**1. *Senecio pseudo-orientalis*** Schischk., Fl. URSS. 26: 727 (1961).

Syn.: *S. orientalis* Willd., Spec. Plant. 3: 2006 (1803) non Miller (1768).

Type: Armenia.

Some studied specimens: Azerbaijan, Mianeh to Tabriz, 1000 m, Sabeti 5606 (TARI); Tehran, 16 km Gazvin to Alamot, 2000-2300 m, Assadi & Maassoumi 50943 (TARI); Hamedan; Kabodar Ahang, 2200-2800 m, Mozaffarian 64565 (TARI); Isfahan; Booien dareh to Khalat, 2600 m, Feyzi, Saeidfar & Eftekhari 6304. Map 1.

Typical characters: Base of stem woolly. Involucral bracts 14-18 in number.

**2. *S. doriiformis* subsp. *orientalis*** (Fenzl) Matthews, Notes Roy. Bot. Gard. Edinb. 33: 434 (1975).

Syn.: *S. doriaeformis* DC. var. *megalophron* Boiss., Fl. Or. 3: 407 (1875).

Type: Turkey.

Studied specimens: Kurdistan, between Nusud and Marivan, 2000 m, Mazaffarian 74827 (TARI); Kermanshah, Paveh, Shaho mountain, 1300-2000 m, Tavakoli & Mirabdali 2900 (TARI). Map 1.

Typical characters: Base of stem woolly. Involucral bracts 12- 13 in number.

**3. *S. racemosus*** (M.B.) DC., Prodr. 6: 338 (1838).

Type: Caucasus.

Studied specimen: Azerbaijan, 5 km Ardebil to Astara, 1300 m, Assadi & Akhane 61640 (TARI). Map 2.

Typical character: Synflorescence racemeose.

**4. *S. thyrso-phorus*** C. Koch, Linnaea 24: 362 (1851).

Type: Caucasus.

Studied specimens: Azerbaijan, 30 km Tabriz, Eskandar village, Eskandar mountain, 1700-2100 m, Mozaffarian & Mohammadi 37563 (TARI); Kurdistan, 40 km Divan dareh to Sagez, 2100 m, Mozaffarian 77155 (TARI). Map 2.

Typical character: Synflorescence paniculate.

Note: In Flora Iranica (Nordenstan 1989) in agreement with Matthews (1975) *S. thyrso-phorus* were regarded as synonymous of *S. racemosus*, but in this investigation based on the study of herbarium specimens the synflorescence seems to be a reliable character for distinction of these two species.

**5. *S. paulsenii* subsp. *khorsanicus*** (Rech. f. & Aell.) B. Nord., Flora Iranica 164: 68 (1989).

Syn.: *S. khorsanicus* Rech.f. & Aell., Osterr. Bot. Zeitschr. 97: 236 (1950).

Type: Iran: Khorasan.

Some studied specimens: Azerbaijan, Tabriz to Moshk anbar, 1770 m, Mozaffarian 87147 (TARI); Tehran, Gazvin, Abegarm, 1974 m, Mozaffarian 87302(TARI); Semnan, between Semnan and Firuz kuh, 2450 m, Wendelbo & Assadi 29768 (TARI); Khorasan, E. Esfarayen, Sarigol National Park, Kalate Narimani, 1746 m, Joharchi & Zangoii 39828 (FUMH). Map 3.

Typical characters: Plant sparsely arachnoid, arachnoid-floccose to subglabrous. Phyllaries 15-22, 11-15 × 1.5-3 mm. Limb of ray flowers 12-25 mm long. Tube of ray flowers 6-10 mm long. Disk flowers 35-60 in number and 10-15 mm long.

**6. *S. joharchii*** F. Ghahremaninjad, Ezazi, Rahchamani & Attar, Feddes Repert. 121(1-2): 27-31 (2010).

Type: Iran: Khorasan. Endemic.

Studied specimen: Northern Khorasan, Esfarayen, Saluk National Park, Mt. Ahangaran, 1861 m, Ezazi & Rahchamani 4692 (FAR). Rare. Map 3.

Typical characters: Plant densely arachnoid floccose. Phyllaries 32-35, 9-10 × 0.8-1 mm. Limb of ray flowers 6-7 mm long. Tube of ray flowers 2 mm long. Disk flowers ca. 80 in number and 3-5 mm long.

Sect. ***Quadridentati*** Boiss., Fl. Or. 3: 385 (1875).

Plants perennial. Leaves obovate or lyrate, pinnatifid or pinnatisect. Capitula radiate; tubular flowers 4 dentate. Pappus persistent.

**7. *S. taraxacifolius*** (M. B.) DC., Prodr. 6: 348 (1838).

Syn.: *Cineraria taraxacifolia* M.B., Fl. Taur.-Cauc. 2: 313 (1808); *Ligularia aucheri* DC., Prodr. 7: 300 (1838); *Iranecio taraxacifolius* (M. B.) C. Jeffrey, Kew Bull. 47 (1): 103 (1992).

Type: Caucasus.

Studied specimens: Azerbaijan, Sabalan, Shah bil, 3000-3570 m, Mozaffarian 87588 (TARI); Sabalan mountain, 3340 m, Rejamand 6745 (TARI). Map 4.

Typical characters: Stem 30 cm high. Leaves with 1-3 pairs of lobes; terminal lobe longer.

**8. *S. davisii*** Matthews, Notes Roy. Bot. Gard. Edinb. 33: 259 (1974).

Syn.: *Iranecio davisii* (Matthews) C. Jeffrey, Kew Bull. 47 (1): 102 (1992).

Type: Caucasus.

Studied specimens: Azerbaijan, Urumieh, Khalil kuh, 2450-3155 m, Mozaffarian 87446 (TARI); Uromeieh, 2400 m, Sabeti 4147 (TARI); Urumieh, Silvana, 2600-3000 m, Mozaffarian 69903 (TARI). Map 4.

Typical characters: Stem 70 cm high. Leaves with 4-8 pairs of lobes; terminal lobe equaling the other lobes.

**9. *S. lipskyi*** Lomak., Trav. Jard. Bot. Tiflis 3: 51 (1899).

Syn.: *S. saxatilis* Lomak., l. c. 2: 287 (1897) non Wall. ex DC., Prodr. 6: 367 (1838); *Iranecio lipskyi* (Lomak.) C. Jeffrey, Kew Bull. 47 (1): 103 (1992).

Type: Caucasus.

Some studied specimens: Azerbaijan, Marand, Misho dagh mountain, 2000 m, Assadi 78964 (TARI); 20 Km South Ahar to Tabriz, 1700-1800 m, Wendelbo & Assadi 27923 (TARI). Map 5.

Typical character: Achenes pubescent.

**10. *S. lorentii*** Hochst. in Lorent, Wanderungen, 330 (1845) et in Flora 28: 27 (1845).

Syn.: *Iranecio lorentii* (Hochst.) C. Jeffrey, Kew Bull. 47 (1): 103 (1992).

Type: Turkey.

No specimen was found among the herbarium specimens. It has been recorded from Kurdistan province without exact locality (cf. Nordenstam 1989). Map 5.

Typical character: Achenes glabrous.

**Sect. *Jacobaea*** (Mill.) Dumort., Fl. Belg. 65 (1827).

Syn.: *Jacobaea* Mill., Gard. Dict. Abr. ed. 4 (1754).

Plants perennial. Leaves obovate or oblanceolate, pinnatifid or pinnatisect. Capitula radiate; tubular flowers 5 dentate. Pappus persistent or temporary.

**11. *S. mollis*** Willd., Sp. Pl. 3: 2011 (1803).

Syn.: *S. hebespermus* DC., Prodr. 7: 301 (1838); *Jacobaea mollis* (Willd.) B. Nord., Comp. Newslet. 44: 12 (2006).

Type: Anatolia.

Some studied specimens: Azerbaijan, Arasbaran, 1200 m, Hamzee & Asri 81365 (TARI); Kurdistan, Divan dareh, Chehel cheshme mountain, 2000-2750 m, Mozaffarian 79853 (TARI); Lorestan, Borojerd, 1480 m, Karimi 2431 (TARI); Isfahan, Fereidan, Varzaneh, 2200 m, Feyzi 12358; Tehran, Karaj, Dashteh, 1910 m, Foroughi 935 (TARI). Map 6.

Typical characters: Leaf margin smooth. Achenes with glossy pubescent.

**12. *S. erucifolius*** L., Sp. Pl. 869 (1753).

subsp. ***erucifolius*** (Fig. 1).

Syn.: *Jacobaea erucifolia* (L.) G. Gaertn., B. Mey. & Schreb., Oeken Fl. Wetteran 3 (1): 208 (1801).

Type: Caucasus.

Studied specimens: Azerbaijan, W. Salmas, Pereshkhoran, border of Turkey, 2100 m, Mozaffarian 96947 (TARI); 50 km W. Khoy, near to Turkey, 2800 m, Assadi & Olfat 68793 (TARI). Map 6.

Typical characters: Basal and stem leaves present, oblanceolate, dorsal surface glabrous, green. Capitula 7-13.

This subspecies is recorded from Iran for the first time. In Flora Orientalis (Boissier 1875) *S. erucifolius* includes two taxa:  $\beta$  *latilobus*,  $\gamma$  *grandidentatus*. In Flora URSS (Schischkin 1961) *S. erucifolius latilobus* was regarded as a synonym of *S. schischkinianus*. The present species with bipinnatisect leaves and endemic distribution in Caucasus (described from Daghestan) is



Fig . 1. *Senecio erucifolius* subsp. *erucifolius* ( $\times 0.5$ ); capitula ( $\times 1.5$ ) ray and disk flowers ( $\times 2$ ).

Table 2. Diagnostic characters of the subspecies of *Senecio erucifolius*.

Subspecies	Characters	Leaf division	Leaf indument	Capitula number
subsp. <i>erucifolius</i>		Lanceolate- pinnatisect	Glabrous	7-13
subsp. <i>grandidentatus</i>		Pinnatifid	hairy grey	16-90

separable from our specimens. In Flora de Iran (Parsa 1943) *S. erucifolius* var *latilobus* was reported from Tehran. This area is close to the distribution of *S. erucifolius* subsp. *grandidentatus*, therefore Parsa (l. c.) record may be a misidentification of *S. erucifolius* subsp. *grandidentatus*.

In Flora URSS (Schischkin 1961), Flora of Turkey (Matthews 1975) and Flora Europaea (Chater & Walters 1976) *Senecio erucifolius* and *Senecio grandidentatus* are known as two distinct, but in Flora Iranica *S. grandidentatus* was reduced to a subspecific rank named *S. erucifolius* subsp. *grandidentatus* for the first time.

The closest locality to the Iranian gathering of *S. erucifolius* subsp. *erucifolius* seems to be in E. Anatolia (Matthews 1975).

*S. erucifolius* subsp. *erucifolius* (Fig. 1) is compared with closely related subspecies, *S. erucifolius* subsp. *grandidentatus* (Ledeb.) B. Nord. in Table 2.

subsp. *grandidentatus* (Ledeb.) B. Nord., Flora Iranica. 164: 76 (1989).

Syn.: *S. grandidentatus* Ledeb., Fl. Ross. 2: 636 (1845). Type: Caucasus.

Studied specimens: Mazandaran, Firuzkuh to Ghaem Shahr, Duab, 700 m, Mozaffarian 77354 (TARI); Gorgan, Zarin Gol, 850 m, Riazi 6711 (TARI). Map 6.

Typical characters: Stem leaves only present, elliptic or obovate, pinnatifid, dorsal surface densely hairy, grey. Capitula 18-90.

Sect. *Senecio*

Syn.: Sect. *Obaejacae* DC., Prodr. 6: 341 (1838); Sect. *Obaejacoideae* DC., Prodr. 6: 343 (1838).

Plants annual or biennial. Leaves ovate or oblanceolate, entire, pinnatifid or pinnatisect. Capitula radiate or discoid or disciforme; tubular flowers 5 dentate. Pappus temporary or seldom persistent.

**13. *S. vulgaris*** L., Sp. Pl. 867 (1753).

Type: Cultivated in Europe.

Some studied specimens: Khuzestan, Andimeshk, Zal bridge, 260 m, Foroughi 3026 (TARI); Fars, 18 km Kazeroon road to Dalaki, 800 m, Runemark & Mozaffarian 26758 (TARI); Tehran Botanical garden, 1320 m, Riazi 2876 (TARI); Khorasan, Mashhad, Ghar moghan mountain, 1900 m, Faghehnia & Zangoii 20380 (FUMH). Map 7.

Typical character: Capitula discoid.

**14. *S. eligulatus*** B. Nord., Moussavi & Djavadi. Comp. Newslet. 38: 42 (2002).

Type: Iran: Kerman: Jiroft. Endemic.

Studied specimen: Kerman, Jiroft, Baft, Hanza, Takhte Sartashtk, 3200-3600 m, Fatehi 15586 (IRAN). Map 10.

Typical character: Radiate florets with corolla reduced to a narrowly cylindrical tube, apically truncate and 2-3 fids.

**15. *S. iranicus*** B. Nord., Flora Iranica. 164: 95 (1989).

Type: Iran: Tehran: Damavand mountain. Endemic.

Studied specimens: Mazandaran, South slope of Damavand mountain, 4200 m, Cobham 85752 (TARI); Tehran, South slope of Damavand mountain, 3700-4350 m, Assadi & Hamdi 85752 (TARI); Gazvin, Abdol Abad, Bonvan 9761 (TARI). Map 10.

Typical character: Achenes glabrous.

**16. *S. breviflorus*** (Kadereit) Greuter, Willdenowia 37: (1) (2007).

Syn.: *Senecio flavus* sensu Nordenstam, Flora Iranica no. 164: 93 (1989) non (Decne.) Schultz Bip.; *Senecio flavus* subsp. *breviflorus* Kadereit, Bot. Jahrb. Syst. 104: 510 (1984); *Senecio mohavensis* subsp. *breviflorus* (Kadereit) M. Coleman, Edinburgh J. Bot. 58: 392. 2001.

Type: Jordon.

Some studied specimens: Bandar abbas, between Kahgum and Traum, 800 m, Mozaffarian 52287 (TARI); Kerman, 50 km Sirjan to Haji abad, 1700-1900 m, Mozaffarian 74246 (TARI); Baluchestan, 45 km Chabahar road, 1100 m, Runemark, Assadi & Sardabi 23323 (TARI); Khozestan, 17 km E. Dezful, Pabot 195 (TARI). Map 9.

Typical character: Stem leaves only present, ovate or rotundate, integrate.

*Senecio flavus* was included by Nordenstam (1984) in Flora Iranica and reported from Iran. Kadereit (1984) described *S. flavus* subsp. *breviflorus* indicating that this subspecies has ligulate flower, while *S. flavus* subsp. *flavus* has no ligulate flowers. Later, Coleman et al. (2001) made the new combination *S. mohavensis* subsp. *breviflorus*, a species with the new and old world distribution. Finally, Greuter (l. c.), made the new combination *S. breviflorus* with no explanation, apparently based on the distribution of *S. mohavensis* from the new world and and *S. breviflorus* from the old world. Studies on Iranian materials showed that the

Iranian materials bear ligulate flowers, therefore they can not be named *S. flavus*. It seems further studies based the examination of the old and new world are needed to understand the relationship of *S. mohavensis* and *S. breviflorus*.

**17. *S. kotschyanus*** Boiss., Diagn. Pl. Or. Nov. Ser. 1, 6: 93 (1846).

Type: Iran: Fars. Kuhe Daena. Endemic.

Studied specimen: Bakhtiari, Gandoman, (Sabzkuh) Lah- Deraz, Vastegan, 2400-2900 m, Moussavi & Tehrani 15585 (IRAN). Rare. Map 9

Typical characters: plant 4-12 cm high, densely pubescent. Radiate flowers 5-6, in apex with 3 profound lobes or teeth.

**18. *S. subnivalis*** Y. Ajani, J. Noroozi & B. Nord. Comp. Newslet. 48: 47 (2010), (Fig. 2).

Type: Iran: Kerman. Endemic.

Studied specimen: Kerman, Lalehzar Mountain, 4100 m, Mirtajoddini 86980 (TARI). Rare. Map 11.

Typical characters: Plant 3- 5 cm high, glabrous or sparsely pubescent. Radiate flowers 1-5, at the apex with 3 short teeth. This species was known as a new species by present authors, but as it was known by the other authors simultaneously we stopped to publish it.

**19. *S. glaucus*** L., Sp. Pl. 868 (1753).

Syn.: *S. lacerus* Boiss., Diagn. Pl. Or. Nov. Ser. 1, 11: 32 (1849).

Type: Egypt.

Some studied specimens: Azerbaijan, 30 km S. Khalkhal, 1500 m, Forghandust 36211 (TARI); Mazandaran, Sangdeh, Polsefid, 1400 m, Domancheh 31416 (TARI); Tehran, Shemshak, 1800 m, Dinii & Arazm 5225 (TARI); Zanjan, Bijar, 1400 m, Sabeti 5259 (TARI); Baluchestan, 5 km Khash to Iranshahr, 1500 m, Runemark, Assadi & Sardabi 22194 (TARI); Isfahan, Ghameshloo Protect Area, 2200-2300 m, Yousofi 1518 (TARI); Khuzestan, Hendijan, 20 m, Mozaffarian 62372 (TARI); Bandar Abbas, Genu mountain, 1200-2200 m, Mozaffarian 59154 (TARI); Khorasan, Ferdows to Boshroveieh road, 1400 m, Rafeii & Zangooi 24816 (FUMH). Map 8.

Typical characters: Leaves pinnatifid, pinnatisect and or linear and entire; lobes acute. Calyculus bracts green or brown.

**20. *S. vernalis*** Waldst & Kit., Pl. Rar. Hung. 1: 23 (1800).

Syn.: *S. rapistroides* DC., Prodr. 6: 346 (1838).

Type: Hungaria.

Some studied specimens: Azerbaijan, Shahbil, Sabalan mountain, 1700 m, Foroughi & Assadi 13886 (TARI); Kurdistan, Sanandaj, 21 km E Sanandaj, 2010 m, Babakhanlo & Pabot 19987 (TARI); Gilan, Asalam to Khalkhal, 800-1000 m, Wendelbo & Assadi 27718

(TARI); Mazandaran, 25 km S. Ramsar, 3000 m, Assadi & Maassoumi 51348 (TARI); Lorestan, Khoram abad, Dorood, Oshtoran kuh, 1750 m, Riazi 9654 (TARI); Semnan, Sangsar, 1800 m, Babakhanlo & Amin 17679 (TARI); Tehran, Lashkarak, 1850 m, Dinii 8991 (TARI); Hamedan, Abbas abad, 2300 m, Assadi & Amini 13609 (TARI); Khuzestan, Andimeshk, 750 m, Foroughi 9556 (TARI); Zanjan, Taroum, 930 m, Makouii 9879 (TARI); Fars, 15 km Firuzabad to Ghir, 1500-2100 m, Assadi & Sardabi 41472 (TARI); Khorasan, N. W. Bojnord, between Eshghabad & Cale imani, 950 m, Joharchi & Zangooi 33220 (FUMH). Map 7.

Typical characters: Plant annual, 3- 55 cm high.

**21. *S. vulcanicus*** Boiss., Diagn. Pl. Or. Nov. Ser. 1, 11: 31 (1849).

Type: Iran: Mazandaran. Kelar dasht. Endemic.

Studied specimen: Mazandaran, Kelar dasht, Takhte Soleiman mountain, 3620 m, Fotovat 10087 (TARI). Rare. Map 8.

Typical character: Plant biennial or perennial, rhizomatose, 3- 8 cm high.

Note. This species was mentioned as annual or perennial in Flora Orientalis (Boissier 1875). Nordenstam (1989) reported it as biennial or perennial in Flora Iranica. The studied specimen is showing that it could be biennial or perennial.

### Names to be excluded from flora of Iran

***Senecio aurantiacus*** var. ***leiocarpus*** Boiss., Fl. Or. 3: 410 (1875).

This variety was reported from Elbrus Mountains (Caucasus) in Flora Orientalis (Boissier 1875) but in Flora de l'Iran (Parsa 1943) erroneously was reported from Elburz Mountains in N. Iran that is apparently confusion of Elbrus and Elburz names.

***Senecio cineraria*** DC. Prodr. 6: 355 (1837).

This species was reported and illustrated for the first time from Azerbaijan elevations (between Marand and Yam) in Color Flora of Iran (Ghahreman 1987) as a new record to Iran. Unfortunately, the herbarium specimen is not traceable. But clear photograph of the plant with 12-14 ligulate flowers distinguishes this plant from *S. cineraria* with 8 ligulate flowers. Moreover, *S. cineraria* is a Mediterranean element (Chater & Walters 1976). With respect to the habit and locality, the plant identified as *S. cineraria* should be *S. lipskyi* Lomak.

***Senecio nudicaulis*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178 (1825).

This species was reported by Parsa (1943) from Baluchestan. Also, this species was reported from East

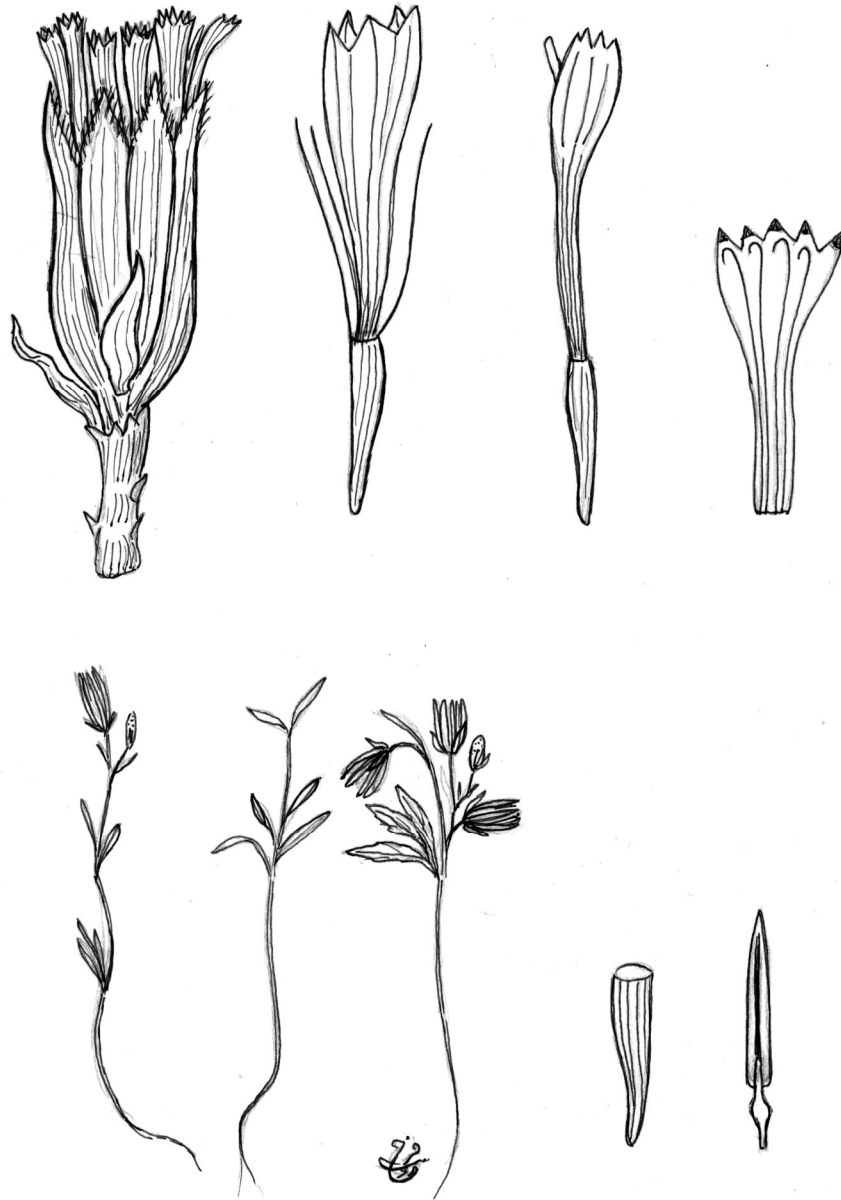


Fig. 2. *Senecio subnivalis* (×1); capitula (×8); ray and disk flowers, fruit and anther (×20).

Afghanistan and Hindukush in Flora Iranica (Nordenstam 1989). Comparing Parsa (l. c.) record with the local name (Sonowall) and the book of Flowering Plants of Baluchistan (Burkill 1906) it is quite clear that Parsa,s record has been based on Burkill,s (l .c.) record. As, the area of the book Flowering Plants of Baluchistan is Baluchistan of

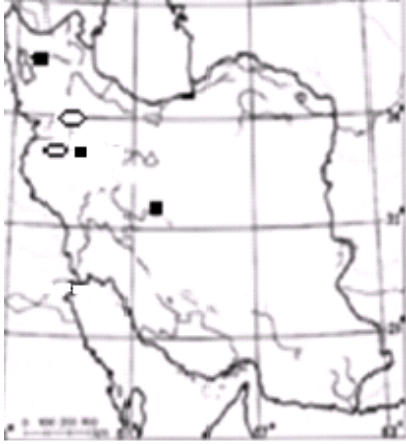
Pakistan, therefore the record of this species from Iran is erroneous.

**Key to the accepted species of *Senecio***

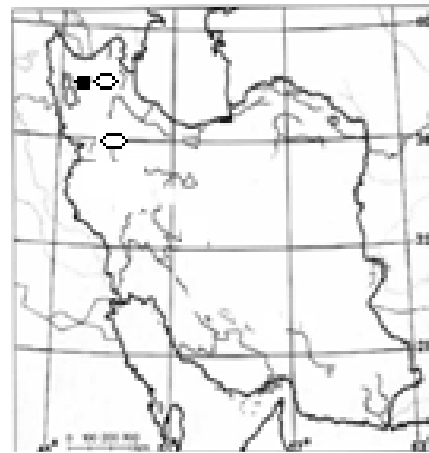
- |                                       |    |
|---------------------------------------|----|
| 1. Plants perennial                   | 2  |
| - Plants annual, very seldom biennial | 14 |
| 2. Disc flowers 4-lobed               | 3  |

- Disc flowers 5-lobed 6
3. Achenes glabrous 4
- Achenes pubescent 9. *S. lipskyi*
4. Stem floccose hairy. Leaves sparsely floccose above, densely so below 10. *S. lorentii*
- Stem glabrous or sparsely hairy. Leaves glabrous or with few hairs 5
5. Stem 30 cm high. Leaves with 1-3 pairs of lobes; terminal lobe longer 7. *S. taraxacifolius*
- Stem 70 cm high. Leaves with 4-8 pairs of lobes; terminal lobe equaling the other lobes 8. *S. davisii*
6. Leaves obovate or oblanceolate, pinnatifid or pinnatisect. Achenes 2- 2.5 cm long 7
- Leaves oblanceolate or lanceolate, entire or along the margin shortly divided. Achenes 3- 7 mm long 8
7. Leaves smooth at the margin. Achenes glossy pubescent 11. *S. mollis*
- Leaves returned to the back at the margin. Achenes pubescent between ribs 12. *S. erucifolius*
8. Synflorescence raceme-like or paniculate 9
- Synflorescence single or sparsely corymbose 10
9. Synflorescence raceme-like 3. *S. racemosus*
- Synflorescence paniculate 4. *S. thyrsophorus*
10. Plant 3- 8 cm high 21. *S. vulcanicus* Boiss.
- Plants 30- 97 cm high 11
11. Achenes hairy. Involucre 1- 2 cm in diameter 12
- Achenes glabrous. Involucre 0.5- 1.5 cm in diameter 13
12. Phyllaries 15-22 in number. Calycular bracts 6-10 in number. Limb of ray flowers 12-25 mm long
5. *S. paulsenii* subsp. *khorsanicus*
- Phyllaries 32-35 in number. Calycular bracts 13-16 in number. Limb of ray flowers 6-7 mm long
6. *S. joharchii*
13. Base of stem woolly. Involucral bracts 14-18 in number 1. *S. pseudo-orientalis*
- Basal of stem not woolly. Involucral bracts 12- 13 in number 2. *S. doriiformis* subsp. *orientalis*
14. Capitula discoid 13. *S. vulgaris*
- Capitula radiate 15
15. Radiate flowers with corollas reduced to a narrowly cylindrical tube, apically truncate with 2-3 fids 14. *S. eligulatus*
- Radiate flowers entire 16
16. Achenes glabrous 15. *S. iranicus*
- Achenes pubescent 17
17. Lamina of radiate flowers 2- 3.5 mm long 18
- Lamina of radiate flowers 3.5- 15 mm long 20
18. Leaves only on stems, ovate or rotundate, entire 16. *S. flavus*
- Leaves basal and on stems, lanceolate or oblanceolate, pinnatifid or dentate 19
19. Plant 4- 12 cm high, densely pubescent. Radiate flowers 5-6, at the apex with 3 profound lobes or teeth 17. *S. kotschyanus*
- Plant 3- 5 cm high, glabrous or sparsely pubescent. Radiate flowers 1-5, at the apex with 3 short teeth 18. *S. subnivalis*
20. Leaves up to the middle of lamina pinnatifid or crenulate; lobes obtuse or rounded. Calyculus bracts with black tips 21
- Leaves pinnatifid to pinnatisect and/ or linear and entire; lobes acute. Calyculus bracts with green or brown tips 19. *S. glaucus*
21. Plant annual, 3- 55 cm high 20. *S. vernalis*
- Plant biennial or perennial, rhizomatose, 3- 8 cm high 21. *S. vulcanicus*

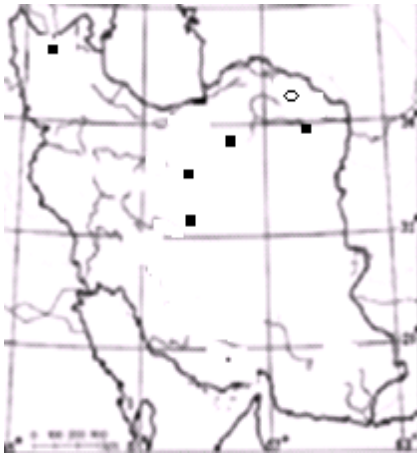




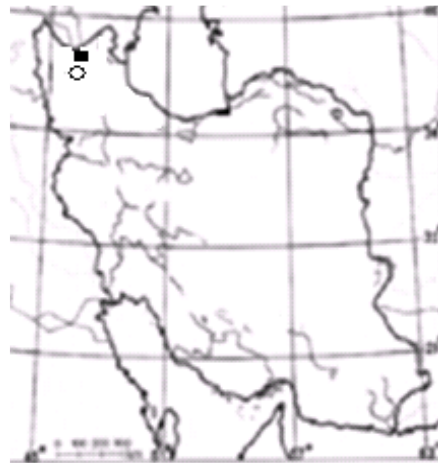
Map 1: ■ *Senecio pseudo-orientalis*,  
○ *S. doriiformis* subsp. *orientalis*



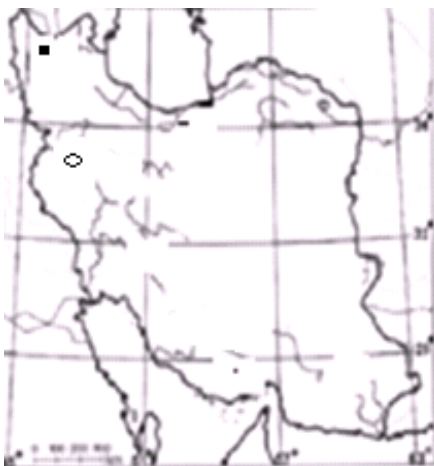
Map 2: ■ *Senecio racemosus*, ○  
*S. thrysophorus*



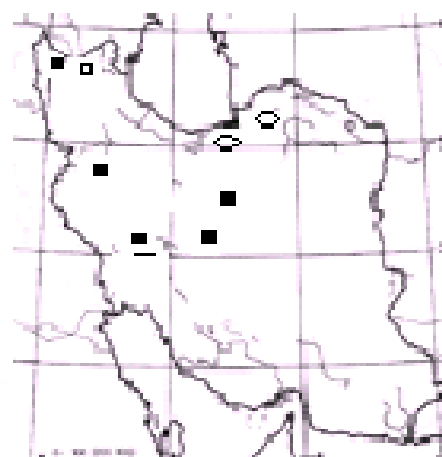
Map 3: ■ *Senecio paulsenii* subsp.  
*khorasanicus*, ○ *S. joharchii*



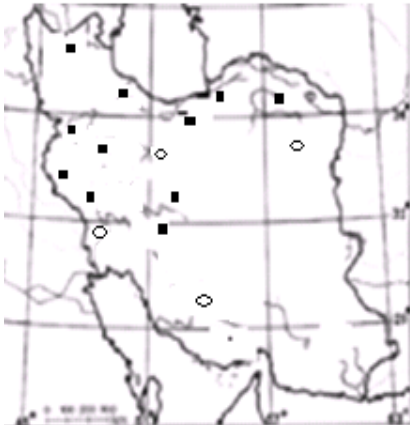
Map 4: ■ *Senecio davisii*, ○  
*S. taraxacifolius*



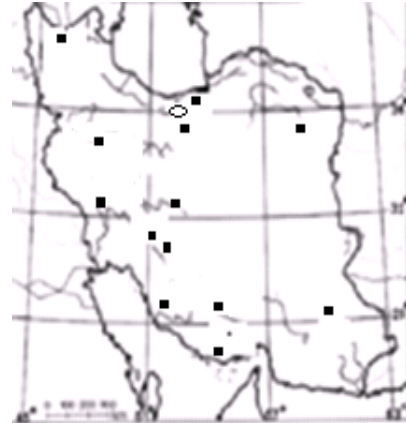
Map 5: ■ *Senecio lipskyi*, ○ *S. lorentii*



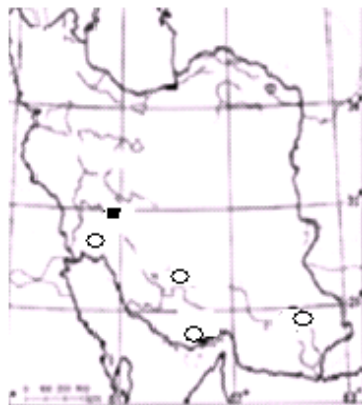
Map 6: ○ *Senecio erucifolius* subsp.  
*grandidentatus*, □ *S. erucifolius* subsp.  
*erucifolius* ■ *S. mollis*



Map 7: ○ *Senecio vulgaris*, ■ *S. vernalis*



Map 8: ○ *Senecio vulcanicus*, ■ *S. glaucus*



Map 9: ■ *Senecio kotschyanus*, ○ *S. breviflorus*



Map 10: ■ *Senecio iranicus*, ○ *S. eligulatus*



Map 11: ○ *Senecio subnivalis*

**DISCUSSION****Diversity centers of *Senecio* in Iran**

The geographical distribution of *Senecio* is on the elevations of Azerbaijan provinces, Zagros Mountains, Central Alborz Mountains and elevations of the Southern desert of the Iranian plateau such as Lalehzar Mountains in Kerman province. A few numbers of the species, such as *S. paulsenii* subsp. *khorsanicus* and *S. joharchii* can be found in N.E. Iran. *S. vulcanicus*, and *S. iranicus* grow on the Demavand Mountains in the Central Alburz. The diversity of this genus is rapidly increased toward the W. and N.W. Iran. Diversity center is on the elevations of Azarbaijan in western Iran. Therefore, Azarbaijan with 7 species has the highest species diversity among the other provinces in Iran. Toward S Iran, there is speciation of this genus with endemic species such as *S. subnivalis* and *S. eligulatus*. The farthest limit of southern distribution of *Senecio*, with *S. glaucus*, *S. vernalis* and *S. flavus*, occurs in Hormozgan and Bushehr provinces.

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