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Additional Records of *Raphanus* L. and *Campanula* L. for the Flora of Turkey

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Abstract: Two taxa, *R. raphanistrum* L. subsp. *rostratus* (DC.) Thell. and *Campanula hierosolymitana* Boiss., collected from southern Anatolia are described as a second records for the Flora of Turkey. Different taxonomists had collected these taxa from Turkey, but these collected samples were not identified correctly. These samples were not recorded in the first or sixth volume or the other 2 supplements of the Flora of Turkey in spite of these misidentifications having been published in different papers. In this paper, these taxa that are added to the Flora of Turkey are presented for the interest of Turkish taxonomists. The descriptions and photograph of the fruit shape of the taxa are given and an identification key for their closely related taxa is supplied.

Key Words: *Raphanus*, *Campanula*, Flora, Turkey

Türkiye Florası için *Raphanus* L. ve *Campanula* L.'nin Eklenilen Kayıtları

Özet: Anadolu'nun güneyinden toplanan 2 takson *R. raphanistrum* L. subsp. *rostratus* (DC.) Thell. and *Campanula hierosolymitana* Boiss. Türkiye Florası için ikinci kayıt olarak toplanmıştır. Farklı taksonomistler bu taksonları Türkiye'den toplamıştır fakat toplanan bu örnekler doğru olarak teşhis edilememiştir. Bu yanlış teşhisler farklı yayınlarda belirtilmiş olmasına rağmen Türkiye Florası'nın birinci ve altıncı cildi ile diğer iki ek cildinde bu taksonlar kaydedilmemiştir. Bu yayınlara, Türkiye Florası'na eklenen bu taksonlar Türk taksonomistlerinin ilgisine sunulmuştur. Tanımlar ve meyve şekillerini gösteren fotoğraf, ayrıca yakın taksonlardan ayırmak için anahtar verilmiştir.

Anahtar Sözcükler: *Raphanus*, *Campanula*, Flora, Türkiye

Introduction

Two specimens belonging to the genera *Raphanus* L. and *Campanula* L. were found during a floristic trip in southern Anatolia, Turkey. After checking the Flora of Turkey, I concluded that one of the specimens was *Raphanus raphanistrum* L. (Hedge, 1965). Hedge indicated that *R. raphanistrum* might have 3 subspecies in Turkey. He did not identify these subspecies because the herbarium representation of *Raphanus* from Turkey is rather sparse and often inadequate. These subspecies are subsp. *raphanistrum*, subsp. *maritimus* (Smith) Thellung and subsp. *landra* (Moretti) Bannier & Layens. Subsp. *maritimus* was recorded from the Black Sea Coast near Of village in Grossheim's Map (Hedge, 1965). Güner and Şağban collected this subspecies from Rize and İstanbul and these samples found in the Hacettepe Herbarium.

However there are no records of specimens of subsp. *landra*. Furthermore, there is no identification key for the species and subspecies of *Raphanus* in the Flora of Turkey. Pistrick identified some samples in the herbarium of the Naturhistorisches Museum, Vienna (W) collected by Bozakman and Fitz in 1870 as *Raphanus raphanistrum* subsp. *rostratus* var. *rostratus*. This identification was published in the Kulturpflanze in 1987.

Other specimens collected in the Altınbeşik Cave National Park were identified as *Campanula reuteriana* Fisch. & C.A.Mey. from the Flora of Turkey (Dambolt, 1978). After checking the taxonomic revision of *Campanula* subgenus *Sicyocodon* (Feer) Damboldt and subgenus *Megalocalyx* Dambolt (Saez, Aldasoro, 2003), I concluded that these samples were *Campanula hierosolymitana* Boiss. Soez and Aldasoro identified some

samples in the herbarium of W collected by Montbret from İskenderun in 1834 as *Campanula hierosolmitana* in this revision.

Materials and Methods

Herbarium specimens and specimens collected from field studies were evaluated. These specimens were identified basically using the Flora of Turkey (Hedge, 1965; Damboldt, 1978; Davis et al., 1988; Güner et al., 2000), other floras (Tutin & Heywood, 1964; Zohary, 1966), and revisions (Pistrick, 1987; Saez & Aldasoro, 2003). The chorology of Turkish species of the families *Brassicaceae* (Yıldırımli, 2001a) and *Campanulaceae* (Yıldırımli, 2001b) was checked. Collected plant materials were deposited in the herbarium of the Hacettepe University Department of Biology (HUB). Other studied herbarium specimens are given below.

R. raphanistrum subsp. *raphanistrum*; [Turkey] B1 İzmir, Ödemiş, around Zeytinlik village, 150 m, macchie clearings, 23/4/1997, A. Yılmaz 118! (HUB). B3 Isparta, Şarkikaraağaç Kızıldağ National Park, road edge at Park entrance, 1200 m, 2/6/1995, B. Mutlu 1386! (HUB). B5 Kayseri, Sultan Sazlığı, Yahyalı, Yerköy, in garden, 1071 m, 23/7/1994, M. Öztekin 1637! (HUB). C1 Muğla, Güllük, 50 m, road edge, 29/5/1998, B. Mutlu 3646! (HUB). C3 Antalya, Kemer, W. of Göynük stream, sandy coast, 0-5 m, 9/5/1997, H. Peşmen 3703! (HUB). Kemer, entrance of Kindilçeşme, sandy areas, 0 m, 24/5/2000, B. Mutlu 5711! (HUB). C4 Antalya, Gazipaşa, Çobanlar village, Katranlık, 75 m, 16/4/1983, H. Sümbül 1569! (HUB). C5 Adana, Yumurtalık, Çamlık, 10 m, sandy areas, 20/4/1998, B. Mutlu 2336! (HUB).

R. raphanistrum subsp. *maritimus*; [Turkey] A2 İstanbul, Beykoz, Kirazlı, 100 m, road edge, 3/8/2001, H. Şağban 3685! (HUB). A8 Rize, between Ardeşen and Fındıklı, coast side, 5 m, 29/10/1980, A. Güner 3105! (HUB). Between Ardeşen and Işıklı village, coast side, 0-10 m, 28/6/1980, A. Güner 2717! (HUB).

R. sativus; [Turkey] B5 Kayseri, Sultan Sazlığı, Sindelhöyük village, in garden, 1071 m, 3/9/1994, M. Öztekin 1879! (HUB). Nevşehir, Göreme, Arılıburun Stream, 1150 m, 17/6/1989, volcanic tuff M. Vural 5146! (HUB). C4 Konya, Ermenek, around village, 700-1100 m, 14/10/1984, H. Sümbül 2628! (HUB).

C. strigosa; [Turkey] C6 Malatya: Doğanşehir, 20 km between Erkenek and Gölbaşı, in meadows, 800 m,

24/5/1987, E. Aktoklu 430! K. Maraş: Ahır M., Ulucak H., Bakacak ridge, 1200-1500 m, 21/5/1991, Z. Aytaç 4610-H.Duman! (HUB).

C. propinqua; [Turkey] B7 26 km from Malatya to Pötürge after branching on the south side of Kube Mountain, 1650 m, 17/7/1982, M. Nydeger 17211! (HUB). C3 Isparta: 1 km from Sütçüler to Labanisa, limestone slopes, in macchie and *J. excelsa*, c. 1080 m, 26/5/1974, H. Peşmen 1067-A. Güner! (HUB).

C. stellaris; [Turkey] C5 Adana: Karaisalı, Karsantı, 22/6/1970, A. Pamukçuoğlu-Quezel! (HUB). C5 Konya: Ereğli, Aydos M., Delimahmutlu, Kapızardıç forest, 1650 m, limestone slopes, 21/6/1977, S. Erik 2196! (HUB).

C. saxonorum; [Turkey] A9 Kars: Sarıkamış, Karakurt, Agup, 1500-1650 m, 16/6/1979, O. Güneş 1108! (HUB). B7 Tunceli: Pülümür, Kuzdere H. foot, 1500-1700 m, 14/6/1980, Ş. Yıldırımli 3111! (HUB).

C. dichotoma; [Turkey] B6 K. Maraş: Göksun, Karadut village, Dağobası, 1800 m, *Pinus* forest, 19/6/1981, B. Yıldız 2971! (HUB).

C. cecillii; [Turkey] B8 Siirt: Baykan, exit of Bitlis, left side of road, 700 m, 20/5/2003, B. Mutlu 8227-J. Beck! (HUB).

Results and Discussion

According to Hedge (1965) the genus *Raphanus* has 2 species in Turkey. One of these *R. sativus*, is now cultivated everywhere for its edible roots (in Turkish 'turp'). These may be red, pink, white or black. The other species is *Raphanus raphanistrum*, it has 2 subspecies in Turkey. However the number has increased to 3, including *Raphanus raphanistrum* subsp. *rostratus*.

Raphanus raphanistrum L. subsp. *rostratus* (DC.) Thell. var. *rostratus* in Hegi, III. Fl. Mitteleur. 4, 1 (1918) 279.-*Raphanus rostratus* DC., Syst. 2 (1821) 666; *Rapanistrum rostratum* (DC.) Fisch. et Mey. Ind. Sem. Hort. Petropol. (1838) 22. Figure 1.

Lectotype: Herb. De Candolle, leg. Fischer 1819, Aserbaidshania prope Lenkoran (Herb. G; vgl. Szonova 1985).

Annual with stem 15-30 cm, ascending, branched at base. Basal and lower cauline leaves lyrate; upper usually entire, lateral lobes of basal and lower cauline leaves very small and distant. Sepal 0.8-1.8 mm, elliptic-lanceolate,

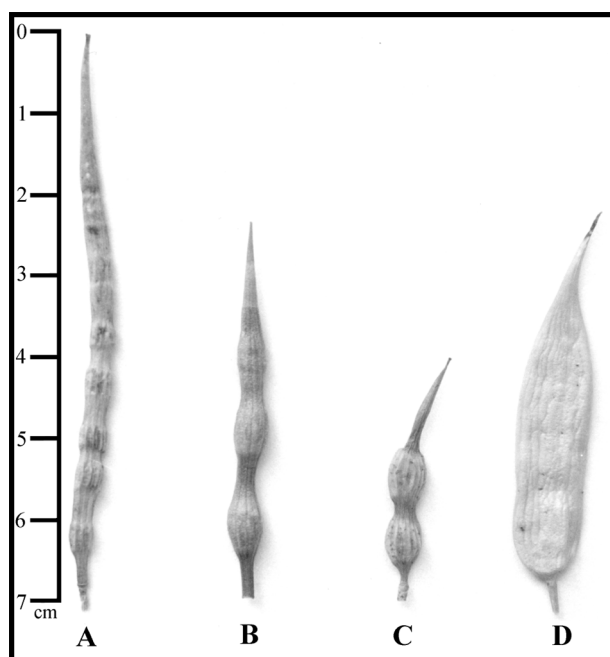


Figure 1. Fruit of *Raphanus taxa*; A. *R. raphanistrum* subsp. *raphanistrum*, B. *R. raphanistrum* subsp. *rostratus* var. *rostratus*, C. *R. raphanistrum* subsp. *maritimus*, D. *R. sativus*.

obtuse. Petal 15-25 mm, pale lilac, with darker veins. Fruiting pedicels 1-5 cm. Siliqua erecto-patent, 30-130 x 4-6 mm, lomentaceous at least above, with 2-7 segments usually longer than wide, strongly veined; beak 10-30 mm. Flowering 4-6.

C3 Antalya: Perge, Bozakman and Fitz 1970, (herb: W 13880); Olimpos Seashore National Park, Dikece Cape, 0 m, seashore, 12/6/2000, B. Mutlu 5983.

The most useful characters for identification to subspecies of *R. raphanistrum* are fruit shape (Figure 1), petal length, colours and veins. A key of the species and subspecies of the genus *Raphanus* in the Flora of Turkey, in which the most useful characters are considered, is given below.

1. Plant annual with tuberous taproot. Siliqua 8-15 mm in diameter, not lomentaceous and not or scarcely constricted between the seeds (Figure 1) **sativus**
1. Plant annual, biennial and perennial with napiform root. Siliqua 3-8 mm in diameter, lomentaceous and constricted between the seeds **raphanistrum**
 2. Siliqua less than 5 mm in diameter

3. Plant annual. Siliqua 4-5 mm in diameter. Seed 2-5 **subsp. rostratus**

3. Plant annual or biennial. Siliqua 3-4 mm in diameter. Seed 4-11 (Figure 1) **subsp. raphanistrum**

2. Siliqua 5-8 mm in diameter

4. Plant usually perennial. Leaves with contiguous lateral lobes. Petals 15-20 mm, yellow. Beak 8-20 mm (Figure 1) **subsp. maritimus**

4. Plant annual or perennial. Leaves with distant lateral lobes. Petals 10-25 mm, white, pale lilac or yellowish. Beak 10-40 mm

5. Plant annual. Petal 15-25 mm, pale lilac with darker veins. Beak 10-30 mm (Figure 1) **subsp. rostratus var. rostratus**

5. Plant perennial or sometimes annual. Petal 10-15 mm, white or yellowish. Beak 15-40 mm **subsp. landra**

According to Dambolt (1978) the subgenus *Megalocalyx* of the genus *Campanula* has 7 species and *C. dichotoma* is doubtfully recorded and needs confirmation in Turkey. Saez and Aldasoro (2003) identified some samples in herbarium W (C8 Mardin: Senar, 6/5/1888, *Sintenis* 921; NW of Mardin, Diyarbakır, 30/5/1983, *Sorger* 83162; C9 Siirt: Şırnak to Cizre 14 km from Şırnak, 8/5/1966, *Davis* 42678) as *C. dichotoma*. In addition, I identified one specimen (*B. Yıldız* 2971) in herbarium HUB as *C. dichotoma* that had not been identified correctly. *Campanula cecillii* Chitt. was subsumed in *C. reuteriana* Boiss. & Balansa by Damboldt (1978) because they only differ in the shape of the calyx lobes. However, Saez and Aldasoro (2003) separated these species because they have different characters, namely are stamen shape and types of hairs in the pedicels. *C. balansae* Boiss. & Hausskn., which is endemic for the Flora of Turkey, was subsumed in *C. propinqua* Fisch. & C.A.Mey by Saez and Aldasoro (2003). Species number in the subgenus *Megalocalyx* in Turkey increased to 9 after these taxonomic recognitions at the specific level and additional species. Taxonomical corrections of these species in the Flora of Turkey are given below.

Campanula hierosolymitana Boiss. Diagn. Pl. Orient. Ser. 1, 11: 62 (1849).

Lectotype: (designated by Saez & Aldasoro, 2003,

Bot. J. L. Soc., 141, 215-241) [Palestine], aux pieds des rochers a Jarusalem, Naplouse, iii-iv. 1846 *Boissier* s.n. (G).

Annual 5-30 cm, hispid. Stem erect, simple or dichotomously usually branched in the upper part, rarely from the base. Leaves 5-40 x 4-15 mm, sessile entire, ovate to oblong, obtuse or subacute. Flowers in groups of 2-3. Pedicel hispid. Calyx 6-16 x 2-3.8 mm (8-17 x 3-4.5 mm in fruit), rather densely hirsute; lobes 4-10 mm long (12 mm long in fruit), ovate to lanceolate, acute; appendages 2-3 mm long (2.5-3 mm in fruit), ovate to rounded, obtuse, concealing ovary in fruit. Corolla 10-22 mm long, divided to 1/3-1/2, tubular-campanulate, glabrous or hairy on nerves outside, light or deep violet; lobes 3-7 mm long, ovate to triangular-ovate, obtuse; tube 7-15 mm long. Stamen 6.5-8 mm long; filiform part of filament 0-0.2 mm long; base 1.5-1.9 x 1.3-1.7 mm, oblong-elliptical, sparsely hairy in the margin; anthers 5-5.8 mm long. Style 8.4-11 mm long, included. Stigma 1.5-2 x 0.5-0.7 mm. Capsule 5-7 x 5.65 mm, concealed by the acresent connivent calyx lobes and appendages, hairy on the keel and on the valves. Seeds 1 x 0.4-0.45 mm, yellowish. Flowering 3-5.

C3 Antalya: İbradı, Altınbeşik Cave National Park, around İntepe, 750 m, 7/6/2003, *B. Mutlu* 8317. C6 Hatay: Syria, Prope Alexandrette (İskenderun), 1834, *Montbret* 18 (W).

The most useful characters for identifying the species of the subgenus *Megalocalyx* are corolla and calyx shape, type of pedicel hairs, anther size, length of filiform part of the filament and seed size. A species key of the subgenus *Megalocalyx* of the genus *Campanula* in the Flora of Turkey, in which the most useful characters are considered, is given below.

1. Corolla divided more than half of its length. Filiform part of filament absent **stellaris**
1. Corolla divided less than half of its length. Filiform part of filament absent to 1.5 mm long
 2. Anthers 1-2 mm long. Corolla usually 4-5.5 mm long **rimarum**

2. Anther longer than 3 mm. Corolla usually longer than 6 mm
 3. Lobes of calyx ending in a ± subulate apex
 4. Subulate apex on calyx lobes up to 2 mm long. Seed width/length 0.5-0.7 **saxanorum**
 4. Subulate apex on calyx lobes up to (3) 5-10 mm long. Seed width/length 0.8-0.9 **strigosa**
 3. Lobes of calyx acute, not ending in a subulate apex
 5. Pedicels of flowers and base of calyx with two types of hairs; some shorter, retrorse and others longer, patent
 6. Appendages of calyx 5.5-7 mm long during fructification. Corolla 20-30 mm long **reuteriana**
 6. Appendages of calyx 2-4 mm long during fructification. Corolla 9-20 (23) mm long **propinqua**
 5. Pedicels of flowers and base of calyx with only one kind of hairs, all similar and patent
 7. Stamens with filiform part 0-0.2 mm long **hierosolymitana**
 7. Stamens with filiform part longer than 0.4 mm
 8. Lobes of fruiting calyx 5.5-15 mm long. Seeds 0.7-0.9 mm long **dichotoma**
 8. Lobes of fruiting calyx longer than 15 mm long. Seeds 1.2-1.5 mm long **cecilii**

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