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RARE AND ENDEMIC TAXA OF APIACEAE IN TURKEY AND THEIR CONSERVATION SIGNIFICANCE

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S U M M A R Y

The family Apiaceae (Umbelliferae) is the eighth largest family in Turkey. It is represented by 101 genera of which 53 have only 1 species and 451 species. After the publication of P. H. Davis' "Flora of Turkey and the East Aegean Islands, vol. 4 in 1972" 4 genera and 53 species are added to the Turkish flora.

Endemism of the family in Turkey is about 33% with 159 species of which 37 are endangered. The following 4 genera are monotypic endemic very locally distributed: *Ekimia bornmuelleri*, *Microsciadium minutum*, *Olymposciadium caespitosum* and *Crenosciadium siifolium.* Other endemic genera (end. 100%) are: *Rhabdosciadium* (2 sp.), *Muretia* (1 sp.), *Kundmannia* (2 sp.), *Froriepia* (1 sp.), *Stenotaenia* (1 sp.).

Ferula halophila and *F. orientalis* are recorded in Bern Convention App. I, it means their habitats must be protected.

Ö Z E T

Apiaceae (Umbelliferae) familyası Türkiye'deki sekizinci büyük familyadır ve 53'ü sadece bir tür taşıyan 101 cinse ait 451 türle temsil edilir. P. H. Davis' "Flora of Turkey and the East Aegean Islands, vol. 4 in 1972" adlı eserinden sonra Türkiye florasına 4 cins 53 tür ilave edilmiştir.

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37'i tehlike altında 159 endemik türle familya'nın Türkiye'deki endemism oranı %33'tür. Oldukça local 4 monotipik endemik cins bulunur: *Ekimia bornmuelleri*, *Microsciadium minutum*, *Olymposciadium caespitosum* ve *Crenosciadium siifolium.* Diğer endemic cinsler *(*%100 endemik): *Rhabdosciadium* (2 sp.), *Muretia* (1 sp.), *Kundmannia* (2 sp.), *Froriepia* (1 sp.), *Stenotaenia* (1 sp.).

Ferula halophila ve *F. orientalis* Bern Sözleşmesi Ek I'de kayıtlı, habitatı mutlaka korunması gereken türlerdir.

Key words: Apiaceae (Umbelliferae), rare species, endemic, Turkey

I N T R O D U C T I O N

Turkey is among the richest countries in the world in terms of flowering plant diversity. With around 9300 flowering plant species, the flora is the richest of any country in Europe, North Africa and Middle East. It is more typical of a continent or tropical country than an individual temperate country.

Wild Flowering Plants in Turkey (3, 4, 8):

Family	Genera	Species	Subspecies	Varieties	Total infrageneric taxa
142	1138	8898	1680	1069	10754

Since the publication of the Flora of Turkey, the Turkish flora has received considerable attention from botanists both from Turkey and abroad. The second supplement of " Flora of Turkey and the East Aegean Islands'' was published in 2000.

Since 2000, up until end of 2007, 470 taxa have been added based on 350 published papers on the flora of Turkey.

Additional taxa (Özhatay & Kültür 2006, Özhatay et al. 2009):
Genera: 16
Species: 354 /subspecies: 64 /variety: 38
Total infrageneric taxa: 470

TOTAL of the Turkish flora vascular plant are 9252 species and 11224 taxa.
The main reasons for this wealth are as follows:

- A variety of climates
- topographical diversity with marked changes in ecological factors over short distance
- geological and geomorphic variation
- a range of aquatic environments such as seas, lakes and rivers
- altitude variations from sea level to 5000 m
- the situation of the country at the junction of three major phytogeographical regions:

  - Euro-Siberian
  - Mediterranean
  - Irano-Turanian
- There are a number of major mountain ranges in Anatolia which constitute effective barriers and these have further encouraged a greater diversity of species
- Additionally, during many historical periods, Anatolia has served as a passage way between the continents of Europe, Asia and Africa, resulting in the dispersal of a wide variety of plants and animals.

All these factors combined have provided many opportunities for the plants to evolve and differentiate creating the present wealth of species now estimated to be over 9252 taxa, about one third of which are endemics. (The Apiaceae is represented by 101 genera and 482 taxa in Turkey).

MATERIAL AND METHODS

Data were obtained by scanning the Floras, Check-Lists, Red Data Books, publications and our observations (1, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17)

RESULTS AND DISCUSSION

Apiaceae in Turkey

The family of *Apiaceae* with a total of 451 native species of which 159 are endemic in Turkey is remarkable in various respects.

After Graminae (131) and Compositae (126) , it is the third largest family Apiaceae (101), of the total number of the native genera and it is eighty largest family number of native species after Compositae (1132), Leguminosae (958), Labiatae(543), Cruciferae (509), Graminae (483), Caryophyllaceae (465) and Scrophulariaceae (463).

It is also the seventh largest family having high number of endemic species after Compositae (509), Leguminosae (375), Scrophulariaceae (241), Labiatae (240), Cruciferae (194) and Caryophyllaceae (187).

It is only family has 4 monotypic and endemic genera in Turkish flora. Photos are mainly from the herbarium specimens of the monotypic genera and their distribution given (2, 5) (Fig. 1-4).

Turkish genera of Apiaceae are given in the Table 1 arranged in descending.

Result of endangered species of Apiaceae according to IUCN threat categories are (Table 2):
En (Endangered): 29 (27 endemics / 2 non endemics)
DD (Data deficient): 25 (7 endemics / 17 non endemics)

VU (Vulnerable): 88 (39 endemics / 49 non endemics)
CR (Critically endangered): 13 (12 endemics / 1 non endemics)
NL (Not listed): 1 (1 endemics)

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Appendix I: Monotipic endemic genera in Turkey

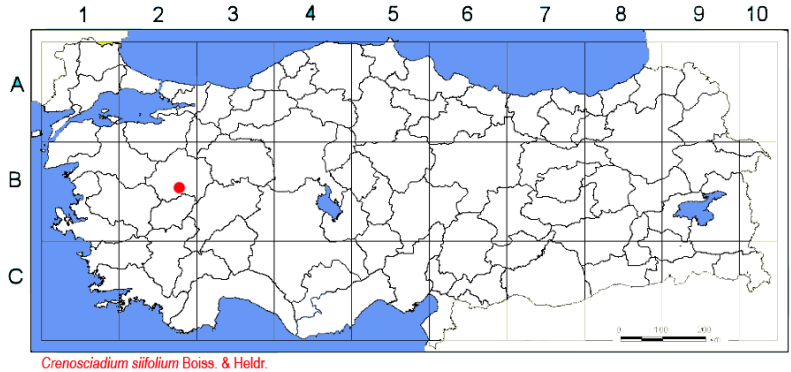

Fig. 1. *Crenosciadium siifolium;* Herbarium specimen and distribution map
Localities: Murat Dağı, (Kütahya) ISTE 45913, 57730
Anamas Dağı (Isparta)

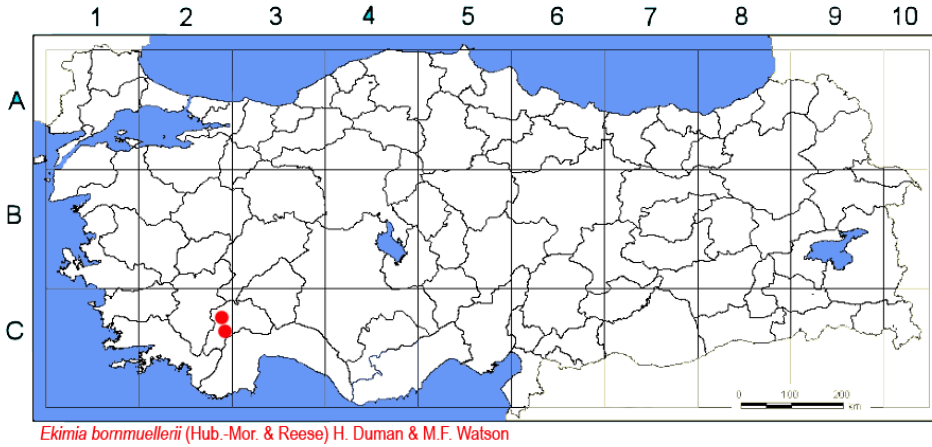

Fig. 2. *Ekimia bornmuelleri;* Herbarium specimen and distribution map
Localities:Dirmil-Tefenni (Burdur) ISTE 72127
Salda Gölü (Burdur)
Acıpayam (Denizli)

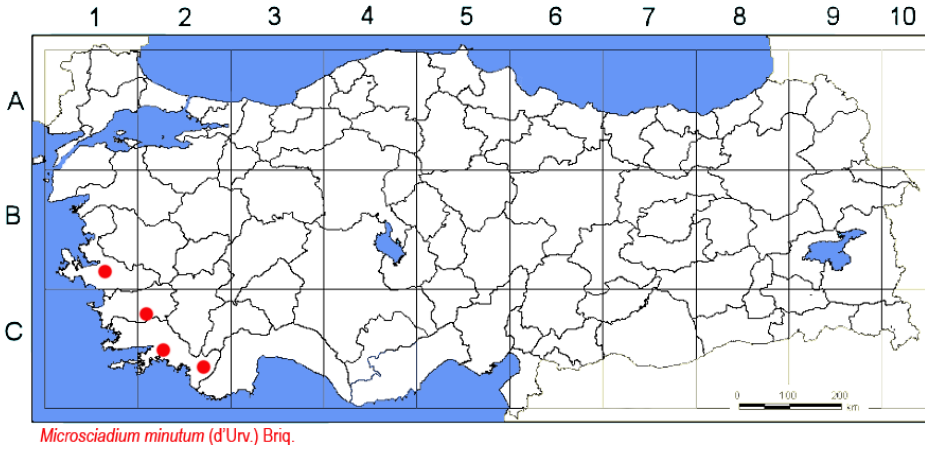

Fig. 3. *Microsciadium minutum;* Herbarium specimen and distribution map
Localities: Bafa Gölü (Muğla) ISTE 68846; Fathiye (Muğla)
Kavaklıdere (İzmir)
Çine (Aydın)

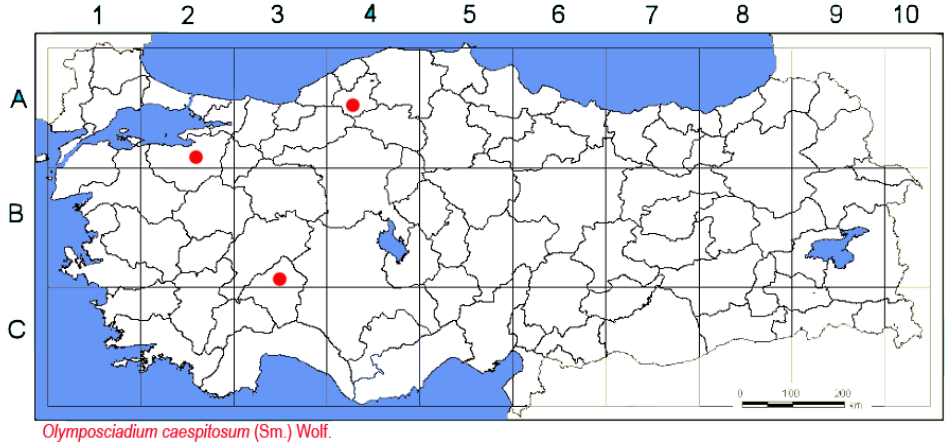

Fig. 4. *Olymposciadium caespitosum;* Herbarium specimen and distribution map
Localities: Uludağ-Kilimli Göl (Bursa) ISTE 20930, 59571, 67266
Karabük, Keltepe (Zonguldak)
Eğridir, Barla Dağı (Isparta)

Appendix II: Tables

Tablo 1. Turkish genera of Apiaceae **(**Monotipic genera in Turkey are indicated by * and %100 endemic species are indicated by + .)

Genera (101)	Species (451)	Taxa (482)	Endemics (159)	% species endemism (33)	% taxa endemism (35,2)
Bupleurum L.	46	48	20	48	41,6
Ferulago W. Koch	32	32	19	59,4	59,4
Eryngium L.	24	25	11	44	45,8
Pimpinella L.	23	27	5	18,5	21,7
Ferula L.	20	21	10	47,6	50,0
Tordylium L.	18	18	9	50	50,0
Heracleum L.	17	22	9	40,9	52,9
Chaerophyllum L.	17	17	5	29,4	29,4
Peucedanum L.	16	17	6	35,3	37,5
Prangos Lindl.	14	16	9	56,2	62,3
Seseli L.	13	14	4	28,6	30,8
Bunium L.	11	17	7	41,2	63,6
Torilis Adans.	9	12	1	8,3	11,1
Scandix L.	8	9	1	11,1	12,5
Johrenia DC.	8	9	5	55,5	62,5
Anthriscus Pers.	8	8	0	0	0,0
Oenanthe L.	8	8	1	12,5	12,5
Echinophora L.	7	7	4	57,14	54,1
Scaligeria DC.	7	7	2	28,6	28,6
Smyrnium L.	6	6	0	0	0,0
Grammosciadium DC.	6	6	1	16,7	16,7
Malabaila Hoffm.	6	6	2	33,3	33,3
Daucus L.	6	6	1	16,7	16,7
Carum L.	5	5	1	20	20
Hippomarathrum Link	5	5	0	0	0,0
Laserpitium L.	5	5	2	40	40
Heptaptera Marg. & Reuter	4	4	1	25	25
Cymbocarpum DC.	4	4	2	50	50
Pastinaca L.	3	4	1	33,3	33,3
Opopanax W. Koch	3	3	0	0	0
Trigonosciadium Boiss.	3	3	2	66,7	66,7
Lisaea Boiss.	3	3	0	0	0
Dumaniana Yıldırımlı & Selvi	3	3	2	66,7	66,7
Actinolema Fenzl	2	2	0	0	0
Coriandrum L.	2	2	0	0	0
Bifora Hoffm.	2	2	0	0	0
Smyrniopsis Boiss.	2	2	0	0	0
Hellenocarum Wolff	2	2	1	50	50
Stefanoffia Wolff	2	2	1	50	50
+Kundmannia Scop. (S)	2	2	2	100	100
Eleutherospermum C. Koch	2	2	0	0	0
Trinia Hoffm.	2	2	1	50	50
Apium L.	2	2	0	0	0
Ammi L.	2	2	0	0	0
Falcaria Fabr.	2	2	0	0	0
Orlaya Hoffm.	2	2	0	0	0
+Astrantia L.	1	2	1	50	100

+*Angelica* L.	1	2	1	50	100
Hydrocotyle L.	1	1	0	0	0
Sanicula L.	1	1	0	0	0
Lagoecia L.	1	1	0	0	0
Myrrhoides Heister ex Fabr.	1	1	0	0	0
+*Rhabdosciadium* Boiss.	1	1	1	100	100
Fuernrohria C. Koch	1	1	0	0	0
Huetia Boiss.	1	1	0	0	0
+*Muretia* Boiss.	1	1	1	100	100
Chamaesciadium C. A. Meyer	1	1	0	0	0
Trachyspermum Link	1	1	0	0	0
Aegopodium L.	1	1	0	0	0
Sium L.	1	1	0	0	0
Berula W.Koch	1	1	0	0	0
Crithmum L.	1	1	0	0	0
Aethusa L.	1	1	0	0	0
Foeniculum Miller	1	1	0	0	0
Anethum L.	1	1	0	0	0
Physospermum Cusson	1	1	0	0	0
Conium L.	1	1	0	0	0
Trachydium Lindley	1	1	0	0	0
Lecokia DC.	1	1	0	0	0
**Ekimia*. Duman & M.F. Watson	1	1	1	100	100
Hohenackeria Fisch. & Mey.	1	1	0	0	0
Szovitsia Fisch. & Mey.	1	1	0	0	0
+*Frorepia* C. Koch	1	1	1	100	100
**Microsciadium* Boiss.	1	1	1	100	100
**Olymposciadium* Wolff	1	1	1	100	100
Petroselinum Hill	1	1	0	0	0
Ridolfia Moris	1	1	0	0	0
Sison L.	1	1	0	0	0
Cicuta L.	1	1	0	0	0
Oliviera Vent.	1	1	0	0	0
Cnidium Cusson	1	1	0	0	0
Ligusticum L.	1	1	0	0	0
Xanthogalum Lallem.	1	1	0	0	0
Capnophyllum Gaertn.	1	1	0	0	0
Diplotaenia Boiss.	1	1	0	0	0
**Crenosciadium* Boiss.	1	1	1	100	100
+*Stenotaenia* Boiss.	1	1	1	100	100
Zosima Hoffm.	1	1	0	0	0
Ormosciadium Boiss.	1	1	0	0	0
Ainsworthia Boiss.	1	1	0	0	0
Laser Borkh.	1	1	0	0	0
Glaucosciadium Burtt & Davis	1	1	0	0	0
Elaeoselinum W. Koch ex DC.	1	1	0	0	0
Thapsia L.	1	1	0	0	0
Astrodaucus Drude	1	1	0	0	0
Turgeniopsis Boiss.	1	1	0	0	0
Caucalis L.	1	1	0	0	0
Turgenia Hoffm.	1	1	0	0	0
Pseudorlaya Murb.	1	1	0	0	0
Artedia L.	1	1	0	0	0
Exoacantha Lab.	1	1	0	0	0

Table 2. The IUCN threat categories of endangered species of Apiaceae

Species	**End.**	**RDB**
Angelica sylvestris L. var. *stenoptera* Boiss.	E	EN
Anthriscus ruprechtii Boiss.		DD
Anthriscus tenerrima Boiss. & Spruner		VU
Bunium cylindricum (Boiss. & Hohen.) Drude		DD
Bunium microcarpum (Boiss.) Freyn subsp. *longiradiatum* Hedge & Lamond	E	EN
Bunium caroides (Boiss.) Hausskn. ex Bornm.		VU
Bunium paucifolium DC var. *junceum* (Boiss.) Hedge & Lamond		VU
Bunium pinnatifolium Kljuykov	E	VU
Bupleurum libanoticum Boiss. & Blanche		DD
Bupleurum semicompositum L.		DD
Bupleurum pendikum Snogerup	E	EN
Bupleurum brachiatum K. Koch ex Boiss.	E?	VU
Bupleurum davisii Snogerup	E	VU
Bupleurum dichotomum Boiss.		VU
Bupleurum erubescens Boiss.	E	VU
Bupleurum nodiflorum Sibth. & Sm.		VU
Bupleurum pauciradiatum Fenzl	E	VU
Bupleurum polyactis Post ex Snogerup	E	VU
Bupleurum praealtum L.		VU
Bupleurum schistosum Woronow	E	VU
Bupleurum tenuissimum L.		VU
Bupleurum zoharii Snogerup	E	VU
Carum leucocoleon Boiss. & A. Huet		VU
Carum rupicola Hartvig & Strid	E	EN
Chaerophyllum aksekiense A. Duran & H. Duman	E	CR
Chaerophyllum karsianum Kit Tan & Ocakv.	E?	CR
Chaerophyllum posofianum Erik & Demirkuş	E?	CR
Chaerophyllum roseum M. Bieb.		DD
Chaerophyllum hakkiaricum Hedge & Lamond	E	VU
Chaerophyllum leucolaenum Boiss.	E	VU
Chaerophyllum libanoticum Boiss. & Kotschy		VU
Cicuta virosa L.		DD
Crenosciadium siifolium Boiss. & Heldr.	E	EN
Cymbocarpum amanum Rech. Fil.	E	VU
Cymbocarpum anethoides DC.		VU
Daucus conchitae Greuter	E	VU
Diplotaenia cachrydifolia Boiss.		VU
Dumaniana gelendostensis Yıld. & B. Selvi	E	CR
Dumaniana zozimioides (Fenzl)) Yıld. & B. Selvi	E	DD

Echinophora lamondiana Yıldız & Z. Bahçecioğlu	E	EN
Echinophora chrysantha Freyn & Sint.	E	VU
Ekimia bournmuelleri (Hub.-Mor. & Reese) H. Duman & M.F. Watson		VU
Eleutherospermum lazicum Boiss. & Balansa		VU
Eryngium isauricum Contandr. & Quézel	E	EN
Eryngium ilex P. H. Davis	E	VU
Eryngium palmito Boiss. & Heldr.	E	VU
Eryngium pseudothoriifolium Contandr. & Quézel	E	VU
Eryngium thyrsoideum Boiss.		VU
Eryngium wanaturi Woronow		VU
Exoacantha heterophylla Labill.		VU
Ferula anatolica Boiss.	E	DD
Ferula amanicola Hub.-Mor. & Peşmen		EN
Ferula huber-morathii Peşmen	E	EN
Ferula longipedunculata Peşmen	E	EN
Ferula tenuissima Hub.-Mor. & Peşmen	E	EN
Ferula caspica M. Bieb.		VU
Ferula drudeana Korovin	E	VU
Ferula halophila Peşmen	E	VU
Ferula hermonis Boiss.		VU
Ferula parva Freyn & Bornm.	E	VU
Ferula coskunii H. Duman et. Sağıroğlu	E	CR
Ferula mervynii Sağıroğlu et. H. Duman	E	CR
Ferulago isaurica Peşmen	E	CR
Ferulago amani Post ex Boiss.		DD
Ferulago bracteata Boiss. & Hausskn.	E	DD
Ferulago latiloba Schischk.	E	DD
Ferulago sylvatica (Besser) Rchb.		DD
Ferulago antiochia Saya & Miski	E	EN
Ferulago longistylis Boiss.	E	EN
Ferulago sandrasica Peşmen & Quézel	E	EN
Ferulago silaifolia (Boiss.) Boiss.	E	EN
Ferulago angulata (Schltdl.) Boiss.		VU
Ferulago autumnalis Thiebéaut		VU
Ferulago bernardii Tomk. & Pimenov		VU
Ferulago confusa Velen.		VU
Ferulago pachyloba (Fenzl) Boiss.	E	VU
Ferulago trojana Akalın & Pimenov	E	VU
Ferulago idaea Özhatay & Akalın	E	CR
Ferulago glareosa Kandemir & Hedge	E	CR
Froriepia gracillima Leute	E	VU

Grammosciadium confertum Hub.-Mor. & Lamond	E	VU
Grammosciadium cornutum (Nábelek) C. C. Towns.		VU
Heptaptera cilicica (Boiss. & Balansa) Tutin	E	EN
Heptaptera triquetra (Vent.) Tutin		EN
Heracleum marashicum Kit Tan & Yildiz	E	EN
Heracleum sphondylium L. subsp. *artvinense* (Manden.) P. H. Davis	E	EN
Heracleum lasiopetalum Boiss.		VU
Heracleum pastinacifolium C. Koch subsp. *transcaucasicum* P. H. Davis		VU
Heracleum peshmenianum Ekim	E	VU
Heracleum rawianum C. C. Towns.		VU
Heracleum sosnowskyi Manden.		VU
Heracleum sphondylium L. subsp. *montanum* (Schleicher ex Gaudin) Briquet		VU
Heracleum trachyloma Fisch. & C. A. Mey.		VU
Hippomarathrum boissieri Reut. & Haussk. Ex Boiss.		VU
Hippomarathrum scabrum Boiss.		VU
Johrenia polyscias Bornm.	E	CR
Johrenia aurea Boiss. & Balansa		DD
Johrenia porteri Post ex Boiss.		DD
Johrenia dichotoma DC. subsp *sintenisii* Bornm.	E	EN
Kundmannia anatolica Hub.-Mor.	E	CR
Laserpitium affine Ledeb.		DD
Laserpitium glaucum Post		DD
Malabaila involucrata Boiss. & Spruner		VU
Microsciadium minutum Briq.	E	VU
Muretia aurea Boiss.	E	VU
Oenanthe cyclocarpa Pimenov & Kljuykov	E	EN
Oliviera decumbens Vent.		VU
Opopanax chironium W. D. J. Koch		VU
Pastinaca armena Fisch & C. A. Mey. subsp. *dentata* (Freyn & Sint.) Chamberlain	E	VU
Peucedanum carvifolium Vill.		DD
Peucedanum arenarium Waldst. & Kit. subsp *urbanii* (Freyn & Sint. ex Wolff) Chamberlain	E	EN
Peucedanum graminifolium Boiss.	E	EN
Peucedanum arenarium Waldst. & Kit. subsp. *neumayeri* (Vis.) Stoj. & Stef.		VU
Peucedanum obtusifolium Sm.		VU
Peucedanum zedelmeyerianum Manden.		VU
Peucedanum longibracteolatum Parolly et Nordt	E	VU
Peucedanum. isauricum Parolly & Nordt	E	VU
Pimpinella cretica Poir. var. *arabica* (Boiss.) Boiss.		CR
Pimpinella aromatica M. Bieb.		VU
Pimpinella flabellifolia (Boiss.) Benth. & Hook. ex Drude	E	VU

Pimpinella isaurica W. A. Matthews	E	VU
Pimpinella paucidentata W. A. Matthews		VU
Pimpinella sintenisii H. Wolff		VU
Prangos denticulata Fisch. & C. A. Mey.	E	DD
Prangos scabrifolia Post & Beauv.	E	DD
Prangos heyniae H. Duman & M.F. Watson	E	EN
Prangos platychlaena Boiss. subsp. *engizekensis* H. Duman & M.F. Watson	E	EN
Prangos acaulis Bornm.		VU
Prangos corymbosa Boiss.		VU
Prangos turcica A. Duran, Sağıroğlu & H. Duman	E	NL
Prangos ilanae Pimenov, Akalin et Kljuykov	E	VU
Rhabdosciadium microcalycinum Hand.-Mazz.	E	VU
Scaligeria hermonis Post		DD
Scaligeria glaucescens (DC.) Boiss.		VU
Scandix balansae Reuter ex Boiss.	E	VU
Seseli foliosum (Sommier & Levier) Manden.		DD
Seseli ramosissimum Hartvig & Strid	E	EN
Seseli andronakii Woronow ex Schischk.	E	VU
Seseli grandivittatum Schischkin		VU
Seseli gummiferum Pall. ex Sm.subsp. *gummiferum*		VU
Seseli petraeum M. Bieb.		VU
Seseli resinosum Freyn & Sint.	E	VU
Stefanoffia daucoides H. Wolff		DD
Stefanoffia insoluta Klyujkov	E	EN
Szovitsia callicarpa Fisch. & C. A. Mey.		DD
Tordylium ebracteatum Al-Eisawi & Jury	E	CR
Tordylium cappadocicum Boiss.	E	DD
Tordylium brachytaenium Boiss. & Heldr.	E	EN
Tordylium hirtocarpum Candargy		VU
Tordylium ketenoglui H. Duman & A. Duran	E	VU
Tordylium lanatum Boiss.	E	VU
Tordylium macropetalum Boiss.	E	VU
Tordylium pestalozzae Boiss.	E	VU
Trachydium depressum Boiss.		VU
Trigonosciadium intermedium Freyn & Sint.	E	EN
Trigonosciadium tuberosum Boiss.	E?	DD
Trigonosciadium viscidulum Boiss. & Hausskn.		VU