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## Conspect and chorology of the genera *Amygdalus* L. and *Louiseania* Carrière\*

### Abstract

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The author listed all species of the genus *Amygdalus* and of the closely related genus *Louiseania*. The former has 39 species (some of them critical) and 19 hybrids, while the latter has only 3. Ranges of these species are shown on maps from which it can be clearly seen that *Amygdalus* is an Irano-Turanian genus and that *Louiseania* is Central-Asiatic. Along with each species its synonymy is given, its intraspecific taxonomy and the geographic distribution is briefly discussed.

*Additional key words:* systematics, chorology, *Rosaceae*, *Amygdalus*, *Louiseania*

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### 1. AMYGDALUS L.

The genus *Amygdalus* has been proposed, next to genus *Prunus*, by Linné in the year 1753 in his „Species Plantarum”. However, Linné has been using these names even earlier (1737, *Genera Plantarum*) and this basing on the views of Tournefort from the year 1700. The latter author treated *Prunus*, as well as *Armeniaca*, *Persica*, *Cerasus*, *Amygdalus* and *Laurocerasus* as independent genera. Since that time the treatment of these taxa of high rank underwent various types of transformations, at the base of which there are the difficulties in delimitating them one from the other on the basis of at least one but clear morphological trait. All these opinions, have been presented in historical aspect by Meyer (1923, *Feddes Repert. Beih.* 22) and Kovalev and Kostina (1935, *Trudy Prikl. Bot. Ser.* 8. No 4), thus there is no need to go back to this topic here. Nonetheless till this day, that is almost 300 years since the days of Tournefort taxonomists cannot agree on a unified opinion in this matter. Still there persist two main systematic trends.

The first one treats the genus *Prunus* of Linné in a very wide sense,

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including within it the above mentioned genera as well as some other ones, and currently this opinion is represented in the „Flora Europaea” in which the intrageneric division of the genus *Prunus* s.l. has been adopted as proposed by Rehder (1949) and based on a much earlier works of Koehne (1910, Verh. Bot. Ver. Brandenburg; 1912, Mitt. Deutsch. Dendrol. Ges.). The second approach is represented primarily by Russian and Soviet botanists, who divide the genus *Prunus* s.l. in to such genera as *Prunus* s. str., *Amygdalus*, *Armeniaca*, *Persica*, *Cerasus*, *Padus* and *Laurocerasus*. Recently the list includes also *Louiseania* and *Padellus*. The latter genus has been formed in 1973 by Vassilčenko, but it did not meet with sufficient confirmation. One has to admit, however, that the boundaries between these genera are not very clear and the existence of species with intermediate characteristics presents difficulties in locating them.

Opinions are also known which differ from the two main tendencies defined above. Thus for example Schneider (1905-1906) and recently Hutchinson (1964, The Genera of Flowering Plants, 1) admit the independence of genera *Padus* and *Laurocerasus* but include the remaining ones in the single genus *Prunus* s.l. The whole issue is further complicated by the existence of intergeneric hybrids, both natural ones and obtained by breeding (fig. 1). One must remember, however, that in the family *Rosaceae*, particularly in the *Maloideae*, intergeneric hybrids are nothing unusual.

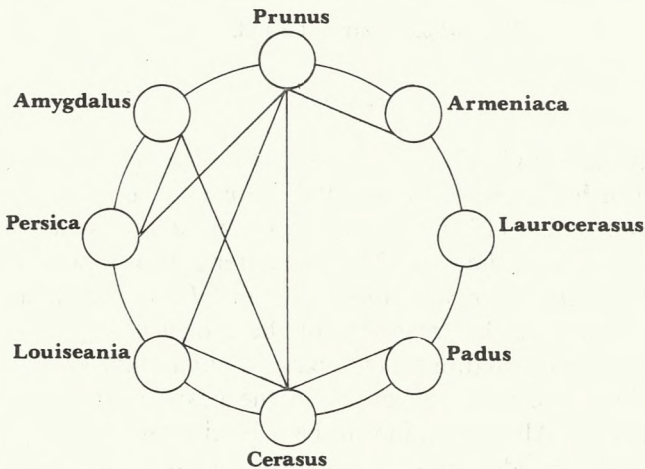


Fig. 1. Sexual intergeneric hybrids in the *Prunoideae* (*Prunus* L. s.l.)

Using the first treatment of the genus *Prunus* when defining the flora of one country, or of a few neighbouring countries, particularly in Europe, as a rule does not create any major difficulties and appears to be a very satisfactory approach. The situation is much more difficult when we have to deal with species from the genus *Prunus* s.l. occurring over a whole continent, or with all the taxa described so far. This was the experience also of Koehne (l.c) who dealt with the



classification of the genus *Prunus* s.l. with more than 250 species. In order to appropriately classify the species he had to create a very complicated system consisting of 6 subgenera (*Padus*, *Cerasus*, *Chamaeamygdalus*, *Emplectocladus*, *Amygdalus*, and *Prunophora*), and furthermore he divided the first two subgenera into two groups (?) each and within them a subdivision into sections, subsections and series. For subsection *Mesocraspedon* in subgenus *Padus* he introduced a geographic subdivision into 9 regions. In spite of such a detailed treatment boundaries between all these intrageneric taxa are still vague and artificial.

In the second case, the division of genus *Prunus* s.l. into seven (or 8-9) smaller genera appears more convincing and, what is perhaps not without importance, is more practical. While also in this case there exist difficulties in defining precisely the traits that separate these taxa, it appears, however, that these are not insurmountable problems. However, further detailed studies based on abundant material are still essential.

The definition of the genus *Amygdalus* adopted here is after Spach (1843) with some modifications of the intrageneric classification (Browicz 1969). The genus is divided into two subgenera; subgenus *Amygdalus* with sections *Amygdalus*, *Chamaeamygdalus*, *Spartioides* and *Leptopus*, and subgenus *Dodecandra*. However, in the case of genus *Amygdalus* two tendencies of its definition exist, one a narrow one and the other a wide one. In the latter case, similarly as Linné did earlier, the genus includes species from the genus *Persica* and sometimes also of other genera, and occasionally sections are formed for them such as: *Persicae*, *Mirae* and *Pedunculatae* (1985, Yü T. T., Lu L. T., Acta Phytotaxonom. Sinica 23, 3).

In the present study the genus *Amygdalus* is treated in the narrow sense, without the representatives of the genus *Persica*, and the main diagnostic feature here is the dry pericarp dehiscing along the ventral suture. Within this genus one observes a great ease of hybridisation between various species, both within one section, between sections and even between subgenera. The available data about hybrids found and described suggest that where two species of almonds occur side by side on the same site the appearance of hybrids is very likely. So far 19 such hybrids have been observed.

All species from the genus *Amygdalus* occur in Asia, particularly in its southwestern and central part. Only two species, *A.nana* and *A.webbii* are represented also in Europe, and even the major parts of their ranges lie in that continent. The greatest concentration of species, as well as the largest number of hybrids occurs in Iran (almost 20 taxa), in Afghanistan and in eastern Anatolia. A number of species is distributed also in Middle-Asiatic republics of the USSR, particularly in Turkmeniya and Kirgiziya, and also in Iraq. It is clear therefore that we are dealing here with an Irano-Turanian genus. While some species, such as *A.webbii* and *A.graeca* appear also in the Mediterranean Region, their close affinity to the Irano-Turanian species is unquestionable.

The range of the genus extends from the east to the west and basically speaking is continuous in nature (fig. 2.). In some isolation and rather removed are only



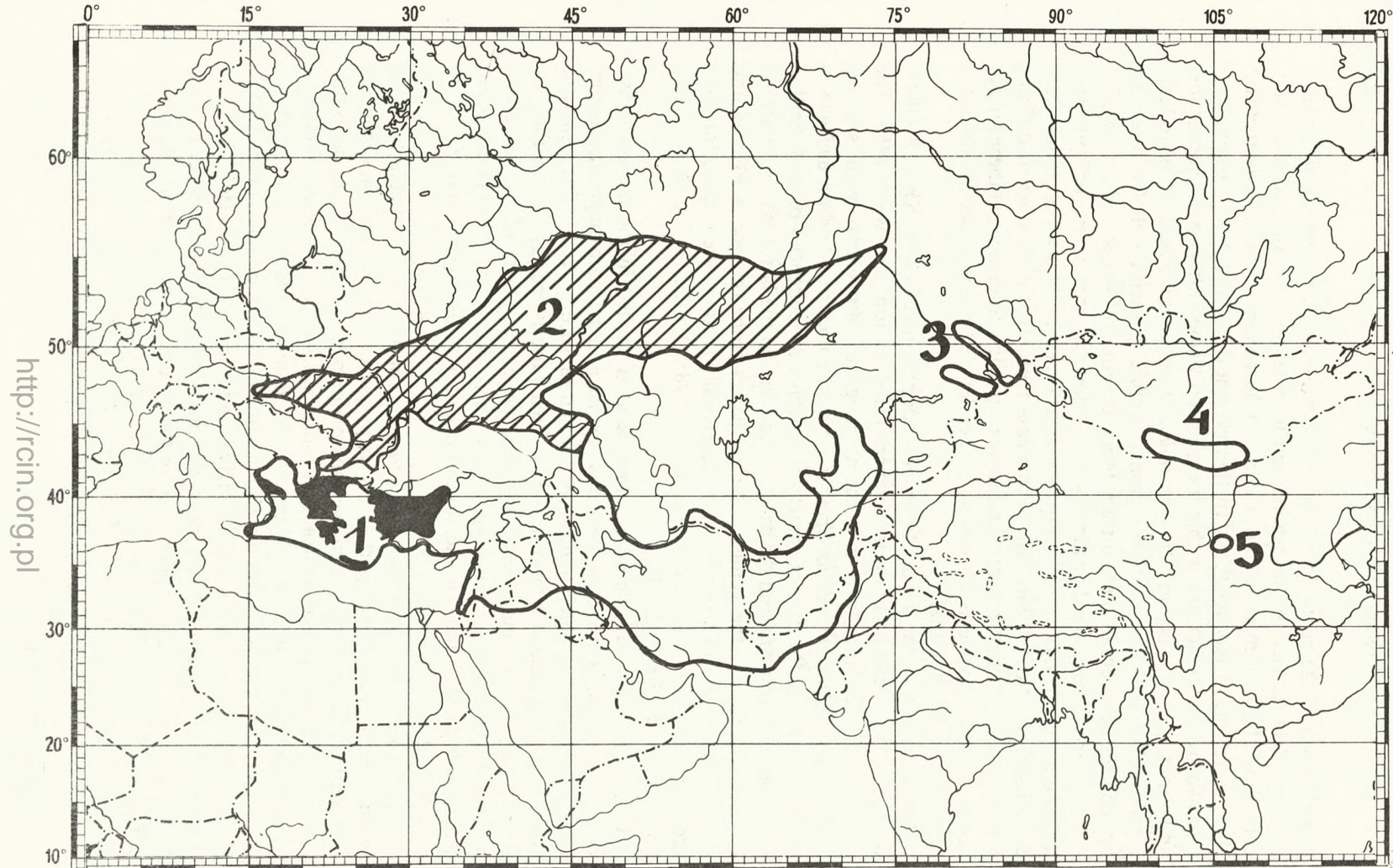


Fig. 2. The range of distribution of the genus *Amygdalus*. The ranges of some species are marked 1-5: 1. *Amygdalus webbii*, 2. *A. nana*, 3. *A. ledebouriana*, 4. *A. mongolica*, 5. *A. tangutica*



three eastern species, *A. ledebouriana* in SE Kazakhstan, *A. mongolica* in Mongolia and *A. tangutica* in China. Furthest to the west, as far as Sicily, extends the range of *A. webbii*, more or less to 15° Long. E and the range of *A. nana* in Austria to about 17° Long. E. On the other hand in the east the continuous range is closed by *A. kuramica* in Pakistan up to 72° Long. E. In India the genus *Amygdalus* is not represented. On the other hand furthest to the north *A. nana* grows in Europe, in the USSR, in the vicinity of Kazan up to 56° Lat. N, and furthest to the south are to be found representatives of the subgenus *Dodecandra*, which is characterised by small, narrowly tubular flowers and numerous, frequently branched, sharp thorns, such almonds reaching even to Lat. 26° N.

Only very few species of almonds have extensive ranges, such as *A. scoparia*, *A. orientalis*, *A. nana*, or *A. spinosissima*. The majority of ranges is restricted to small areas, and some species are so far known only from single stands, such as *A. wendelboi*, *A. glauca*, *A. ramonensis*, *A. reticulata*, *A. urumiensis*, *A. georgica* and *A. agrestis*. A detailed drawing up of range maps for individual species does not present major difficulties today. The only exception is *A. communis*, since its indigenuity in many regions is very controversial. It is claimed that it occurs in the Mediterranean region, both in Europe and in northwest Africa, from where even a separate taxon was described, *A. trabuti* A.Chev. Evaluating all these opinions one can come to the conclusion, that natural occurrence of *A. communis*, a species which since antiquity has been cultivated for the production of „sweet almonds”, can be demonstrated today only in Turkmeniya, Kirgiziya and Uzbekistan, that is in Middle-Asia. In these republics one can still observe considerable variability within the species. All other data about „indigenuity” concern either cultivated specimens or ones that have gone wild from cultivation (abandoned plantations), naturalized, or not distinguished from other closely related species of almonds such as *A. trichamygdalus*, *A. webbii*, *A. korshinskyi*, *A. kuramica*, *A. bucharica*, or else hybrids between the cultivated *A. communis* and some wild species. It is also possible that in many places, under the influence of man's purposeful activity depending on the elimination of less valuable specimens, with small or not tasty seeds, while promoting individuals profusely fruiting with sweet seeds and thin shells, the variability of *A. communis* declined and presently if we do in fact deal with the progeny of a wild almond, it is, however, already selected. In this particular instance therefore I declined preparing a range map believing that taking whatever criterion of the nature of a stand of *A. communis*, would of necessity be burdened with an error resulting from cultivation over many ages.

In vertical distribution individual species of the genus *Amygdalus* differ from each other, though generally it could be said that these are woody plants of dry mountain regions, usually distributed between 1000 and 2000 (2500) m elevation. Nonetheless taxa are known, which as a rule occur in lower regions as for example *A. graeca* which has been found near the sea shores (Rhodes Is.) and does not exceed 500 m elevation. Most elevated species were found, *A. haus-sknechtii* at 3600 m, *A. elaeagnifolia* at 3400 m, *A. brahuica* at 3000 m and



*A. carduchorum* also at 3000 m. Unfortunately for some species information is lacking about the vertical distribution, it appears, however, that they do not attain such extreme mountain locations.

Below a list is given of all the species of almonds in alphabetic order. Next to each species the sources are cited, the more important synonyms are given, as well as taxa of lower order (subsp. or var.). A short description is given of the geographic distribution, both horizontal and vertical. Range maps were also prepared for the whole genus and for species, using the line techniques (joining extreme stands). At the end a bibliography is given of the most important works in the field of systematics and geography of the genus *Amygdalus*, while publications concerning breeding and cultivation of almonds were excluded.

AMYGDALUS L., SPEC. PL. 472 (1753)

1. *Amygdalus agrestis* Boiss. Diagn. ser. 1, 10:1 (1849). Syn.: *A. spartioides* Spach var. *agrestis* (Boiss.) Post, Fl. Syria 302 (1896). General distr.: NE Lebanon – endemic (fig. 3).
2. *Amygdalus arabica* Olivier, Voy. Emp. Othoman 3: 460 (1804). Syn.: *A. spartioides* Spach, Ann. Sci. Nat. (Paris) ser. 2, 19:108 (1843); *Prunus spartioides* (Spach) C. Schneider, Ill. Handb. Laubholz. 1: 590 (1905); *Prunus arabica* (Olivier) Meikle, Kew Bull. 19, 2: 229 (1967).  
Variability: var. *spartioides* (Spach) Browicz, Arbor. Kórnickie 14: 30 (1969).  
var. *pubipetala* V. Denisov et Seraf., Byul. Vses. Ord. Lenina Inst. Rasten. N. J. Vavilova 92: 79 (1979).  
General distr.: Syria, Jordan, N. Saudi Arabia, N. E., U. A. Emirates Iraq, S. E. Anatolia, W. Iran. 150-1560 m (fig. 4)
3. *Amygdalus brahuica* Boiss., Fl. Or. 2: 645 (1872).  
Syn.: *Prunus brahuica* (Boiss.) Aitch. et Hemsley, Trans. Linn. Soc. ser. 2,3: 62 (1886).  
Variability: subsp. *afghanica* (Pachom.) Browicz, in K. H. Rechinger Fl. Iranica 66: 182 (1969).  
– Syn.: *A. afghanica* Pachom., Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 16: 50 (1961).  
General distr.: Afghanistan, Pakistan, U.S.S.R. (S.E. Turkmeniya). 1000-3000 m (fig. 6).
4. *Amygdalus browiczii* Freitag, Bot. Jahrb. Syst. 91,4: 470 (1972).  
General distr. Afghanistan – endemic. 1300-2900 m (fig. 4).
5. *Amygdalus bucharica* Korsh., Bull. Acad. Imp. Sci. Saint-Petersbourg ser. 5,14: 92 (1901),  
Syn.: *Prunus amygdalus* Batsch var. *ovalifolia* Franchet, Ann. Sci. Nat. (Paris) ser. 6,16: 281 (1883) p.p.; *Prunus bucharica* (Korsh.) Hand.-Mazz., Ann. Naturhist. Hofmus. Wien 27: 70 (1913).  
Variability: var. *glabra* Popov, Trudy Prikl. Bot. 22,3: 369 (1929).  
var. *media* Popov, ibid.  
var. *incana* Popov, ibid.  
General distr.: U.S.S.R. (S.E. Turkmeniya, Uzbekistan, Tadzhikistan, Kirgiziya), N. Afghanistan. 500-2600 m (fig. 6).
6. *Amygdalus carduchorum* Bornm. Beih. Bot. Centralbl. 58 B: 257 (1938).  
Syn.: *Prunus carduchorum* (Bornm.) Meikle, Kew Bull. 19,2: 229 (1965).  
Variability: subsp. *serrata* Browicz, Notes Roy. Bot. Gard. Edinburgh, 31: 321 (1972).  
subsp. *serrata* Browicz var. *macrocarpa* Hadač et Chrtek, Candollea 35,1: 314 (1980)  
General distr.: S. E. Anatolia, N. E. Iraq, W. Iran. 1500-3000 m (fig. 5).
7. *Amygdalus communis* L., Sp. Pl. 473 (1753).  
Syn.: *A. dulcis* Miller, Gard. Dict. ed. 8: no. 2 (1768); *Prunus amygdalus* Batsch, Beitr. Entw. Prag. Gesch. Nat.-Reiche, 1: 30 (1801); *Prunus communis* (L.) Arcang., Com. Fl. Ital. 209 (1882) non Hudson (1778); *Prunus dulcis* (Miller) D. Webb, Feddes Repert. 74: 24 (1967).





Fig. 3. The ranges of the species: 1. *Amygdalus agrestis*, 2. *A. trichamygdalus*, 3. *A. eburnea*, 4. *A. spinosissima*, 5. *A. jugata*, 6. *A. susakensis*



- Variability: var. *sativa* C. F. Ludwig, Neu. Wilde Baumz. 2 (1783). var. *amara* DC. in Lam. et DC. Fl. France 4: 486 (1805). var. *fragilis* (Borkh.) Arcang., Com. Fl. Ital. 209 (1882).  
General distr.: Native only in S. W. Asia but in many regions subsponaneous – N. and E. Anatolia (?), N. Iraq (?), Iran (?), U.S.S.R. (S. Caucasus (?), S. Turkmeniya, Kirgiziya, Uzbekistan), Levant.
8. *Amygdalus eburnea* Spach, Ann. Sci. Nat. (Paris) ser. 2,19:123(1843).  
Syn.: *A. scorpius* Spach, Ann. Sci. Nat. (Paris) ser. 2,19:122(1843); *A. spathulata* Boiss., Diagn. ser. 1,6:53(1845); *Prunus eburnea* (Spach) C. Schneider, Ill. Handb. Laubholz. 1:599(1906).  
General distr.: Iran, S. Pakistan (?). 700-2350 m (fig. 3).
9. *Amygdalus elaeagnifolia* Spach, Ann. Sci. Nat. (Paris) ser. 2,19:120(1843) sphalm „*elaeagrifolia*”.  
Syn.: *A. kermanensis* Bornm., Beih. Bot. Centralbl. 58 B:256(1938); *Prunus argentea* (Lam.) Rehder var. *elaeagnifolia* (Spach) Meikle, Kew. Bull. 19,2:229(1965); *Prunus elaeagnifolia* (Spach) E. Murray, Kalmia 1,7:30(1969).  
Variability: subsp. *leiocarpa* (Boiss.) Browicz, in K. H. Rechinger Fl. Iranica 66:175(1969). – Syn: *A. leiocarpa* Boiss. Diagn. ser. 1,6:52(1845); *Prunus leiocarpa* (Boiss.) C. Schneider, Ill. Handb. Laubholz. 1:591(1905). subsp. *leiocarpa* var. *pubescens* Browicz, in K. H. Rechinger Fl. Iranica 66:176(1969).  
General distr.: Iran – endemic. 1200-3400 m (fig. 6).
10. *Amygdalus erioclada* Bornm., in Bornm. et Gauba, Feddes Repert. 49:256(1940).  
Syn.: *Prunus erioclada* Bornm., herb. ibid.  
General distr.: Iran, Afghanistan. 1080-2050 m (fig. 5).
11. *Amygdalus fenziiana* (Fritsch) Lipsky, Trudy Imp. S. – Petersburgsk. Bot. Sada 14:263(1897).  
Syn.: *Prunus fenziiana* Fritsch, Sitzungsber. Kaiserl. Akad. Wiss. Math. Naturwiss. Cl. 101:632(1892); *A. urartu* Tamamshjan, Feddes Repert. 38:166(1935); *A. gjarnyensis* Tamamshjan, Feddes Repert. 38:391(1935); *A. grossheimii* Tamamshjan, ibid.; *A. pseudopersica* Fed. et Takht., Trudy Armen. fil. Akad. Nauk. SSSR, ser. biol. 2:199(1937); *A. zangezura* Fed. et Takht. ibid. 2:198(1937).  
General distr.: U.S.S.R. (Caucasus), N. E. Anatolia, N. W. Iran. 700-2100 m (fig. 7).
12. *Amygdalus georgica* Desf., Hist. Arbr. Arbriss. 2:221(1809).  
Syn.: *Prunus tenella* Rehd. J. Arnold Arb. 19,3:275(1938) p.p.  
General distr.: U.S.S.R. (Caucasus – endemic) (fig. 6).
13. *Amygdalus glauca* Browicz, in K. H. Rechinger Fl. Iranica 66:179(1969).  
Syn.: *Prunus glauca* (Browicz) E. Murray, Kalmia 1,7:30(1969),  
General distr. S. W. Iran – endemic. 1450 m. Critical species, needs confirmation. (fig. 8).
14. *Amygdalus graeca* Lindley, in Sibth. et Smith. Fl. Graeca 10:71(1840).  
Syn.: *A. orientalis* Duhamel var. *discolor* Spach, Ann. Sci. Nat. (Paris) ser. 2,19:119(1843); *A. discolor* (Spach) Roemer, Syn. Monogr. 3:12(1847); *Prunus discolor* (Spach) C. Schneider, Ill. Handb. Laubholz. 1:591(1905).  
General distr.: Greece (Island Rhodes and Kalimnos), S. W. and C. Anatolia, N. W. Syria. 10-500 m (fig. 7).
15. *Amygdalus haussknechtii* (C. Schneider) Bornm., Beih. Bot. Centralbl. 28,2:226(1911).  
Syn.: *Prunus haussknechtii* C. Schneider, Ill. Handb. Laubholz. 1:592(1905).  
Variability: *A. haussknechtii* (C. Schneider) Bornm. var. *pubescens* Bornm. Beih. Bot. Centralbl. 28,2:226(1911).  
General distr.: W. Iran – endemic. 1200-3600 m (fig. 8).
16. *Amygdalus jugata* Browicz, in K. H. Rechinger Fl. Iranica 66:181(1969).  
Syn.: *Prunus jugata* (Browicz) E. Murray, Kalmia 1,7:31(1969).  
General distr.: C. Afghanistan – endemic. 2600-2800 m (fig. 3).
17. *Amygdalus koelzii* Browicz, in K. H. Rechinger Fl. Iranica 66:182(1969).  
Syn.: *Prunus koelzii* (Browicz) E. Murray, Kalmia 1,7:31(1969).  
General distr.: Afghanistan – endemic. 1430-2400 m (fig. 5).
18. *Amygdalus korshinskyi* (Hand.-Mazz.) Bornm., Beih. Bot. Centralbl. 31,2:212(1914).  
Syn.: *A. communis* L. var. *microphylla* Post., Fl. Syria 302(1896); *Prunus korshinskyi* Hand.-



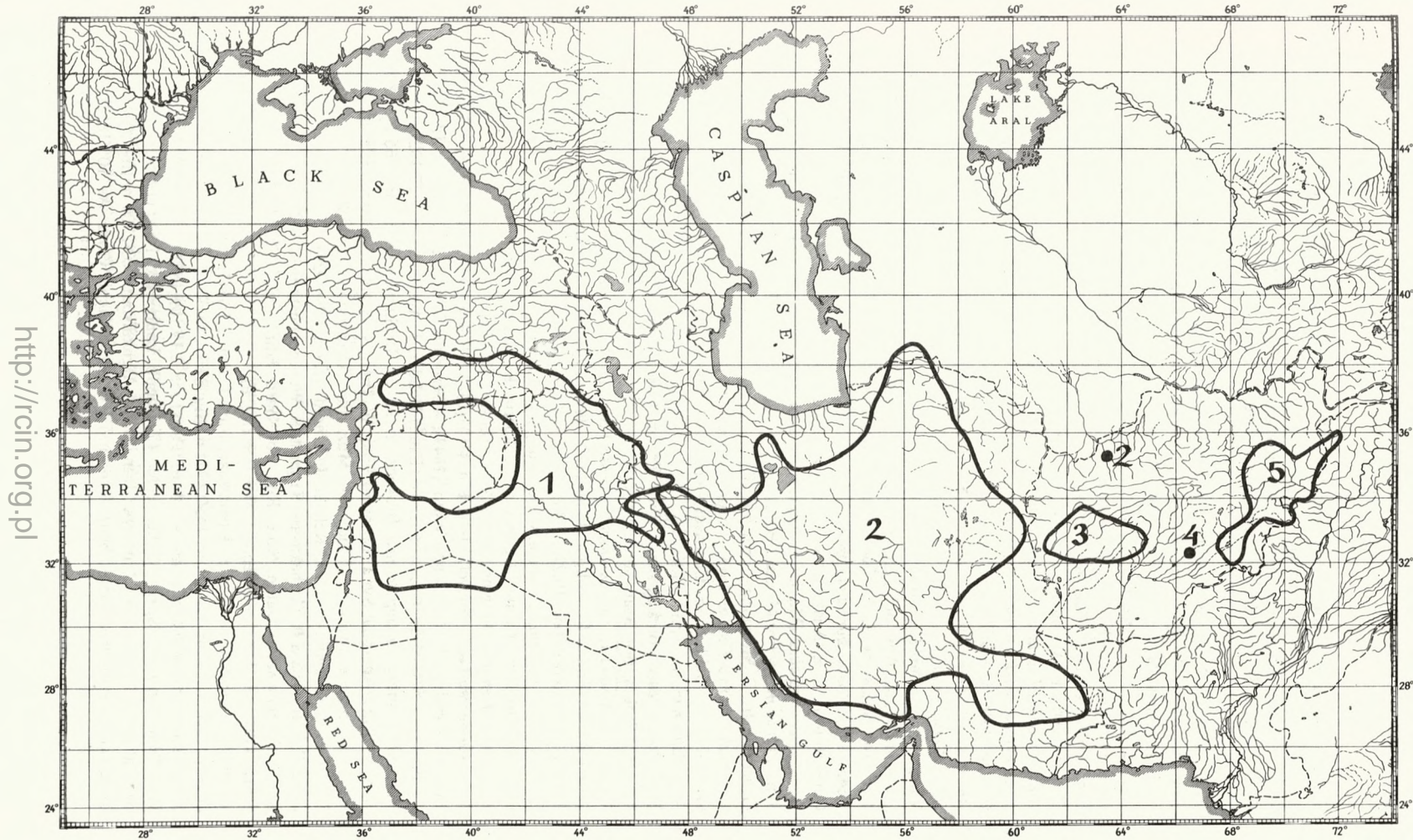


Fig. 4. The ranges of the species: 1. *Amygdalus arabica*, 2. *A. scoparia*, 3. *A. browiczii*, 4. *A. zabolica*, 5. *A. kuramica*



- Mazz., Ann. K. K. Naturhist. Hofmus. Wien 27:71(1913); *A. microphylla* (Post) Browicz in K. H. Rechinger Fl. Iranica 66:176(1969) non H. B. et K.  
 Variability: var. *bornmülleri* Browicz, Arbor. Kórnickie 19:18(1974).  
 General distr.: S. Anatolia, Lebanon, Syria, Jordan, Israel, N. W. Saudi Arabia. 200-1800 m (fig. 7).
19. *Amygdalus kotschyi* Boiss. et Hohen., in sched. Kotschy, Pl. Alepp, Kurd. Mossul 338(1843).  
 Syn.: *A. elaeagnifolia* Spach. var. *kotschyi* (Boiss. et Hohen.) Boiss. Fl. Or. 2:643(1872); *Prunus kotschyi* (Spach) Náb., Publ. Fac. Univ. Masaryk (Brno) 35:105(1923).  
 General distr.: S. E. Anatolia, W. Iran, N. E. Iraq. 1220-2500 m (fig. 6).
20. *Amygdalus kuramica* Korsh., Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 5,14:93(1901).  
 Syn.: *Prunus kuramica* (Korsh.) Kitam., Fl. Afgh. 179(1960).  
 General distr.: E. Afghanistan, N. W. Pakistan. 1000-2850 m (fig. 4).
21. *Amygdalus ledebouriana* Schlecht., Abh. Naturf. Ges. Halle 2:21(1854).  
 Syn.: *Prunus tenella* Batsch, Beytr. Entw. Prag. Gesch. Natur-Reiche. 29(1801) p.p.  
 General distr.: U.S.S.R. (S.E. Kazakhstan, Altai). 500-1500 m (fig. 2).
22. *Amygdalus lycioides* Spach., Ann. Sci. Nat. (Paris), ser. 2,19:120 (1843).  
 Syn.: *Prunus lycioides* (Spach) C. Schneider, Ill. Handb. Laubholz. 1:600(1906).  
 Variability: var. *horrida* (Spach) Browicz, in K. H. Rechinger Fl. Iranica 66:183(1969). – Syn.: *A. horrida* Spach, Ann. Sci. Nat. (Paris), ser. 2,19:121(1843); *A. reuteri* Boiss. et Buhse, Nouv. Mém. Soc. Nat. Mose. 12:79(1960); *A. horrida* Spach var. *reuteri* (Boiss. et Buhse) Boiss., Fl. Or. 2:645(1872); *Prunus horrida* (Spach) C. Schneider, Ill. Handb. Laubholz. 1:601(1906).  
 General distr.: S. E. Anatolia, N. W. and W. Iran. 200-2900 m (fig. 7).
23. *Amygdalus mongolica* (Maxim.) Ricker, Proc. Biol. Soc. Wash. 30:17(1917).  
 Syn.: *Prunus mongolica* Maxim., Bull. Soc. Nat. Mosc. 45:16(1879).  
 General distr.: S. Mongolia – endemic. (fig. 2).
24. *Amygdalus nairica* Fed. et Takht., Feddes Repert. 40:288(1936).  
 General distr.: U.S.S.R. (S. Caucasus – endemic.) 1500 m (fig. 6).
25. *Amygdalus nana* L., Sp.Pl. 473(1753).  
 Syn.: *Prunus tenella* Batsch, Beytr. Entw. Prag. Gesch. Natur-Reiche 29 (1801) p.p.; *Prunus nana* (L.) Stokes, Bot. Mat. Med. 3:103(1812).  
 Variability: *A. nana* L. var. *campestris* (Besser) Ser., in DC, Prodr. 2:530(1825); Syn.: *A. campestris* Besser, Enum. Pl. Volhyn. 46,58(1822); *Prunus tenella* Batsch var. *campestris* (Besser) Rehder., J. Arnold Arbor. 19:272(1938).  
 General distr.: Austria, Czechoslovakia, Hungary, Romania, Jugoslavia, Bulgaria, U.S.S.R. (Ukraine, Moldavia, Crimea, Caucasus, W. Siberia, Kazakhstan) up to 1.100 m (fig. 2).
26. *Amygdalus orientalis* Duhamel, Trait. Arb. Arbust. 1:48(1755).  
 Syn.: *A. argentea* Lam., Encycl. Meth. Bot. 1:103(1783); *Prunus orientalis* (Duhamel) Koehne, Deutsch. Dendrol. 315(1893) non Walp. (1843); *A. variabilis* Bornm. ex Schneider, Ill. Handb. Laubholz. 1:591(1905); *Prunus argentea* (Lam.) Rehder, J. Arnold. Arb. 3:27(1922).  
 Variability: subsp. *mesopotamica* Browicz, in K. H. Rechinger Fl. Iranica 66:173(1969).  
 General distr.: Anatolia, Syria, Lebanon, Iraq, W. Iran, N. Israel. 360-2000 m (fig. 8).
27. *Amygdalus petunnikovii* Litv., Trudy Bot. Muz. Imp. Akad. Nauk, 1:16(1902).  
 Syn.: *Prunus petunnikovii* (Litv.) Rehder, J. Arnold Arbor. 7:29(1926).  
 General distr.: U.S.S.R. (Uzbekistan, Kirgizia, S. W. Kazakhstan) 1200-2000 m (fig. 6).
28. *Amygdalus ramonensis* Danin, Notes Roy. Bot. Gard. Edinburgh 38,2:283(1980).  
 General distr.: S. Israel – endemic, 700-900 m (fig. 8).
29. *Amygdalus reticulata* Runem. ex Khatamsaz, Iran. J. Bot. 3,1:78(1985).  
 General distr.: S. Iran – endemic. 1650-1900 m (fig. 8).
30. *Amygdalus scoparia* Spach., Ann. Sci. Nat. (Paris) ser. 2,19:109(1843).  
 Syn.: *Prunus scoparia* (Spach) C. Schneider, Ill. Handb. Laubholz. 1:590 (1905).  
 General distr.: U.S.S.R. (Turkmeniya), Iran, N. W. Afghanistan, 400-2700 m (fig. 4).
31. *Amygdalus spinosissima* Bunge, Beitr. Kenntn. Fl. Russl. u. Stepp. Centr.-As. 106(1852).



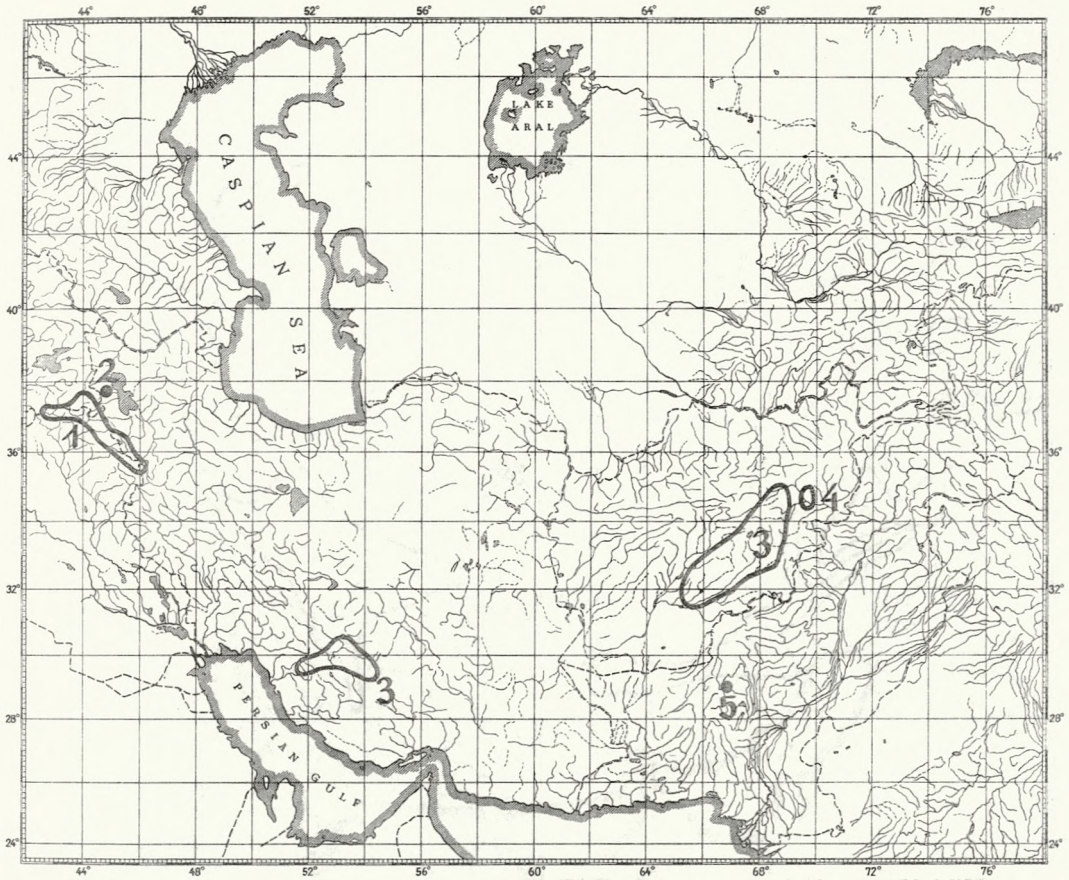


Fig. 5. The ranges of the species: 1. *Amygdalus carduchorum*, 2. *A.urumiensis*, 3. *A.erioclada*, 4. *A.koelzii*, 5. *A.stocksiana*

Syn.: *Prunus spinosissima* (Bunge) Franchet, Ann. Sci. Nat. (Paris) ser. 6,16:281(1883).

Variability: subsp. *turcomanica* (Lincz.) Browicz, in K. H. Rechinger Fl. Iranica 66:179(1969).

– Syn.: *Amygdalus turcomanica* Lincz., Fl. SSSR 10:639(1941); *Prunus turcomanica* (Lincz.), Kitam. Fl. Afgh. 180(1960).

General distr.: U.S.S.R. (S. Turkmeniya, S. Kazakhstan, W. Kirgizya, S. Uzbekistan, W. Tadzhkistan), Afghanistan. 300-2700 m. (fig. 3).

32. *Amygdalus stocksiana* Boiss., Diagn., ser. 2,2:45(1856).

Syn.: *A.communis* L. var. *stocksiana* Browicz, in K. H. Rechinger Fl. Iranica 66:169(1969).

General distr.: Pakistan (Baluchistan) – endemic. (fig. 5).

33. *Amygdalus susakensis* Vassilcz., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 21:6(1961).

General distr.: U.S.S.R. (Kirgizya – endemic). 950 m (fig. 3).

34. *Amygdalus tangutica* (Batalin) Korsh., Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 5,14:94(1901).

Syn.: *A.communis* L. var. *tangutica* Batalin, Trudy Imp. S.-Petersburgsk Bot. Sada 12:163(1892); *Prunus tangutica* (Batalin) Koehne, in Sargent Pl. Wilson. 1:276(1912); *Persica tangutica* (Batalin) Kovalev et Kostina, Trudy Prikl. Bot., ser. 8,4:75(1935).

General distr.: C. China (E. Kansu) – endemic. (fig. 2).



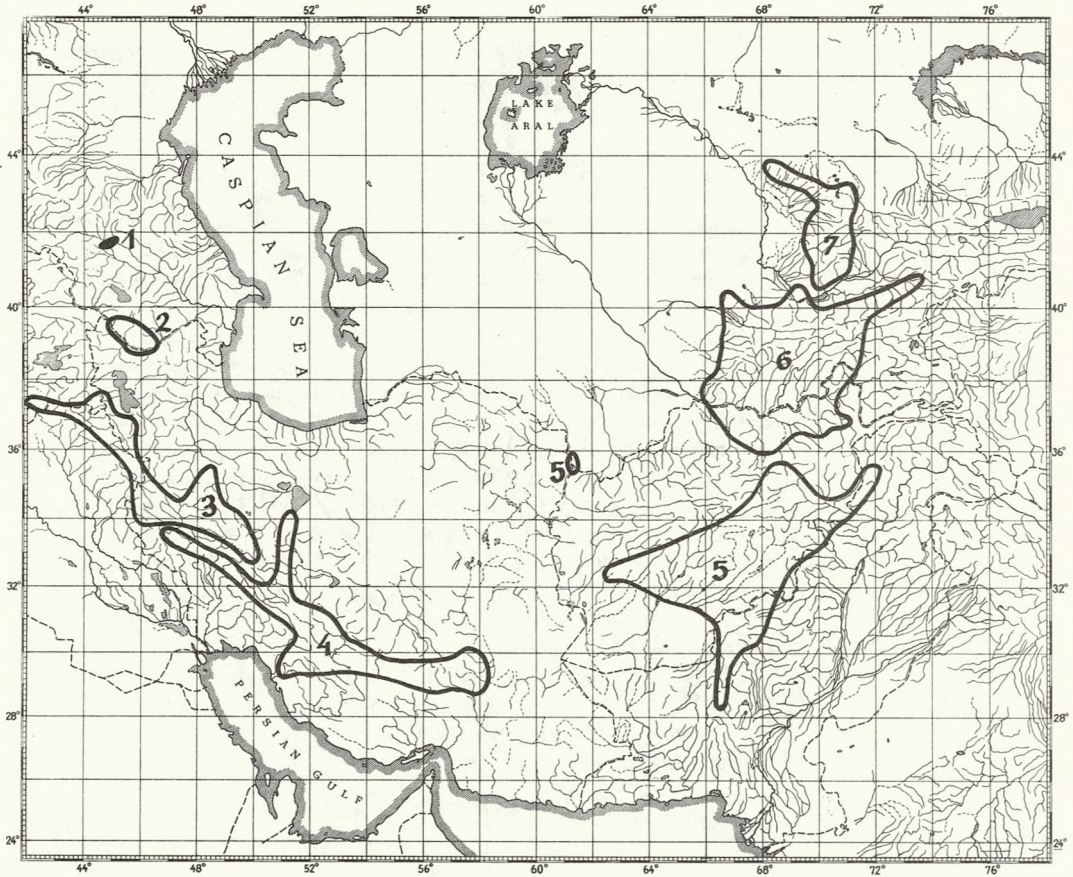


Fig. 6. The ranges of the species: 1. *Amygdalus georgica*, 2. *A.nairica*, 3. *A.kotschyi*, 4. *A.elaeagnifolia*, 5. *A.brahuica*, 6. *A.bucharica*, 7. *A.petunnikovii*

35. *Amygdalus trichamygdalus* (Hand.-Mazz.) Woronow, Trudy Prikl. Bot. Selekc. 14:49(1925).  
Syn.: *Prunus trichamygdalus* Hand.-Mazz., Ann. K. K. Naturhist. Hofmus. Wien 27:70(1913).  
Variability: var. *elongata* Browicz, Notes Roy. Bot. Gard. Edinburg 31:321(1972).  
General distr.: S. E. Anatolia, W. Iran. 1250-2100 m (fig. 3).
36. *Amygdalus urumiensis* (Bornm.) Browicz, in K. H. Rechinger Fl. Iranica 66:176(1969).  
Syn.: *A.spinossissima* Bunge var. *urumiensis* Bornm., Verh. Zool.-Bot. Ges. Wien 60:109(1910);  
*Prunus urumiensis* (Bornm.) E. Murray, Kalmia 1,7:31(1969).  
General distr. W. Iran – endemic. Needs confirmation. (fig. 5).
37. *Amygdalus webbii* Spach, Ann. Sci. Nat. (Paris) ser. 2,19:117(1843).  
Syn.: *A.salicifolia* Boiss. et Bal., in Boiss. Diagn. ser. 2,6:71(1859); *A.webbii* Spach var. *salicifolia*  
(Boiss. et Bal.) Boiss., Fl. Or. 2:642(1872); *Prunus webbii* (Spach) Vierh. Oesterr. Bot. Z. 65:21(1915).  
General distr.: S. Italy, Albania, S. Jugoslavia, S. W. Bulgaria, Greece, Kriti, W. Anatolia. up to 1200 (1600) m (fig. 2).
38. *Amygdalus wendelboi* Freitag, Iran. J. Bot. 1,2:118(1977).  
General distr.: S. Iran – endemic. 2250-2300 m (fig. 7).
39. *Amygdalus zabulica* Seraf., Novosti Sist. Vysš. Rast. 8:173(1971).  
General distr.: Afghanistan, 1200-1350 m (fig. 4).





Fig. 7. The ranges of the species: 1. *Amygdalus graeca*, 2. *A.korshinskyi*, 3. *A.lycioides*, 4. *A.fenzliana*, 5. *A.wendelboi*





Fig. 8. The ranges of the species: 1. *Amygdalus ramonensis*, 2. *A. orientalis*, 3. *A. haussknechtii*, 4. *A. glauca*, 5. *A. reticulata*



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1. *Amygdalus* × *aitchisonii* Korsh., Bull. Acad. Imp. Sci. Saint-Petersbourg, ser. 5, 14:94(1901) pro spec. = *A.kuramica* Korsh. × *Amygdalus* subgen. *Dodecandra*. Occurs in Pakistan.
2. *Amygdalus* × *andarobii* Seraf., Compt. Rend. Acad. Agric. Bulgar. 4, 3:350(1970). = *A.kuramica* Korsh. × *A. spinosissima* Bunge subsp. *spinosissima*. Occurs in Afghanistan.
3. *Amygdalus* × *balansae* Boiss., Diagn. ser. 2, 6:71(1859) pro spec. = *A.communis* L. × *A.orientalis* Duhamel. Occurs in Anatolia.
4. *Amygdalus insueta* Seraf., Novost. Sist. Vysš. Rast. 14:134(1977) = *A.zabulica* Seraf. × *A.ericoclada* Bornm. Occurs in Afghanistan.
5. *Amygdalus* × *kalmykovii* O. Lincz., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 14:203(1951) = *A.communis* L. × *A.spinossissima* Bunge. subsp. *spinosissima*. Occurs in S. Kazakhstan. U.S.S.R.
6. *Amygdalus* × *keredjensis* Browicz, in K.H. Rechinger Fl. Iranica 66:186(1969). = *A.scoparia* Spach × *A.lycioides* Spach. Occurs in N. Iran.
7. *Amygdalus* × *pabotii* Browicz, Fragm. Florist. Geobot. 28, 4:621(1984) pro spec. = *A.cardu-chorum* Bornm. × *A.haussknechtii* (C.Schneider) Bornm. Occurs in W. Iran.
8. *Amygdalus* × *podperae* (Náb.), Woronow Trudy Prikl. Bot. Selekc. 14:49(1925) pro spec. = *A.elaeagnifolia* Spach × *A.eburnea* Spach. Occurs in S. Iran.
9. *Amygdalus* × *rhodia* Browicz, Ann. Musei Goulandris, 7:34(1985) = *A.communis* L. × *A.gracea* Lindley. Occurs in Greece (Isl. Rhodes).
10. *Amygdalus* × *saviczii* Pachom., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 16:198(1954) = *A.bucharica* Korsh. × *A.spinossissima* Bunge subsp. *spinosissima*. Occurs in U.S.S.R. (Uzbekistan).
11. *Amygdalus* × *sefinensis* Bornm., Beih. Bot. Centralbl. 58 B:257(1938) = *A.communis* L. × *A.kotschyi* Boiss. et Hohen. Occurs in N. Iraq.
12. *Amygdalus* × *uzbekistanica* Sabirov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 19:230(1959) pro spec. = *A.communis* L. × *A.bucharica* Korsh. Occurs in U.S.S.R. (Uzbekistan, Tadzhkistan).
13. *Amygdalus* × *vavilovii* Popov, Trudy Prikl. Bot. 23, 3:373(1929) pro spec. = *A.communis* L. × *A.spinossissima* Bunge subsp. *turcomanica* (Lincz.) Browicz. Occurs in U.S.S.R. (Turkmeniya – Kopet Dag Mts.).
14. *A.communis* L. × *A.fenzliana* (Fritsch) Lipsky (?) – acc. to Denisov, Rikhter, Yadrov, Trudy Prikl. Bot. 62, 3:92(1978). Occurs in U.S.S.R. (Armeniya).
15. *A.communis* L. × *A.webbii* Spach., acc. to Browicz, Ann. Musei Goulandris 7:37(1985). Occurs in Crete. Recently 4 new hybrids of almonds from Iran have been described by M. K h a t a m s a z (Iran J. Bot. 4, 1:113–116.1988).
16. *Amygdalus* × *kamiaranensis* Khatamsaz = *A.scoparia* Spach × *A.haussknechtii* (C. Schneider) Bornm. Occurs in W. Iran.
17. *Amygdalus* × *iranshahrii* Khatamsaz = Probabiliter *A.scoparia* Spach × *A.eburnea* Spach. Occurs in SW. Iran.
18. *Amygdalus* × *mozaffarianii* Khatamsaz = Probabiliter *A.scoparia* Spach × *A.brahuica* Boiss. Occurs in SE. Iran.
19. *Amygdalus* × *yasufjensis* Khatamsaz = Probabiliter *A.scoparia* Spach × *A.elaeagnifolia* Spach subsp. *elaegnifolia*. Occurs in SW. Iran.

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\* Items marked \* concern also the next genus, *Louiseania*.



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2. *LOUISEANIA* CARRIÈRE

The generic name *Louiseania* has been proposed more than 100 years ago and for a long time it has been completely forgotten (even in *Index Kewensis* it appeared only in the year 1966). The genus was looked into by Pachomova in 1959, which was connected with the description in 1955 by Vassilčenko of the new genus *Aflautunia*. The characteristic traits of the genus *Louiseania* are primarily:

1) serrulate or doubly serrulate or even serrate-serrulate leaf margins, sometimes the leaves being sharply tri-lobed towards the tip with numerous pubescent lateral veins, a rugose surface, resembling more the leaves of the genus *Cerasus* than those of the genus *Amygdalus*.

2) drupes with a thin and dry pericarp, usually non-dehiscent.

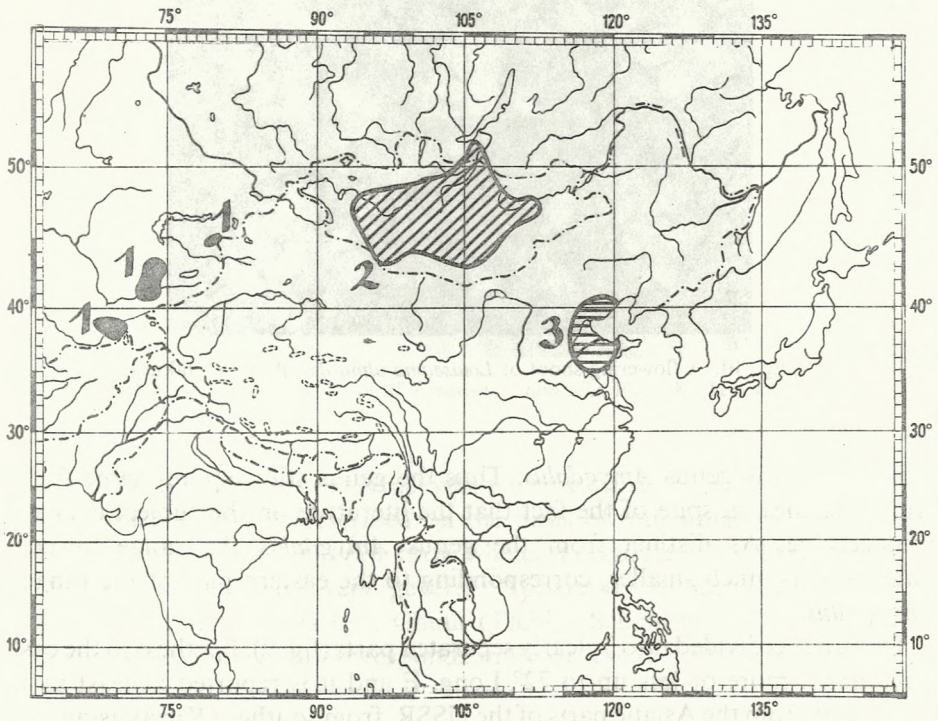


Fig. 9. The range of the genus *Louiseania* (1. *L. ulmifolia*, 2. *L. pedunculata*, 3. *L. triloba*)

In the genus usually two species are included, *L. triloba* and *L. ulmifolia*. Recently, in 1985, a third species was included here, transferring it from the genus *Amygdalus*, namely *L. pedunculata* (a similar opinion was suggested already by Pachomova in 1961). There are some doubts about this inclusion. The leaves of this species appear to correspond to those typical for genus *Louiseania* but the drupes have, as can be judged from the literature, a dehiscent pericarp, which is





Fig. 10. A flowering shoot of *Louiseania ulmifolia*. Phot. K. Jakusz

a feature of the genus *Amygdalus*. Thus the genus still requires some further critical studies, in spite of the fact that the literature on the subject is already considerable. As distinct from the genus *Amygdalus* the range of genus *Louiseania* is much smaller, corresponding to the eastern part of the range of *Amygdalus*.

The range is divided into 3 clearly separated parts (fig. 9). Furthest to the east is *L. ulmifolia*, more or less up to 72° Long. E and it is reported at least so far, exclusively from the Asiatic parts of the USSR, from southern Kazakhstan, from western and central Kirgiziya and from southwestern Tadzhikistan. It is not unlikely that the species may yet be found in the border regions of northern Afghanistan and western China.

The range of the second species, *L. pedunculata* occurs primarily in Mongolia, where the shrub grows in most of the country and only slightly extends beyond its northern border into the USSR. Here it is known only in south of the Buryatskaya A.S.S.R., more or less up to 52° Lat. N. It is possible that the species reaches into northern China, south of 42° Lat. N.





Fig. 11. A fruiting shoot of *Louiseania ulmifolia*. Phot. K. Jakusz

Greatest difficulty is encountered when trying to determine the range of *L. triloba*, which has been described on the basis of individuals which are in cultivation, and for long it was not known whether it occurs in the wild state at all. Data about its stands are very general. Apparently it occurs on forested mountain slopes in northeastern China (Tschili, Schantung). One can only suspect that its eastern limit corresponds more or less to 120° Long. E.

*LOUISEANIA* CARRIERE, REV. HORT. 44:34(1872)

Syn.: *Amygdalopsis* Carrière, Rev. Hort. 1862:91(1862) von Roemer 1841. *Amygdalus* L. sect. *Amygdalopsis* (Carrière) Lincz., Fl. SSSR 10:545(1941). *Aflatunia* Vassilcz., Bot. Mater.

Bot. Inst. Komarova Akad. Nauk SSSR 17:261(1955).

1. *Louiseania pedunculata* (Pallas) Erem. et Jushev., Nauč. – Techn. Bjul. Inst. Rasten. N. I. Vavilova 147:31(1985).

Syn.: *Amygdalus pedunculata* Pallas. Nova Acta Acad. Sci. Petropol. 7:353(1789); *Amygdalus pilosa* Turcz., Bull. Soc. Nat. Moscou 5:189(1832); *Prunus pedunculata* (Pallas) Maxim., Bull.



- Acad. Sci. Petersb. 29:78(1883); *Prunus pilosa* (Turcz.) Maxim., Bull. Acad. Sci. St. Petersb. 29:79(1883)  
 General distr.: U.S.S.R. (S. W. Transbaikal), Mongolia, China? (fig. 9).
2. *Louiseania triloba* (Lindley) Pachom., Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 15:32(1959).  
 Syn.: *Prunus triloba* Lindley, Gard. Chron. 1857:268(1857); *Amygdalopsis lindleyi* Carrière, Rev. Hort. 1862:91(1862); *Prunopsis lindleyi* (Carrière) André, Rev. Hort. 1883:367(1883); *Amygdalus triloba* (Lindley) Ricker, Proc. Biol. Soc. Nat. Wash. 30:17(1917); *Persica triloba* (Lindley) Drob., Fl. Uzbek. 3:379(1955).  
 General distr.: N. E. China (Schantung, Tschili) – endemic (fig. 9).
3. *Louiseania ulmifolia* (Franchet) Pachom., Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Uzbeksk. SSR 15:32(1959).  
 Syn.: *Prunus ulmifolia* Franchet, Ann. Soc. Nat. (Paris) ser. 6,16:281 (1881); *Amygdalus ulmifolia* (Franchet) Popov, Trudy Prikl. Bot. 22,3:362(1929); *Aflautunia ulmifolia* (Franchet) Vassilcz., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 17:261(1955) – endemic (fig. 10, 11).  
 General distr.: U.S.S.R. (S. E. Kazakhstan, Kirgiziya, Tadzhikistan). 1300-2500 m (fig. 9).

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\* Some items marked \* in the bibliography of the genus *Amygdalus* concern also partially this genus.



## SUMMARY

The author listed in alphabetical order all species of the genus *Amygdalus* and *Louiseania*. The former, *Amygdalus*, is an Irano-Turanian genus counting now 39 species and 19 hybrids occurring within one and the same section, between sections and even between subgenera. Some of these taxa, such as *Amygdalus urumiensis*, *A. glauca* or *A. stocksiana* are critical species and require further detailed studies. Possibly it may be necessary to include them into other species as identical with them or to lower their systematic rank to subspecies or even variety. The second genus, the Central-Asiatic *Louiseania* is represented by only three species. Their ranges are to be found on the northeastern margin of the general range of the genus *Amygdalus*.

For each species its most important synonymy is given, its variability and its geographic distribution. The ranges of the species are presented on maps. Besides the most important literature concerning the systematics, nomenclature, ecology and chorology of the two genera is listed.

The author points out the lack of agreement between taxonomists in the treatment of the above mentioned genera (as well as of others such as *Armeniaca*, *Persica*, *Cerasus*, *Prunus* s. str., *Padus*, *Laurocerasus*). Sometimes they are included into the broad sense genus *Prunus*, or else they are separated as independent taxa. This is caused among others by the existence of many species characterized by intermediate traits, which obliterates the divisions not only into genera, but also into subgenera, sections or series. It needs to be stressed also, that these „small” genera can hybridize with each other (though not all of them), and the greatest ease of crossing is observed between the genus *Prunus* s. str. and genus *Cerasus* (see fig. 1).

### Konspekt i chorologia rodzajów *Amygdalus* L. i *Louiseania* Carrière

#### Streszczenie

Autor zestawił w porządku alfabetycznym wszystkie gatunki rodzaju *Amygdalus* i *Louiseania*. Pierwszy z nich, irano-turański rodzaj *Amygdalus*, liczy obecnie 39 gatunków i 19 mieszańców powstałych zarówno w obrębie jednej i tej samej sekcji, jak też i między różnymi sekcjami, a nawet podrodzajami. Niektóre z tych taksonów, jak np.: *Amygdalus urumiensis*, *A. glauca* czy też *A. stocksiana* są jednak wątpliwe i wymagają dalszych szczegółowych studiów. Być może okaże się, że trzeba je będzie włączyć do innych gatunków, jako identyczne z nimi, lub też obniżyć ich rangę systematyczną do podgatunku, czy też odmiany. Drugi rodzaj, centralno-azjatycki, *Louiseania* reprezentowany jest tylko przez trzy gatunki. Ich zasięgi znajdują się na północno-wschodnim obwodzie ogólnego zasięgu rodzaju *Amygdalus*.

Dla każdego gatunku podana jest najważniejsza synonimika, zmienność oraz geograficzne rozmieszczenie. Zasięgi tych gatunków przedstawiono na mapach. Ponadto zestawiono najważniejsze pozycje literatury dotyczące systematyki, nomenklatury, ekologii i chorologii.

Autor zwraca uwagę na brak zgodności wśród systematyków w traktowaniu wyżej wymienionych rodzajów (również i innych, jak *Armeniaca*, *Persica*, *Cerasus*, *Prunus* s. str., *Padus*, *Laurocerasus*). Włącza się je bowiem z jednej strony do szeroko pojmowanego rodzaju *Prunus*, bądź to wydziela z tego rodzaju jako niezależne jednostki. Spowodowane jest to między innymi istnieniem wielu



gatunków charakteryzujących się cechami pośrednimi, co zaciera podział i to nie tylko na rodzaje, ale również podrodzaje, sekcje czy też serie. Warto również zwrócić uwagę, że te „drobne” rodzaje krzyżują się między sobą (choć nie wszystkie), a największą łatwością krzyżowania odznacza się rodzaj *Prunus* s. str. i *Cerasus* (patrz fig. 1).

### Конспект и хорология родов *Amygdalus* L. и *Louiseania* Carrière\*

#### Резюме

Автор составил в алфавитном порядке все виды рода *Amygdalus* и *Louiseania*. Первый из них, ирано-туранский род *Amygdalus* насчитывает в настоящее время 39 видов и 19 гибридов, образовавшихся как в границах одной и той же секции, так и между разными секциями и даже подродами. Некоторые из этих таксонов, например: *Amygdalus urumiensis*, *A. glauca* или также *A. stocksiana* являются, однако, спорными и требуют дальнейших подробных изучений. Возможно, окажется, что потребуется отнести их к другим видам как идентичным с ними или снизить их систематический ранг до подвида или же сорта. Другой род, центральноазиатский *Louiseania* представлен только тремя видами. Их ареалы находятся на северо-восточном участке общего ареала рода *Amygdalus*.

Для каждого вида поданы все важнейшие синонимы, изменчивость, а также географическое размещение. Ареалы этих видов представлены на картах. Кроме этого собрана важнейшая литература, относящаяся к систематике, номенклатуре, экологии и хорологии.

Автор обращает внимание на отсутствие согласия среди систематиков относительно вышеуказанных родов (также и других, таких как *Armeniaca*, *Persica*, *Cerasus*, *Prunus* s. str., *Padus*, *Laurocerasus*). Включают их либо в широко понимаемый род *Prunus* либо выделяют из этого рода как независимые единицы. Вызвано это между прочим существованием множества видов характеризующихся промежуточными чертами, что стирает разделение и не только на роды, но также подроды, секции или же серии. Стоит также обратить внимание на то что эти „небольшие” роды скрещиваются между собой (хотя не все), а наибольшей легкостью скрещивания отличается род *Prunus* s. str. и *Cerasus* (см. рис. 1).

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