

JERZY ZIELIŃSKI

Distribution of *Sageretia thea* (Osb.) M. C. Johnst. in southwestern Asia*

The genus *Sageretia* Brongn. (*Rhamnaceae*) represents a rather rare type of geographic distribution. The range, strongly disjunct in places, covers the subtropical regions of the American continent, southwestern and southeastern Asia and northeastern Africa. The genus has not been monographically treated so far and therefore the exact number of species it contains is unknown. Index Kewensis mentions about 40, in point of fact however, there are probably no more than 15-20 species. The majority of them grow in southeastern Asia. In the region of southwestern Asia discussed here the genus *Sageretia* is represented by only one species, namely by *S. thea* (Osb.) M. C. Johnst.

For the first time this species was described under the name *Rhamnus thea* (*Rhamnus Thea*) from China by Osbeck in 1757. Several years later it was once again described by Linné (1771) as *Rhamnus theezans* L. When the genus *Sageretia* was formed by Brongniart the name was changed from that proposed by Linné to *Sageretia theezans* (L.) Brongn. The name *Rhamnus thea* Osb. as was recently shown by Johnston (1968) was perfectly legitimately published, and for this reason the correct name for the species should be *Sageretia thea* (Osb.) M. C. Johnst.

S. thea is a strongly branched shrub which differs from other representatives of that genus in Asia primarily in having relatively small, deciduous or subsistent leaves. Very small flowers are gathered into a spike or panicle inflorescences. The fruit is a fleshy drupe (fig. 1).

S. thea has an exceptionally extensive geographic distribution. This is not only an exception within the genus *Sageretia*, but is rare among woody plants in general. It extends from Malayasia, South Korea and Japan through southeastern regions of China, central Asia all the way to Anatolia, Sinai and northeastern Africa (Fig. 2). The vertical distribution of *S. thea* is also characterised by a considerable span. The plant has been reported from the sea level to elevations of 3500 m. At this extremely

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Phot. K. Jakusz

Fig. 1. Specimen of *Sageretia thea* (Osborn) M. C. Johnston. *subsp. thea* collected in Afghanistan (Edelberg 1142)

high elevations *S. thea* was recently found in Iran in the Kerman province (Assadi, Edmondson, Miller, 1767, in sched. E).

The extensive range combined with the considerable variability of the taxon have resulted in it being discussed under different names in various parts of the range. Thus for example in USSR the species is known under the name *S. leatevirens* (Kom.) Gontsch. (Grubov 1949), in northeastern Africa as *S. spiciflora* (A. Rich.) Hutch. et Bruce (Kattab, El-Hadidi, 1971) and in Turkey as *S. spinosa* Wettst. (Davis, 1967).

The variability of *S. thea* is indicated in the first place in the size of the leaves and intensity of pubescence of various organs, in the structure of the inflorescences etc. Particularly striking is the variability of *S. thea* in the size of leaves. It varies from a few to about 40 mm or more. Fre-

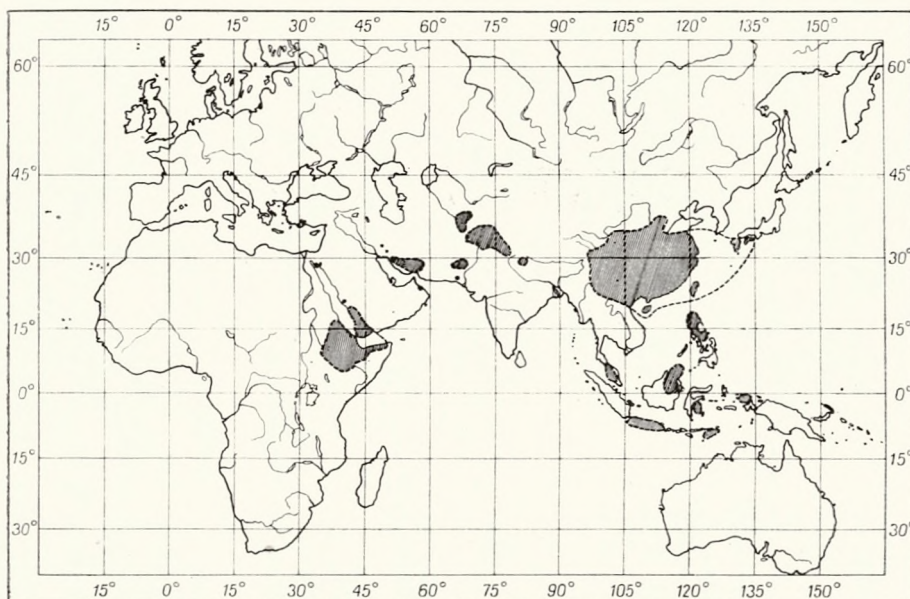


Fig. 2. The range of *Sageretia thea* (Os.) M. C. Johnst. Acc. to Meusel and Schubert (1971), supplemented

quently the leaves are differentiated in size even within one and the same individual. A certain tendency for larger leaves is to be noted in the region of the Far East and southeastern Asia, however in both these regions small leaved forms are not by any means rare (Fig. 3). According to Li (1963) small leaved forms appear to predominate in Taiwan.

A similarly large variability as in the character described above is to be found in the dentation of the leaf margin. Leaves can have either entire margins or regularly denate and both these extreme forms are linked by whole series of intermediary ones (Fig. 3). A certain tendency for the occurrence of leaves with entire and irregularly dentate margins is to be observed in the central regions of the species range, in Afghanistan, Tadjikistan and in Iran, while in the eastern parts of the range forms with more or less regularly dentate leaf margins appear to predominate.

A special word must be said about the type of pubescence observed within *S. thea*. A considerable variation is observed both in the morphology of the hairs themselves and in the degree of tomentosity and persistence of the indumentum on various organs. The hairs can be either straight or characteristically twisted. However both these types are linked with a series of intermediary forms and besides leaves characterised by various type of hairs are frequently found on the same site.

The most significant differences in the intensity of pubescence are observed in the case of leaves, and particularly on their lower sides. The leaf blade on the lower surface is either glabrous, more or less loosely pu-

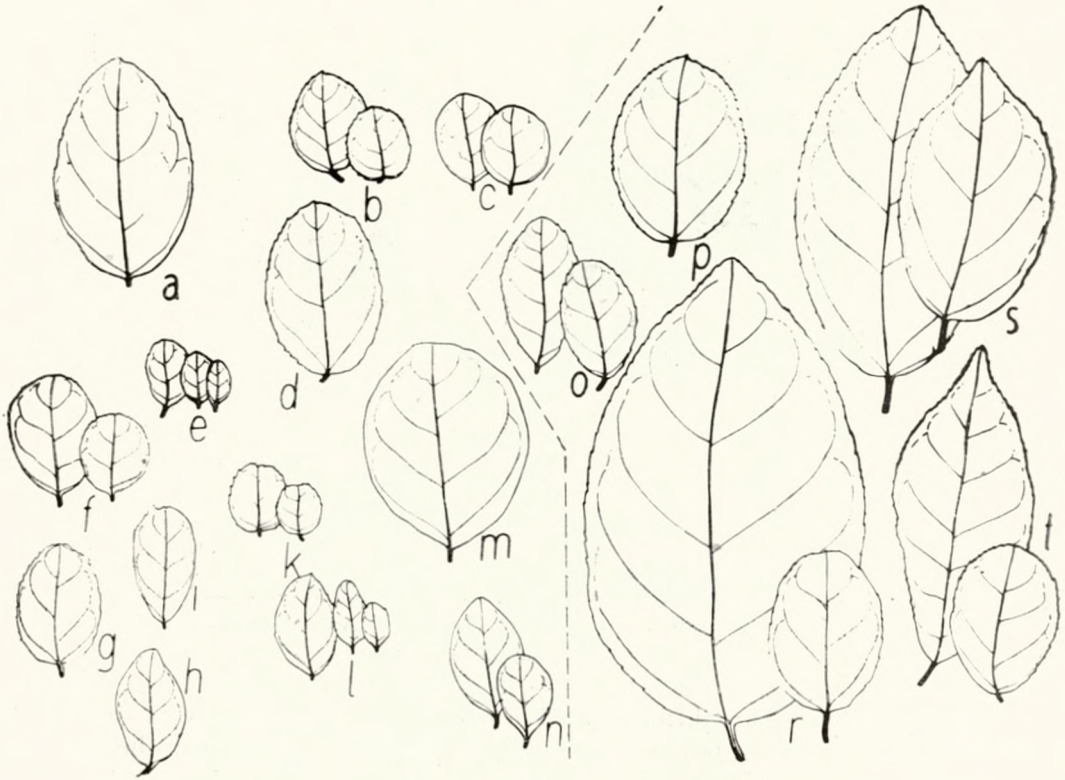


Fig. 3. Leaves of *Sageretia thea* (Osb.) M. C. Johnst. (1,5×)

a-d, i-t — subsp. *thea*, e-h — subsp. *brandrethiana* (Aitch.) J. Zielinski; a — Tadzhikistan (Vassilchenko 277) b — Pakistan (Aitchinson 759), c — Iran (Sčerbimovskij s.n.), d — Pakistan (Rechinger 29511), e — Afghanistan (Koelz 11494), f — Afghanistan (Gilli 1789); g — Pakistan (Khan 43), h — Hazara, India (Duthie s.n.), i — Afghanistan (Koelz 13895), k — Tadzhikistan (Kükenthal 33), l — Afghanistan (Rechinger 11173), m — Afghanistan (Neubauer 4590), n — Iran (Koelz 14740), o — Szechuan (Wilson 3339), p — China (Takhtadjan s.n.), r — China (Tseng 21895), s — Korea (Taquet 642), t — China (Taam 1971)

bescent, or with a thick woolly indumentum. In the latter case the hairs are compacted so that the leaf surface is not visible. This pubescence is also very persistent, and therefore it is to be found even on last year's leaves.

One of the characters that have been used in the systematics of *S. thea* is the number of loculi. It varies in the species from 2 to 3. According to Chio v e n d a (1912) 2-locular ovaries dominate in the African forms of *S. thea*. On the basis of my own information (Zieliński, 1977) I was able to establish that in southwestern Asia besides 3-locular ovaries one can find throughout the area forms with 2-locular or 2-3 — locular ovaries in one and the same individual.

The inflorescence of *S. thea* is characterised by a no lesser variability than the characters discussed above. Apart from the pubescence of the inflorescences axis, the stalks etc. (there are glabrous and pubescent forms) the whole structure and size of the inflorescence can be spikes or passing

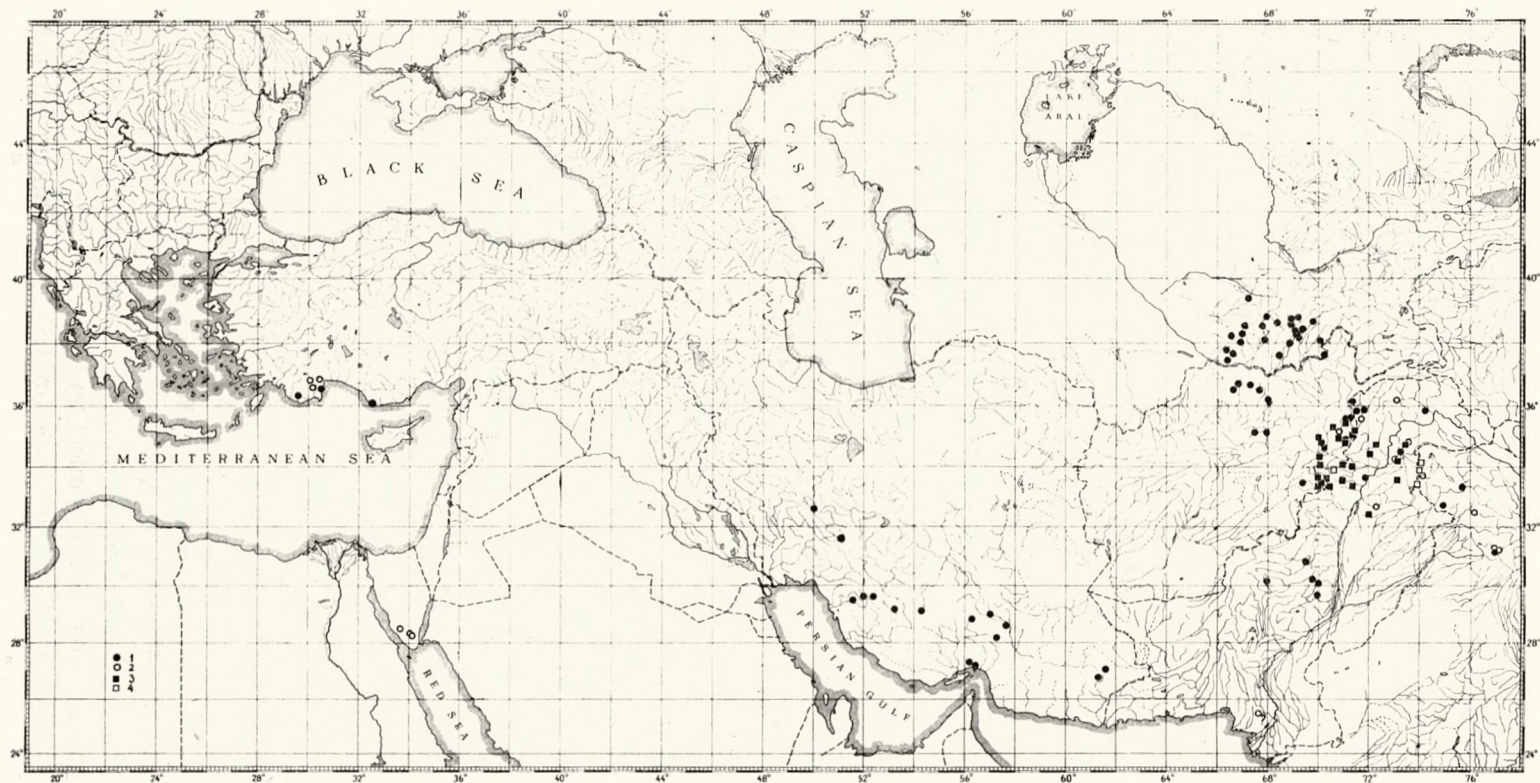


Fig. 4. Distribution of *Sageretia thea* (Osborn) M. C. Johnston, in southwestern Asia, herbarium and literature
 1-2 — subsp. *thea*, 3-4 — subsp. *brandrethiana* (Aitchison) J. Zielinski

through all kinds of intermediate forms strongly ramified panicles. In extreme cases their length is from several to more than 20 cm, they are positioned on lateral shoots or on the terminal ones.

The characters discussed above are not visibly correlated with each other and majority of them show no distinct geographic distribution. An exception is the character of a dense wooly indumentum composed of twisted hairs on the lower leaf surface. Among the many forms of *S. thea* those with such a pubescence appear to be most distinct and have a clear geographic range. These forms already in 1865 have been recognised as distinct by Aitchinson and given a species rank — *S. brandrethiana* Aitch. In all other characters *S. thea* and *S. brandrethiana* are characterised by a similar variability. For this reason and also in view of the occurrence of intermediate forms between these taxa in describing the genus *Sageretia* for the Flora Iranica (Zieliński l.c.) I have included *S. brandrethiana* into *S. thea* as a subspecies. Of special interest are the intermediate forms which have been collected several times in the Quetta province of Pakistan. Their occurrence in that region is interesting in view of the fact that typical *S. brandrethiana* has not been reported from that region and the closest known stands of that taxon are displaced in the northerly direction by about 250 km.

In the light of the foregoing data concerning the variability of *S. thea*, forms from Tadzhikistan (*S. laetevirens*), Anatolia (*S. spinosa*) and from Africa (*S. spiciflora*) fit within the type subspecies. They are all characterised by glabrous or more or less loosely pubescent leaves. While in some extreme cases the difference between these forms and the typical *S. thea* from eastern parts of the range species can be quite distinct, in general there is insufficient basis to recognise *S. laetevirens*, *S. spinosa* or *S. spiciflora* as taxons even of the subspecies rank.

The range of *S. thea* in southwestern Asia is distinctly disjointed in nature (Fig. 4) The regions of the greatest agglomeration of stands cover northeastern Pakistan, northeastern Afghanistan and Tadzhikistan. In Pakistan two basic regions of *S. thea* occurrence can be recognised. The major one covers Chitral, Peshwar and the regions between rivers Kurram and Jhelum. A certain agglomeration of stands can be observed again in the region of Quetta. Also some very general information about the occurrence of *S. thea* in the Sind province is reported by Stewart (1972). On the enclosed map these latter stands are indicated as tentative.

In Afghanistan *S. thea* occurs quite abundantly in the northeastern part of the country. In Nuristan stands of species appear to be continuous with the stands in Pakistan. A relatively clear disjunction separates them from the nearest stands in the region of Mazar-i Sharif. These latter stands appear to have direct connection with the stands of *S. thea* in the USSR, where the plant appears to be limited to Tadzhikistan and northeastern Uzbekistan.

The range of *S. thea* in Iran is rather interesting. It is a decidedly rarer species here than in the regions discussed previously. Strongly scattered stands occur in the southwestern mountain regions of Iran. After a colossal, measuring nearly 1500 km disjunction *S. thea* grows again on the Sinai peninsula and in southwestern Anatolia. On the Sinai peninsula relict stands of *S. thea* are restricted exclusively to regions located south of the El-Tih-desert.

A similarly relict character of the distribution of *S. thea* is to be found in Turkey. All the known stands in that country are located in villayets Anatolya and Mersin south of latitude 37°N.

The above discussion concerns primarily the type subspecies, subsp. *thea*. In contrast the subsp. *brandrethiana* has a relatively small range. It is restricted almost exclusively to the northeastern parts of Pakistan and northeastern Afghanistan, and only single stands of this subspecies are known from western Kashmir. In vertical distribution subsp. *brandrethiana* has been reported from regions between 700 and 2000 m elevation. In general the range of subsp. *brandrethiana* falls within the range of the type subspecies, though in the area in question the forms of subsp. *thea* are decidedly rarer.

The information available so far about the occurrence of *S. brandrethiana* beyond the region mentioned above is rather unlikely. Reports of stands of *S. brandrethiana* for example in Iran (Bornmüller, 1940) or in the Near East (Täckholm, 1956) originate probably from the fact that in the agreement with the suggestion of Schneider (1916) glabrous or sparsely pubescent forms of *S. thea* from these regions have been included to *S. brandrethiana* (*S. brandrethiana* var. *Bornmuelleri* Schneider).

Also erroneous is the information given by Kamelin (1973) about occurrence of *S. brandrethiana* in Tadzhikistan. In this case the author has been dealing with strongly pubescent forms but belonging decidedly to *S. thea* (Gormazak pass between Ordže and Nurek, Kamelin s.n. in sched. LE). These specimens appear akin to *S. brandrethiana* having a more dense pubescence of the lower leaf surface, however the similarity is only apparent. The hairs are here distinctly less twisted, and they do not form such a dense wooly and persistent indumentum as in the case of *S. brandrethiana*.

Judging by the nature of the range the ecology of *S. thea* is probably very diverse. From the data available so far one can be suspect that regardless of the part of the range the factors determining the occurrence of *S. thea* are the temperature and light. *S. thea* occurs primarily in warm more or less exposed sites, on slopes, in rock fissures etc. It is most commonly reported from a limestone substratum.

There is little information so far about the phytosociological affinities of *S. thea*. According to Korovin (1962) in Tadzhikistan it occurs in the

understorey of juniper forest characteristic for that region composed of *Juniperus seravschanica* Kom., *Acer semenovii* Rgl. et Herd. and *A. regelii* Pax. The indicator species for that community described as *Juniperetum seravschanici artemisetum* is *Artemisia baldschuanica* Krasch. et Zapr.

According to K o r o v i n (l.c.) *S. thea* is also one of the shrubs forming the so called „šibljak”. This community developing usually on the upper limit of deciduous forests, is composed of *S. thea* and such thermophilous species as *Pistacia vera* L., *Amygdalus bucharica* Korsh., *A. communis* L., *A. spinosissima* Bge, *Punica granatum* L., *Rhus coriaria* L., *Paliurus spinachristii* L., *Celtis caucasica* Willd., *Cercis griffithii* Boiss., *C. siliquastrum* L. etc.

The information provided recently by Meusel and Schubert (1971) concern different region. In the valley of the middle run of the Che-nab river *S. thea* is a component of a community of *Olea ferruginea-Quercus baloot*. It grows there in the understorey of sparse forests, where trees are represented by *Olea ferruginea* Royle, *Albizzia lebbek* Benth., *Pyrus pashia* Buch.-Ham., *Celtis caucasica* Willd. and *Quercus baloot* Griff. Among the shrubs accompanying *S. thea* there are *Punica granatum* L., *Gymnosporia royleana* Wall., *Indigofera gerardiana* Wall., *Ziziphus jujuba* Miller, *Z. rotundifolia* Lam. etc.

The utilization of *S. thea* has already mentioned by discoverer of the species O s b e c k (1765). The leaves of *S. thea* have been used from times immemorial as a substitute for tea. Its fruits are also consumed. In some regions *S. thea* is used as a fodder for camels, goats and sheeps.

The presented map has been based primarily on herbarium materials. For the USSR I used the collections of the Botanical Institute of the USSR, Academy of Sciences in Leningrad and Botanical Institute of the Tadzhik SSR, Academy of Sciences in Dušanbe. For south-west Asia I utilised the lists of localities made by Brandis (1874), Collett (1902), Bamber (1916), Parker (1918), Stewart (1958, 1972), and Zieliński (1977). Below I quote only the materials not mentioned in the works referred above.

LOCALITIES

SUBSP. *THEA*

Turkey. In Gebüsch bei Termessus (Davis 1967); Bey Dağları, 36 km N of Finike, 850 - 900 m (Davis l.c.); Ak Dağ near Karabel, in juniperetis, ca 1200 m, 23.07.1938, Schwarz 225 (J.E.); Distr. Kemer, near Ovaçik, 12.07.1949, Davis 15214 (E.); entre Korkudelli et Elmali versus septentrional du Teke Dağ. 1200 m (Quézel et al. 1970); Mersin: Anamur — Gazipaşa, Pinus brutia forest, Akman, Quezel 6260 (ANK).

Sinai. Mt. S. Catherine, 1000 m, 16.04.1937, Shabetai s.n. (K); Sinai proper ie. south of El-Tih desert (Täckholm 1956); Umm Enwen, Farsh Sheikh el'Arab. Aug. 1926, Kaiser (Täckholm 1969); Zreqije, 12.08.1926, Kaiser (Täckholm 1969).

Iran. Neiriz: Abshar, 1850 m, 1.05.1972, Foroughi 8093 (Ariamehr B.G.); Sarvestan. Fasa road, 1850 m, 3.10.1974, Foroughi et Assadi 15060 (Ariamehr B.G.); Sarvestan: Tange Ghanimeh, 2200 m, 24.04.1973, Riazi 9225 A (Ariamehr B.G.); Khabr va Rouchun protected region, 50 km SWW of Baft. Kuh-e Khabr, 10 km E of Khabr, 3500 m. 8.06.1977, Assadi, Edmondson, Miller 1767 (E).

Afghanistan. Between Voma et Trokikorl (Kitamura 1960).

Pakistan. Pingal (Kitamura 1964); Between Pingal and Dahinal (Kitamura 1964); Susal Pass, 1887, Giles 347 (K); Mansehra, 29.04.1888, Duthie 7452 (LE).

India. Kishtwar, 5000', 18.09.1876, Clarke 31410 (BM); Burdawur, 6000', 23.09.1876, Clarke 32497 (BM); Chenab valley near Jammu, 650 m, 17.04.1970, Freitag 7807 (Herb. Freitag); Bei Ramban, 700 m S (Meusel, Schubert 1971); Bei Bagga, 900 m (Meusel, Schubert l.c.).

SUBSP. *THEA* × SUBSP. *BRANDRETHIANA*

Pakistan. Quetta: Torkhan Pass. Belrud gorge at Harnai, 14.05.1965, Kazmi 1705 (H).

SUMMARY

On the basis of herbarium materials and data from literature the geographic distribution of the only representative of the genus *Sageretia* Brongn. in southwestern Asia, *S. thea* (Osb.) M. C. Johnst., is described. The disjunctive range of the species extends from southeastern Asia to Anatolia, the Synai peninsula and northeastern Africa. This, coupled with great variability in many characters results in it being discussed under different specific names in various parts of the range. According to the author these are all synonyms and only the form with dense, woolly indumentum on the lower leaf surfaces merits a subspecific rank, subsp. *brandrethiana*. In contrast to the type subspecies, subsp. *brandrethiana* has a limited range to northeastern Afghanistan, northeastern Pakistan and western Kashmir. Information about its occurrence beyond these regions are deemed erroneous.

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JERZY ZIELIŃSKI

*Rozmieszczenie Sageretia thea (Osob.) M. C. Johnst.
w południowo-zachodniej Azji*

Streszczenie

Jedynym przedstawicielem rodzaju *Sageretia* Brongn. w południowo-zachodniej Azji jest *S. thea* (Osob.) M. C. Johnst. Zasięg ogólny tego gatunku rozciąga się począwszy od Malajazji, południowej Japonii i Korei, przez południowo-wschodnie rejony Chin, centralną Azję, po Anatolię, półwysep Synaj i północno-wschodnią Afrykę. W rozmieszczeniu pionowym *S. thea* obejmuje rejony położone od poziomu morza po 3500 m.

Rozległy zasięg w połączeniu z ogromną zmiennością sprawiają, że w różnych rejonach swego zasięgu *S. thea* omawiana jest pod różnymi nazwami.

Zmienność *S. thea* przejawia się przede wszystkim w formie wzrostu, w wielkości, ząbkowaniu i owłosieniu liści, budowie i wielkości kwiatostanu, w liczbie komórek zalążkowych itd. Cechy powyższe nie wykazują wyraźnej korelacji między sobą, a ponadto większość z nich nie jest geograficznie uwarunkowana. Wyjątkowo pod tym

względem zachowują się formy charakteryzujące się zwartym, trwałym owłosieniem blaszek liściowych. Zostały one już wcześniej wyodrębnione jako *S. brandrethiana* Aitch. Z uwagi jednak na okazy przejściowe ściśle rozgraniczenie typowej *S. thea* i *S. brandrethiana* nie jest możliwe. Autor traktuje ten ostatni takson jako podgatunek *S. thea*.

Zasięg *S. thea* w południowo-zachodniej Azji posiada wyraźnie dysjunktywny charakter. Najobficiej gatunek ten występuje w północno-wschodnim Pakistanie i północno-wschodnim Afganistanie oraz w Tadżykistanie. W Iranie *S. thea* występuje na silnie rozproszonych stanowiskach w południowo-zachodnich, górskich rejonach kraju. Po ogromnej, blisko 1500-kilometrowej dysjunkcji *S. thea* rośnie znów na nielicznych stanowiskach w południowej Turcji i na Synaju.

W przeciwieństwie do podgatunku typowego subsp. *brandrethiana* posiada stosunkowo niewielki zasięg. Jest on ograniczony do północno-wschodniego Afganistanu, północno-wschodniego Pakistanu i zachodniego Kaszmiru. Dotychczasowe informacje o występowaniu subsp. *brandrethiana* poza wyżej wymienionymi rejonami, na przykład w Tadżykistanie, w Iranie czy na Bliskim Wschodzie są zdaniem autora mylne.

Autor zamieszcza mapkę ogólnego zasięgu *S. thea* oraz punktową mapkę rozmieszczenia tego gatunku w Azji południowo-zachodniej.

ЕЖИ ЗЕЛИНЬСКИ

Распространение Sageretia thea (Osб.) М. С. Johnst. в юго-западной Азии

Резюме

Единственным представителем рода *Sageretia* Brongn. в юго-западной Азии является *S. thea* (Osб.) М. С. Johnst. Общий ареал этого вида проходит, начиная с Малазии, южной Японии и Кореи, через юго-восточные районы Китая, центральную Азию до Анатолии, Синайского полуострова и северо-восточную Африку. В вертикальном размещении *S. thea* встречается в районах до 3500 м над уровнем моря.

Значительный ареал и большая изменчивость приводят к тому, что в различных частях своего ареала *S. thea* описывается под различными названиями.

Изменчивость *S. thea* проявляется прежде всего в форме роста, высоте, зубчатости и опушенности листьев, строении и величине соцветий, в числе семезачаточных камер и т.д. Выше названные признаки не имеют между собой отчетливой корреляции, а кроме того, большинство из них не обусловлено географически. Исключительно, с этой точки зрения поведение форм, характеризующихся густой устойчивой опушенностью листовой пластинки. Эти формы были уже раньше выделены как *S. brandrethiana*. Однако, учитывая переходные формы точное разграничение типичной *S. thea* и *S. brandrethiana* является невозможным. Автор относит этот таксон к подвиду *S. thea*.

Ареал *S. thea* в юго-западной Азии имеет отчетливо дизъюнктивный характер. Наиболее многочисленно этот вид встречается в северо-восточном Пакистане и северо-восточном Афганистане и Таджикистане. В Иране *S. thea* встречается в сильно разбросанных местоположениях в юго-западных районах страны. За значительной, почти 1500-километровой дизъюнкцией *S. thea* растет опять на немногочисленных местоположениях в южной Турции и на Синае.

В отличие от типичного подвиды subsp. *brandrethiana* имеет относительно небольшой ареал, ограниченный до северо-восточного Пакистана и западного Кашмира.

Информация относительно встречаемости *S. brandrethiana* вне выше указанных районов, например, в Таджикистане, Иране или Ближнем Востоке по мнению автора, ошибочны.

Автор приводит карту общего ареала *S. thea*, а также точечную карту распространения этого вида в юго-западной Азии.