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Pinus fenzeliana HAND.-MAZZ. (*Pinaceae*) still misinterpreted?

By

Roman BUSINSKÝ*)

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Summary

BUSINSKÝ R. 2011. *Pinus fenzeliana* HAND.-MAZZ. (*Pinaceae*) still misinterpreted? – Phyton (Horn, Austria) 51(1): 77–87, with 3 figures.

Despite the clarification of long-lasting problems with the interpretation of the name *Pinus fenzeliana* HAND.-MAZZ. by BUSINSKÝ 2004 and the selection of a neotype, at least two authors have recently connected this name with fundamentally different taxa following the old concept based on several confusions caused by insufficiency and later through the absence of original material. Relevant misinterpretations are reviewed and a photo of the neotype specimen of *P. fenzeliana* is given along with a photo of the most commonly confused taxon, *P. wangii* H. H. HU & W. C. CHENG subsp. *kwangtungensis* (CHUN ex TSIANG) BUSINSKÝ. Diagnostic characters of *P. fenzeliana* (leaves ± drooping, mostly 12–19 cm long and less than 1 mm wide, cones erecto-patent, seeds mostly 10–15 mm long, with a rudimentary, lacerate, ineffective wing) and five other taxa (all of *P.* sect. *Quinquefoliae*) often confused with it are summarized.

Zusammenfassung

BUSINSKÝ R. 2011. *Pinus fenzeliana* HAND.-MAZZ. (*Pinaceae*) still misinterpreted? [*Pinus fenzeliana* HAND.-MAZZ. (*Pinaceae*) noch immer fehlinterpretiert?] – Phyton (Horn, Austria) 51(1): 77–87, mit 3 Abbildungen.

*) Ing. R. BUSINSKÝ, Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Květnové nám. 391, 252 43 Průhonice, Czech Republic; e-mail: businsky@vukoz.cz

Obwohl die lange währenden Probleme mit der Interpretation des Namens *Pinus fenzeliana* HAND.-MAZZ. durch BUSINSKÝ 2004 geklärt worden sind und ein Neotypus festgelegt worden ist, haben zumindest zwei Autoren diesen Namen jüngst mit grundlegend verschiedenen Taxa in Verbindung gebracht (indem sie einem alten, auf einigen Verwechslungen aufbauenden Konzept folgten). Die Fehldeutungen werden hier referiert und ein Photo des Neoptyus von *P. fenzeliana* gezeigt, ebenso ein Photo von *P. wangii* H. H. HU & W. C. CHENG subsp. *kwangtungensis* (CHUN ex TSIANG) BUSINSKÝ, der am häufigsten mit *P. fenzeliana* verwechselten Sippe. Kurze Beschreibungen mit den wichtigsten Merkmalen von *P. fenzeliana* (Blätter ± hängend, meist 12–19 cm lang und weniger als 1 mm breit, Zapfen aufrecht-abstehend, Samen meist 10–15 mm lang, mit einem rudimentären, zerschlitzten, uneffektiven Flügel) und fünf weiteren, damit häufig verwechselten Arten (alle aus *P.* sect. *Quinquefoliae*) werden gebracht.

1. Introduction

The name *Pinus fenzeliana* HAND.-MAZZ. has been very differently interpreted and was connected with several other taxa for more than 70 years from the time of its first description in 1931. The interpretation of this name is possibly the most controversial case in the history of classification of Eurasian or perhaps all world pines. HANDEL-MAZZETTI 1931 described this taxon according to the only available herbarium specimen (FENZEL 55) collected in 1929 in the mountains of the Hainan Island, S China, and placed it into sect. *Strobus* SWEET (today sect. *Quinquefoliae* DUHAMEL). He compared the new species with the Taiwanese *Pinus morrisonicola* HAYATA, the only species from this group in the region of southern China known at the time that was also reported without evidence from the Hainan Island by CHENG 1930. The later problems arising with this name were because 1) HANDEL-MAZZETTI based his detailed description on the above-mentioned herbarium specimen consisting of imperfectly developed seeds and leaves shorter than average, and 2) the relevant original material was missing at W for a long time, where it was probably destroyed in a conflagration in 1945 at the end of World War II. Information about the holotype being deposited at WU (FARJON 1993) is probably wrong. Thus the holotype specimen FENZEL 55 is currently missing from both the mentioned Viennese herbaria. An analysis of the classification history and taxonomic identity of *P. fenzeliana* was carried out only recently (BUSINSKÝ 2004) after careful field study of soft pines [subgen. *Strobus* (D. DON) LEMMON] on the Hainan Island and the study of all other taxa of this subgenus in natural populations in SE Asia (BUSINSKÝ 1999b). To prevent further misinterpretation of the name, a neotype (BUSINSKÝ 39103) was designated by BUSINSKÝ 2004 after collections of the relevant taxon in two populations in the central mountains of the Hainan Island. The most representative specimen selected for the neotype comes most likely from the same population of which FENZEL collected the original material.

2. Interpretations of the Name *Pinus fenzeliana*

The basic misinterpretations of *Pinus fenzeliana* analyzed by BUSINSKÝ 2004 are presented below:

(1) The most frequent misinterpretation occurs with *P. kwangtungensis* CHUN ex TSIANG, which is a quite different taxon not occurring on the Hainan Island. It was recently reassessed as *P. wangii* H. H. HU & W. C. CHENG subsp. *kwangtungensis* (CHUN ex TSIANG) BUSINSKÝ, together with *P. wangii* subsp. *varifolia* (NAN LI & Y. C. ZHONG) BUSINSKÝ.

(2) Confusion with *P. armandii* FRANCH. repeatedly reported from the Hainan Island on the basis of a misleading determination in the 1930s.

(3) Confusion with a soft pine of isolated occurrence from Central Vietnam unidentified for eighty years, known for forty years as "Pin du Moyen Annam", and recently described as *Pinus dalatensis* FERRÉ subsp. *procera* BUSINSKÝ (see BUSINSKÝ, 1999a).

(4) Merging with *P. dabeshanensis* W. C. CHENG & Y. W. LAW into one species with two varieties by creating the new combination *P. fenzeliana* var. *dabeshanensis* (W. C. CHENG & Y. W. LAW) L. K. FU & NAN LI (LI & FU 1997), based on incomplete diagnostic characters (e. g. the conspicuously different position of mature cones was ignored) and on an erroneous interpretation of this taxon's geographic distribution ("south of the Yangtze River").

Long before BUSINSKÝ's revision of the relevant group of soft pines (BUSINSKÝ 2004), the following treatments have accepted *P. fenzeliana* and *P. kwangtungensis* as two different species: KWEI & LEE 1963, CHENG & al. 1975, LAW & al. 1978, SYKES 1991: 361, FU & al. 1999, 2001. Of these works, both cited versions of Chinese Floras (LAW & al. 1978; FU & al. 1999 & 2001) accepted a congruent concept and provided illustrations of both taxa. Aside from the fact that the taxonomic status of the latter taxon was changed and that it was excluded from the flora of Hainan Island (BUSINSKÝ 2004), the morphological differences of these two taxa were confirmed to be fundamental and the taxa found to be very dissimilar. *P. fenzeliana* is one of the morphologically most unique pines of SE Asia (certainly after *P. krempfii* LECOMTE, *P. squamata* X. W. LI and *P. bungeana* ZUCC. ex ENDL.). None of the known species of the genus is so similar to *P. fenzeliana* that it could be naturally combined with it.

LUU & THOMAS 2004 mentioned *P. fenzeliana* either as a possible name for the N Vietnamese population of *P. wangii* subsp. *varifolia* or partly confused it with the name *P. kwangtungensis*.

ECKENWALDER 2009, in his generally broad species concept, created a new combination *P. armandii* var. *fenzeliana* (HAND.-MAZZ.) ECKENW., in parallel to *P. armandii* var. *dabeshanensis* (W. C. CHENG & Y. W. LAW) SILBA and more two varieties exclusive the typical one.

FARJON 2005, 2010 surprisingly held his earlier opinion (FARJON 1998, 2001) that *P. fenzeliana* and *P. kwangtungensis* are conspecific "using a somewhat broader species circumscription" (comprising taxa from two subsections ?, see below), even though he had the manuscript of BUSINSKÝ's revision (2004) at his disposal in 2003. FARJON follows the concept of CRITCHFIELD & LITTLE 1966, and MIROV 1967 based on poor material and data only available at the time and ignores all the above-cited Chinese publications, particularly both versions of Chinese Flora. Furthermore, A. FARJON determined in March 2006 the isotype specimen of *P. eremitana* BUSINSKÝ (BUSINSKÝ 39133; stored at K under No. K000287551), as *P. fenzeliana*. It is noteworthy to state that *P. eremitana* is a stenotopic endemic species known only from the limestone area SW of the Red River Basin in N Vietnam (BUSINSKÝ 2004, 2008), recently known from about five near subpopulations in Son La, Hoa Binh (former Ha Son Binh) and Thanh Hoa Provinces (Philip Ian THOMAS, in litt.). *Pinus eremitana* is morphologically closest to *P. wangii* and the Japanese *P. parviflora* SIEBOLD & ZUCC. (BUSINSKÝ 2004). Furthermore, FARJON 1998, 2001 referred to *P. wangii* as occuring except for its known distribution in SE Yunnan (China) also from "Mai Chou" (correctly Mai Chau) in Vietnam, which is the district town of the type locality of *P. eremitana*.

SILBA 2000 described a new variety *Pinus fenzeliana* var. *annamiensis* based on a single specimen CHEVALIER 38353 (P) that was identified as *P. dalatensis* subsp. *procera* BUSINSKÝ in a specifically aimed study (BUSINSKÝ 1999a). Ignoring all other relevant data summarized on the basis of field studies and recently acquired extensive material (BUSINSKÝ 2004, 2008), SILBA 2009 elevated his mentioned variety to the level of a subspecies. In the same census-list he parallelly made new combinations *P. fenzeliana* subsp. *kwangtungensis* (CHUN ex TSIANG) SILBA and *P. fenzeliana* subsp. *varifolia* (NAN LI & Y. C. ZHONG) SILBA. The latter taxon was revised as very near to *P. wangii* and accepted as one of its three subspecies (BUSINSKÝ 1999b, 2004, 2008).

3. Characteristics of Taxa

To minimize further misinterpretations of the name *Pinus fenzeliana*, the photo of the holo-neotype of this name is given here (Figs 1, 2). This species can be easily compared with the most often confused taxon, *P. wangii* subsp. *kwangtungensis*, documented here parallelly in the photo of its representative specimen from the "locus classicus" (Fig. 3). The following summary of diagnostic characters of *P. fenzeliana*, and of the contrasting ones of the often confused other taxa is given below. For these taxa only diagnostic characters versus *P. fenzeliana* are given. Areas of native geographic distribution are also added.

Fig. 1. The neotype specimen of *Pinus fenzeliana* HAND.-MAZZ. [BUSINSKÝ 39103, from China, Hainan Island, Ying Ge Ling massiv (1822 m), 19°04'20" N, 109°32'30" E, 1040 m, W].

Fig. 2. Cones, seed scales and seeds from the neotype specimen of *Pinus fenzeliana* Hand.-Mazz. (Businský 39103) in Fig. 1 in detail.

Fig. 3. A representative specimen of *Pinus wangii* subsp. *kwangtungensis* (CHUN ex TSIANG) BUSINSKÝ from the "locus classicus" in Lechang Co., Guangdong, China (BUSINSKÝ 39117).

3.1. *Pinus fenzeliana* HAND.-MAZZ.

Mature trees mostly 20–30 m high. Ramification of secondary orders sparse; foliage deeply green. First-year shoots glabrous. Leaves slender, flexible, ± drooping, (8–)12–19 cm long, mostly 0.5–0.8 mm wide, only slightly glaucous pruinose on ventral sides, gradually terminated. Cones erecto-patent on short, straight, stiff peduncle, 5–9(–12) cm long, ovoid to conical-ovoid; apophyses with distal edges reflexed or at least elevated (apex of seed scales always distant from neighbouring apophyses in closed cones), those of freshly opened cones dark ochreous. Seeds with a rudimentary, always ineffective wing; seed corpus (8–)10–15 × 5–8 mm, with integument thin, fragile; wing 1.5–5(–7) mm long, frangible, usually adhering to its own seed scale, with a lacerate distal edge.

Geographic distribution: China: Hainan Island, Guangxi, Guizhou.

3.2. *Pinus wangii* H. H. HU & W. C. CHENG subsp. *kwangtungensis* (CHUN ex TSIANG) BUSINSKÝ

Mature trees mostly 10–15 m high. Ramification of secondary orders dense; foliage silvery green. Leaves stiff, but usually conspicuously crescently curved, (2.5–)3.5–5(–7) cm long, mostly 1.2–1.5 mm wide, conspicuously whitish pruinose on ventral sides, abruptly terminated. Cones pendulous on medium thick or slender peduncle, (5–)7–10(–11) cm long, narrowly ovoid or oblong-ovoid; apophyses with distal edges inclined towards the cone axis (apex of seed scales appressed to neighbouring apophyses in closed cones). Seeds with always effective wing; wing 6.5–17.5 mm long, with smooth distal edge.

Geographic distribution: China: N Guangdong, S Hunan, NE Guangxi and the Guizhou boundary.

3.3. *Pinus eremitana* BUSINSKÝ

Mature trees mostly 8–15(–20) m high. Ramification of secondary orders dense. Leaves soft but erect, (2–)3–4.5(–6.5) cm long, mostly 0.9–1.1 mm wide. Cones pendulous on medium thick peduncles; apophyses of the apical third of the cone distinctly convex, with distal edges straight (apex of seed scales appressed to neighbouring apophyses in closed cones). Seeds with well developed, basically effective wing, usually falling together or sometimes less or more reduced and frangible, but not adhering to the seed scale; wing 3.5–16.5 mm long, with smooth or almost smooth distal edge.

Geographic distribution: North Vietnam: SE part of Son La Prov. including the W border of Hoa Binh Prov., N border of Thanh Hoa Prov. near Hoa Binh Prov.

3.4. *Pinus dalatensis* Ferré subsp. *procera* Businský

First-year shoots densely or unevenly pubescent. Leaves erect and straight, (4–)5.5–11(–14) cm long. Cones pendulous on medium thick peduncle, (9–)13–20(–23) cm long, usually cylindrical and often moderately crescent-shaped; apex of seed scales appressed to neighbouring apophyses in closed cones. Seeds with always effective wing, falling together; seed corpus 7.5–10 × 3.5–5 mm; wing (13–)15–26(–29) mm long, with smooth distal edge.

Geographic distribution: Central Vietnam: mountains SW of Hue, Kon Tum Prov. (mainly the Ngoc Linh Mts.), NE tip of Gia Lai Prov.; Southern Laos: Sekong Prov.

3.5. *Pinus armandii* Franch.

Leaves erect and ± straight, mostly 1.0–1.5 mm wide. Cones pendulous, 9–25 cm long; apophyses with distal edges straight or slightly recurved. Seeds always without wings, only with narrow ridge around the distal part of seed corpus, integument thick, hard.

Geographic distribution: SW to Central China (including E Tibet), N Myanmar; central range of Taiwan.

3.6. *Pinus dabeshanensis* W. C. Cheng & Y. W. Law

Leaves erect and ± straight, 5–12(–14) cm long, mostly 0.9–1.1 mm wide. Cones pendulous, 9–16 cm long, cylindric-ellipsoid; apophyses of freshly opened cones pale tawny.

Geographic distribution: Central China: one scattered population around the Anhui, Hubei and Henan boundary in the Dabie Shan Mts.

4. Conclusions

All the species mentioned above – except *Pinus dabeshanensis* – are quite dissimilar to *P. fenzeliana* in cone and seed characters; *P. wangii* s.l. and *P. eremitana* are also dissimilar in leaf characters. *P. dabeshanensis* is the morphologically nearest taxon to *P. fenzeliana*, above all in seed characters, which are almost identical. However, the extent to which the cone characters of these taxa are different clearly supports the independent species status of the former one. Important characteristics of *P. dabeshanensis* are leaves mostly 5–12 cm long and ± straight, cones pendulous, 9–16 cm long, pale tawny when freshly opened. Also the ecological conditions in populations of these taxa differ: *P. dabeshanensis* is known from the only sparse population of trees scattered on mountain slopes among mostly deciduous broad-leaved woody vegetation in warm temperate climate at about 31° N (see also Peng & Jiang 1999) whereas *P. fenzeliana* prefers mountain ridges among mostly evergreen broad-leaved woody ve-

getation in tropic to subtropic climate surely between 18°30' N and about 26° N.

Pinus fenzeliana should be classified into subsect. *Flexiles* (SHAW) P. LANDRY (of *Pinus* sect. *Quinquefoliae*) defined by the always ineffective seed wing reduced to a narrow ridge or rudimentary lacerate blade detaching from the seed corpus, and also by seed scales thickened in the apophysis area with the apex always distant from neighbouring apophyses in closed cones. However, the species of sect. *Quinquefoliae* with well developed, basically effective seed wing, and usually also with the apex of seed scales appressed to neighbouring apophyses in closed cones, such as *P. wangii, P. eremitana* and *P. dalatensis* from the above-mentioned species or the recently described *P. anemophila* BUSINSKÝ (BUSINSKÝ 2010), belong to subsect. *Strobus* LOUDON.

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