

A newly recorded naturalized species in Korea: *Prunus speciosa* (Koidz.) Nakai (Rosaceae, Prunoideae)

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ABSTRACT: *Prunus speciosa* (Koidz.) Nakai belonging to Prunoideae of Rosaceae, a species previously unrecorded in Korean flora, is described. *Prunus speciosa* (Koidz.) Nakai is similar to *Prunus sargentii* Rehder and *Prunus jamasakura* Siebold ex Koidz., but different because it has toothed lobes of calyx tubes with the apex of leaf serrations aristate. This species is naturalized widely in the eastern parts of Jeju Island but is endemic to Japan.

Keywords: *Prunus*, Prunoideae, Rosaceae, unrecorded, Jeju Island

Rosaceae is largely divided into four subfamilies, Spiraeoideae, Maloideae, Rosoideae and Prunoideae, according to the characteristics of the fruit, the ovary position and the number of carpels (Cronquist, 1981; Krussman, 1986).

Of those subfamilies, Spiraeoideae has a follicle dehiscent along the suture or rarely a capsule. All remaining examples have indehiscent fruit, but Maloideae has an inferior ovary or semi-inferior, rarely superior, and 2–5 carpels or rarely one. Moreover, it has pome, sometimes berry-like, rarely small and drupaceous fruit. Rosoideae has a superior ovary or rarely inferior, and usually numerous carpels, rarely few. They have achenes or rarely drupaceous fruits, persistent sepals and compound leaves or very rarely simple. However, Prunoideae have one carpel, drupaceous fruits, often deciduous sepals; they are characterized by simple leaves which distinguish them from the rest of the three subfamilies. In addition, Prunoideae are trees or shrubs and have stipule, superior ovary, and 1 or rarely as many as 5 carpels with 2 pendulous anatropous ovules per carpel. Their fruits are succulent and fleshy drupe or dry that do not or rarely split when ripe (Lu et al., 2003).

This Prunoideae can be further divided into *Amygdalus*, *Armeniaca*, *Prunus*, *Cerasus*, *Padus* and *Laurocerasus* by presence of a grooved stone, the arrangement status and numbers of winter buds, the continuity of the leaves, and the presence of leaves on the rachis (Lee and Wen, 2001; Okie, 2003). Such a classification was proposed by some researchers as early as 1737; Linnaeus used the present *Prunus* as *Amygdalus*, *Cerasus*, *Prunus* and *Padus* added as four genera. However, *Amygdalus*,

Armeniaca, *Cerasus*, *Laurocerasus*, *Padus*, and *Prunus* were often treated as subgenera or sections of *Prunus* (Bentham and Hooker, 1880-1883; Hooker, 1894; Fernald, 1950; Krussman, 1986).

Recent phylogeny studies based on molecular data suggested the complete absence of monophyly. It was assumed that its separations were not appropriate (Bortiri et al., 2001). To reflect these recent findings, the Integrated Taxonomic Information System (ITIS, 2011) now recognizes just the single genus *Prunus*. *Prunus* encompasses approximately 400 to 430 species worldwide. In Korea, the distribution of 21 taxa has been reported (Mabberley, 1987; The Royal Horticultural Society, 1999; Lee and Kim, 2007).

In this paper, *P. speciosa* (Koidz.) Nakai, collected from Jeju Island, is reported.

Taxonomic Treatment

Prunus speciosa (Koidz.) Nakai in Bot. Mag. (Tokyo) 29 (344): 139, 1915. Fig. 1 & 2.

Prunus jamasakura Siebold ex Koidz. var. *speciosa* Koidz. Bot. Mag. (Tokyo) 25 (295): 186 (-187). 1911.

Prunus donarium Siebold subsp. *speciosa* (Koidz.) Koidz. in J. Coll. Sci. Imp. Univ. Tokyo 34(2): 271. 1913.

Cerasus speciosa (Koidz.) H. Ohba in J. Jap. Bot. 67(5): 279. 1992.

Deciduous trees, 15 m tall, trunk 60 cm in diameter, broad oblanceolate, elliptical and obovate crown; bark grayish or

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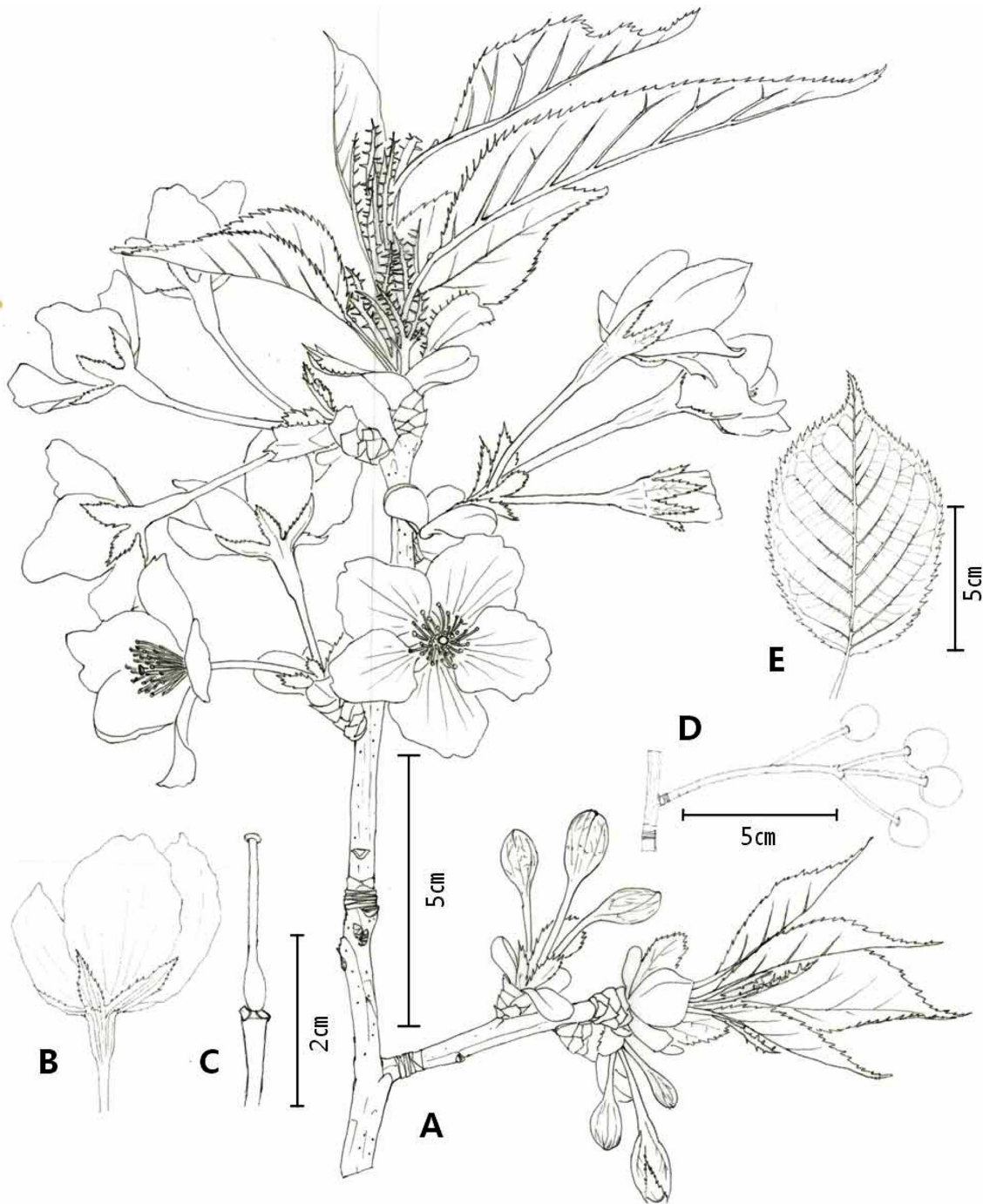


Fig. 1. *Prunus speciosa* (Koidz.) Nakai. A. Habit; B. Flower; C. Pistil; D. Fruit; E. Leaf.

purplish brown, young branches glabrous, lustrous and pale-brown, with marked horizontal dark brown lenticel in older stems; buds ovate, acute, obtuse at apex, scales purplish brown. Leaves green when young; lamina obovate to obovate-elliptic, caudate-acuminate at apex, rounded at base, margin acutely serrate, serrations aristate at apex, 10.6–13.3 cm long, 5.4–6.6 cm wide, with 7–9 pairs of secondary veins, glabrous on both surfaces;

petiole glabrous, 1.9–3.1 cm long, with a pair of protuberance-shaped glands at upper part; stipule linear-lanceolate, margin incised. Flowers late March to early April. Inflorescence corymbose on axil of the former year, 3–4 flowered, glabrous, 4.2–5.5 cm long; peduncle 1.8–2.2 cm long; pedicel 2.1–2.3 cm long; bract obovate, serrate on upper part, persistent; calyx tube cup-shaped, 7–8 mm long, glabrous, ca. 2 mm in



Fig. 2. Photographs of *Prunus speciosa* (a. habit; b. fluorescences; c. flowers; d. calyx; e. pistil; f. fruits).

diameter; lobes lanceolate, acute at apex, margin serrate, 6–7 mm long, flat at flowering. Petals widely elliptic, emarginate at apex, white or pale pink, 1.4–1.8 cm long, 1.1–1.4 cm wide. Stamens 24–32, as long as style, Style and ovary glabrous. Fruit ripening from June to early July, globose, 1.1–1.3 cm in diameter, flesh, sweet and sour, red becoming darker and almost black; calyx lobes caducous; stone flat, ellipsoid, 7.3–9.6 mm long, 6.2–7.2 mm thick.

Korean name: 왜벳나무 (Wae-beot-na-mu)

Distribution: Korea (naturalized), Japan (Izu Islands, endemic; naturalized in Boso, Miura and Izu Peninsula, and warmer regions) (Ohba, 2001).

Specimens observed: Jeju Special Self-Governing Province, Jeju-si, Ara-dong, Gwaneumsa, 12 Jun. 2004, *C.S. Kim 30339* (1 sheet); Jeju-si, Bonggae-dong, 23 Mar. 2007, *M.O. Moon*

23962 (4 sheets); Jeju-si, Gujwa-eup, Gimnyeong-ri, 26 Mar. 2010, *M.O. Moon 29289* (5 sheets); 12 Jun. 2004, *C.S. Kim 30323* (1 sheet); Jeju-si, Gugwa-eup, Gimnyeong-ri, Myosanbong, 14 Apr. 2005, *M.O. Moon 20075* (10 sheets); *C.S. Kim 20340* (6 sheets); 29 Mar. 2004, *M.O. Moon 30074* (2 sheets); 30 May. 2004, *M.O. Moon 30268* (1 sheet); 6 Apr. 2011, *C.S. Kim 31321* (6 sheets); *C.S. Kim 31322* (2 sheets); *C.S. Kim 31325* (4 sheets); *C.S. Kim 31326* (4 sheets); *C.S. Kim 31328* (3 sheets); *C.S. Kim 31329* (3 sheets); *C.S. Kim 31330* (3 sheets); *C.S. Kim 31331* (3 sheets); Jeju-si, Gugwa-eup, Songdang-ri, 14 Apr. 2005, *M.O. Moon 20071* (5 sheets); Jeju-si, Hwabuk-dong, 8 Apr. 2005, *C.S. Kim 20048* (3 sheets); Seogwipo-si, Pyoseon-myeon, Pyoseon-ri, 23 Mar. 2007, *C.S. Kim 23967* (4 sheets); Seogwipo-si, Seohong-dong, Sammaebong, 13 Mar. 2009, *J. Kim 26763* (5 sheets); 24 Mar. 2009, *C.M. Kang 26799* (3 sheets).

P. speciosa are indigenous to the island of Izu, Japan but are currently widely naturalized in the Boso islands, the Miura islands of the Izu Peninsula and in other areas of Japan, in the provinces where it is relatively warm (Ohba, 2001). This species grows in Jeju island from Seogwipo to the eastern regions of Seongsan-eup and Pyoseon-myeon, and including Ara-dong of Jeju City to Gujwa-eup in the eastern Jeju Island region. In other words, it has been confirmed that in the eastern region of Jeju Island to less than 200 m above sea level it is now widely distributed. These areas are secondary forests dominated by *Pinus thunbergii* Parl.

Even if the cause of naturalization on Jeju island is not clear, there are three trees 12 m in height and about 180 cm in diameter at breast height at the Wolmong temple in Jeju City. Furthermore, in light of the fact that the species are cultivated in Gimnyeong-ri of Jeju City, it is assumed that it was introduced as an ornamental tree and that the seeds were widespread.

Meanwhile, this species is also considered as one of the parent species of *P. yedoensis*, suggesting that it is a hybrid. In other words, Wilson (1916), Takenaka and Tateoka (1954), Takenaka (1959, 1962, 1963, 1965), Oginuma (1977), Iwasaki (1986), Kaneko *et al.* (1986), Kaneko (1992) have assumed that this species was the other parent in a pair with *Prunus spachiana*. These arguments were later rebutted by Kim (1998), Kim *et al.* (1998) and Kim *et al.* (2005).

This species was named as a variety of *Prunus jamasakura* by Koidzumi in 1911. However, in 1913, this species was also regarded as a subspecies of *Prunus donarium* by the view that pointed out the fact that its inflorescence is very similar to that of *Prunus donarium*. Meanwhile, Nakai argued that it should be treated as a species due to its long peduncle and distinctive differences

in the leaf characteristics in 1915. In recent times, the genus *Cerasus* has been adopted and used according to the view whereby the genus *Prunus s.l.* was divided into various genera, such as *Amygdalus*, *Armeniaca*, *Cerasus*, *Laurocerasus*, *Padus*, and *Prunus*. However, this paper follow the view that regards as a species of *Prunus s.l.*

Twenty four species including *P. speciosa* of *Prunus* in Korea can be distinguished by the following key.

Key of the genus *Prunus* in Korea

1. Inflorescence raceme of many flowers; flower white.
 2. Raceme naked at base; calyx persistent after anthesis *P. buergeriana*
 2. Raceme leafy at base; calyx deciduous after anthesis.
 3. Upper surface of leaves appressed pilose *P. maximowiczii*
 3. Upper surface of leaves glabrous.
 4. Racemes hairy; calyx tube bell-shaped, pubescent on the outer surface *P. maackii*
 4. Racemes glabrous; calyx-tube cup-shaped, glabrous on the outer surface *P. padus*
1. Inflorescence fascicle of 2–4 flowers; reddish, pink or white.
 5. Pedicel of fruit much shorter than diameter of fruit.
 6. Fruit less than 1.5 cm in diam.
 7. Flowers 2–2.5 cm in diam.; sepals 1–1.5 cm long; fruits 1–1.5 cm long *P. triloba*
 7. Flowers 1.5–2 cm in diam.; sepals ca. 1 cm long; fruits ca. 1 cm long *P. tomentosa*
 6. Fruits more than 2 cm in diam.
 8. Leaves lanceolate or ovate-lanceolate.
 9. Leaves lanceolate; stamens 1.5–2 cm long; fruit ca. 5 cm in diam. *P. persica*
 9. Leaves ovate-lanceolate; stamens 0.8–1.5 cm long; fruit ca. 3 cm in diam. *P. davidiana*
 8. Leaves ovate or elliptic.
 10. One or both surfaces of leaves pilose.
 11. Upper surface of leaves pilose; calyx tube broadly campanulate; lobe broadly oblong, no recurved at flowering; stamens shorter than style; fruit yellowish, sour *P. mume*
 11. Upper surface of leaves glabrous; calyx tube cylindrical-conical; lobe elongate-oval, recurved at flowering; stamens as long as style; fruit reddish yellow, tannic *P. sibirica*
 10. Both surfaces of leaves glabrous.
 12. Cork on trunk prominent; pedicel ca. 8 mm

- long; endocarp without a wing *P. mandshurica*
12. Cork on trunk not prominent; pedicel sessile or very short; endocarp with a wing along one side *P. armeniaca*
5. Pedicel of fruit equaling or longer than diameter of fruit.
13. Fruit more than 2 cm in diam. *P. salicina*
13. Fruit less than 1.2 cm in diam.
14. Shrubs; buds in 3's; apex of petals round.
15. Petiole 1–2 cm long; pedicel 1.7–2.2 cm long *P. japonica*
15. Petiole 4–6 mm long; pedicel ca. 1 cm long
16. Leaves lanceolate; flowers solitary or 2-flowered fascicle *P. glandulosa*
16. Leaves oblanceolate; flowers 2-6-flowered fascicle *P. choreiana*
14. Trees; buds solitary; apex of petals retuse.
17. Sepals revolute.
18. Apex of petals convolute; leaves glabrous on both surfaces *P. takesimensis*
18. Apex of petals straight; leaves initially usually densely hairy beneath, later glabrous above *P. avium*
17. Sepals straight; apex of petals straight.
19. Style and pedicel pubescent at base.
20. Inflorescence 2-6-flowered corymb, calyx-tube cup-shaped *P. yedoensis*
20. Inflorescence 2-5-flowered fascicle, calyx tube vase-shaped *P. spachiana*
19. Style glabrous, pedicel glabrous or pubescent.
21. Calyx lobes usually minutely serrate on margins, inflorescence corymbose; apex of leaf serrations aristate *Prunus speciosa*
21. Calyx lobes entire; inflorescence umbel-like or corymbose; apex of leaf serrations acute or acuminate.
22. Inflorescence umbel-like, stamens as long as pistil, bud scale sticky *P. sargentii*
22. Inflorescence corymbose, stamens shorter than pistil, bud scale not sticky.
23. Young leaves reddish brown, blade oblong or elliptic, or oblanceolate, glabrous *P. jamasakura*
23. Young leaves green, blade obovate-elliptic, or obovate, usually sparsely hairy on both surface *P. verecunda*

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Literature Cited

- Bentham, G. and J. G. Hooker. 1880-1883. Rosaceae. Genera Plantarum I. Pars 3. Pp. 600-629.
- Bortiri, E., S.-H. Oh, J. Jiang and S. Baggett, et al. 2001. Phylogeny and systematics of *Prunus* (Rosaceae) as determined by sequence analysis of ITS and the chloroplast *trnL-trnF* spacer DNA. Syst. Bot. 26(4): 797-807.
- Cronquist, A. 1981. An Intergrated System of Classification of Flowering Plants. Columbia University Press, New York.
- Fernald, M. 1950. *Prunus* L. Gray's Manual of Botany (8th ed.). Amican Book Company, New York.
- Hooker, J. D. 1894. The Flora of British India. II, L. Reeve & Cd., Ltd. Pp.312-317.
- ITIS (Intergrated Taxonomic Information System). <http://www.itis.gov/mou.html>. Retrieved 2011-09-14.
- Iwasaki, F. 1986. Origin of *Prunus* × *yedoensis* Matsum. cv. *Yedoensis*. Coll. & Breed. 48(4): 146-150 (in Japanese).
- Kaneko, T. 1992. The origin of *Prunus yedoensis*. Planta 20:21-24 (in Japanese).
- Kaneko T., T. Toru and T. Koichiro. 1986. Studies on the origin of crop species by restriction endonuclease analysis of organellar DNA. II. Restriction analysis og ctDNA of 11 *Prunus* species. Jpn. J. Genet. 61: 157-168.
- Kim, C. S. 1998. Distribution and taxonomic study of *Prunus yedoensis* Matsumura (Rosaceae). Ph. D. Dissertation of Cheju Natl. Univ., Jeju.
- Kim C. S., M. O. Moon, E. J. Cheong and G. O. Byun. 2005. Evaluation of leaf moepology for distinguishing *Prunus* (Rosaceae) from Jeju, Korea. Korean J. Pl. Taxon. 35: 81-98.
- Kim, C. S., K. Y. Lee, M. O. Moon, H. J. Hyun, B. S. Ihm and M. H. Kim. 1998. Natural habitat *Prunus yedoensis* Matsumura and its moepological variation. Korean J. Pl. Taxon. 28: 117-137 (in Korean).
- Krussman, G. 1986. *Prunus* L. In Manual of Cultivated Broad-Leaved Trees & Shrubs, Vol III. Krussmann, G., S. D. Gilbert (eds.). Timber Press, Oregon. Pp. 18-58.
- Lee, S. and C.-S. Kim. 2007. *Prunus* L. In The Genera of Vascular Plants of Korea. Park, C. W. (ed.). Academy Publishing Co. Seoul. Pp. 568-573.
- Lee, S., and J. Wen. 2001. A phylogenetic analysis of *Prunus* and the

- Amygdaloideae (Rosaceae) using ITS sequences of nuclear ribosomal DNA. *Am. J. Bot.* 88: 150-160.
- Lu, L., C. Gu, C. Li, S. Jiang, C. Alexander, B. Bartholomew, A. R. Brach, D. E. Boufford, H. Ikeda, H. Ohba, K. R. Robertson and S. A. Spongberg. 2003. Rosaceae A. L. Jussieu. *In* Flora of China Vol. 9. Wu, Z. Y., P. H. Raven and D. Y. Hong (eds.), Science Press and Missouri Botanical Garden, Beijing, and Missouri. Pp.46-434.
- Mabberley, D. J. 1987. *Prunus* L. *In* The Plant-Book, A Portable Dictionary of the Higher Plants. Mabberley, D.J. Cambridge University Press, Cambridge. Pp. 478-479.
- Oginuma, K. 1977. Karyotypical speculation on the origin of *Prunus* × *yedoensis* 'yedoensis'. *Jour. Bio. Hiroshima Univ.* 43: 53-55 (in Japanese).
- Ohba, H. 2001. *Cerasus* Mill. *In* Flora of Japan, Vol. IIb: Angiospermae; Dicotyledoniae; Archichlamideae (b). Iwatsuki, K., Boufford, D. E. & Ohba, H. (Eds.). Kodansha, Ltd, Tokyo. Pp. 128-144.
- Okie, W. 2003. Stone fruits. Agricultural Research Service, United States Department of Agriculture. Washington D.C.
- Takenaka, T. 1959. The origin of *Prunus yedoensis*. *Heredity* 3(4): 47 (in Japanese).
- Takenaka, Y. 1962. Studies on the Genus *Prunus*, I. The origin of *Prunus yedoensis*. *Bot. Mag. Tokyo* 75: 278-287.
- Takenaka, Y. 1963. The origin of Yoshino cherry tree. *Journ. of Heredity* 54: 207-211 (in Japanese).
- Takenaka, Y. 1965. Studies on the genus *Prunus* II. The origin of *Prunus yedoensis*, Continued. *Bot. Mag. Tokyo* 78: 319-331.
- Takenaka, Y. and T. Tateoka. 1954. On the origin of *Prunus yedoensis*. *La Kromosomo* 21: 777-778.
- The Royal Horticultural Society. 1999. The New Royal Horticultural Society Dictionary of Gardening. Macmillan Reference Ltd. London.
- Willson, E. H. 1916. The Cherries of Japan. Tokyo.