Pyrus ussuriensis

Scientific Name

***Pyrus ussuriensis* Maximowicz**

Synonyms

Pyrus asiae-mediae Maleev, *Pyrus communis* auct. non. L., *Pyrus communis* sensu Bunge non L., *Pyrus lindleyi* Rehder, *Pyrus ovoidea* Rehder, *Pyrus simonii* Carrière, *Pyrus sinensis* Jard., *Pyrus sinensis* Lindl., *Pyrus sinensis* sensu Decne. Non Poir., *Pyrus sinensis* α *ussuriensis* Makino, *Pyrus sinensis* var. *asiae-mediae* Popov, *Pyrus sinensis* var. *ussuriensis* Makino, *Pyrus sogdiana* Kudr., *Pyrus ussuriensis* Maxim. var. *ovoidea* (Rehder) Rehder.

Family

Rosaceae

Common/English Names

Chinese Pear, Fragrant Pear, Harbin Pear, Manchurian Pear, Mongolian Pear, Siberian Pear, Snow Pear, Ussurian Pear.

Vernacular Names

Chinese: Qiu Zi Li, Chiu-Tzu-Li, Shan-Li, Suan-Li;
Danish: Kinesisk Pære, Sandpære;
Finnish: Paeaerynaepuu;
German: Ussuri-Birne;
Japanese: Chuugoku Nashi, Iwate Yama Nashi, Hokushi Yama Nashi, Michinoku Nashi, Tjosen-Yama-Nashi;
Korean: Santolbaenamu;
Russian: Gruša Ussurijskaja;
Swedish: Manchuriskt Päron;
Thai: Sali Chin.

Origin/Distribution

Fragrant pear is indigenous to North eastern China, Far East of Russia (Amur and Ussuri regions) and Korea.

Agroecology

Fragrant pear is a cold temperate species and the most frost resistant of the *Pyrus* species. It occurs singly or in small groups within cedar-broadleaved, broadleaved and mixed forests along river valleys

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and on river terraces, in the lower mountain belt in its native range and can be found as high as 1,100–1,300 m above sea level. It grows on a wide range of soil types and in full sun.

Edible Plant Parts and Uses

Fruits are best consumed fresh, they can be used to prepare compotes, drinks and beverages. Fruits can be dried or fermented after addition of salt.

Botany

Deciduous, small to medium tree, growing to 15 m with a broad pyramidal or oval crown, dark grey bark and yellow-gray glabrous branchlets. Leaves orbicular-ovate or ovate, 5–10 cm by 4–6 cm, acuminate, base rounded or subcordate, margin long spinulose-serrate, tomentose when young to glabrescent on 2–5 cm long petioles, green turning (Plate 1) to bright red or bronze in autumn. Corymb densely 5–7-flowered. Flowers white, 3–3.5 cm in diamond 2–5 cm long pedicels. Hypanthium campanulate, slightly tomentose, sepals broadly triangular, glabrous, and persistent, petals white, obovate or broadly ovate, ca. 1.8×1.2 cm, glabrous, styles5 distinct. Fruit ovoid to subglobose, greenish–yellow, with tiny white specks and tinge of pink, sometimes with rusty spots, 3–5 cm diameter, 5-loculed (Plates 2 and 3). Pulp is juicy, with pleasant flavour, sweet to sub-acid.

Plate 1 Fragrant pear leaves

Plate 2 Manchurian (Fragrant) pears

Plate 3 Close up of Fragrant pear cv Hong-hua-guan (red flower jug)

Nutritive/Medicinal Properties

Ussurian pear (*Pyrus ussuriensis*) cultivars and Xinjiang pear (*Pyrus sinkiangensis*) cultivars tend to have smaller fruit weight and higher level of sugars. Total sugar content in 29 varieties of *Pyrus ussuriensis* was very variable ranging from 81.2 to 138 mg/ml juice, fructose 32.2–88.6 mg/ml juice, glucose 7.2–51.1 mg/ml juice, sucrose 2.1–56.5 mg/ml juice and sorbitol 8.2–23.9 mg/ml juice (Pan et al. 2002).

The total organic acid content of fruits of *P. ussuriensis* cultivars ranged from 3.04 to 9.13 mg/g fresh weight (FW) (Sha et al. 2011). The dominant organic acids were malic and citric acid. Malic acid content ranged from 1.51 to 4.78 mg/g FW, accounting for 33–62% of the

total organic acid content. Citric acid content ranged from 0.77 to 5.51 mg/g FW, accounting for 20–60% of the total organic acid content. The minor organic acids in the fruit were quinic (0.35–0.95 mg/g-FW) and oxalic acid (0.002–0.18 mg/g-FW), which accounted for 4–15% and 0.3–5.6% of the total organic acid, respectively. The content of acetic, shikimic, succinic, fumaric, tartaric, and lactic acids were relatively low.

Arbutin and chlorogenic acid were found to be the main phenolic constituents in *Pyrus ussuriensis* fruit (Cui et al. 2005). The mean concentration of arbutin and chlorogenic acid was 0.164 mg/g fresh weight (FW) and 0.163 mg/g FW respectively. Arbutin and chlorogenic acid were also the dominant phenolic compounds in the skin (Lin and Harnley 2008). Fragrant pear group was found to contain significant quantities of quercetin glycosides and lesser quantities of isorhamnetin glycosides and the glycosides of luteolin, apigenin, and chrysoeriol compared to other pear groups.

Three antioxidative compounds, 1, 4-dibenzenediol, chlorogenic acid and quercitrin were isolated from the ethyl acetate extract of the fruits of *Pyrus ussuriensis* (Kim et al. 1999). The DPPH (diphenylpicrylhydrazyl) free radical scavenging activities of 1, 4-dibenzenediol (RC_{50} : 0.4 μg) and chlorogenic acid (RC_{50} : 4 μg) were more effective than those of BHA (butylated hydroxyanisole) (RC_{50} : 14 μg) and α-tocopherol (RC_{50}: 12 μg).

Water, ethanol and acetone extracts of *P. ussuriensis* leaf exhibited more than 70%, 80% and 85% DPPH (1,1-diphenyl-2-picryl-hydrazyl) scavenging radical activity at 50 ppm concentration, respectively (Lee et al. 2010). Xanthine oxidase inhibition activity and superoxide dismutase (SOD)-like activity by *P. ussuriensis* extract were higher than 30% and increased with increasing concentration. In the antiinflammatory test, *P. ussuriensis* leaf extract inhibited generation of nitric oxide (NO) stimulated by LPS in the macrophage cell line (raw 264.7) after 12–24 hours. The results suggested *P. ussuriensis* to have great potential as a cosmeceutical raw material as well as antioxidant and antiinflammatory agent.

Other Uses

Pyrus ussuriensis is often used as rootstock for other *Pyrus* species and in pear breeding because of its resistances to frost, fire-blight, Asiatic pear scab and other diseases. Its wood is used to make souvenir craftwork objects.

Comments

Pyrus ussuriensis is cultivated in China since ancient times, domesticated from wild populations in the north. There exist about 150 cultivars with high variability, possibly enhanced by introgression from other pear species. *Pyrus ussuriensis* var. *ovoidea* Rehder is, in fact, a cultivar of *Pyrus ussuriensis*. It is characterized by its ovoid, subglobose, or ellipsoid fruit, longer fruiting pedicels (2–4 cm) and tomentose leaves and corymb.

Pyrus ussuriensis var. *viridis* T. Lee, the fragrant pear (Plates 2 and 3), cultivated in the Shandong province of China, is allowed to be imported into Australia subject to compliance with phytosanitary equirements.

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