

WILD APPLE

COMMON NAME



Malus sieversii

SCIENTIFIC NAME

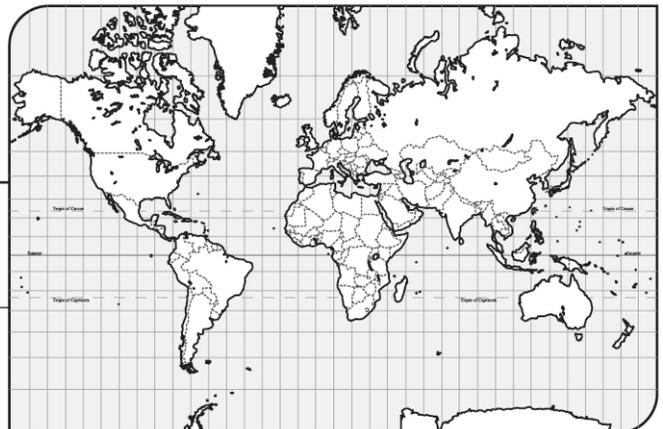


Photo credit: Phillip Forline

Importance

An apple a day would not keep the doctor away without this tree. Previously known under the synonym *Pyrus sieversii* and also known in Asia as *xin jiang ye ping guo*, this sour wild apple played an important role in the food we eat today.

Biogeographic and genetic studies have identified this wild apple species as the ancestor of the domestic apple. In 2010, analysis of the draft genome sequence of the domesticated apple strengthened the case that *Malus sieversii* is the primary ancestor of the domesticated apple. That means virtually all the apples that we eat every day are derived from this species. That also means that this species is an important genetic resource for breeding better apples in the future and protection our apple populations against future threats from disease, pests, or climate change. However, because of its limited range and exploitation, this species is vulnerable to extinction.



Rose Family (*Rosaceae*)

FAMILY

Vulnerable

RED LIST CATEGORY

Description

Form: These small trees grow 7 to 32 ft tall (2 to 10 m; sometimes up to 45 ft or 14 m), with a spreading crown.

Leaf: The green deciduous leaves of *M. sieversii* are oval shaped to narrowly oval-shaped, 2 to 4 inches long by 1 to 2 inches wide (6 to 11 by 3 to 5.5 cm), fuzzy on the underside of the leaf, particularly along the veins. The base of the leaf is wedge-shaped, rarely rounded, with softly toothed edges and a pointed tip.

Flower: The flowers appear in May and are arranged in clusters 1.5 to 2 inches (4 to 6 cm) in diameter of 3 to 6 blossoms. The individual flowers in these clusters are pinkish, tinged rose when in bud, and tend to be 1 to 1.5 inches (3 to 3.5 cm) in diameter, with petals rounded and wider at the top and narrowing to the base. The bracts and sepals are lance-shaped with pointed tips and slightly toothed edges. The pedicel of the flowers is approximately a half inch long (1.5 cm), and both the pedicel and sepals have a white coating of hairs. The flowers possess 20 stamens of unequal lengths, that are approximately half as long as petals and 5 styles as long or slightly longer than the stamens with white hairs at the base.

Fruit: In August through October, these trees produce fruits in the form of apples. Called a pome, the fruit is a yellowish-green globe, tinged red, up to 1 to 2 inches in diameter (3 to 4.5 cm; sometimes up to 3 inches or 7 cm) in diameter. The fruit may have depressions at the stem and base. The center of the fruit (the ovary) has 5 cavities, with 2 seeds per cavity.

Bark & Twigs: Twigs are dark grayish red when old, cylindrical or slightly tapering,

short, smooth and robust. They are covered with fine hairs when young and are slightly curved, but become gradually hairless as the twigs age. The opposite buds are dark red and ovoid.

Habitat and Ecology

The species is native to Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan, with the native range extending into the western part of the Tianshan Mountains and hillsides in western Junggar in China. *M. sieversii* is found on mountain summits, slopes, and valleys from 3600 to 5000 feet (1100 to 1600 m) and is often the dominant tree of those forests.

Years of surviving on the cold, dry mountains of Kazakhstan mean that *Malus sieversii* may possess genetic defenses against diseases, cold, and drought that could be bred into domestic apples.

Threats

The apple forests of Kazakhstan are disappearing as humans bulldoze remote areas for new development, and mountain habitats are used more heavily for grazing. Over 70% of the habitat for this species in Kazakhstan has vanished in the past 30 years. Populations throughout the range of this species are suspected to have declined by 30% or more in the past three generations, and in the last 50 years, up to 90% of wild fruit forests of central Asia have been lost. As populations decline, and remaining plants are used for grafting of commercial stock and hybridization, genetic diversity is also being lost.

Conservation Action

The USDA has sent researchers into Kazakhstan to collect and store the genetic

and phenotypic diversity represented in the trees from each of two of the Kazakhstan collection sites. They are currently developing core seed collections that will help preserve the maximum available genetic diversity in this species.

Because of the close connection to human interests, this is also an important tree for public education. The factors that endanger this tree are common to many endangered species, and learning more about apples may help children and adults learn more about the importance of conserving biodiversity.

Want to take action? Read Michael Pollan's chapter on apples and apple genetic diversity in the book *Botany of Desire* and share what you learn with others. You can also make your friends aware of the plight of this tree by "liking" [this species on Facebook!](http://www.facebook.com/pages/Malus-sieversii/143520648997078?sk=info) (<http://www.facebook.com/pages/Malus-sieversii/143520648997078?sk=info>)

References

The Flora of China Project. *Malus sieversii*. In: Flora of China. Missouri Botanical Garden Press, St. Louis, and Science Press, Beijing. (<http://flora.huh.harvard.edu/china/index.html>, 31 March 2011).

Participants of the FFI/IUCN SSC Central Asian regional tree Red Listing workshop, Bishkek, Kyrgyzstan (11-13 July 2006) 2007. *Malus sieversii*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.4. (www.iucnredlist.org, 31 March 2011).

USDA, ARS, National Genetic Resources Program. 2010. *Germplasm Resources Information Network - (GRIN)* [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland.

(<http://www.ars-grin.gov/cgi-bin/npgs/html/taxon.pl?23275>, 31 March 2011).

Velasco, R. *et al.* 2010. The genome of the domesticated apple (*Malus x domestica* Borkh.). *Nature Genetics* 42: 833–839.

Volk, G.M., Richards, C.M., Henk, A.D., Reilley, A., and Forsline, P.L. 2007. Genetic Diversity of the *Malus sieversii* Collection in the USDA-ARS National Plant Germplasm System. Meeting Abstract HortScience. July 16-19, 2007, Scottsdale, Arizona. 44:895. (http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=208889, 31 March 2011).