Zelkova serrata (Thunb.) Makino

Ulmaceae

LOCAL NAMES
Chinese (Japanese ju shu,orinoco Jute); English (gray-bark elm,water-elm,saw-leaf zelkova,sawtooth zelkova,Japanese zelkova); Japanese (kiaki)

BOTANIC DESCRIPTION
Zelkova serrata is a deciduous tree, vase shaped when young, rounded umbrella-like habit when mature (roughly the same shape as Ulmus americana), main branching starts low creating a short trunk, grows to 15.2-18.3 m in height and rarely reaches 30.5 m. Older trees grown in the open can have a very wide and majestic canopy.

Leaves alternate, dark green above and much paler below, simple, oblong-ovate, 2.5-5 cm long but can be up to 12.7 cm long on some fast growing shoots with acuminate tips, pinnately veined and serrate leaf margin. Leaves are dark green above and much paler below. The foliage puts on a showy display in fall when the leaves turn yellow then orange or red before dropping.

Flower monoecious; yellow-green, not showy, occur in tight clusters along new stems; appearing before the leaves.

Fruit a small triangular drupe, pea green turning brown, sub-sessile, 2.5 cm long and 2.5-3.5 mm in diameter with the surface covered by an irregular network of low ridges.

Twig very slender, zigzag, red-brown with widely divergent, pointed, cone-shaped buds.

Bark smooth and red-brown to gray when young with numerous lenticels; remains smooth for many years but eventually exfoliates into small patches exposing an orange to reddish brown inner bark.

BIOLOGY
Zelkova serrata flowers in spring (March-May) as the foliage emerges, followed by fruits maturing in mid to late summer.

bark (Chris Evans, The University of Georgia, www.forestryimages.org)

Leaves; taken at: Blake Garden - Kensington, CA and The National Arboretum - Washington, DC (W. Mark and Reimer)

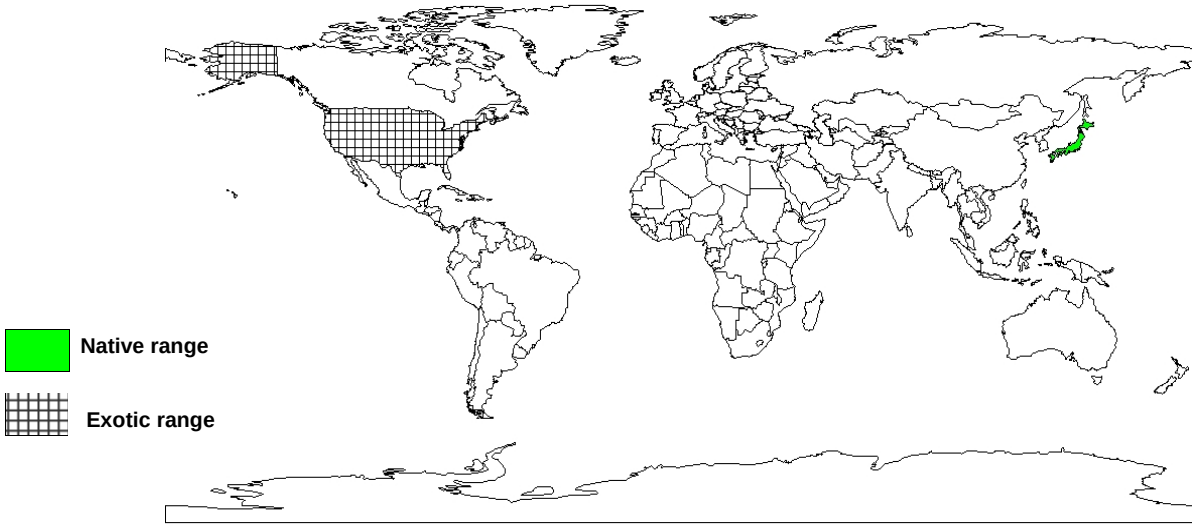
Seeds (Steve Hurst @ USDA-NRCS PLANTS Database)

ECOLOGY
Zelkova serrata is found growing naturally in the lowlands (valleys, beside streams) and mountains of central and southern Japan in places with partial shade (light woodland) or no shade and moist well drained soil as a canopy tree.

BIOPHYSICAL LIMITS
Altitude: 500-2000 m
Temperature: tolerates frost and cold up to -36°C, tolerant of heat, prefers full sun, relatively tolerant of drought and pollution once established.
Rainfall: 508-1778 mm
Soil type: prefers sandy, loamy and clay soils that are well-drained, moist, deep, acidic, neutral and alkaline.

DOCUMENTED SPECIES DISTRIBUTION

Native: Japan, Korea, Republic of, Taiwan, Province of China
Exotic: US



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Timber: Highly valued as a commercial timber tree in Japan, where its close-grained (beautiful) high quality wood is used to make fine furniture, tool handles, for construction etc. The timber production of Z. serrata in Japan has basically depended on exploitation from natural populations.

Food: Young leaves are cooked to make vegetables.

Medicine: The bark and leaves are used medicinally.

SERVICES
Ornamental: Zelkova is elm-like in shape and is often used as a replacement for American elm where the latter has died out due to Dutch elm disease. It is a handsome street tree or specimen for a park, large garden or around official facilities for shade or as a buffer strip. It is valued for its stately wide-spreading canopy, attractive bark characteristics and excellent fall color. With its small leaves, pretty exfoliating gray and orange bark, and handsome fall color, Japanese zelkova is a popular bonsai tree.

TREE MANAGEMENT
Zelkova serrata has a moderate to rapid growth rate. Though established trees are fairly drought tolerant, the finest specimens are grown with regular watering. For bonsai, the foliage should be sprayed with water daily during summer.

It requires pruning to develop a strong structure since it is susceptible to breakage either at the crotch due to poor collar formation, or the wood itself tends to break. This should be done in winter so that the tree looses less sap. The foliage can also be developed by pinching back 2 sets of 4 new sets of leaves during the growing season.

To establish a wonderfully shaded street with a closed crown the trees should be planted on 30-foot-centers.

To reduce leaf size, healthy trees can be leaf pruned in early summer. All of the leaves are removed, leaving only the leaf stems on the branches. The tree responds by putting out a second set of leaves, smaller than the first set.

GERMPLASM MANAGEMENT
Seeds show recalcitrant behaviour and should not be allowed to dry, or viability is rapidly lost. Stored seed requires cold stratification and should be sown as early in the year as possible.

PESTS AND DISEASES
No serious insect or disease problems are documented. Elm leaf beetle (Pyrrhalta luteola) and Japanese beetle (Popillia japonica) feed on the foliage. Other insect visitors include leaf miners and scales. Spider mites can be a problem in hot, dry summers. Aphids, leafhoppers and gall mites can also be a problem.

Though related to elms it shows high resistance to Dutch Elm Disease, honey fungus and bacterial canker, but not immune. Zelkova is subject to canker diseases particularly if the trunk is repeatedly wounded. Phloem necrosis, wilts and twig dieback due to lack of cold hardiness may also occur.

FURTHER READNG

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SUGGESTED CITATION

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