Ficus religiosa: Growing it for Bonsai

Colin Doherty
Hort 5051
Bonsai: The Art

• Chinese word meaning “tree in a pot”.
• Miniature bonsai is often just a small immature tree potted in a bonsai style tray.
• To the bonsai artist and true bonsai enthusiasts the tree becomes a work of art.
• Tree is kept in a small pot and restrained from growing
• “Trained” by many techniques over a long period (often years) to meet ancient standards of style and design
upright informal style bonsai.

immature tree: bonsai style tray.
Taxonomy

• The *ficus religiosa* is a large dry-season deciduous or semi-evergreen tree.
• Moraceae family
• Often called mulberry or fig
• Moraceae are either monoecious or dioecious flowering trees, shrubs and lianas (vines), comprising of 40 genera and 1,000 species, nearly all with milky sap.
• A synonym for the *ficus religiosa* is *Urostigma religiosum*.
• Common names (depending on the language) include: the sacred fig, bo tree, peepal, and bohdi tree.
Geographic Distribution

• First tree believed to have been grown in India thousands of years ago.
• Now native to India, Nepal, Chad, Thailand, and Southwest China, and Southeast Asia east to Vietnam.
• Grows in both tropical and subtropical climates on either side of the **tropic of cancer at 23.5 degrees north which divides India in half**.
• Grows in areas up to 5000 feet above sea level.
• Grows in Hawaii since 1900’s, when a Buddhist monk brought a sapling to Hawaii, while traveling there to do missionary work.
• This tree still stands in a botanical garden in Honolulu.
• Introduced to Israel in late 1930’s.
Native Habitat

- Has adapted to the monsoonal climate characteristics of its South and East Asia habitat.
- Mid July to September the climate is characterized by warm, windy and intense periods of rain causing flooding and lasting for weeks.
- March though June the weather is generally cooler, but dry and dusty.
- During winters in Katmandu, Nepal the tree survives just below freezing winter temperatures.
- Found in woodland areas it shares with other trees such as the banyan and palm.
Taxonomic Description

• A large tree and can grow 65-70 feet tall and 5-6 feet dbh.
• Irregularly shaped habit, with wide-spreading branches
• Trunk is regularly shaped, and thick, often with large low shallow buttressed roots, which grow out from the base. An adaptation to poor soil, roots spread to for more nutrients
• Bark smooth and gray with brownish specks
Leaves:

- Alternate, spirally arranged, broadly ovate, glossy, leathery, and dark green when mature.
- They are 6-7 inches long by 3-4 inches wide, with unusual tail-like tips.
- Pink when they first emerge.
- They are base-cordate or heart shaped attaching to the petiole at a notch in the base.
• The flowers are inside the fig (fruit) cannot be seen unless the fig is opened
• Figs develops in pairs, begin green and ripen to purple and are about a half inch in diameter
Interesting facts

- Often begins life as an epiphyte germinating and growing on a host tree or in some cases in cracks in walls.
- Evolutionary adaptation to dry hot season habitat by sending its roots down inside the host tree often splitting the host.
- In less hostile habitats it will send roots in circles around the host sometimes.
- Strangling the host.
Another interesting fact

- Monoecious but cannot pollinate itself
- over thousands of years developed mutualistic relationship with one species of fig wasps
- Both depend on each other for continuation of their species.
- Process of active pollination (the wasp picks up pollen from other trees and stores it in special sack. Then deposits it inside the fig where she goes to lay her eggs)
- the fig fruit in return houses and nourishes the larvae until they become adults
- The seeds of the *Ficus religiosa* are sterile unless they are grown where this wasp is present
Very Strange But True

• If your mobile has been discharged and you are inside a jungle then you need not to use any charger. You Should pluck two Bodhi (*Ficus religiosa*) leaves and your work would be done.
• Open your mobile battery and connect it with a Bodhi leaf.
• Set the battery in your mobile set. After some time your mobile would be charged.
• Though it is unbelievable, it has been proven true.
• Hundreds of people in Nepal are using this technique and charging their mobiles.
• According to the botanists, it is just changing mutual energy into electrical energy power that can be saved in battery.
• It is currently a subject of research.
Medicinal Uses

• Several medicinal uses by indigenous people.
• Leaves are known to treat dysentery.
• Seeds urinary ailments.
• Bark is said to have antibiotic properties against staph and e-coli bacteria.
• Sap is used to remove warts and its roots to heal gum disease.
Varieties/Cultivars

- It is not known if there are any cultivars or varieties on the market.
- It is very unlikely that any exist.
Propagation Methods

• The method of this experiment was seed propagation
• Is mostly propagated by cuttings, air layering and tissue cultures
• Most likely due to short viability window and erratic germination
• 14-90 days
• Seeds require light, soil temps over 80F(27C) and constant misting
• Seed coats may have germination inhibitors
• Seeds soaked in 1000 ppm GA3 produced 3/5 germinations
• Seeds are very sensitive to age and moisture retention
Ideotype

For miniature bonsai style potted plant: 6-8 inches in 4 inch pots.
• 2-3 years old “starter”, pruned several times ready to start training for authentic bonsai: Minimal 12-16” with developing buttressed roots and trunk.
• Often desired by artists, trees as large as 2 feet.
Market Niche

• There are only a few growers of the *Ficus religiosa* in the U.S.
• They report the trees are being purchased for bonsai. There is demand
• Most important reason consumers are buying is the religious significance
• Buddhist sees the tree as an example “of the dependence of our lives and achievements on nature and to be kind to all living beings.”
• Could be marketed for Buddha’s birthday is primarily observed on the first full moon date of the fourth month in the Chinese lunar calendar (typically May).
• Hindus also seek the tree
• Environmental interest as the tree has a story of thousands of years of adaptation to survive as a species.
• The bonsai community will need more convincing, the tree has limitations for true bonsai
• Most of these can be overcome by techniques. More difficult to create, but more challenging and rewarding.
Anticipated Cultural Requirements

• winter hardy to USDA zones 10-12
• heat drought tolerant to USDA Heat Zones 11-12 where there are more than 180 days of temperatures over 30 C.
• easily grown year round in controlled greenhouse
• From seed requires soil temps of 27-29C., light and constant moisture
• Once transplanted from plug stage needs long days (18 hours)
• Initial growth is very slow, no PGR’s needed
• Later size will be contained by keeping in small pots
• Before sale, plants sold as starters for bonsai should be exposed to low light for 2-6 months to acclimate to be moved out of greenhouse. If not they will lose their leaves.
• Once plant has established, feed only during spring and summer and stop feeding in the fall and winter allowing the plant to go through its natural growth cycle.
Experiment: to grow *ficus religiosa* from seed and determine proper media as well as pre-sowing treatments to promote germination.

- Of these 5 germinations 4 survived and are growing on
- The highest number of germinations came from the group treated with 1000 ppm GA3 in water.
- May indicate germination inhibitors in the seed coats
- Or the seeds were old and needed extra help to germinate
- Inconclusive results
Production Schedule

- For immature yet established plants 6-8” May take up to 1 year
- For use by bonsai artists. “Starters” pruned to encourage bonsai attributes, 2-3 years
- Best method of propagation to plan and achieve a production schedule remains by cuttings.
- Seeds must be fresh and have been harvested and stored to retain moisture and temperature to be viable.
- Must have reliable seed source.
Treatments/number of germinations

- Control 100 seeds in soil mix / 0
- Control 100 seeds in sphagnum moss / 2: week 12
- 100 seeds soaked in water only 24 hours sowed in soil mix / 0
- 100 seeds soaked in water only sowed in sphagnum moss / 0
- 100 seeds soaked in 1000 ppm GA3 in water 24 hours sowed in soil mix / 2: week 13, 1: week 16
- 100 seeds soaked in 1000 ppm GA3 in water 24 hours / 0
Genetic Improvement

• The seeds of *Ficus religiosa* are difficult to germinate.
• However, this difficulty does not come from a genetic trait that can be bred out of them.
• The factors that lead to seed viability, fertilization by the right fig wasp, followed by timely harvesting and finally a very short storage that continuously maintains the seeds moisture and temperature are the keys.
• Therefore, genetic improvement of seeds to enhance germination rates is not necessary. It is even most likely, not possible.
Sid-Siddhartha at 5 weeks

- From the penny it is clear it is still very small at five weeks past germination. (Note the heart-shaped leaves beginning to be apparent.)
References


