

LIVING FENCE

Its Role on the Small Farm

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Published 1991; Revised 2010

What's Inside:



Palisade Style Living Fence [ECHO]

Introduction

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Benefits

- *Fuel*
- *Fertilizer*
- *Other Uses*

Disadvantages

Establishment & Care

Species for Living Fences

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Purpose of a Fence

There are several reasons for establishing fences on the small farm. Fences are used to:

1. To mark boundary lines between farms or next to roads.
2. To separate adjacent fields used for distinct purposes
3. To protect and keep animals from straying
4. To protect crops from animal damage

A fence represents a major investment on the small farm. Although it carries a cost, it also provides something of benefit, namely protection. It is often a challenge to small farmers to increase farm production, such as crop yield, and the use of fences can facilitate such improvements. Whereas a fence may facilitate yield increase on the farm, a **living fence** can improve the efficiency of the production as well.

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“Major” fences are usually constructed of poles and wire. “Minor” fences, such as those used for fencing small animals or kitchen gardens, may be constructed entirely of wood, or of a combination of materials, such as poles, slats, and woven or welded wire. Both major and minor fences may be constructed of living posts, reducing initial costs of the fence. Additionally, living posts last longer than wooden (dead) ones, thereby reducing maintenance costs as well.

Living fences are commonly used in a wide range of ecological situations, from semi-arid to rain forest conditions. Suitable plant materials are available for almost all ecological regions and conditions.

Benefits of a Living Fence

A living fence shares many of the benefits of a manufactured or “dead” fence. However, for the small farmer a living fence provides additional benefits. For instance, living fences are not bothered by termites, carpenter ants and dry rot, which are a continual battle in maintaining “dead”, wooden fence posts.

The economic benefits (mentioned above) along with other benefits of employing living fences on the small farm (outlined below) provide the small farm holder with a resource which, when wisely used, can become a valuable contributing resource to the well-being of the farmer, his family and his community.

Fuel

As a general rule, firewood or charcoal is the primary cooking fuel in developing communities. A living fence post can be trimmed periodically and the branches used as fuel. A convenient source of firewood near the farm home, such as a living fence, is especially beneficial in areas where wood is scarce. Extra firewood may be sold or bartered.

Fertilizer

Living fences provide fertilizer in several ways. First, leaves that fall naturally from the tree, as well as leaves and small branches cut away when the tree is harvested for fuel, can be (1) composted, (2) immediately mixed with the soil as green manure fertilizer, or (3) left on the ground as leaf litter mulch. Second, because trees are deep rooted, they have access to mineral nutrients in soil that may be too deep for shallow-rooted, annual crops to access. After residues from trees decompose, such minerals are released into the soil and become available to crop plants. Third, nitrogen is always difficult and costly to obtain. Leguminous trees are an important source of nitrogen for the small farmer, adding significant amounts of nitrogen to the soil. Finally, pruning of trees results in partial die back of roots, releasing additional nutrients directly into the soil.

Other Uses

Forage. The leaves of many living fence species, such as those of moringa, gumbo limbo and erythrina are nutritious forage for small animals. The suitability of leaves as feed varies not only from species to species but also with age. When living fence posts are used to produce forage, space is conserved on the farm.

Food. Leaves, flowers, fruits and seeds of many living fence species are important for human consumption. Examples such as the flowers of izote or moringa, fruit of cactus, mombin or mulberry, leaves and roots of cassava and seeds of annatto and cashew are useful in producing food for family use and for market.

Fiber. A few living fence plants, such as the sisal plant and some bamboo species yield branches or leaves that can be processed into useful fiber for cloth or rope, or used directly for tying.

Shade. Many living fence posts can grow to become shade trees. Trees such as *Inga*, *Erythrina* and *Ficus* species provide welcome relief from the hot sun for people and livestock.

Construction Materials. Many trees are harvested for their wood. Although the farmer wouldn't be expected to cut down his fence to market the timber, branches from such species as willow can be used for making home craftwork such as woven baskets and carvings.

Medicine. Some living fence plant species are also used in medicinal preparations. *Jatropha* produces a medicinal oil in the seeds, and *gliricidia* produces rotenone in the bark which makes an effective rat poison.

Windbreaks. In some areas windbreaks are necessary to protect against the drying and lodging action of winds which can prohibit the growth of crops.

Disadvantages of Living Fences

Some disadvantages of living fences may include the following:

- Added labor costs in pruning species that produce large amounts of biomass.
- Competition of fence species (canopy and roots) with crops for available sunlight, water and soil nutrients.
- Some living fence plants are readily eaten and destroyed by livestock, or may be invasive.

For such reasons, living fences have to be carefully selected, maintained and managed. Whether or not living fences are used on a farm will depend on the balance of the advantages versus the disadvantages.

Establishment and Care of Living Fences

Traditions and practices related to the use of living fences vary from place to place in the tropics, as does the suitability of the various species used to make them. In an area where you plan to promote living fences, it is advisable to first identify the species of trees already being used as living fences. It might also be appropriate to determine if any of the native species are suitable for living fences.

Any species introduced for use as a living fence ideally should have the following characteristics:

- Resilience to cattle browsing or leaning against it.
- Rapid growth from cuttings or seeds.
- Multiple useful properties.

If suitable materials are not locally available, you might consider importing seeds or cuttings. Many other species of trees (besides the ones listed below) may be well suited as living fence species. However, some of the more commonly recommended species include:

- *Bursera simaruba* - for dry regions.
- *Gliricidia sepium* - for areas of alternating wet and dry.
- *Erythrina berteroana* or other *Erythrina* species - for wetter areas.

To establish living fences, trees and other plants are typically planted to form one or more of the following: **posts**, **hedges**, or a **palisade** (a fence of closely set stakes). While any tree can be used as a living fence post, many trees would not normally be so used because of size, propagation difficulty, slow growth, adverse characteristics, or inadequate life span. A few large trees used as occasional fence posts are retained for other benefits (e.g. teak as valuable wood; mango for fruit, forage and shade). The majority of species used as living fence posts can be propagated from large woody cuttings, generally the size of the fence post required. However, some exceptionally fast-growing trees are propagated from seed.



Palisade of *Gliricidia* [Honduras]



Girdling a Fence Post

Living fence **posts** are generally used with conventional barbed wire or wire screen. **Take care that wire is not strung around the post. As the post grows, the wire will girdle and kill it.** It is better to attach the wire with fence staples or nails. **Hedges** are established using species that spread to rapidly fill the spaces between plants. Hedges are often comprised of thorny species and may or may not be strung with wire. A **palisade** includes plants carefully placed as close together as necessary to immediately achieve an animal-proof cage or stockade like fence. Such plants may be propagated from cuttings or offshoots. Some may also be directly seeded in this fashion.

REMEMBER: R.G.I.F. – Roots Go In First!!!

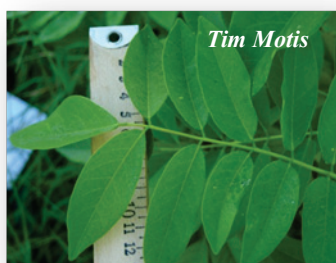
When taking cuttings to propagate your living fence, Remember R.G.I.F. Roots Go In First! Make sure your cutting is oriented so that the end closest to the roots or stem of the mother plant is the part that goes into the ground. If not, your cuttings most likely won't grow!

Living fences are seldom fertilized. They are regularly pruned, however to shape and maintain the fences, to obtain new planting material or other products, and to eliminate excess foliage. Pruning is a seasonal task, usually done during the dry season, but may also be done every 4 to 6 months or as needed. Fences can also be shaped by weaving and tying branches as desired. Insects and disease are seldom a problem with living fences.

Species for Living Fences

Exceptional Species

Only a few select and widely-used species are featured here (*see Table 1 for a listing of additional species.*)



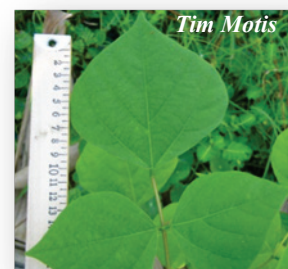
Gliricidia

Gliricidia sepium, [gliricidia, madre de cacao, madero negro (Nicaragua), mata ratón, quick stick (Jamaica), cacahuate (Philippines), piyon (Haiti)]. This small leguminous tree is well known to farmers pantropically and is so useful that it was given a medal of honor in Honduras. *Gliricidia* is easily propagated from cuttings or seed, and can be planted as posts, hedges or a palisade. Common at low to medium elevations, the tree prefers medium rainfall and is well adjusted to periodic dry seasons. An older *gliricidia* fence post will tend to produce large numbers of long, narrow branches, perfect for propagation by cuttings. Branches and

trunks root readily, but growth rate is moderate.

When grown as a hedge, *gliricidia* produces a narrow fence with a broad crown. Its lifetime is almost indefinite. The wood of older trees turns black, very hard and dense, and is used to make many small objects. Animals feed on the foliage, but in fences (posts and hedges) the foliage is often up out of reach. As forage, *gliricidia* is a useful feed in moderate amounts and should be combined with a variety of other forages. Flowers, buds, and young leaves are often eaten as a cooked vegetable. The bark and dry seeds contain rotenone and are prepared with small grains as a rat poison. Leaf fall occurs during dry season, and the leaves make valuable mulch. *Gliricidia* was used in the past as shade for cacao and coffee, but lately farmers have largely used *Inga* and *Erythrina* species instead of *gliricidia* for that purpose. *Gliricidia* is used as a trellis for black pepper and for orchids. In a living fence, *gliricidia* may be pruned every three years, yielding a good quantity of firewood. Pruning also results in root dieback and the release of nitrogen into the soil.

Erythrina berteroana, [pito (Colombia), poró de cerca (Costa Rica), machete (Jamaica), elequeme (Nicaragua), gallito (Panama), pernilla de casa (Panama), brikal (Haiti)]. This leguminous tree is small to medium in size, and is commonly used as a living fence post for barbed wire, a support tree for vine crops or shade for coffee and cacao. *Erythrina* species other than *E. berteroana* may also be used. The tree is covered with dense foliage that is important in building the soil organic and mineral matter. Because the leaves are not lost during the dry season, this tree is best suited for regions with somewhat more rainfall than is required by



Erythrina

gliricidia.

In general, *Erythrina* species are well suited as living fences (posts, hedges and palisades) as they are easily propagated and can withstand regular pruning. *Erythrina* species are propagated readily from seed or from cuttings (large or small) and usually planted where they will be grown. Growth is moderate to rapid resulting in a narrow fence with a dense crown. After it is pruned, *E. berteroana* produces a large volume of new growth within 3 to 4 weeks. The foliage is attractive to animals and is used as forage for cattle, goats and sheep. Rabbits that are fed the prunings have sometimes shown adverse side effects.

Upon pruning, the tree produces a large amount of useful biomass. A study by CATIE showed that *E. berteroana* pruned every 12 months produced the most woody biomass, and when pruned every 6 months produced the most edible leafy biomass. Pruned every 4 months it produces 30 t (30,000 kg) of edible dry matter per km of fence; pruned every 6 months it produces 50 t (50,000 kg) per km. The seeds are toxic. *Erythrina* species are a favorite living fence species in Costa Rica. (Russo, 1993)

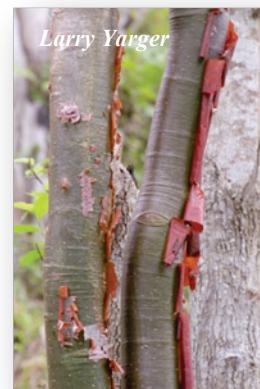


Larry Yarger

Izote

Yucca guatemalensis, (formerly *Y. elephantipes*), [spineless yucca, izote (Latin America), bayonet (Haiti)]. This is one of the most common plants used in living fences in Central America. Large and small cuttings of the straight stem or trunk are planted as a palisade. As they grow, they make a practically impenetrable wall. The tree is easy to propagate, grows slowly and has a long life. The flowers are edible.

Bursera simaruba, [gumbo limbo, indio desnudo, jinote (Latin America), gomye (Haiti)]. Gumbo limbo is especially appropriate for dryer areas where *Gliricidia sepium* is not well suited. Planted as large posts or smaller palisades, it will root even under dry conditions. The leaves are used as forage. *B. simaruba* otherwise has few other uses, as the wood is soft and the tree is short lived.



Larry Yarger

Gumbo Limbo



Larry Yarger

Moringa

Moringa oleifera, [moringa, horseradish or drumstick tree, marango (Nicaragua), benzoliv (Haiti)]. This “perennial vegetable” is one of the most nutritious vegetables in the world. It handles dry seasons well and grows especially quickly the first year. It can be planted as a suitable palisade from both seeds and cuttings (the cuttings tend to be straight), or as a living fence post. The World Vegetable Center (AVRDC) in Taiwan has developed a garden plan which starts with a palisade of moringa grown from closely-spaced seed. Trees are pruned at about head height, and the leaves are used as a nutritious fresh or cooked vegetable or for animal feed.

Jatropha curcas, [jatropa, Barbados nut, physic nut, piñón (Latin America), medsin (Haiti)]. This small tree is known mostly for the medicinal oil produced in its large seeds. The oil is also used to make medicinal soap, and is used for lighting. Recently the oil has been found to have excellent qualities as a biofuel. For the small farm owner, however, the tree is especially important as a living fence (hedge or palisade). Animals will not browse on the leaves, making jatropa an excellent choice for palisade fences around kitchen gardens where goats and cattle may be a problem. Palisades and hedges may be planted either from cuttings or from seed. The wood is soft, but the tree produces large amounts of biomass for mulch and compost.



Jatropa

Additional Species Used as Living Fences

Table 1 lists a number of species that can be used as living fences. Seeds for most of these species are not available through ECHO's seed bank. Those we do have are available only in small trial packets – not enough for a living fence. If you would like us to refer you to a commercial source of seed, please mention this in your correspondence. It is a good idea to first try growing a plant in your area before using it as part of a living fence.

| Table 1. Plants Used as Living Fences | | | | | | | |
|--|------------------|--------------|-----|---------------------|---------------------------------|-----------|---|
| Scientific Name | Common Name | Adaptation * | | Propagation Methods | Traits Fence Types | Prune Y/N | Other Uses/Notes |
| <i>Acacia nilotica</i> | Thorny Acacia | 1-3 | 1 | seed | Wide, thorny hedge | yes | N-fixing, firewood |
| <i>Agave</i> spp. | Agave | 1-2 | 1-2 | offshoots | Succulent hedge | no | Ornamental, fiber |
| <i>Anacardium occidentale</i> | Cashew | 1 | 1 | seed | Large, broad hedge | yes | Fruit, nut, firewood, oil, gum |
| <i>Bambusa vulgaris</i> | Common Bamboo | 1-2 | 2-3 | Offshoots, cuttings | Tall, dense Palisade, hedge | no | Large culms, erosion control |
| <i>Bambusa multiplex</i> | Hedge Bamboo | 1-2 | 2-3 | Offshoots, cuttings | Medium, dense hedge | no | Medium culms |
| <i>Bauhinia rufescens</i> | Kharroub | 1-2 | 1-2 | seed | Dense hedge | yes | N-fixing, forage, fiber, lumber, tannin, medicine |
| <i>Bixa orellana</i> | Annatto | 1-2 | 2-3 | seed | Shrub hedge | yes | Vitamin A in seed coat, food coloring |
| <i>Bombacopsis quinata</i> | Pochote | 2 | 2-3 | seed | Tree, large, thorny bark post | yes | Lumber, tannin, medicine, firewood |
| <i>Bromelia pinguin</i> | Pinguin, Piñuela | 1-2 | 1-2 | Offshoots, seed | Forb, thorny, 1-2m spread hedge | no | Edible fruit, heart; not cattle resistant |
| <i>Bursera simaruba</i> | Gumbo Limbo | 1-2 | 1-2 | Cuttings, seed | Tree, medium Post, palisade | yes | Forage, medicine, firewood |

| Table 1, cont'd. Plants Used as Living Fences | | | | | | | |
|--|----------------------------------|--------------|-----|------------------------------|---|-----------|--|
| Scientific Name | Common Name | Adaptation * | | Propagation Methods | Traits Fence Types | Prune Y/N | Other Uses/Notes |
| <i>Byrsonima crassifolia</i> | Nance | 1-2 | 2-3 | seed | Tree, medium post | yes | Edible fruit, charcoal |
| <i>Caesalpinia eriostachys</i> | Saino | 1-2 | 1-2 | seed | Shrub hedge | yes | Firewood, bark poisonous to fish |
| <i>Cassia grandis</i> | Coral Shower | 1-2 | 1-2 | seed | Tree, small, fast post | yes | Medicine |
| <i>Casuarina</i> spp. | Australian Pine | 1-2 | 2-3 | seed | Tree, tall Post, hedge | yes | Firewood, lumber, windbreak, erosion control, N-fixer, invasive |
| <i>Cedrela odorata</i> | West Indian Cedar | 1-2 | 2-3 | seed | Tree, large post | yes | Lumber, firewood |
| <i>Cereus hildmannianus</i> | Queen-of-the-Night, Hedge Cactus | 1-2 | 1-2 | Seed, cuttings | Cactus, large, thorny, branched Hedge, palisade | yes | Fruit, ornamental |
| <i>Cochlospermum vitifolium</i> | Rope Tree | 1-2 | 2-3 | Seed, cuttings | Tree, medium post | yes | Cortex for rope |
| <i>Codiaeum variegatum</i> | Garden Croton | 1-2 | 2-3 | cuttings | Shrub, 1-2 m Hedge | yes | Ornamental, edible young leaves |
| <i>Cordia</i> spp. | Cordia, Manjack | 1-2 | 1-3 | Cuttings, seed | Shrubs-trees, Hedge, Post | yes | Lumber, firewood, fruit of some |
| <i>Cornutia pyramidata</i> | Azulejo | 1-2 | 2-3 | Seed | Tree, small Post, Hedge | yes | Dye, firewood |
| <i>Croton niveus</i> | copalchi | 1-2 | 2-3 | Seed | Shrub Hedge | No | Medicine |
| <i>Cupressus lusitanica</i> | Mexican Cypress | 2-3 | 2-3 | Seed | Tree, large Post | No | Lumber, shade, windbreak |
| <i>Cyathea</i> spp. | Tree Fern | 2-3 | 2-3 | Spores, Offsets, Transplants | Tree, small Hedge | No | Starch, orchid production, ornamental |
| <i>Brugmansia x candida</i> | Angel's Trumpet | 1-3 | 2-3 | Cuttings | Shrub, small, succulent Hedge, Palisade | Yes | Ornamental, medicinal, poisonous |
| <i>Diphysa americana</i> | Guachipilín | 1-2 | 2-3 | Seed | Tree, small, shrubby Hedge, Palisade | Yes | N-fixing, forage, dye |
| <i>Dracena fragrans</i> | Dracaena | 1-3 | 2-3 | Cuttings | Tall – 2m Palisade | Yes | ornamental |
| <i>Drimys winteri</i> | Winter's Bark, Canelo | 1-2 | 2-3 | Seed | Tree, medium Post | No | Medicine, condiment, firewood, temperate region |

| Table 1, cont'd. Plants Used as Living Fences | | | | | | | |
|--|-----------------------------|--------------|-----|--------------------------------|---|-----------|---|
| Scientific Name | Common Name | Adaptation * | | Propagation Methods | Traits Fence Types | Prune Y/N | Other Uses/Notes |
| <i>Erythrina berteroana</i> | Pito | 1-3 | 2-3 | Cuttings, seed | Tree, medium, thorny Post, Hedge, Palisade | Yes | N-fixing, forage, vine support, coffee/cacao shade, seeds poisonous |
| <i>Erythrina poeppigiana</i> | Coral Tree, Immortelle | 1-3 | 2-3 | Cuttings, Seed | Tree, large Post, Hedge, Palisade | Yes | N-fixing, coffee/cacao shade |
| <i>Euphorbia cotinifolia</i> | Mexican Shrubby Spurge | 1-2 | 1-2 | Seed, Cuttings | Shrub Hedge | Yes | Poisonous to livestock |
| <i>Euphorbia lactea</i> | Candelabra Cactus | 1-2 | 1-2 | Cuttings or Pieces | Hedge, Palisade | Yes | Latex is skin irritant |
| <i>Euphorbia nerifolia</i> | Leafy Hedge Euphorbia | 1-2 | 1-2 | Cuttings or Pieces | Hedge, Palisade | Yes | Medicine, Latex is skin irritant |
| <i>Euphorbia tirucalli</i> | Pencil Tree, Milkbush | 1-2 | 1-2 | Cuttings | Dense Shrub Hedge | Yes | Latex is skin irritant; cancer agents cited in some medical research |
| <i>Ficus citrifolia</i> | Citrus-Leaf Fig | 1-2 | 2-3 | Cuttings, Plantlets | Tree, dense Post | Yes | Forage, edible fruit |
| <i>Ficus crocata</i> | Higuerón | 1-2 | 1-2 | Cuttings, Plantlets | Tree, dense Post | Yes | Caudiciform base, shade |
| <i>Ficus microcarpa</i> | Indian Laurel, Malay Banyan | 2 | 1-3 | Cuttings, Plantlets, Air Layer | Tree, medium, dense Post | Yes | |
| <i>Gliricidia sepium</i> | Gliricidia, Madre de Cacao | 1-2 | 2-3 | Cuttings, Seed | Tree, medium Post, Palisade | Yes | Forage, firewood, edible flowers, rat poison |
| <i>Grevillea robusta</i> | Silk Oak | 1-2 | 2-3 | Seed | Tree, large Post | No | firewood |
| <i>Hibiscus rosa-sinensis</i> | Chinese Hibiscus | 2-3 | 2-3 | Cuttings | Shrub Palisade, Hedge | Yes | Forage, ornamental |
| <i>Inga</i> spp. | Ice Cream Bean Tree | 1-3 | 1-3 | Cuttings, Seed | Tree, medium Post | Yes | N-fixing, firewood, fruit |
| <i>Jatropha curcas</i> | Physic Nut, Jatropha | 1-2 | 1-2 | Cuttings, Seed | Tree, small Palisade, Hedge | Yes | Oil, medicine, Cattle won't eat leaves |
| <i>Leucaena leucocephala</i> | Ipil Ipil, Leucina | 1-2 | 1-2 | Seed | Tree, small Post, Palisade | Yes | Firewood, charcoal, forage, edible shoots, N-fixing |
| <i>Ligustrum lucidum</i> | Glossy Privet | 1-3 | 2-3 | Cuttings | Shrub Hedge | Yes | Wax |
| <i>Ligustrum vulgare</i> | Common Privet | 1-3 | 2-3 | Cuttings | Shrub Hedge | Yes | Wax, dye, charcoal, fiber |

| Table 1, cont'd. Plants Used as Living Fences | | | | | | | |
|--|------------------------|--------------|-----|---------------------|--------------------------------|-----------|---|
| Scientific Name | Common Name | Adaptation * | | Propagation Methods | Traits Fence Types | Prune Y/N | Other Uses/Notes |
| <i>Sesbania grandiflora</i> | Vegetable Humming-bird | 1-2 | 1-2 | Seed | Tree, medium Palisade | Yes | Edible foliage & flowers, N-fixing |
| <i>Spondias mombin</i> | Yellow Mombin | 1-2 | 1-2 | Cuttings, Seed | Tree, large Post, Palisade | Yes | Lumber, fruit, firewood |
| <i>Spondias purpurea</i> | Red Mombin, Jocote | 1-2 | 1-2 | Cuttings, Seed | Tree, medium Post, Palisade | Yes | fruit |
| <i>Syzygium jambos</i> | Rose-apple | 1-2 | 2-3 | Seed | Tree, large Hedge | Yes | Fruit, firewood |
| <i>Syzygium malaccense</i> | Malay Apple | 1-2 | 2-3 | Seed | Tree, large, spiny Hedge | Yes | Fruit, firewood |
| <i>Tabebuia rosea</i> | Rosy Trumpet Tree | 1-2 | 1-3 | Cuttings, Seed | Tree, small Post | Yes | firewood |
| <i>Talipariti tiliaceum</i> | Mahoe, Majagua | 1-2 | 2-3 | Cuttings, Seed | Tree, dense Hedge | Yes | Edible foliage & flowers, cortex for fiber |
| <i>Tectona grandis</i> | Teak | 1-2 | 2-3 | Seed | Tree, large Post | No | Lumber |
| <i>Yucca guatemalensis</i> | Spineless Yucca | 1-3 | 1-3 | Cuttings | Palisade, Hedge | No | Edible flowers, dye |
| <i>Ziziphus jujuba</i> | Chinese Jujube | 1-2 | 1-2 | Seed | Shrub-Tree, small, spiny Hedge | Yes | Edible fruit, tropical to temperate regions |

* Altitude: 1 – 0 to 2000 meters; 2 – 2000 to 4000 m; 3 – 4000+ m

Moisture: 1 – low (30-50 inches/yr); 2 – medium (50-70 inches/yr); 3 – high (70+ inches/yr)

Some Useful References

Willow fence videos.

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