Live Fences in Home Gardens: A Sustainable Approach to Protection and Productivity

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ABSTRACT

Home gardens are sustainable agroforestry systems that integrate trees, crops, and sometimes livestock to enhance household livelihood and environmental sustainability. However, they are vulnerable to threats such as stray animals, soil erosion, strong winds, and unauthorized access. Live fences provide a cost-effective and eco-friendly solution by protecting home gardens while offering multiple benefits, including timber, fuelwood, fodder, biodiversity conservation, soil and water conservation, and carbon sequestration. This article discusses the importance, benefits, limitations, and establishment of live fences and highlights suitable plant species for different land-use systems. Adoption of live fencing can significantly improve the productivity, resilience, and sustainability of home gardens.

INTRODUCTION:

Home gardens represent intimate, multistory combinations of various trees and crops, sometimes in association with domestic animals, around the homestead (Kumar and Nair, 2006). However, these gardens are often threatened by stray animals, strong winds, soil erosion, and unauthorized access, which can reduce crop productivity and increase maintenance costs. Therefore, adopting effective, economical, and environmentally friendly boundary protection measures is essential for ensuring the long-term sustainability of home gardens.

Live fencing, also known as living fencing, is a traditional yet highly effective practice in which trees, shrubs, thorny bushes, climbers, or perennial plants are established along

garden boundaries to form a natural protective barrier. Unlike conventional fences made of concrete, wood, or barbed wire, live fences are multifunctional systems that not only safeguard crops but also provide a wide range of ecological and economic benefits. They help conserve soil and water, reduce wind velocity, support biodiversity by providing habitats for birds and beneficial insects, sequester atmospheric carbon, and supply valuable products such as fodder, fuelwood, fruits, flowers, and medicinal materials.

In the context of climate change and sustainable agriculture, live fences have emerged as an important nature-based solution for enhancing the resilience and productivity of home gardens. Their ability to integrate protection with environmental conservation and livelihood support makes them an indispensable component of sustainable home garden management (Kumar and Nair, 2006).

Fig: Live Fence of *Gliricidia sepium*

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. “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. (Martin 2012)

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 along with other benefits of employing living fences on the small farm 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. (Kumar and Nair 2004)

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, gliricidia 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 and leaves of moringa, fruit of mulberry and seeds of 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 Erythrina and Ficus species provide welcome relief from the hot sun for people and livestock.

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 labour 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 of Living Fences

The successful establishment of a living fence depends on matching plant species with local ecological conditions and farming needs. Before introducing new species, farmers should evaluate resilient native plants already adapted to the local climate.

Key Selection Criteria

An ideal live fence species must possess the following traits:

- High Physical Resilience: Capability to withstand livestock browsing, trampling, and heavy pruning.
- Rapid Growth: Ease of propagation from seeds or large vegetative cuttings to form a barrier quickly.
- Deep Root Systems: Non-aggressive lateral roots to minimize water and nutrient competition with adjacent crops.
- Multifunctionality: Provision of auxiliary benefits such as fodder, fuelwood, or green manure.

Propagation Methods

1. **Vegetative Stakes:** Straight, mature branches (1.5–2.0 m long, 4–8 cm diameter) are cut at an angle and planted 30–40 cm deep at the start of the rainy season. Main posts are spaced 1 to 2 meters apart.
2. **Direct Seeding / Seedlings:** For dense, thorny hedges, pre-soaked seeds or nursery seedlings are planted in double, staggered rows spaced 30–50 cm apart to form an impenetrable barrier. Early Management During the first two years, regular weeding is critical to eliminate resource competition. Regular pruning or pollarding is required once the fence reaches the desired height to encourage lateral branching, maximize hedge density, and prevent excessive shading over adjacent crops.

Table 1. Plant species recommended for fence planting on different land uses in hilly region in Sirsi taluk of Uttara Kannada district

Sl No.	Species	Recommended for land use				Use of species
		Betta lands	Areca gardens	Paddy lands	Homestead gardens	
1	*Acacia auriculiformis*	√		√	√	Fencing poles, Timber
2	*A.concinna*	√				Fruit as detergent, Bee forage
3	*A.mangium*	√		√	√	Fencing poles, Timber
4	*Adhatoda vasica*		√	√	√	Medicine, green manure
5	*Agave sisalana*	√				Fiber
6	*Ailanthus excelsa*	√		√	√	Fodder
7	*Anacardium occidentale*	√				Edible fruits, Nut
8	*Annona squamosa*			√	√	Edible fruits
9	*Artocarpus heterophyllus*	√	√	√	√	Timber, Edible fruits and seeds, fodder
10	*A. lakoocha*	√		√	√	Fruits used as a substitute for Tamarind, Timber
11	*Citharexylum fruticosum*		√	√	√	Fencing poles, green manure
12	*Citrus aurantium*		√	√	√	Edible fruits
13	*Citrus limon*		√	√	√	Edible fruits
14	*Calliandra calothyrsus*	√	√	√	√	Fodder, manure Bee forage
15	*Cassia siamea*	√		√	√	Fencing pole, timber, manure
16	*Casurina equisetifolia*	√		√	√	Fencing poles, timber
17	*Clerodendron inerme*		√	√	√	Ornamental

18	*Dalbergia latifolia*	√		√	√	Timber
19	*D.sissoo*	√		√	√	Timber
20	*Dillenia pentagyna*	√		√	√	Fodder
21	*Duranta plumieri*	√				Ornamental
22	*Erythrina indica*		√	√	√	Fencing poles, green manure, fodder
23	*Eucalytus sp.*	√				Fencing poles, timber
24	*Eujenia jambolana*	√		√	√	Edible fruits, timber
25	*Eugenia jambos*		√	√	√	Edible fruits
26	*Ficus glomerata*	√		√	√	Fodder
27	*Garcinia indica*	√	√	√	√	Edible fruits
28	*Glyricidia sepium*	√	√	√	√	Green manure, Fencing poles
29	*Grevillea robusta*	√		√	√	Fencing poles, timber
30	*Hibiscus rosa-sinensis*		√	√	√	Ornamental
31	*Leucaena leucocephala*	√		√	√	Fodder, fencing poles, timber
32	*Mangifera indica*	√	√	√	√	Edible fruits
33	*Moringa pterygosperma*		√	√	√	Edible fruits
34	*Oxytenanthera stocksii*	√	√	√	√	Fencing poles
35	*Pongamia glabra*	√	√	√	√	Green manure, fodder, oil from seed
36	*Phyllanthus emblica*	√		√	√	Edible fruits
37	*Psidium guyava*	√		√	√	Edible fruits
38	*Semicarpus anacardium*	√				Edible fruits
39	*Sesbania grandiflora*		√	√	√	Fodder
40	*Sapindus laurifolius*	√	√	√	√	Fruits used as detergent, Bee forage
41	*Tectona grandis*			√	√	Timber
42	*Terminalia bellerica,*	√				Timber, green manure, Bee foraging
43	*T.chebula*	√				Timber, green manure, Bee foraging
44	*T.paniculata*	√				Timber, green manure, Bee foraging

(Bhat and Hegde 2014)

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