GLIRICIDIA : A MULTIPURPOSE LEGUMINOUS TREE

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Gliricidia, which was introduced to this country way back in 1889, is a fast-growing, medium-sized leguminous tree with multiple uses. In villages the tree is popularly known as Ginisiriya, Makulata, Wetaheeriya or Wetamara. There are two distinct species found in our country. *Gliricidia sepium* is perhaps the most widespread species, producing pink-coloured flowers and large round seeds. *Gliricidia maculata* produces off-white coloured flowers and small round seeds. During January/March of each year, gliricidia trees are in full bloom, a fascinating sight indeed to those who care for and love trees.

Several remarkable features make gliricidia a versatile plant for diverse agricultural ecosystems.

* Adaptability to a wide range of soils and climates
* Easy establishment and management
* No requirement for seed pretreatment before planting
* Tolerance to partial shade
* Ability to withstand repeated lopping
* Free nodulation with indigenous rhizobial strains, requiring no seed inoculation
* Relative freedom from pest and disease problems
* Absence of toxic substances in foliage
* High degree of strees tolerance against drought, extremes of pH and low soil fertility
* Ability to absorb and recycle plant nutrients from deeper soil layers.

In the past, gliricidia has been used as a shade tree for coffee, tea and cocoa plantations, as a green manure in paddy fields and as a hedge tree along boundary fences in coconut areas (''Sepium'' in

Latin means hedge). Although glricidia has been introduced to this country nearly a century back, surprisingly very little is known about the multi-faceted role of this tree. In recent times, however, greater attention has been focussed on this tree and in fact more and more people are now searching for detailed information. It is the intention of this article to highlight the potential uses of gliricidia in agriculture and, to provide some guidelines on the establishment and management of the tree.

POTENTIAL USES

As a green manure : Gliricidia, being a nitrogen-fixing tree, is much sought after as a green manure for many agricultural crops. In the past, gliricidia loppings have been commonly used as a biofertilizer for tea, coffee and cocoa plantations and paddy. More recently, potential use of gliricidia as a green manure for coconut palms has been explored at the Coconut Research Institute(CRI).

Its role as a green manure is attributed to the fact that gliricidia loppings are rich in plant nutrients, containing 4.0% Nitrogen, 2.0% Potassium and 1.4% Calcium, on a dry weight basis. Another advantage is that gliricidia loppings decompose rapidly when incorporated to the soil due to the low carbon : nitrogen ratio (10:7) and low lignin content (4%). In the wet season, much of leaves decompose within 4-6 weeks after incorporation to the soil, thereby releasing the nutrients in a short period with the minimum loss. For this reason, it is not suitable as an effective mulch. Recent work done at the CRI has shown that application of 30 kg fresh gliricidia loppings per palm and incorporation to a depth of 25 cm. provides the total nitrogen, 8% phosphate and 12% potassium requirement of a mature palm, amounting to a considerable saving of about 40% on the cost of fertilizer. In the present context of escalating price of inorganic fertilizer, this is indeed a very useful finding. This amount of loppings could be obtained from about 10 trees when cut back to a height of 1.5 m after the first year of growth. It has been found that growing 450-500 gliricidia trees on paddy field bunds and lopping twice a year, could largely satisfy the green manure requirement of one hectare of rice.

As a soil conditioner : Gliricidia leaves, when incorporated to degraded, less-fertile soil and by the decomposition of leaf litter fall,

could improve the organic matter content, water-holding capacity and physical condition of the soil, making it more suitable for crop production. For instance, incorporation of 30 kg of gliricidia leaves in 30 cm. deep and 30 cm. wide quarter circle trenches around coconut palm has improved the copra and nut yield in low yielding palms in lateritic soil after two years.

As a shade tree and live support : In the past, gliricidia has been used as a shade tree and wind break in tea, coffee and cocoa plantations. More recently, it has been shown that gliricidia can also be used as an effective shade tree for coconut palms during the establishment and early growth phase in replanted/newly planted fields, particularly in the Intermediate and Dry Zone. During the rainy season, trees may be cut back to provide optimum shade for seedling growth and the loppings can be used as a green manure for the palms.

Gliricidia also serves as a promising live support for a number of cash and food crops such as pepper, vanilla, dioscorea yams and winged bean.

As an animal feed : Another useful feature of gliricidia is that its leaf is rich in proteins, containing about 25% crude protein on a dry weight basis with a digestibility as high as 50-75%. It can be used as a protein supplement to low quality roughage such as fodder grass or paddy straw fed to cattle, sheep or goat, particularly during the dry period. Work done at the CRI has demonstrated that gliricidia loppings mixed with improved grass *Brachiaria miliiformis* in the ratio of 50:50 and fed to heifers resulted in an average live weight gain of 700 g/head/day. Although milk production in cattle is not affected by feeding gliricidia even at 100%, milk becomes tainted when fed more than 50% of the total feed intake.

As a fuelwood : In many Asian countries, gliricidia stakes are used as a fuelwood for household cooking. It has a heating value of 4500 kcals/kg, which makes it an alternate source of fuelwood.

Other uses : Gliricidia has some advantages of being attractive to both harmful and beneficial pests. For instance, in tea, it has been observed that incidence of livewood termite damage was less in fields planted with gliricidia, which probably act as a potential host plant for the termites. Coco-

nut is another crop often subjected to termite damage at the seedling stage, sometimes resulting in many casualties. Use of gliricidia as a shade tree in newly established coconut plantation or use of gliricidia leaves as a mulch around the palm could at least reduce the incidence of termite damage without using pesticides.

Gliricidia flowers attract honey bees and is a useful bee forage. Dried flowers on the other hand act as a repellent to ward off rats and mice from stored grains such as paddy. In fact, the name "gliricidia" in Latin means rat killer.

METHOD OF ESTABLISHMENT :

Traditionally, mature cuttings about 1.5 m in length and 2.5 cm. diameter are used for planting. The cuttings, however, develop a shallow laterally spreading root system. Although trees propagated from cuttings establish well and are more productive during the first few harvests, trees become less productive after a few years. Also, in large scale planting, use of cuttings is both costly and inconvenient. A possible alternative is to propagate by seeds. Seedlings also develop a deep root system with a prominant tap root, and appear to be more productive than cuttings in the long run, especially in dry areas.

As seed propagation is relatively a new concept introduced to this country, it is necessary to furnish more detailed information on the flowering season, collection and storage of seeds. Flowering in gliricidia begins usually 18 months after planting. Trees reserved for seed production should be pruned about 8 months after planting to induce branching and increase flowering and podding sites. Thereafter these trees should not be cut back. Profuse flowering in gliricidia trees occurs during January-March and only a small percentage develops within 6-8 weeks into mature pods. Gliricidia pods must be picked from trees at maturity when pod colour changes from green to straw to prevent loss of seed due to shattering, and then sundried for a few days. Seeds separated from pods can be stored in a cupboard at root temperature for about 3-4 months or in a refrigerator (+4 ° C) for a longer period without losing the viability. On average, one kilo of gliricidia seeds can produce 5000-10,000 seedlings.

Obviously the most suitable time of planting is with the onset of rains. In case of cuttings, each

stick may be cut back slantwise at the lower end before planting, to facilitate rooting. Such cuttings should be planted in 30x30x30 cm. pits filled with a mixture of top soil and half a basket of dried cowdung. In less fertile soils, addition of 30 g each of saphos phosphate and potash is beneficial. After planting, the top end of the cutting may be covered with a ball of moist earth or moist coir dust to prevent desiccation, especially in dry areas. Seed propagation is

PROFUSE FLOWERING IN GLIRICIDIA ALONG BOUNDARIES OF COCONUT HOLDINGS

perhaps the easiest and cheapest method of establishment. In areas where annual rainfall is exceeding 1200mm. direct seeding is possible. About 1-2 seeds may be planted 1.0 cm deep in each pit. In drier areas with an annual rainfall less than 1000 mm, polybag seedlings raised in a nursery for 8-10 weeks are more suitable.

Gliricidia can be planted either along the fence or along with other crops. In coconut lands, gliricidia

can be planted either between coconut rows at a spacing of 2.0 x 0.5 m in double hedge rows or along boundary fences 1.0 m apart in double rows.

MANAGEMENT:

Once gliricidia tree is well established in the field, usually about one year after planting, it is important to manage the tree by resorting to a regular pruning cycle. Depending on the distribution of rainfall of the area, trees can be lopped 3-4 times per year to a height of 1.0 - 2.0m above ground level. This can be done manually with a sharp knife or with a brush cutter which requires about 8 hours to complete pruning one hectare. Regular tree management will provide sufficient green matter, controls shade and reduce competition for soil moisture and plant nutrients. In coconut areas, about 3-5 kg fresh green matter can be harvested from a single tree in the first and second year respectively, by pruning 4 times a year. With age, the amount of fresh green matter harvested from a tree appears to be increasing.