



DEVELOPMENT OF AGROFORESTRY

Silvipasture Model : *Acacia auriculiformis* - *Pennisetum purpureum* FPA 2000 (3)

Silvipasture

This term is used to denote combinations of trees and pasture crops on the same unit of land in some form of spatial mixture or sequence. These are essentially land management systems in which trees are managed for the concurrent production of wood and live stock.

Tree species: *Acacia auriculiformis*

Acacia auriculiformis A.Cunn.ex Benth. is a multipurpose leguminous tree in the sub family Mimosoideae. Its rapid growth, ability to fix nitrogen, tolerance to infertile, acid, alkaline, saline or seasonally waterlogged soils and tolerance of dry seasons and rainfall of 600-1000mm makes it a potential tree species for agroforestry in semiarid tracts. The heartwood is suitable for attractive furniture, turnery, carving and also for construction work. The wood has high basic density (500 - 650kg/m³) and calorific value (4700-4900kcal/kg) and is ideal for firewood and charcoal. It is also a good source of paper pulp. The tree produces large quantities of leaf (litter) rich in N and also capable of fixing atmospheric N to the tune of approximately 207kg/ha.

Pasture crop: *Pennisetum Purpureum* (Napier grass)

Pasture species such as this grass can be cultivated in the interspaces of *Acacia auriculiformis* under both rainfed and irrigated conditions though higher yields are naturally obtained under irrigated conditions.



Fig.1. *Acacia auriculiformis* interplanted with Napier grass in silvipasture system

Establishment of the model

The model is established by planting *Acacia auriculiformis* seedlings raised in the poly bags (4 months old) at 4 m espacement between plants and 7 m between rows in pits of size 30 cm³. A basal dose of 50 g of Di ammonium phosphate (DAP), 50 g of murate of potash (Potash) and 1 kg of farmyard manure (FYM) is applied at the time of planting to boost up growth of the seedlings. Slips of napier grass (*Pennisetum purpureum*) are planted in the interspace between the rows with an espacement of 50 X 50 cm. At the time of planting 50 kg/ha of N, 50 kg/ha of P₂O₅ and 40 kg/ha of K₂O is applied and watered once in a week. Casualty replacement of trees is carried out within a month's period and a density of 325 trees/ha maintained. Other periodical cultural operations such as weeding, soil working and fertilizer application are carried out time to time as per standard practice.

Management of trees and pasture grass

The first harvest of grass is done when the plants are three months old and later on once in every two months. Top dressing with 50 kg/ha of urea is performed after each harvest. It was found that the fodder production gradually increased after the first harvest due to heavy tillering. On an average annual basis, the yield of grass amounted to 100 t/ha. Watering of trees is restricted to once in a week for the initial two months to ensure satisfactory establishment and later on, no separate watering is required for trees. But two to three irrigations are required for the grass every month.

Growth and productivity

During the second and third year, lateral branches of the trees are pruned to ward off any shade effect to the grass. The pruned material (2.8t/ha) form the biomass for fuelwood. At four years of age the trees attain an average height of 8.5 m and girth of 24.70 cm at breast height. The entire biomass available at this time can be utilized as fuelwood. The trees were harvested and Table 1 gives the fuelwood production on unit area basis after harvest. The fuelwood biomass (above ground biomass) amounted to 18.44 t/ha which included the main bole, branch wood and pruned material (branches). Studies carried out on *A. auriculiformis* plantations at five years of age in Karnataka have shown that the dry matter production on per tree basis amounted only to 0.4 kg/tree/yr. On the other hand, the agroforestry system practiced in Coimbatore district resulted in high productivity of *Acacia auriculiformis* (14kg/tree/yr) and is a promising model for farmers in this agroclimatic zone.

Economic returns

Over a 4 year period, nearly 400 t/ha of green fodder and 18.4 t/ha of fuelwood could be harvested from this silvipasture model. The average annual net income from the model worked out to Rs 18,416/ha/yr. The other details on the economic returns from different components are given in Table 1. The NPV of the model at 12% discount rate works out to Rs 53,525. This model holds high potential for farmers where the primary consideration is for fodder and fuelwood. Moreover there is no significant reduction in the fodder yield when intercropped with *Acacia auriculiformis*.

Table 1. Economic returns (Rs/ha) from *Acacia auriculiformis* based silvipasture model.

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|--|--------|
| Tree species: <i>Acacia auriculiformis</i> . | |
| Fuel wood (t/ha)_____ | 18.44 |
| Gross income (@Rs 800/t)_____ | 14,752 |
| Expenditure _____ | 3,913 |
| Net income _____ | 10,839 |
| Annual net income _____ | 2,710 |

Fodder species: *Pennisetum purpureum*

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|---|--------|
| Average yield @100t/ha for 4 year's _____ | 400 |
| Gross income(@ Rs 200/t)_____ | 80,000 |
| Expenditure _____ | 17,175 |
| Net income _____ | 62,825 |
| Net income from model _____ | 73,664 |

| | |
|--------------------------------------|--------|
| Average annual net income from model | |
| (Rs/ha/yr) _____ | 18,416 |
| NPV at 12% discount rate _____ | 53,525 |

Insect pests and diseases

Some of the important diseases recorded in seedling stage include foliar diseases like Phomopsis leafspot, Colletotrichum leaf spot, Cercosporidium leaf spot, powdery mildew, blight, dieback, and canker. In younger plantations, incidence of Ganoderma root rot and pink disease caused by *Corticium salmonicolor* have also been reported. Proper drainage and phytosanitary measures could help in controlling these problems in most cases. Among the insect pests, cerambicid beetle (*Xystrocera festiva*), defoliator (*Mylocerus viridanus*) and thrips (*Scirtothrips dorsalis*) have been recorded to cause considerable damage. 5-6 year old plantations of *Acacia auriculiformis* are being attacked by the lac insect (*Kerria lacca*). Pruning of heavily infested branches and thorough drenching of the insecticide Quinalphos has however proved successful in controlling this problem.

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