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**Government of India**
**Ministry of Agriculture, Cooperation & Farmers Welfare**
**Department of Agriculture, Cooperation & Farmers Welfare**
**(Natural Resource Management Division– SMAF)**

# Promotion of Sericulture based Agroforestry System

It has been reported that there are many useful Agroforestry models for promotion of sericulture. A few of the model with cultivation practices are suggested as mentioned below.

**Model 1: *Gmelina* based agri-silvi-horticultural system**

**Area of adoption:** Chattisgarh, Jharkhand, Assam, Madhya Pradesh and West Bengal.
***Gmelina arborea***
**Common name:** Gamari, Gumhar
**Family:** Verbenaceae

*Gmelina arborea* is one of the indigenous multipurpose tree species which produces one of the best quality timbers in India. It is a medium to large-sized deciduous tree of up to 40 m height. It grows best in areas with a mean annual rainfall from 800 mm to- 2,500 mm, and an annual average temperature of 15-36°C. Plants can withstand a dry season of 4 to 8 months and prefer a heavy soil and damp situation. This plant grows best in loamy alluvial soils, but ranges from gravel to sand to clay. It is a fast growing tree, annual increments of 3.0 metres in height and 4.5 cm in diameter with wood density of about 439 kg/cu m at 15% moisture content. A mean annual diameter increment of 3 cm is common. Wood is used for furniture, bent-wood articles, boat-building, panelling, brushes, slate frames, figure and pattern making. Wood-pulp is used for wrapping, writing and printing papers. An excellent agroforestry tree, it is commonly planted to restore land as well as to provide wood for poles, fuel etc.

**Cultural Operations**

**Preparation of land**: The land can be levelled with minor land shaping and providing suitable type of bunds across the slope. If the slope is more, contour bunding, terrace planting or contour line planting can be adopted. In areas with sharp slopes, making platforms for individual plants on contour lines is more suitable as it involves less soil cutting.
**Spacing:** Spacing for tree planting depends on soil topography, extent of land available for cultivation and training method. In general 3 x 3 m is recommended for gentle slopes.

**Pit size:** For deep textured loose soils: 45 cm x 45 cm x 45cm; for shallow soils: 60 cm x 60 cm x 60cm

**Fertilizer application:** For each pit, about 5kg (one iron pan) of well decomposed FYM or compost is applied at the time of plantation along with 50g SSP. NPK fertilizer @100:50:50 kg/ha/yr. The whole of P & K and one-third of N is applied in the month of April, one-third N in July and the remaining one-third in October.

**Planting:** It is done in rainy season preferably during June to September. Monsoon planting is recommended provided the saplings are in polybags. Five-month old saplings are suitable to plant during the regular onset of monsoon. One sapling/pit should be planted.

**Tending Operations**

**Aftercare of plantation:** After one month, all the buds except the top 5-6 should be removed carefully by rubbing with gunny bags without damaging the bark. Weeds around the plants should be removed and regular pot watering should be given as and when required. After three months of planting, second weeding should be given. Plants must be protected from grazing.

**Pollarding:** Trees are pollarded in the third year of establishment, at a height of 5 feet. Single cleared bole should be maintained up to the height of 5 feet.

**Fruit Trees:** Mango, Guava, Sweet orange, Ber

**Suitable intercrops (Kharif –Rabi):** Rice, Mustard, Linseed, Lentil, Okra, Pointed gourd, Bottle gourd and fodder. For raising intercrops

**Orientation:** Boundary / in field /on bunds

**Yield/Annual Return**

*G. arborea* is fast growing tree in fruit based agroforestry system with annual increments of more than 3.0 m in height and 3.5 cm in diameter. A mean annual diameter increment of 2.5 cm is common.


**Source: Received via e-mail from Dr. A.K. Handa, (ICAR-CAFRI) on dated 07.01.2021**

**Model 2: Ber based agri-horti system**

Area of adoption: Semi- arid and arid region

Fruit based agroforestry is a proven land use system for vertically enhancing productivity and risk coverage against unstable weather conditions. Monocropping neither provides gainful employment opportunities nor generates sufficient income to meet the family expenses. Effective utilization of available space, both horizontally and vertically, is the concept of modern cropping system i,e fruit based agroforestry. This system research aims at increasing production and farmers' income in a sustainable manner making use of available technology and physical and socio-economic resources of the farmers.

**Source: Received via e-mail from Dr. A.K. Handa, (ICAR-CAFRI) on dated 06.01.2021**

**Model 3: Mulberry based silvipasture system**

**Area of Adoption:** Jammu & Kashmir, Himachal Pradesh, and of Uttarakhand

Morus alba is a fast growing tree with a ragged and irregular branching habit, vigorous and upright, rounded to pendulous and generally 20 to 60 feet in height. It is found growing in sub-tropical or mild temperate climates where maximum shade temperature never exceeds 48$^{o}$C, the annual rainfall varies from 400 to 4500 mm and mostly, the rain is received in monsoon season. It grows on a variety of soils. Alluvial soils with sufficient moisture content support good growth. The tree cannot tolerate salinity.

**Cultural Operations**

**Preparation of land**: If the land is having gentle slope, it can be levelled with minor land shaping and providing suitable type of bunds across the slope. If the slope is more, contour bunding, terrace planting or contour line planting can be adopted. In more sloping areas, platforms for individual plants on contour lines may be ideal as this t will involve less soil cutting.

**Spacing:** Spacing for tree planting depends on soil topography, extent of land available for cultivation and training method. In general 3 x 3 m is recommended for gentle slopes.

**Pit size:** In case of deep textured loose soils, 45 x 45 cm and in shallow soils 60 cm x 60 cm x 60 cm pits are used..

**Fertilizer application:** For each pit, about 5 kg (one iron pan) of well decomposed FYM or compost is applied at the time of plantation along with 50 g SSP. NPK fertilizer is applied at100:50:50 kg/ha/yr. The whole P & K and 1/3$^{rd}$ N is applied in April, 1/3$^{rd}$ N in July and the remaining 1/3$^{rd}$ N in October.

**Planting:** It is done in winter, preferably in December and January. Monsoon planting is also recommended provided the saplings are in polybags. Five-month old saplings are suitable for planting during the onset of monsoon. One sapling/pit should be planted.

**Pollarding:** Trees are pollarded in the third year of establishment, at a height of 5 feet. Three cuts of fodder can be taken in a year in May, July and September when planted in the fields and also on the boundary to obtain maximum tree fodder and to minimize the shade on adjacent grass. A single cleared bole is to be maintained up to the height of 5 feet.

**Coppicing:** To obtain additional fodder and also to minimize shade on grass/crop trees are coppiced in the third year of establishment, at a height of 50 cm.

Pollarding and copping will be done at same time if the trees are to be used for fodder purpose

**Orientation**

Boundary/in field/on bunds

**Suitable intercrops**

Fast growing grasses like Napier-Bajra hybrid/*Setaria anceps* etc. are planted in rows.

**Seed rate:** Grass is planted at 2 root slips per hill. Establishment of *Setaria* grass from the seed directly in the field is not recommended keeping in view the delicate roots of the newly sprouted grass which take more time to establish because of more competition from the existing grasses.

**Spacing:** Row-to-row and plant-to-plant spacing is 40 cm. Grass rows are planted at a distance of 1 m from the tree line.

**Fertiliser:** NPK is applied at120: 60: 40 in Napier-Bajra Hybrid and at 90: 60: 40 in case of *Setaria*. Phosphorus and potash are applied every alternate year, whereas nitrogen is given every year in split doses.

**Yield/-Annual Return including Tree Productivity**

*Morus*-based silvi-pastoral system results in the production of about 8000 kg/ha green tree fodder and 24,000 kg/ha green grass fodder. Farmer can take three cuts of tree fodder as well as quality green grass fodder during lean period also.

**Economics**

Availability of quality fodder throughout the year boosts the livestock-based economy of the farmers in the region. The overall net income per hectare per year from degraded grassland is Rs. 12000/- to Rs 14000/- per ha in the initial years which increases up to Rs. 50,000/- to Rs 60,000/- per ha. with the complete establishment of the system.

**Source: Received via e-mail from Dr. A.K. Handa, (ICAR-CAFRI) on dated 06.01.2021**