AGROFORESTRY MODELS ADOPTED IN MADURAI - THENI DISTRICTS
OF TAMIL NADU
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Men and animals look to their sustenance on plants. The same land, which cannot expand, has to take care of all the three viz. men, animals and plants. Eventhough, growing trees in association with crops is in vogue for ages, it had not been adopted on a scientific basis to get the maximum out of minimum inputs. Here an attempt has been made to document the different agroforestry models adopted by farmers in Madurai - Theni districts of Tamil Nadu.

Topography
Madurai - Theni district (erstwhile Madurai District) of Tamil Nadu lie between $8^\circ$ and $12^\circ$ North latitude and $76^\circ30'$ and $79^\circ50'$ East longitudes. The altitude ranges from 160 to 270 metres above MSL. The terrain is undulated, slopping from West to East with flat plains and intermittent hills at varying altitudes.

The soil is generally both red and black-shallow red. The Cumbum valley is of sandy red loam. Besides there are pockets of saline and alkaline soils in Thirumangalam taluk adjoining Virudhunagar District. The climate is generally semi-arid with frequent occurrence of drought. The annual rain fall is 880 mm, contributed mainly by North-east monsoon spread over 50 days.

Present Land Use pattern
Of the 0.676 million Ha of land in the district 41.7% is cultivated 23.7% forests, 5.3% barren and uncultivable and the balance (29.3%) constitutes cultivable waste, current fallows and other fallow lands etc.

Livestock
There are 0.55 million heads of cattle, mostly medium sized cross bred animals and 0.50 million non-descript small ruminants. Paddy straw forms the staple diet for large ruminants. It is supplemented with fodder sorghum, bund grasses and weeds depending on availability. Rice bran, gram husks and GN oil cake form the major constituents of concentrate diet. Small ruminants are left to forage for themselves with occasional supplementation of tree leaves.

It is estimated that the ruminant population in Madurai - Theni Districts require 1 million tonne of Dry fodder and 4.60 million tonne of Green fodder per annum. As against this, the availability is only 0.89 million tonne Dry fodder and 0.23 million tonne Green fodder, leaving a shortage of 0.11 million tonne (11%) and 4.37 million ton (94.5%) respectively. This is against the Tamil Nadu State average shortage of 83% for green fodder and 23% for dry fodder reported by Sri Rangasamy and Sukanya Subramaniam (1989).

Methodology
To identify different Agroforestry systems prevalent in the Districts, a total of 182 fields covering a total of 79.7 ha were visited personally over a period of one year and the identified models were documented. Different Agroforestry models identified and their extent of adoption are presented in Table 1.
Table 1. Level of Adoptions of Different Agroforestry systems by Farmers in Madurai - Theni districts of Tamil Nadu.

<table>
<thead>
<tr>
<th>System</th>
<th>Level of adoption %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silviculture</td>
<td>33.6</td>
</tr>
<tr>
<td>Agrisilviculture</td>
<td>36.8</td>
</tr>
<tr>
<td>Hortisilviculture</td>
<td>20.9</td>
</tr>
<tr>
<td>Silvihorti pasture</td>
<td>4.9</td>
</tr>
<tr>
<td>Agri Horticulture</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Silviculture

The common tree species integrated under this system, in the order of priority, were A. India, A. lebbek, proposis, A. nilotica, C. pendentra, and Subabul. Small block plantations were observed in respect of A. indica, A. lebbek and C. pendentra. A. nilotica block plantations were seen in village tanks. Otherwise, the trees were grown scattered with the spacing ranging from 5 to 15 metres. The rotation period varied from 10 to 15 years. Mostly cultivable waste lands were utilised for silviculture.

The suitability of subabul and A. indica for cultivation as fodder trees in the degraded forest area in low rain fall regions of Maharashtra (Reddy, 1981) and in the semi-arid zone of Rajasthan (Mann and Muthana, 1984) were already reported. Dasthagir (1994) had listed Kudaivel (Acacia planifornis), Acha (Hardwickia binata), Elanthai (Zizyphus jujuba) and Nelli (Embllica officinalis) suitable for red soil. Karuvel (Acacia nilotica), Velikathan (Prosopsis juliflora), Nuna (Morinda tinctoria) and Subabul for black soil and A. lebbek and A. indica for both (Jambulingam and Fernandes 1986) observed that prosopis and Vatha Narayan (Delonix elata) were deliberately planted to ameliorate infertile and saline soils.

Agrisilviculture

In this system, A. indica and A. nilotica were integrated with millets, minor millets, pulses, oil seeds and fibre crops in dry lands and Agath with paddy, sugarcane, betel, chilli and tomato in irrigated areas. Otherwise these trees are found scattered in fields.

Increased grain production was reported when subabul was grown along with pearl millet and sorghum (Venkateswarlu et al., 1981), with sorghum, bajra and red gram (Balasubramanian et al., 1984) with groundnut, green gram and black gram (Malviya and Patel, 1989) and with sorghum, pigeon pea and pearl millet (Dass and Reddy, 1992).

Block plantation of A. indica is established in the Districts, mostly in black soils. The data on spacing, girth, height and canopy radius of A. indica under block plantation in black soil is presented in Table 2.

Table 2. Average Girth, Height and Canopy Radius of A. indica Block Plantations.

<table>
<thead>
<tr>
<th>Age of the standing trees (Yrs)</th>
<th>Space (m)</th>
<th>Girth (cm)</th>
<th>Ht (ft)</th>
<th>Canopy radius (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>4 x 6</td>
<td>9.75 ± 2.85</td>
<td>7.12 ± 4.08</td>
<td>2.91 ± 0.08</td>
</tr>
<tr>
<td>3.0</td>
<td>7 x 7</td>
<td>13.50 ± 2.00</td>
<td>10.72 ± 3.12</td>
<td>3.67 ± 1.26</td>
</tr>
<tr>
<td>4.0</td>
<td>5 x 8</td>
<td>17.75 ± 1.37</td>
<td>12.91 ± 3.00</td>
<td>4.92 ± 1.41</td>
</tr>
<tr>
<td>5.0</td>
<td>9 x 9</td>
<td>30.16 ± 3.18</td>
<td>15.25 ± 4.12</td>
<td>7.64 ± 2.08</td>
</tr>
</tbody>
</table>
It was observed that the spacing definitely had its effect on the growth performance of trees. Since the study was taken up under field conditions, blocks of neem with uniform spacing could not be identified. Irrespective of the spacing, it was also observed that the A. indica in black soil (pH-8.5; Ec-0.2; N-62.5; P-11.6; K-309) registered an average growth of 6.80 cm, 2.71 and 1.57 ft respectively in girth, height and canopy radius per annum.

The average yield of agricultural crops grown in association with neem in block plantations in black soil is presented in Table 3.

**Table 3. Average yield of Agricultural Crops in Agrisilvi System with Neem.**

<table>
<thead>
<tr>
<th>Crops</th>
<th>Grain Yield * (kg/Ac)</th>
<th>Straw** (tonnes/Ac)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sorghum</td>
<td>350</td>
<td>1.25</td>
</tr>
<tr>
<td>Bajra</td>
<td>400</td>
<td>1.00</td>
</tr>
<tr>
<td>Varagu</td>
<td>400</td>
<td>0.80</td>
</tr>
<tr>
<td>Kudiraivali</td>
<td>500</td>
<td>1.00</td>
</tr>
<tr>
<td>Sunflower seeds</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Green gram</td>
<td>100</td>
<td>0.20</td>
</tr>
<tr>
<td>Cajanus cajan</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Cotton</td>
<td>150</td>
<td>-</td>
</tr>
</tbody>
</table>

* Data obtained on interaction with farmers

** Calculated figure

**Hortisilviculture**

Under this system Mango (Magnifera indica), Guava (Psidium guava) and Tamarind (Tamarinds indica) were the common Horti components. Sapota (Achras sapota) and Pomegranate (Punica granatum) were seen in some pockets. Subabul was integrated as the silvi component in this system as live fence and mainly used as fodder by pollarding at chest height.

**Silvi Horti Pasture**

Coconut is the main crop in which Hybrid Napier or Stylosanthus hamata was integrated under zero pasture system.

**Agri Horticulture**

Sorghum is the main crop in which mango and guava were integrated at 8-12 m spacing.

**Boundary Plantations**

Subabul, A. indica, Prosopis, C. pendentra, M. tinctoria, I. dulci, E. indica and T. populnea were the common species grown on farm boundaries. The spacing of these trees ranged from 3 to 5 m depending upon the size. In one farm, subabul was planted very closely at the rate of 20-25 plants per metre in single zig-zag row. In another farm, Kodukkapuli was planted as live fence at very close spacing.

**Conclusion**

Among the Agroforestry systems in Madurai - Theni districts the agrisilvi was most preferred and neem is the choice of silvi component.

However, the interaction and compatibility of different models and quantification of benefits on adoption of these models have to be documented further in a pragmatic manner and passed on to the farmers. This alone will aid in wider acceptance of different agroforestry models and incidentally paving the way for increased production of food, fodder, fuel and timber from a unit area in an eco-friendly system.
Acknowledgement

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References


BEST WISHES FOR THE SUCCESS OF

"NATIONAL SEMINAR ON INTEGRATION OF LIVESTOCK AND AGROFORESTRY SYSTEMS IN WASTELANDS DEVELOPMENT"

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