

## (II)

### EVALUATION OF GROWTH RESPONSE OF TEAK TO HIGH INPUTS

In our articles titled "Sewage Water as potential for tree growth - A case study on Teak (*Tectona grandis*) plantations", and "Growth response to irrigation -Eksal (Ambhadi) Teak Plantation - A case Study" (see pages 472-481 and 491-502) a passing reference was made on quality of wood developed in irrigated and high input teak plantations. As the wood samples were not scientifically tested by competent authority for its physical and mechanical properties, the material was described in general terms. Recently timber developed under similar conditions, was sent for testing to Institute of Wood Science and Technology, Bangalore, from whom assessment report is now available, which being of topical interest is discussed here.

M/s. Ichalkaranji Co-operative Spinning Mills has raised a teak plantation in 1986, at Ichalkaranji, District Kolhapur in the Western Maharashtra Dry Zone i.e. Agro-climatic zone VI of Maharashtra. In

addition to the normal practices, the plantation receive a regular flood irrigation at an interval of 3 to 4 weeks, during the dry season. As a spinning mill, the firm generates lot of cotton waste/linter, which in effect is bio-degradable and results in increasing humus. The firm used such a material to fertilise the teak plantation. However, quantitative details of such fertilisation are not available.

As a consequence to such high inputs, the plantation has put on good growth, for the average site quality of the area. Close monitoring of this plantation activity has revealed that saplings attained average dimensions of 28.5 cm (G.H.O.B.) and 10.8 m of height, at the age of 7 years. The total basal area was 14.82 m<sup>2</sup> and thus, thinning was carried out in the year 1994. The samples collected from thinned material were supplied to Institute of Wood Science and Technology, Bangalore as indicated in Table 1.

Table 1

| Sample No. | Length<br>(m) | Mid girth<br>(cm) | Girth<br>at large end<br>(cm) | Girth at<br>small end<br>(cm) |
|------------|---------------|-------------------|-------------------------------|-------------------------------|
| T1         | 3.00          | 25                | 32                            | 21                            |
| T2         | 3.02          | 30                | 36                            | 25                            |
| T3         | 3.00          | 48                | 49                            | 38                            |
| T4         | 3.02          | 37                | 45                            | 36                            |
| T5         | 3.00          | 50                | 62                            | 46                            |

**Table 2**

| Properties   | <i>Tectona grandis</i> * |                 | Standard Teak |                 |
|--|--------------------------|-----------------|---------------|-----------------|
|  | Green Average            | Air-dry Average | Green Average | Air-dry Average |
| <i>Sp. gravity</i> (based on oven dry weight and volume at test)             | 0.425                    | 0.479           | 0.596         | 0.604           |
| % Moisture content   | 68%                      | 12%             | 76.6%         | 12%             |
| Weight   | 786                      | 538             | 1056          | 672             |
| <i>Static bending</i>  |                          |                 |               |                 |
| Fiber stress at elastic limit (kg/cm <sup>2</sup> )                          | 362                      | 423             | 509           | 651             |
| Modulus of rupture (kg/cm <sup>2</sup> )                                     | 605                      | 615             | 841           | 959             |
| Modulus of elasticity (X10 <sup>3</sup> kg/cm <sup>2</sup> )                 | 76.2                     | 70.6            | 109.7         | 119.6           |
| <i>Compression parallel to grain</i>   |                          |                 |               |                 |
| Maximum crushing stress (kg/cm <sup>2</sup> )                                | 211                      | 295             | 415           | 532             |
| <i>Compression perpendicular to grain</i>                                    |                          |                 |               |                 |
| Compressive stress at E.L. (kg/cm <sup>2</sup> )                             | 32.7                     | 104.4           | 86            | 101             |
| <i>Hardness</i> (load to embed 1.128 cm dia steel ball to half its diameter) |                          |                 |               |                 |
| Radial (kg)  | 315                      | 450             | 557           | 502             |
| Tangential (kg)  | 334                      | 550             | 551           | 524             |
| End (kg)   | 459                      | 655             | 486           | 488             |
| <i>Shear parallel to grain</i>   |                          |                 |               |                 |
| Radial (kg/cm <sup>2</sup> )   | 35.1                     | 64.1            | 89.5          | 96.6            |
| Tangential (kg/cm <sup>2</sup> )   | 47.6                     | 82.6            | 100.2         | 108.0           |
| <i>Tension perpendicular to grain</i>  |                          |                 |               |                 |
| Radial (kg/cm <sup>2</sup> )   | 10.1                     | 36.8            | 68.3          | 57.6            |
| Tangential (kg/cm <sup>2</sup> )   | 17.3                     | 35.4            | 79.4          | 66.4            |

\* Test results based on 4 billets

**Table 3***Nail holding power*

|      | Green Average | Air-dry Average |
|------|---------------|-----------------|
| Side | 98            | 52              |
| End  | 48            | 20              |

**Table 4***Screw holding power*

|      | Green Average | Air-dry Average |
|------|---------------|-----------------|
| Side | 129           | 121             |
| End  | 51            | 52              |

**Table 5**

*Suitability indices of Tectona grandis  
in terms of Teak as 100*

| Properties              | Suitability indices |
|-------------------------|---------------------|
| Strength as a beam      | 69                  |
| Stiffness as a beam     | 65                  |
| Suitability as a post   | 60                  |
| Shock resisting ability | 62                  |
| Shear                   | 53                  |
| Refractoriness          | 31                  |
| Hardness                | 73                  |
| Weight or Heaviness     | 80                  |

Results of various tests carried out at the Institute are tabulated in Tables 2, 3, 4 and 5.

The Head of Wood properties and Uses Division of the Institute, concludes that the timber tested is moderately heavy, weak, not tough and moderately hard. Our apprehensions that indiscriminate high inputs will jeopardise timber quality have been vindicated. It is hoped that this investigation and its result will be kept in view by all those entrepreneurs who are selling "dreams" of high returns.

Conservator of Forests,  
Forest Research Circle,  
Pune (Maharashtra).

M.G. Gogate