Data Collections

1. Tree Characteristics

1.1 Height Growth

Measurement of height growth of teak is done by using measuring pole (small trees) and hypsometer (big trees). Clear bole of big tree is also measured.

1.2 Diameter Growth

Measurement of diameter growth is done by using veneer caliper at two positions, diameter at ground level (D_0) diameter at 10 cm above ground level (D_{10}) and diameter at breast height (DBH).

1.3 Crown Diameter

Crown diameter of teak is measured by using measuring tape at two positions at 90 degrees.

1.4 Stem Form and Damaging

Tree form and damaging is studied in Teak International provenances trial at Teak Improvement Center, Lampang by counting the number of tree in each plot and calculate the percentage of each stem character.

1.5 Fruiting Performance

The fruiting performance of each superior clone is done in Teak Clonal Seed Orchard at Uthai Thani. The fruit production will be recorded in each tree by scoring as follow:

0 = no fruit
1 = fruit presents in small amount
2 = fruit presents in some branches
3 = fruit presents in many branches
4 = fruit presents in every branches

Estimation of fruiting potential will be recorded on the percentage of fruit production.

Measurements of tree characteristics are carried out as follows:

1. RFD International Provenance Trials, Lampang: October 2003
2. TPC Clone Bank, Uthai Thani: August 2001, October 2002
3. TPC First Generation Clonal Seed Orchard, Uthai Thani: October 2002
4. TPC First Generation Clonal Seed Orchard, Ladkrating, Chachoengsao: October 2002 - May 2003, October 2004
5. Cha-am Teak Farm, Phetchaburi: May 2002, 2003,2005

2. Coppice Growth

Height, D_0 and DBH growth of the coppices are measured during May 2003 - October 2004 at TPC Clone Bank, Uthai Thani. Coppicing ability in each clone was studied by counting at the first record.

3. Biomass Study

Biomass of teak was studied in Tree Farm at Cha-am, Phetchaburi. 3 sample trees of each type of planting materials were harvested. The fresh weight of stems, branches, roots, leaves was measured. Samples of each part of trees were collected for drying in oven under the temperature of 105° C for 2 day at KUFF. The dry weight was estimated.

4. Stem analysis

The study was conducted at 20 years old Teak Clone Bank in Uthai Thani. All four ramets of each clone were harvested. Volume of each clone will be estimated. Disc samples at 10 cm above ground were collected. Two symmetric trees out of four ramets were studied in more details by which discs were collected at various height levels after measuring tree diameter. The thickness of the disc is around 2.5 cm.

The discs were taken to Department of Silviculture, KUFF for stem analysis by identify and count the ring number on each disc. Height-age curve and taper curve will be prepared for particular clones. Stem volume will be estimated.

So as to gain information about clonal variation in teak wood quality, heart wood formation was also studied by using the discs. Heart wood and sap wood of each disc were coppied in the transparent paper and the area will be estimated.

Data Analysis

    1. Growth Characteristics

Growth of teak under various planting systems is evaluated by using F-test and Duncan New Multuiple Range Test.

    2. Biomass Study

    2.1 Moisture Percentage = $\dfrac{\text{fresh weight (g) – dry weight (g)}}{\text{Dry weight (g)}}$ x 100

    2.2 Converse fresh weight of each parts of sample trees to dry weight using the formula as follow:

$$\text{Dry weight (g)} = \frac{100 \times \text{fresh weight}}{100 + \text{moisture percentage}}$$

    2.3 The volume of each sample trees was estimated by using Smalian's formula:

$$V = \frac{\pi L(d_1^2 + d_2^2)}{8}$$

$$\text{for the top log} \quad V = \frac{\pi L(d_1^2)}{12}$$

Where:

V = volume of log, m^3

L = log length, m

d_1 = diameter at base of log, m

d_2 = diameter at top of log, m

    3. Stem Analysis

Clonal variation in annual rings was studied. The relationship between the annual ring width and climatic factors was also calculated.

An annual ring index was determined by based on the mean ring width of sample trees and the expected ring width of the corresponding calendar year. The index was expressed as a percentage, as follows:

$$It = 100 \times \frac{Yt}{\overline{\overline{Y}}t}$$

Where:

It = the ring width index for year t

Yt = the average ring width in year t

$\overline{Y}t$ = the expected ring width in year t

       The volume under bark of each log can be calculated using Smalian's formular:

$$V = \frac{\pi L(d_1^2 + d_2^2)}{8}$$

Where:

    V = volume of log, m^3
    L = log length, m
    d_1 = diameter at base of log, m
    d_2 = diameter at top of log, m

Mean Annual Increment (MAI)

$$MAI = \frac{V}{age}$$

Where:

    V = volume of tree, m^3