CHAPTER-5

METHODOLOGY
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1. Site selection: - A total number of 117 homegardens from the two sites Chailtabasti and Dargakona were selected where agar (Aquilaria malaccensis) seedlings had been distributed previously. Also three natural habitats (forest gardens) were found where agar seedlings were grown naturally from the seeds of bigger agar trees.

Also the homegardens containing Agar trees were taken into account.

2. Population structure of Agar trees in homegardens and forest gardens: - To see the girth size distribution, in addition to Chailtabasti and Dargakona, another site Allenpur was selected. A total no. of 500 agar trees were marked and numbered with aluminium tags. At breast height of each tree, girth size (cm) was measured with the help of measuring tape. Girth size distribution was observed for all 500 trees. After an interval of one year, the girth measurement was repeated for the same trees in Chailtabasti and Dargakona villages to calculate the girth increment. Observation of girth increment was performed only in the two sites Chailtabasti and Dargakona.

3. Survival and growth of Agar seedlings: - Informations were collected on the previously distributed agar seedlings in the year 2008 pertaining -

   a) number of seedlings distributed,
   b) number of surviving seedlings.

The households of the study sites were asked about the local term of their homegardens soil, and also the physical qualities of their soil where agar seedlings were planted. Also, the reasons for mortality of the seedlings and management measures they followed were recorded. Questionnaire method was followed to gather information on the survivality and mortality of the saplings. The residents were also asked about the
mode of selling of agar trees and other various details regarding domestication of agar seedlings.

3. Study of microclimatic parameters :- Microclimatic parameters such as light-intensity relative humidity and temperature were studied with the help of equipment Luxmeter (Lutron Lx-101) and Thermo-hygrometer (Lutron LM-81 HT) respectively.

These parameters were studied in relation to each agar seedlings as well as in open areas to understand the average microclimatic conditions under which agar seedlings were growing in the study sites.

4. Study of growth of agar seedlings :- Agar seedlings were provided to the local inhabitants of the two study sites. At the first observation, height and diameter of each seedlings were recorded. After 3 months, again these readings were taken and the increment in height and diameter was calculated. Also, the nos. of seedlings surviving at the time of second observation were counted to find out the survival rate of agar seedlings.

A total number of 931 nos. of seedlings were studied which were distributed in previous years before this study started. During the ongoing study, 1155 nos. seedlings were again distributed in May 2009’ and a second observation was carried out after three months in the same year. The survival rate of agar seedlings at each homegarden was calculated.

5. Soil Analysis :- Soil samples were collected from different study sites at 0-15 cm depth. After removing the debris, composite sampling was made and the samples were air-dried, sieved through 2mm mesh and analysed for physico-chemical properties.
Soil colour :- The colour of the soil samples were assessed with the help of Munsell Soil Colour Chart (1994).

Bulk density :- Bulk density was determined by collecting soil samples from selected homegardens with the help of a soil corer of 5.2 cm diameter dipped into 15 cm depth into the soil, and calculated by using the formula :-

\[
\text{bulk density (g/cm}^3\text{)} = \frac{\text{oven dry wt. of soil sample}}{\text{volume of the soil}}
\]

Water Holding Capacity :- The water holding capacity of the soil samples was studied by Keen’s box method (Piper 1994). The calculations were made as follows :-

\[
\text{WHC(\%)} = \frac{b - (c + d)}{c - a} \times 100
\]

\[\begin{align*}
    a & = \text{wt. of empty Keen’s box} \\
    b & = \text{wt. of saturated soil + Keen’s box} \\
    c & = \text{wt. of ovendried soil + Keen’s box} \\
    d & = \text{wt. of wet filter paper}
\end{align*}\]
Soil Texture: The texture of soil was studied by particle fractionation with Bouyoucas soil hydrometer (Allen 1989). The percentages of sand, silt and clay fractions were calculated based on two hydrometer readings at 40 seconds and at 2 hours interval & calculated as:

\[
\text{Clay} \% = \frac{\text{Hydrometer reading (40 secs.)} \times 100}{\text{Weight of the soil}}
\]

\[
\text{Silt} \% = (\text{silt + clay}) \% - \text{clay} \%
\]

\[
\text{Sand} \% = 100 - (\text{silt + clay}) \%
\]

pH: The pH of the soil samples was determined by the “Electrometric method”. The pH was studied in 1:2.5 (soil water) solution. 10 gm of fresh soil (sieve through 2mm mesh) taken in a 100ml beaker and 25ml distilled water was added to it. The solution was then shaken in magnetic stirrer (Shaker RS-24-7796, serial no.-R-IS-178) for 5-10mins. The solution was then kept for time settling and pH was measured in a digital pH meter equipped with glass electrode. (Systronics pH Meter MK VI)
Organic - carbon :- Organic carbon was determined by Walkey and Black’s rapid titration method (Jackson, 1958). Organic carbon was calculated by the following formula:-

\[
OC\, (\%) = \frac{(b - s) \times 0.003 \times 0.5 \times 100}{\text{Weight of the soil}}
\]

\( b = \text{ml. of ammonium ferrous sulphate consumed by blank.} \)

\( s = \text{ml. of ammonium ferrous sulphate consumed by soil sample.} \)

5. **Data Analysis:**- Statistical analysis was performed by standard method (Zar, 1999).