

## NEW TECHNICAL PROGRAMME

### Department of Silviculture and Agroforestry

#### Experiment No. 21.5.3.2

1.	Experiment no. and Title	:	<b>Development of volumetric equation for Subabul (<i>Leucaena leucocephala</i> (Lam.) de Wit)</b>
2.	Background information	:	
	<p>Growing commercial tree plantations play a vital role in increasing tree cover, environmental amelioration, carbon sequestration, and climate change mitigation. In south Gujarat, forest department have already taken initiation of raising plantations of different commercial tree species through social forestry scheme, and also emphasizing growing tree crops in farm lands through Agroforestry sub-mission. Farmers of this region also have already cultivated tree crops in agroforestry systems as well as block plantations using industrial tree species. Subabul is one among them. Moreover, paper mill also providing good quality seedlings of Subabul for large scale plantation in this region. Subabul, <i>Leucaena leucocephala</i> (Lam.) de Wit), is one of best suited species for alley cropping. Green foliage provide good fodder materials and wood is used for paper and pulp making. Hence, farmers are growing subabul in block plantation. On other hand, yield determination of standing tree species was made by estimating volume and biomass. For quick assessment, it is important to determine the volumetric equation for specific regions. Further, volume table can be prepared using such allometric equations using diameter alone as well as combination of diameter and height. This data can be used to determine the carbon content of standing trees. Hence, it is proposed to estimate the suitable volumetric equation as well prepare volume table for calculation of volume of standing Subabul (<i>Leucaena leucocephala</i>) trees. Data generated would be helpful for farmers, timber merchants, forester and other stake holders for determination of stem volume and biomass of standing trees.</p>		
	Hypothesis	:	<ol style="list-style-type: none"> <li>1. Can estimate volume, biomass and carbon content of trees of different diameter classes of Subabul using biometric observation?</li> <li>2. Can determine volumetric equation using growth parameters in Subabul?</li> <li>3. Can prepare local volume table for easy assessment of volume based on height and diameter of Subabul tree?</li> </ol>
3.	Objectives	:	<ol style="list-style-type: none"> <li>1. To develop volumetric equation for Subabul (<i>Leucaena leucocephala</i>) using DBH and height in South Gujarat condition</li> <li>2. To prepare local volume table for Subabul</li> </ol>
4.	Investigators:	:	<b>PI:</b> Dr. Rajesh P. Gunaga, Professor (Forest Biology) <b>Co-PI:</b> Dr. L. K. Behera, Associate Professor (Silviculture) Dr. M.B. Tandel, Professor (Agroforestry) <b>Associates:</b> Dr. N. S. Thakur, Associate Professor (Agroforestry)
	SRFs	:	Dr. Jignesh B. Bhusara Dr. Ramesh L. Sondarva
5.	Location and agro climatic sub region	:	South Gujarat (Heavy rainfall zone, AES- III)

6.	Name of Res Scheme & B.H.	:	Determination of carbon sequestration potential of forest tree species of South Gujarat (BH-12036)																								
7.	Year of experimentation	:	Commencement Year =2025-26 upto 2027-28																								
8.	Crop & Variety or Thematic area	:	<i>Leucaena leucocephala</i> (Lam.) de Wit) (Subabul)																								
9.	Experiment details	:																									
	a. Design	:	Random method of tree selection in different diameter classes																								
	b. Treatment	:	<p>For this trial, about 1000 trees will be selected randomly from different locations in Navsari and adjoining areas of south Gujarat regions. Trees with DBH 10 cm to 60 cm will be used for measurement of biometric data. Various biometrical parameters as shown in observation column will be recorded. Further, volume of trees is calculated using following formulas/ procedures-</p> <p>a) Calculation of form quotient (FQ) = Mid-diameter/ DBH</p> <p>b) Calculation of volume (V, m<sup>3</sup>) = S x FQ x H, where H= Tree height, S= Basal area (<math>\pi D_2^2/4</math>) and FQ = form quotient</p> <p>c) Biomass (kg/tree) (Volume x Basic density of wood)</p> <p>d) Carbon content (kg/tree) = [Biomass (kg) x Carbon content (%)]</p> <p>e) Carbon will be estimated by wet digestion followed by titration using Walkley-Black method</p> <table border="1" data-bbox="673 1043 1426 1310"> <tr> <td colspan="4">Table : Different diameter classes for trees are given below for the volumetric equation</td> </tr> <tr> <td>D<sub>1</sub></td> <td>10-15 cm</td> <td>D<sub>6</sub></td> <td>35-40 cm</td> </tr> <tr> <td>D<sub>2</sub></td> <td>15-20 cm</td> <td>D<sub>7</sub></td> <td>40-45 cm</td> </tr> <tr> <td>D<sub>3</sub></td> <td>20-25 cm</td> <td>D<sub>8</sub></td> <td>45-50 cm</td> </tr> <tr> <td>D<sub>4</sub></td> <td>25-30 cm</td> <td>D<sub>9</sub></td> <td>50-55 cm</td> </tr> <tr> <td>D<sub>5</sub></td> <td>30-35 cm</td> <td>D<sub>10</sub></td> <td>55-60 cm</td> </tr> </table>	Table : Different diameter classes for trees are given below for the volumetric equation				D <sub>1</sub>	10-15 cm	D <sub>6</sub>	35-40 cm	D <sub>2</sub>	15-20 cm	D <sub>7</sub>	40-45 cm	D <sub>3</sub>	20-25 cm	D <sub>8</sub>	45-50 cm	D <sub>4</sub>	25-30 cm	D <sub>9</sub>	50-55 cm	D <sub>5</sub>	30-35 cm	D <sub>10</sub>	55-60 cm
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	c. Repetition	:	In each diameter class, minimum of 50 to 100 trees will be used depending upon the availability of trees of particular diameter.																								
10.	Observations to be recorded	:	<p><b>Tree biometric parameters</b></p> <p>a) Tree height (m)</p> <p>b) DBH (cm)</p> <p>c) Mid- diameter (cm)</p> <p>d) Crown length (m)</p> <p>e) Crown height (m)</p> <p>f) Crown diameter (m)</p> <p><b>Estimating parameters</b></p> <p>g) Form quotient</p> <p>h) Volume (m<sup>3</sup>)</p> <p>i) Biomass (kg/tree)</p> <p>j) Carbon content (kg/tree)</p>																								