

NEW TECHNICAL PROGRAMME

Department of Silviculture and Agroforestry

Experiment No. 21.5.3.3

01.	Experiment No. and Title	:	Influence of pre-sowing treatments on seed germination and early growth in seedlings of Patla [<i>Stereospermum chelonoides</i> (L.f.) DC.]
02.	Budget Head	:	12065
03.	Collaborative department, if any	:	-
04.	Background information	:	<p><i>Stereospermum chelonoides</i> (L.f.) DC. (Syn. <i>Stereospermum suaveolens</i> (Roxb.) Benth & Hook. F., Family- Bignoniaceae) is commonly called as 'Padijala or Paral' (Hindi), 'Patala' (Sanskrit) and Patla (Gujarati). It is a large sized indigenous tree and distributed in sub-Himalayan tract, central parts of India and also sparsely distributed in Gujarat. Different parts of the tree are used for pharmacological purposes where root is used for hypoglycaemic and anticancer activity; stem bark for diuretic effect, antihyperglycemic, antioxidant, hepatoprotective and free radical scavenging activity.</p> <p>Destructive methods of tree harvesting seriously reduced population size and it also affected on seed yield and natural regeneration. Moreover, it is propagated naturally by seeds and collection of seeds is difficult as winged pericarps dispersed by wind after mature. Further, poor germination rate affected the natural regeneration. <i>S. chelonoides</i> is a lesser known tree species and listed as Critically Endangered in Gujarat (Anon., 2008). Further seed germination is very meagre (Approx. 6 %) in normal condition. Hence, there is great scope for scientific exploration of the LKT species including germination attributes; further, there is a need to understand the germination characters of this species. Therefore, pre-sowing treatments for enhancement of seed germination and early seedling growth of <i>S. chelonoides</i> in the nursery stage is proposed.</p>
	Hypothesis	:	There is no influence of pre-sowing treatments on seed germination and early seedling growth in Patla (<i>Stereospermum chelonoides</i>)
05.	Objectives	:	To study the influence of pre-sowing treatments on seed germination and early seedling growth in Patla (<i>Stereospermum chelonoides</i>)
06.	Principal investigator and associates	:	PI: Dr. L.K. Behera, Associate Professor (Silviculture) Co-PI: Dr. R.P. Gunaga, Professor (Forest Biology/ Agroforestry)

			Dr. S.A. Huse, Associate Professor (Tree Improvement) Associate: Dr. A.A. Mehta, Associate Professor (FPU)
	SRF	:	1. Dr. Minal H. Patel 2. Mr. Chinatan A. Dholariya
07.	Location and Agro-climatic sub-region	:	South Gujarat (Heavy rainfall zone, AES-III)
08.	Year and Season	:	Commencement Year - 2025-26
09.	Crop and Variety	:	Patla (<i>Stereospermum chelonoides</i> (L.f.) DC.)
10.	Experimental details	:	
	(a) Treatments	:	<p>For germination trial</p> <p>For germination experiment, total fourteen different pre-sowing treatments will be adopted and details are as follows:</p> <ul style="list-style-type: none"> • T₁- Control • T₂- Soaking seeds in normal water for 24 hrs • T₃- Soaking seeds in normal water for 48 hrs • T₄- Soaking seeds in luke warm water for 24 hrs • T₅: T₂ + Soaking seeds in GA₃ solution @ 50 ppm for 30 min • T₆: T₂ + Soaking seeds in GA₃ solution @ 100 ppm for 30 min • T₇: T₂ + Soaking seeds in GA₃ solution @ 150 ppm for 30 min • T₈: T₂ + Soaking seeds in GA₃ solution @ 200 ppm for 30 min • T₉: T₂ + Soaking seeds in GA₃ solution @ 50 ppm for 60 min • T₁₀: T₂ + Soaking seeds in GA₃ solution @ 100 ppm for 60 min • T₁₁: T₂ + Soaking seeds in GA₃ solution @ 150 ppm for 60 min • T₁₂: T₂ + Soaking seeds in GA₃ solution @ 200 ppm for 60 min • T₁₃- Soaking seeds in cow dung slurry for 24 hrs • T₁₄- Soaking seeds in cow dung slurry for 48 hrs
	(b) Experimental Design	:	CRD
	(c) Replications/repetition	:	3
	(d) Plot size (if applicable)	:	Gross - ____ m x ____ m
			Net - ____ m x ____ m

	(e) Spacing	:	NA
	(f) Seed rate (kg/ha)	:	NA
	(g) Manures and fertilizer	:	NA
	(h) Any other detail, if required	:	NA
11.	Observations to be recorded	:	<p>➤ Germination data</p> <ol style="list-style-type: none"> 1. Germination percentage 2. Mean Daily Germination (MDG) 3. Peak Value of Germination (PV) 4. Germination Value (GV) 5. Mean Germination Time (MGT) 6. Germination Rate Index (GRI) <p>➤ Seedling growth and vigour parameters</p> <ol style="list-style-type: none"> 1. Shoot height (cm) 2. Collar diameter (cm) 3. Number of leaves per plant 4. Fresh weight (shoot and root separately) of plant (g) 5. Dry weight (shoot and root separately) of plant (g) 6. Root: Shoot ratio 7. Sturdiness quotient 8. Seedling quality index 9. Survivability (%) <p>Seedling growth and vigour parameters should be taken after 6 months of transplanting</p>
12.	Methodology	:	<p>In first experiment of germination, for each treatment, 3 repetitions will be used and for each repetition, 50 seeds will be considered (N= 2100 seeds for whole experiment). Seeds will be sown on germination tray containing sand media. Daily germination count will be recorded up to 30 days. For the second experiment of growth, best 5 treatments out of 14 treatments will be considered for the study. Two leaf stage seedlings from five treatments will be transplanted into polybags of 6" x 8" size containing Soil+ Sand + FYM (2:1:1) for growth study. For each treatment, 60 seedlings (20 seedlings per repetition) will be employed for growth and biomass observations.</p>

Experiment No. 21.5.3.1

1.	Experiment no. and Title	:	Development of volumetric equation for Mango (<i>Mangifera indica</i> L.) trees from orchards
2.	Background information	:	
	<p>Mango (<i>Mangifera indica</i> L.) is one of the commercial important tree species for its fruit and is grown as commercial horticultural component. Mango is distributed throughout India as a cultivated tree crop in orchard, home gardens and on farm bunds. South Gujarat is considered as hub of horticultural crops and farmers are growing different fruit crops including many varieties of Mango. The wood is used for many purposes, including indoor construction, meat-chopping blocks, furniture, carpentry, flooring, boxes, crates and boat building (canoes and dugouts). With a calorific value of 4200 kcal/kg, the wood makes excellent charcoal and firewood. Young mango is often interplanted with other fruits and vegetables, and the tree is a valued component of the traditional home-garden agroforestry system. Volumetric equation/volume table play a vital role in quick estimation of volume and this value is also used in assessment of biomass and carbon content of standing trees. Many farmers and mango growers need biomass value while felling or converting mango orchards with new variety of mango, orchard rejuvenation or some other crops. Such local volume table is help in determining standing volume, so that biomass can be estimated. In view of carbon farming or carbon project, estimation of carbon per unit area of Orchard is also necessary. In that situation also, volumetric equation and/or volume table helps in determining carbon per individual or unit area. Hence, it is proposed to estimate the suitable volumetric equation as well as development of volume table for Mango grown in orchards. It may also help in estimating biomass and carbon yield. This would be helpful for timber merchant/farmers and other stake holders for biomass estimation.</p>		
	Hypothesis	:	<ol style="list-style-type: none"> 1. Can estimate volume, biomass and carbon content of trees of different diameter classes of Mango using biometric observation? 2. Can determine volumetric equation using growth parameters in Mango? 3. Can prepare local volume table for easy assessment of volume based on height and diameter of Mango trees?
3.	Objectives	:	<ol style="list-style-type: none"> 1. To determine the volumetric equation(s) for Mango trees grown in Orchard land use system of South Gujarat 2. To prepare local volume table
4.	Investigators:	:	PI: Dr. Rajesh P. Gunaga, Professor (Forest Biology) Co-PI: Dr. L. K. Behera, Associate Professor (Silviculture) Dr. N. S. Thakur, Associate Professor (Agroforestry) Associate Scientist: Dr. S. K. Sinha, Associate Professor (FPU)
	SRFs	:	Dr. Ramesh L. Sondarva Dr. Jignesh B. Bhusara
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 2028																								
8.	Crop & Variety or Thematic area	:	Mango (<i>Mangifera indica</i> L.)																								
9.	Experiment details	:																									
	a. Design	:	Random method of tree selection in different diameter classes																								
	b. Treatment	:	<p>For this trial, minimum of 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, m³) = S x FQ x H, where H= Tree height, S= Basal area ($\pi D^2/4$) 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="673 945 1426 1211"> <tr> <td colspan="4">Table showing different diameter classes for trees are given below for the volumetric equation</td> </tr> <tr> <td>D₁</td> <td>10-15 cm</td> <td>D₆</td> <td>35-40 cm</td> </tr> <tr> <td>D₂</td> <td>15-20 cm</td> <td>D₇</td> <td>40-45 cm</td> </tr> <tr> <td>D₃</td> <td>20-25 cm</td> <td>D₈</td> <td>45-50 cm</td> </tr> <tr> <td>D₄</td> <td>25-30 cm</td> <td>D₉</td> <td>50-55 cm</td> </tr> <tr> <td>D₅</td> <td>30-35 cm</td> <td>D₁₀</td> <td>55-60 cm</td> </tr> </table>	Table showing different diameter classes for trees are given below for the volumetric equation				D ₁	10-15 cm	D ₆	35-40 cm	D ₂	15-20 cm	D ₇	40-45 cm	D ₃	20-25 cm	D ₈	45-50 cm	D ₄	25-30 cm	D ₉	50-55 cm	D ₅	30-35 cm	D ₁₀	55-60 cm
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	c. Repetition	:	In each diameter class, minimum of 100 trees will be used, whereas in higher diameter classes, minimum of 50 trees will be used depending upon the availability of trees of particular diameter. Trees belonged to 60 to 100 cm DBH, will be used to record biometric data based on its availability.																								
10.	Observations to be recorded	:	<p>Tree biometric parameters</p> <p>a) Tree height (m)</p> <p>b) Basal diameter (cm)</p> <p>c) Crown length (m)</p> <p>d) Crown height (m)</p> <p>e) Crown diameter (m)</p> <p>f) No. of prominent branch</p> <p>g) Length of prominent branch (m)</p> <p>h) Mid diameter of prominent branch (cm)</p> <p>Estimating parameters</p> <p>i) Form quotient</p> <p>j) Volume (m³)</p> <p>k) Biomass (kg/tree)</p> <p>l) Carbon content (kg/tree)</p>																								