

**Monthly report for the Month of March 2021**  
**Institute of Wood Science & Technology, Bengaluru**

**IMPORTANT RESEARCH FINDINGS:**

**Value-addition of low-density woods by producing nano-wood-composites (NWC) with enhanced properties for high end applications:**

Three low density species were impregnated with carbon nanotube blended phenol formaldehyde (PF) and melamine formaldehyde (MF) polymeric adhesives under vacuum and pressure. Impregnated woods have shown improved physical and mechanical properties including decay resistance which may be used for valued added applications.

**NBA Projects:**

The mango wood impregnated with methanol extracts of *Pterocarpus santalinus* bark exhibited very good brown shades. Experiment revealed that the bark extracts of *P. santalinus* were more effective against white rot fungi as the colony growth were not observed even after 14 days of inoculation.

**AICRP – 8 (Redsanders):** TLC fingerprints were developed for methanolic extract of *P. santalinus* (Red sanders) wood which revealed distinct spots at  $R_f$  0.94(light brown), 0.91(purple), 0.79(blackish brown), 0.75 (light purple), 0.60(yellow), 0.51 (dark red) and 0.28(brownish red) in normal phase. Whereas, HPLC analysis indicates that at least 11 peaks at retention time (tR) 3.1, 3.5, 8.9, 11.1, 12.8, 13.5, 14.9, 15.7, 17.9, 18.3 and 26.5 (minutes) were common in the methanolic extract of all the heartwood samples of *P. santalinus*. UV spectrum pattern was observed with consistency in major absorbance peaks at ~280 nm, ~472 nm and ~503 nm. Further, similarities between the samples from different locations were evaluated using the principal coefficient analysis (PCA).

**Study on flame retardancy and recyclability of natural fiber-polyethylene composites**

Pretreatment of bamboo fibers with NaOH and borax-boric acid and addition of ammonium polyphosphate is found to improve the thermal and flame retardant performance of natural fiber polyethylene composites. Further addition of nano SiO<sub>2</sub> to into this combination has no significant contribution towards improvement in thermal and flame retardant performance of natural fiber polyethylene composites.

**Development of natural fiber and charcoal filled hybrid polymer composites**

Charcoal prepared at different temperature from coconut and bamboo biomass shows significant variation in their chemical and elemental properties, and their use as filler is found to have significant effect on improvement in mechanical properties of wood polymer composites. More specifically the mechanical properties of wood polymer composites improves by adding charcoal prepared at lower carbonization temperatures i.e., 300 and 400°C.

**1. NEW PROJECTS SANCTIONED DURING THE MONTH: Nil**

**2. PROJECTS CONCLUDED DURING THE MONTH:**

Sl No.	Name of the project	Amount Sanctioned (Rs in Lakhs)	Sponsoring Authority
1	Value-addition of low-density woods by producing nano-wood-composites (NWC) with enhanced properties for high end applications. (2017-2021) PI: Dr. S.R. Shukla	36.58	ICFRE
2	Evaluation of palm wood ( <i>Borassus flabellifer</i> and <i>Areca catechu</i> ) and their suitability for various application. (2019-2021) PI: Dr. S.K. Sharma	9.35	ICFRE
3	Wood –PlasticComposites- Performance, Sustainability, Environmental Impacts and Life cycle Assessment. (2019-2021) PI: Mr. Ritesh D Ram	19.00	ICFRE
4	Development of natural fiber and charcoal filled hybrid polymer composites (2018-2021) PI: Mr. Ritesh D Ram	12.00	ICFRE
5	Study on flame retardancy and recyclability of natural fiber-polyethylene composites (2018-2021) PI: Mr. Ritesh D Ram	15.00	ICFRE
6	Exploration of methods to enhance the shelf life and fixative property of neem based ecofriendly preservative. (2017-2021). PI: B.S.,\Chandrashekar	19.04	ICFRE
7	Studies on propagation of a valuable timber species, <i>Diospyrosebenum</i> J.Koenig ex Retz. through seeds and <i>invitro</i> techniques. (2017-2021) PI:TresaHamalton	21.65	ICFRE

**3. PARTICIPATION INSEMINARS/WORKSHOPS (BOTH NATIONAL & INTERNATIONAL): Nil**

Sl. No	Topic	Duration	No. of participants	Beneficiaries

**4. MEETINGS ORGANIZED:**

Sl. No	Topic	Duration	No. of participants	Beneficiaries
1	E-Symposium on the topic "Wood: The sustainable and versatile building material" on the occasion of World Wood Day	19 March 2021	223	Wood based Industries and associates, Research Organizations, Forest Departments
2	Industry meet for developing industry institute partnership and working towards emerging issues in the wood-based sector	22 March 2021	80	Wood based Industries and associates, Research Organizations, Forest Departments

**5. MEETINGS ATTENDED: NIL**

Sl. No	Topic	Duration	No. of participants	Beneficiaries

**6. WORKSHOP ORGANIZED: NIL**

Sl. No	Topic	Duration	No. of participants	Beneficiaries

**7. TRAININGS ORGANIZED:**

Sl.No	Topic	Duration	No. of participants	Beneficiaries
1	Hands-on training on "Micro propagation of Bamboos"	1 – 5 March 2021	9	UG-students of Surana College, Bangalore
2	Two days training program on "Capacity building of state forest departments for developing state REDD+ action plans"	15. – 16 March 2021	119	Forest officers of Karnataka , AP, Goa, Scientist of IISc, GKVK, ATREE, CSTEP

**8. TRAININGS ATTENDED: NIL**

Sl. No	Topic	Duration	No. of participants	Beneficiaries

1	HRD training on Food safety and quality control for technical staff.	10 – 11 March 2021	3	Technical staff of IWST
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#### 9. DEMONSTRATIONS:NIL

Sl.No	Topic	Duration	No. of participants	Beneficiaries
1.	Demonstration Program on preservation and treatment of wood	17 March 2021	150	Artisans of Kinnal cluster

#### 10. PARTICIPATION IN KISAN MELA/EXHIBITION/TRADE FAIR ETC:

Institute	Participated	Duration	Place

#### 11. OTHER EXTENSION ACTIVITY:

- A Memorandum of Understanding (MoU) has been signed by Institute of Wood Science and Technology, Bangalore with M.G.R.Educational and Research Institute, Chennai to contribute to academic development and promote research related activities. The MoU is effective for 5 years from March 2021.
- Dr. G.P. Rao, Principal Scientist, Indian Agricultural Research Institute, New Delhi delivered a talk at IWST on the topic “Diagnosis and Management of Phytoplasma Diseases” on 12 March 2021.
- As part of study tour, 49 students of III Bsc Forestry (Hons) and 2 staff members from Forest College and Research Institute, Hyderabad at Mulugu, Telangana visited the institute on 1 March 2020
- As part of Central India study tour, 35 Forest Range Officer Trainees and 2 Faculty from Tamilnadu Forest Academy, Coimbatore visited the institute on 9 March 2021.
- As part of curriculum, 14 students of BSc (Agriculture) and 2 Faculty from University of Agricultural Science, Bangalore visited the institute on 19 March 2021

#### 12. RESEARCH PAPERS:

- Shukla S.R. and Sharma S.K. (2021). Estimation of density, moisture content and strength properties of *Tectona grandis* wood using near infrared spectroscopy. *Maderas. Ciencia y tecnología* (23): 18, 1-12, DOI: 10.4067/s0718-221x2021000100418
- Pal, A., Kumar, R. and Tripathi, Y. C. (2021). Antifungal Finishing of Fabrics with Natural Dyes from Aerial Biomass of *Perilla frutescens* (L.) Britton, *International Journal of Applied Pharmaceutical Sciences and Research* Vol 6 (1) 8-14.
- Bisht, S. S., Chandra, G., & Pandey, K. K. (2021). Simple and rapid FTIR spectral data and chemometric analysis based method for evaluation of the quality of Indian Sandalwood oil. *Journal of Essential Oil Research*, 1-9.
- Bisht, S. S. (2021). “SANDALWOOD (*Santalum album* L.) OIL: Adulteration and Detection Techniques”. IWST TECHNICAL BULLETIN NO:22, Published by

Institute of Wood Science & Technology, Bengaluru (Indian Council of Forestry Research and Education) Ministry of Environment, Forest and Climate Change Government of India.

- Bisht, S. S. and Kumar R (2021). Phytochemicals from Indian sandalwood (*Santalum album* L.) and their adulterants: An overview. Tropical Plant Research. MS number PC-210103 (accepted).
- TresaHamalton (2021).Comparative sequence analyses reveal a species-specific nucleotide segment in matkregion of *Santalum album* L.International Journal of Advanced Biological Research 11 (1): 26-29
- Abstract titled 'Hydroponic acclimatization of micropropagated Bamboo plantlets' as co-author in the e-abstract book (Pg-13) of the online National Seminar on 'Propagation, Management and Development of value chain in Bamboos' organised by TFRI, Jabalpur on 10.2.2021
- Muthukumar, A., G. M. Sandhya and Dakshayini, G (2021). Morphological and Biochemical Characterization – A Comparative Analysis of Non-commercial and Commercial Plant Growth Promoting Microorganisms. Int. J. Curr. Microbiol. App. Sci. 10(02): 867-874.

**Book Chapter:** Divakara, B.N, Nikhitaha, C.U, Mahmud M.A., Nils Nolke, Tewari, V.P, 2021. IN: “Rural-Urban Interface”: Studies on tree species diversity along the Southern transect of Bengaluru, Karnataka (Edited by: Ellen Hoffmann, and stephan von Cramon Taubadel, Andreas Bukert, Kotrakere Basegowda, Umesh, Prasannakumar pethandiahalli shivaraj and Prem Jose Vazhacharickal ; Published by Springer Nature (In Press)

### **13. VISIT OF DIGNITARIES: Nil**

### **14. CONSULTANCIES: Nil**

### **15. OTHER IMPORTANT ACTIVITIES:**

- Dr. S.R. Shukla, “Participated in Bamboo-an alternative timber” workshop being held on 13.03.2021 at Moshree Auditorium, Lucknow conducted by State Mission Direcor (NBM) cum CCF and gave a presentation on the topic “Laminated bamboo lumber – an alternative to conventional timbers for building and construction.”
- Dr. A. Muthukumar, Scientist-E in the capacity as an expert member in TEC, the report on Exempted trees related to IA NO. 10 of 2020 of Writ Petition No. 17841/2018 was submitted to Hon’ble High Court of Karnataka.
- Dr. A. Muthukumar, Scientist-E visited BIAL to participate in a meeting organized by BIAL authorities with TEC to discuss various issues related to establishment of suitable trees / plantation in the proposed extension area of Airport.

- Test reports of 11 samples for identification, 3 samples for moisture content, 5 samples for Density, 2 samples for shrinkage and 6 samples for mechanical properties were sent to the concerned department/parties.