

Biodata

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Education

Degree	Subject of specialization	Institution	Year	Percentage	Award
Ph.D., Forest Biotechnology	Genetic transformation	Institute of Forest Genetics and Tree Breeding, FRI University, Dehra Dun	2006	-	-
M. Sc., Biotechnology	DNA markers	CPMB, Tamil Nadu Agricultural University, Coimbatore	1996	91.0	DBT Fellowship holder
B. Sc., Agriculture	Agriculture	Annamalai University, Chidambaram	1993	80.8	-

Ph.D. Dissertation: Genetic transformation studies in *Casuarina equisetifolia*

M. Sc. Dissertation: Molecular analyses for Leaf folder (*Cnaphalocrocis medinalis* GUENEE.) resistance in Rice.

Professional positions

Institution	Position	Period	Duties
IFGTB, Coimbatore	Scientist F	July 2016 till date	Genetic transformation lab in-charge
Wisconsin Energy Institute, University of Wisconsin- Madison, USA	Fulbright- Nehru Academic & Professional Excellence Fellow	August 2016 to Jan 31, 2017	Analysis of Poplar transgenics modified for enhanced pulping efficiency.
IFGTB, Coimbatore	Scientist E	Jan 2011 - June 2016	Genetic transformation lab in charge
Institut de Recherche pour le Développement (IRD), Montpellier, France	DBT Overseas Associate	July 2007 - July 2008	Functional genetics studies in Casuarina.
IFGTB, Coimbatore	Scientist D	Jan 2006 – Dec 2010	Genetic transformation lab in charge

IFGTB, Coimbatore	Scientist C	Jan 2002 - Dec 2005	DNA fingerprinting studies and Genetic transformation studies in Eucalyptus and <i>Casuarina</i>
IFGTB, Coimbatore	Scientist B	March 1998 – Dec 2001	DNA fingerprinting studies in Eucalyptus

Research interests:

The focus of research is on the institute's transgenic programme in which we aim "***to evolve and apply transgenic approaches in forestry species for functional analysis of genes and genetic modification of desired traits***". Traits of interest being researched are salt tolerance, insect resistance and enhanced pulping efficiency in Eucalyptus and *Casuarina*. **Salient achievements are given below.**

Transgenic approaches

- Established infrastructure for research on gene function analysis and genetic modification in trees.
- Genetic markers were developed for identification of mislabeled clones and somaclonal variants in micropropagated Eucalyptus germplasm (Tripathi et al., 2006).
- Developed an accessory for gene delivery into live plants.
- Optimized transformation protocols and **developed composite transgenic strategy for functional analysis of genes in Eucalyptus** (Balasubramanian et al., 2011). The technique had been originally used for functional analysis of genes involved in Frankial nodulation of *Casuarina*, through a DBT funded post doctoral visiting scientist programme at IRD, France (Gherbi et al., 2008; Svistoonoff et al., 2013, Perrine-Walker et al., 2011, Benabdoun et al., 2011, Svistoonoff et al., 2009).

Salt tolerance: Identification of genes from tolerant tree species and functional analysis

- **Using the model composite transgenic system in which roots alone are transgenic (Balasubramanian et al., 2011), we showed that restricting sodium uptake by down-regulating a sodium transporter gene in roots results in increasing NaCl tolerance limits from < 350 mM to 400 mM NaCl (Nambiar-Veetil, 2016).**
- Highly salt tolerant and salt susceptible clones of *Casuarina equisetifolia* were selected after screening 84 different genotypes. Proline accumulation and shoot to root ratio of sodium were identified to play an important role in salt tolerance of *C. equisetifolia* (Selvakesavan et al., 2016).
- Partially sequenced 35 gene homologues of sodium transporters (35) from different salt tolerant trees.
- Developed and hosted an online database: IGBAAS - *In silico* gene bank for adaptation to abiotic stresses <http://igbaas-ifgtb.icfre.gov.in>

Insect tolerance

- Generated and analyzed whole transcriptome sequence of *Leptocybe invasa*; and developed a multigene targeting hpRNAi construct (Nambiar-Veetil et al., 2017).

Pulping efficiency

- Initiated work on improving pulping efficiency in Eucalyptus through a "*Fulbright-Nehru Academic and Professional Excellence Fellowship*" award availed at the University of Wisconsin- Madison, USA.

Awards/ Fellowship Received/ Foreign visits/ National Level Exams Qualified

- Awarded *Fulbright- Nehru Academic and Professional Excellence Fellowship at the University of Wisconsin-Madison, USA and pursued research on* “Developing diagnostic methods and analyzing the incorporation of monolignol ferulates into FMT transgenic Poplars destined to improve pulping performance” (August 2016- January 2017).
- Awarded **DAAD fellowship** and pursued a research programme on “Evaluation of dsRNA chitosan nanoparticles for enhancing RNAi in *Manduca sexta*” from 13th February 2016 to 26th February 2016 at the University of Osnabruck, Germany.
- Awarded **DST** travel grants for presenting two papers in the International Union of Forestry Research Organization's (**IUFRO's**) **Tree Biotechnology** symposium on "From genomes to integration and delivery" at **Brazil**, held from 26th June – 2nd July 2011.
- Awarded **DBT associateship** for pursuing one-year Post doctoral research on “Development of post-transcriptional gene silencing approaches as a tool for the functional analysis of symbiotic genes in the tropical actinorhizal tree *Casuarina glauca*” at the **Institut de Recherche pour le Développement (IRD), Montpellier, France** from 4th July 2007 to 3rd July 2008.
- Co- recipient of the “**ICFRE award for Excellence** for the year 2001-2002.
- Participated in the international laboratory course on "Biopesticides: Application and mechanism of action at the "**International Centre for Genetic Engineering and Biotechnology**", **New Delhi** from 8th November to 19th November, 2010
- Qualified Graduates Aptitude Test in Engineering (GATE 1997) conducted by Indian Institute of Science (IISc), Bangalore with **96.7** percentile.
- Qualified the “National Eligibility Test” conducted by ICAR, and “State Level Education Testing” exam conducted by Bharathidasan University, Tiruchirapalli.
- Qualified for **DBT fellowship** for M. Sc. Biotechnology programme through National exam conducted by the Jawaharlal Nehru University, New Delhi.

Projects

- Incorporating resistance in *Eucalyptus* to *Leptocybe invasa fisher & La Salle (Hymenoptera: Eulophidae)* through expression of insect specific dsRNA.
- Developing diagnostic methods and analyzing the incorporation of monolignol ferulates into FMT transgenic Poplars destined to improve pulping performance. *Research carried out at Wisconsin Energy Institute, University of Wisconsin-Madison, USA. USIEF*
- Development of methods for functional analysis of genes involved in salt tolerance in *Eucalyptus tereticornis*.
- Determination of target genes in *Leptocybe invasa* for engineering resistance in *Eucalyptus* through gene- silencing approaches.
- Web enabled database and analysis of gene sequences implicated in abiotic stress tolerance for screening gene homologues in salt tolerant tree species.

- Development of post-transcriptional gene silencing approaches as a tool for the functional analysis of symbiotic genes in the tropical actinorrhizal tree *Casuarina glauca*- Research carried out at IRD, France. **DBT**
- Genetic transformation of Eucalyptus and Casuarina to enhance salinity tolerance.
- Identification of conserved motifs in genes conferring salt tolerance to develop strategies for gene isolation from salt tolerant tree species.

Fostering International partnership

- Functioned as one of the four international partners for "**Transcriptome analysis of salt tolerance in Casuarina trees**" by the Joint Genome Institute, USA, along with the principal collaborator from Research Institute for Development, France, and partners including Université Cheikh Anta Diop, Dakar (UCAD), Senegal and University of New Hampshire, USA.
- Hosted and guided a **CV Raman Post Doctoral Researcher** from **Senegal**, Dr. Nathalie Diagne, for six months (July 2012- January 2013).
- Facilitated PhD student, Mrs Sowmiya Rani, for winning the **DAAD Sandwich Programme** at **Germany** (Dec 2014 to March 2016).
- As IFGTB's international student coordinator, assisted Director, IFGTB in the preparation of ICFRE guidelines for Externally funded Post Doctoral Fellows.

Students supervised for B.Tech/ M.Sc/ project dissertations during the last 5 years

- CV Raman African Postdoctoral Fellows : 2 Completed
- PhD scholars : 3 Completed, 1 ongoing
- CSIR/DAAD scholars : 2
- B. Tech./ M.Sc./ short project dissertations : 8

Selected publications

Selvakesavan, R. K., Dhanya, N. N., Thushara, P., Abraham, S. M., Jayaraj, R.S.C., Balasubramanian, A., Deeparaj, B., Sudha, S., Sowmiya Rani, K.S., Bachpai, V. K. W., Ganesh, C. D., Diagne, N., Laplace, L., Gherbi, H., Svistoonoff, S., Hocher, V., Franche, C., Bogusz, D., **Nambiar-Veetil, M.** 2016. Intraspecies variation in sodium partitioning, potassium and proline accumulation under salt stress in *Casuarina equisetifolia* Forst. Symbiosis. doi:[10.1007/s13199-016-0424-9](https://doi.org/10.1007/s13199-016-0424-9)
Impact factor 1.438

Svistoonoff, S., Benabdoun, F.M., **Nambiar-Veetil, M.**, Imanishi, L., Vaissayre, V., et al. 2013. The independent acquisition of plant root nitrogen-fixing symbiosis in Fabids recruited the same genetic pathway for nodule organogenesis. PLoS ONE, 8: e64515. doi:10.1371/journal.pone.0064515. Impact factor: 3.234

Zhong, C., Mansour, S., **Nambiar-Veetil, M.**, Bogusz, D., and Franche, C. 2013. *Casuarina glauca*: A model tree for basic research in actinorrhizal symbiosis. J Biosci, 38: 815-23. Impact factor: 1.8

Diagne, N., Arumugam, K., Ngom, M., **Nambiar-Veetil, M.**, Franche, C., Narayanan, K.K., and Laplace, L. 2013. Use of Frankia and actinorrhizal plants for degraded lands reclamation. Biomed Res Int, 2013:948258. Epub Nov 11. Impact factor: 2.880

- Balasubramanian, A., Venkatachalam, R., Selvakesavan R. K., Abraham, S. M., Gherbi, H., Svistoonoff, S., Franche, C., Bogusz, D., Krishna Kumar, N. and **Nambiar-Veetil, M.**, 2011. Optimisation of methods for *Agrobacterium rhizogenes* mediated generation of composite plants in *Eucalyptus camaldulensis*. BMC Proc, 5 (Suppl 7):O45.
- Nambiar-Veetil, M.**, Sangeetha, M., Sowmiya Rani, K. S., Aravinthakumar, V., Selvakesavan, R. K., Balasubramanian, A., Venkatachalam, R., Abraham, S. M., Jacob, J. P. and Krishna Kumar, N. 2011. Identification of insect-specific target genes for development of RNAi based control of the Eucalyptus gall pest *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae). BMC Proc, 5(Suppl 7):P98
- Benabdoun, F.M., **Nambiar-Veetil, M.**, Imanishi, L. Svistoonoff, S., Ykhlef, N., Gherbi, H. and Franche, C. 2011. Composite actinorhizal plants with transgenic roots for the study of symbiotic associations with *Frankia*. J Bot, Article ID 702947, 8 pages
- Perrine-Walker, F., Gherbi, H., Imanishi, L., Hocher, V., Ghodhbane-Gtari, F., Lavenus, J, Benabdoun, M, **Nambiar-Veetil, M.**, Svistoonoff, S., and Laplaze, L. 2011. Symbiotic signaling in actinorhizal symbioses. Curr Protein Pept Sci, 12: 156-164. Impact Factor: 2.328
- Svistoonoff, S., Gherbi, H., **Nambiar-Veetil, M.**, Zhong, C., Michalak, Z., Laplaze, L., Vayssaire, V., Auguy, F., Hocher, V., Dumas, P., Bonneau, J., Bogusz, D., and Franche, C. 2009. Contribution of transgenic *Casuarinaceae* to knowledge of the actinorhizal symbiosis. Symbiosis, 50: 3-11. Impact Factor : 1.438
- Gherbi, H., **Nambiar-Veetil, M.**, Zhong,C., Félix, J., Autran, D., Girardin, R., Vaissayre, V., Auguy, F., Bogusz, D and Franche, C. 2008. Post- transcriptional gene silencing in the root system of the actinorhizal tree *Allocasuarina verticillata*. Mol Plant Microbe In, 21: 518–524. Impact Factor: 3.944
- Tripathi, S.B., **Nambiar-Veetil, M.**, and Gurumurthi, K. 2006. Use of genetic markers in the management of micropropagated *Eucalyptus* germplasm. New Forest, 31:361-372. Impact Factor: 1.829, Citation 8
- Nambiar-Veetil, M.**, Tripathi S.B., and Gurumurthi K. 2001. DNA- Fingerprint database management using Microsoft Access- a simple strategy to corroborate fingerprints of clones. PCBMB, 2: 119-124.

Books and Book chapter

- Nambiar-Veetil, M.** and Krishnakumar, N (Eds). 2013. Twenty-five years of Biotechnology Research at IFGTB. Institute of Forest Genetics and Tree Breeding, Coimbatore 641002
- Nambiar-Veetil, M.**, Selvaraj, P., George, B.S., Ganesan, M., Raghunath, T. P., and Krishnakumar N. 2015. Synchronous and rhythmic light display by a panoramic congregation of fireflies at Varagaliar, Anamalai Tiger Reserve, 197-201: In Biodiversity Conservation- Challenges for Future, Laladhas, K.P., Oommen, O. V. and Sudhakaran, P.R. (Eds.), Bentham Science Publishers, Sharjah.

Oral Presentations at International Conferences

Nambiar-Veetil, M., Rathish, P., Balasubramanian, A. and Jacob, J.P. 2017. An *in silico* strategy for rational design of insect specific hpRNAi construct to address biosafety concerns of off target effects in entomophilous trees. Abstracts of 5th South Asia Biosafety Conference- Sept 11-13, 2017, Bangalore, P43. http://ilsirf.org/wp-content/uploads/sites/5/2017/10/SABC2017_PlenaryV_MathishNambiar-Veetil.pdf

Balasubramanian, A., Venkatachalam, R., Selvakesavan R. K., Abraham, S. M., Gherbi, H., Svistoonoff, S., Franche, C., Bogusz, D., Krishna Kumar, N. and **Nambiar-Veetil, M.**, 2011. Optimisation of methods for *Agrobacterium rhizogenes* mediated generation of composite plants in *Eucalyptus camaldulensis*. Tree Biotechnology Conference, 2011, Sau Paulo, Brazil

Database developed and hosted

Web enabled database on gene sequences related to Abiotic stress tolerance is uploaded online for use by researchers working on abiotic stress tolerance www.igbaas-ifgtb.icfre.gov.in

NCBI sequence submissions

Thirty five partial sequences of genes from salt tolerant tree species and insects pest published in NCBI with accession numbers: JF786711, JN157810.1, JN157814.1, JX840854, JN157813.1, JN629033, JX840853, JQ837965, JN157811.1, JX840860, JQ837963, JN157812.1, JX218027.1, JX840855, JX840859, JN629034, JX679724, JX679717, JX679718, JX679719, JX679720, JX679721, JX679722, JX840856, JX840857, JX840858, JX679723, JQ837964, JF772551.1, JF772552.1, JN381022.1, JN673812.1, JQ319890. 1, JF774409.1, JX101956.1

Membership and activities in professional associations

- Functioned as a DBT, GoI, Nominee for the Institutional Biosafety Committee of Bharathiar University, Coimbatore and Tamil Nadu Agricultural University (TNAU), Coimbatore.
- Functioning as member secretary of the Institutional Biosafety Committee Meeting, IFGTB, and organized 13 IBSC meetings.
- Life member of the Indian Science Congress Association.