

1. Major areas of Research:

- ❖ Comprehending the molecular basis of host – pathogen interaction in tree species
- ❖ Isolation and *in planta* validation of defense-related genes
- ❖ Application of DNA markers in tree improvement programs
- ❖ Bio-prospecting novel antifungal proteins from medicinal plants
- ❖ Understanding molecular mechanisms of wood formation and water stress response in Eucalypts using genome-wide expression data.
- ❖ Karyotyping and molecular cytogenetics using FISH technology
- ❖ Whole genome and transcriptome sequencing, assembly and annotation of tropical tree species.



2. Achievements

- Assessed genetic diversity and population structure analysis in short rotation tree species like Casuarina and Eucalypts using dominant (RAPD, ISSR) and co-dominant (SSR) markers.
- Identified species specific SCAR markers for authentication of species and hybrids.
- Developed high throughput markers (SNPs and InDels) using target capture and deep sequencing of trait specific genes.
- Identified molecular pathways during tree – pathogen interaction using *Casuarina - Trichosporium* as a model.
- Isolated defense related genes (antifungal and antipest) and functional characterized them using *in planta* assays.
- Isolated antifungal proteins from pharmaceutically relevant species.
- Developed gene co-expression/ regulatory networks and identified major regulators of wood formation and water stress response in Eucalypts
- High resolution imaging platform used to document root architecture in Eucalypts.
- Karyotyped tree chromosomes and conducted fluorescent *in situ* hybridization (FISH) and Bacterial Artificial Chromosome FISH (BAC FISH) with rDNA probes.
- Developed gene co-expression/ regulatory networks for wood formation and water stress response in Eucalypts
- Sequenced, assembled and annotated sandalwood genome.

3. Projects

NFRP

Ongoing: Nil

Completed:

- i. Identification of secondary xylem specific cellulose synthase genes from *Eucalyptus tereticornis*

EAP

Ongoing:

- i. Multi-environment non destructive phenotyping of wood property traits in inter-specific hybrids of *Eucalyptus*.
- ii. Development of candidate gene based DNA markers in *Eucalypts* for linkage and QTL mapping.
- iii. Establishment of phenomics facility and screen water stress tolerant clones of *Eucalypts* for trait based breeding program.

Completed:

- i. Genome evaluation and characterization in *Casuarinas* and *Eucalyptus* for improving productivity and conservation.
- ii. Identification of broad-spectrum antifungal protein from elite medicinal plants for control of plant pathogens.
- iii. Differential analysis of transcript expression in *Casuarina* – *Trichosporium* interaction to isolate defense – related genes.
- iv. Production of recombinant antifungal/antipest lectin from *Withania somnifera*.
- v. High throughput multi environmental phenotyping of mapping of *Eucalypts* for Adventitious rooting and wood property traits.
- vi. Candidate gene association for identification of pulping trait markers in *Eucalyptus tereticornis*.

4. Biodata

Educational History:

Name of Institution (City/Country)	Period	Field of Study	% of Marks	Degree
Centre for Plant Molecular Biology, Osmania University, Hyderabad, India	1994-2000	Molecular Biology	-	Doctorate in Philosophy (Genetics)
Pachaiyappas College, University of Madras, Chennai, India	1992-1993	Experimental embryology	74%	Master of Philosophy (Botany)
Pachaiyappas College, University of Madras, Chennai, India	1990-1992	Botany	71.6%	Master of Sciences
J,B.A.S. Women's College, University of Madras, Chennai, India	1987-1990	Botany, Chemistry & Zoology	81.5%	Bachelor of Sciences

Professional Appointments :

S. No.	Institution	Position	From (Date)	To (date)
1.	Institute of Forest Genetics and Tree Breeding, Coimbatore	Scientist F	2015	Till Date
2.	Institute of Forest Genetics and Tree Breeding, Coimbatore	Scientist E	2010	2015
3.	Institute of Forest Genetics and Tree Breeding, Coimbatore	Scientist D	2006	2010
4.	Institute of Forest Genetics and Tree Breeding, Coimbatore	Scientist C	2002	2005
5.	Institute of Forest Genetics and Tree Breeding, Coimbatore	Scientist B	1998	2001

Awards & Honors (Individual)

1. Chief Instructor of the the Guinness World Record on “Most people conducting a DNA isolation experiment simultaneously” held at 4th India International Science Festival held at Lucknow from 5 – 8 October 2018.
2. Receptient of travel grant from Australian Centre for International Agricultural Research (ACIAR) to attend the IUFRO Eucalypt Conference 2015 held at Zhangjiang, China in 2015.
3. Recipient of fellowship from International timber trade organization (ITTO) for the year 2012-2013 to undergo hands-on-training "Molecular cytogenetics techniques" at Texas A&M university, College Station, Texas, USA.
4. Recipient of DBT-CREST Award for the year 2010-2011 by Department of Biotechnology, Govt. of India.
5. Recipient of Scientist Assistance Program (SAP) Grant to attend the XXIII IUFRO World Congress in 2010.
6. Recipient of International travel grant from FAO to attend the World Forestry Congress on “Forests in Development: A Vital Balance” in 2009.
7. Recipient of International travel grant to attend the International Symposium on “Forest Genetic Resources Conservation and sustainable utilization towards climate change mitigation and adaptation" at Kuala Lumpur, Malaysia in 2009.
8. Recipient of International grant to attend the Training workshop “Forest Biodiversity - Conservation and Management of Forest Genetic Resources” held at Kuala Lumpur, Malaysia in 2008.
9. Received (along with five other researchers) the ICFRE Award of Excellence in Forest Biotechnology for the year 2001-2002.
10. Qualified CSIR-UGC National Eligibility Test.
11. University First rank holder for Masters degree.
12. Receptient of Pulni Andy Gold medal for Masters degree. Receptient of Madras University Student club Endowment prize for Masters degree.
Receptient of Jawaharlal Nehru Memorial Award for Masters degree.
13. University Second rank holder for Bachelors degree.

14. Receptient of National Scholarship from Govt. Of India for Bachelors degree.

Patent:

- Granted Indian patent titled “A simple protocol for isolation of undegraded total RNA from Eucalyptus and Casuarina and cDNA synthesis from unpurified RNA” (patent number 272765).

Technology Transfer to R& D Company:

- The technology on “Isolation of Nucleic Acid from plant tissues” was *licensed to Sai Genomics Solutions, Coimbatore on non-exclusive basis* in collaboration with Biotech Consortium India Ltd. New Delhi. It is a low cost, rapid and high recovery protocol for isolation of nucleic acid without use of any hazardous chemicals.

Membership in National and International Committees:

1. Deputy Co-ordinator of the IUFRO Unit 2.04.01 – Population, Ecological and Conservation Genetics.
2. Member of Screening Committee of the NER Twinning R&D Program under Department of Biotechnology, Government of India from 2016.
3. Member of Task Force on “Basic Plant Biology, Agriculture and Frontier Areas” of Department of Biotechnology, Govt. of India from 2014.
4. Nominated as Nodal Officer in subject area of “Genome Mapping and Sequencing” by Indian Council of Forestry Research and Education, Dehra Dun from 2014.
5. Department of Biotechnology, Govt of India nominee to the Institutional Biosafety Committee of Bharathidasan University, Trichy and Rubber Research Institute of India, Kottayam from 2013.
6. Member of International Climate-Resilient Crop Genomics Consortium (ICRCGC) since 2012.
7. Member of Ginger group and Think tank of Indian Council of Forestry Research and Education, Dehra Dun, India.
8. Member of the Research Advisory Group of Institute of Forest Genetics and Tree Breeding, Coimbatore from 2008 – 2009.

International Trainings:

- Undergone two months training in "Molecular Cytogenetics Techniques" from March 2014 to May 2014 at Forest Science Laboratory, Department of Ecosystem Science & Management Texas A&M University, College Station, Texas, USA under the ITTO fellowship.
- Undergone six months training on “Forest Genomics” at Department of Ecosystem Science & Management Texas A&M University, College Station, Texas, USA from November 2011 to April 2012 under the DBT-CREST Award funded by Department of Biotechnology, Govt. Of

India. The title of the project undertaken was ‘SNP discovery in candidate genes related to wood property traits in Eucalypts for QTL and Association mapping’.

Publications:

Research papers :	37
Books (Chapter):	9
Cumulative Impact factor :	40.129
h-index:	12

Selected peer-reviewed publications

1. George, B.S., Silambarasan, S., Senthil, K., Jacob, J.P. and Ghosh Dasgupta, M. (2018). Characterization of an insecticidal protein from *Withania somnifera* against lepidopteran and hemipteran pest. *Molecular Biotechnology* DOI: 10.1007/s12033-018-0070-y. (JIF: 1.634)
2. Ghosh Dasgupta, M. and Dharanishanthi V. (2017). Identification of PEG-induced water stress responsive transcripts using co-expression network in *Eucalyptus grandis*. *Gene* (JIF: 2.415).
3. Dharanishanthi, V. and Dasgupta, M. G. (2016). Construction of co-expression network based on natural expression variation of xylogenesis-related transcripts in *Eucalyptus tereticornis*. *Molecular biology reports*, 43: 1129-1146 (JIF: 1.698).
4. Dasgupta, M.G., Dharanishanthi, V., Agarwal, I. and Krutovsky, K.V. (2015). Development of genetic markers in *Eucalyptus* species by target enrichment and exome sequencing. *PLoS ONE* 10(1): e0116528. doi:10.1371/journal.pone.0116528 (JIF: 3.534). (JIF: 3.534)
5. Radha Veluthakkal and Modhumita Ghosh Dasgupta (2015). *Agrobacterium*-mediated transformation of chitinase gene from the actinorhizal tree *Casuarina equisetifolia* in *Nicotiana tabacum*. *Biologia* 70: 905–914 (JIF: 0.827)
6. Ghosh Dasgupta, M., George, B.S., Bhatia, A. and Sidhu, O.P. (2014). Characterization of *Withania somnifera* leaf transcriptome and expression analysis of pathogenesis – related genes during salicylic acid signaling. *PLoS ONE* 9(4): e94803. doi:10.1371/journal.pone.0094803. (JIF: 3.534)
7. Karpaga Raja Sundari, B. and Ghosh Dasgupta, M. (2014). Isolation of developing secondary xylem specific cellulose synthase genes and their expression profiles during hormone signalling in *Eucalyptus tereticornis*. *Journal of Genetics* 93: 403 - 414. (JIF: 1.013)
8. Veluthakkal, R and Ghosh Dasgupta, M. (2012). Isolation and characterization of pathogen defence-related class I chitinase from the actinorhizal tree *Casuarina equisetifolia*. *Forest Pathology*, DOI: 10.1111/j.1439-0329.2012.00781.x (JIF: 1.67)
9. Veluthakkal, R., B. Karpaga Raja Sundari, Ghosh Dasgupta, M. (2012). Tree chitinases – stress and developmental-driven gene regulation. *Forest Pathology*, DOI: 10.1111/j.1439-0329.2011.00759.x (JIF: 1.67)

10. Ghosh, M., Chezhain, P., Sumathi, R. and Yasodha, R. (2011). Development of SCAR marker in *Casuarina equisetifolia* for species authentication. *Trees - Structure and Function* 25: 465-472. (JIF: 1.685)
11. Ghosh M. (2006). Antifungal properties of haem peroxidase from *Acorus calamus*. *Annals of Botany* 98(6):1145-1153. (JIF: 2.44)
12. Balasaravanan, T., Chezhian, P., Kamalakannan, R., Ghosh, M., Yasodha, R., Varghese, M. and Gurumurthi, K. (2005). Analysis of inter- and intra-species genetic relationships among six *Eucalyptus* species by inter-simple sequence repeats (ISSR). *Tree Physiology* 25: 1295-1302. (JIF: 2.101)