CURRICULUM VITAE

Name	:	**Dr Mallikarjuna Gadwala**
Designation	:	Scientist-C
Qualification	:	M. Sc, Ph. D
Organization	:	Central Silk Board (Ministry of Textiles, Govt of India)
Subject Specialization	:	Sericulture (Silkworm Immunity and Pathology)
Date of birth	:	01-07-1980

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Office Address with Fax No.	:	**Dr Mallikarjuna Gadwala** Scientist-C **Silkworm Pathology Section** **Central Sericulture Research and Training Institute**, Central Silk Board Srirampura, Manadawadi Road Mysore-570008 Karnataka Fax No: 0821-2363845

Academic qualification

Degree	University / College	Subjects	Year of Passing
B. Sc	Sri Krishnadevaraya University, Anantapur, Andhra Pradesh	**Botany, Zoology & Chemistry**	2001
B. Ed	Sri Krishnadevaraya University, Anantapur, Andhra Pradesh	**Biology**	2005
M. Sc	Sri Krishnadevaraya University, Anantapur, Andhra Pradesh	**Sericulture**	2007
Ph. D	Karnatak University, Dharwad, Karnataka	**Sericulture**	2014

Academic Research Experience

Completed my M.Sc in Sericulture at Sri Krishnadevaraya University, Anantapur, Andhra Pradesh and Ph.D. in sericulture with silkworm immunity and pathology as

specialization from Karnataka University, Dharwad, Karnataka. I have gained rich experience in insect (Silkworm *Bombyx mori* L) immunity and pathology. During my doctoral research I was trained in insect biochemistry especially haemolymph protein study. I used SDS-PAGE and Two-Dimensional gel electrophoresis (2-DE) for characterization of total haemolymph proteins their *pI* values and Molecular weights. I could successfully complete screening of antibacterial proteins from silkworm *Bombyx mori* by using different proteomics and spectroscopic methods. I have intensive experiences in molecular biology and protein chemistry.

In addition, I am familiar with different molecular techniques including, Protein purification (Gel filtration, ion exchange), Protein Characterization, SDS-PAGE, 2-DE, PCR, Blotting techniques, ELISA, RAPD analysis, Tissue Culture, Embryo culture.

Research Work Experience

Insects are one of the successful animals on the planet they survive in all kinds of environments and can be found in all geographic climates. The Success of their survival can be attributed to the unique immune system of the insects. Unlike higher animals' insects don't have the capacity to produces antibodies but instead rely on production of inducible antibacterial proteins which protects them from infections. I have studied the insect model silkworm for induced expression of novel antibacterial proteins by using Two-dimensional electrophoresis which is a high-resolution proteomic technique. We have found that insects produce stress proteins which also act as antimicrobial proteins for fighting infections and our study has paved way to realize the insights of insect immune capacity to survive infections.

I have worked as a Senior Research Fellow in Biotechnology Department, University of Agriculture Sciences on *Bt* cotton research. Cry1Ac, Cry2Ab these are the most important *Bt* proteins against the cotton pest such as pink bollworm and other bollworms. I could successfully screen cotton in different generation like F_1, BCF_1 and BC_2F_1. For B*t* conformation used different molecular techniques such as PCR, ELISA analysis and RAPD analysis.

Present Research:

Presently I am working on the microsporidia which is most deadly disease pebrine causes the silkworm. Collected different butterflies from the institute mulberry garden and screened for microsporidian infection. Total 20 butterflies species (Common emigrant, Common four ring, Common mormone, Crimson rose, Dakhan common gull, Dakhan common castor, Dakhan dark blue tiger, Dakhan yellow orange tip, Double branded black crow, Dragon fly, Indian bush hopper, Indian pioneer, Indian wanderer, Oriental chocolate,

Oriental mottled emigrant, Oriental plain tiger, Oriental psyche, Red line small grass yellow, Sahyadri common albatross, Sylhet three spot grass yellow and White orange) and leaf rollers were collected. Out of 21 butterfly species 09 were infected with microsporidia. The 09 isolates were inoculated to silkworm for identify the infectivity. All isolates were infectious to silkworm and got transmitted to tranovarially.

Genome size of the microsporidia ranges between 2.3 to 23 Mbp (Kelling *et al*., 2005). The first full genome sequence of microsporidian reported is that *Encephalitozoon cuniculi*, which is 2.9 Mbp (Katinka *et al.,* 2011). *Nosema ceranae* infecting honey bee has a size of 7.85 Mbp (Comman *et al*., 2009) and genome of *N. apis* has an estimated size of 8.5 Mbp (Chan *et al*., 2013). *Nosema bombycis* has genome size of 15.7 Mbp and *Nosema antheraeae* has 7.4 Mb (Pan *et al.,* 2013).

The dreaded disease pebrine in silkworm, *Bombyx mori* is caused by *Nosema bombycis*. Other genus of microsporidia also infects silkworm. Full genome sequence of *N. bombycis* and *N. antherea* from China are available. Only partial sequence of the *Vairimorpha* spp. and *Nosema spodopterae* isolated from the *Spodoptera litura* and lepidopterans insects are available. No attempt has been made for the sequencing of the microsporidia isolated from India. Shallow genome sequence will give the complete genome of the parasite and it will provide information about the genes which are involved in the infectivity and germination. The comparative analysis of the genome will help in identification of differences that are conserved in different microsporidia and genes that are unique for the individual species. The difference in infectivity and virulence can be understood from this. The information can be used for the development of tools for the control of the microsporidian infection. Transmission studies of the collected microsporidia also will be done to find non transovarially transmitted microsporidia, if any.

Project(s) submitted/being pursued/carried out

SI. No	Title of the Project	Funding Agency	Duration (from - to)	Total approved cost of the project
1.	**APR-3559:** Validation trails of automated disinfection of silkworm rearing house	CSB	Jan 2016 to March 2017	5.00 Lakhs
2.	**ARP-3597:** Standardization and validation of LAMP (Loop mediated isothermal amplification reaction) technique for the detection of *Nosema bombycis* infection in silkworm	CSB	October 2016 to February 2017	12.0 Lakhs

Utilization status of the output of the projects completed during the last five years as a Principal/Co-investigator

APR-3550: Validation trials of automated disinfection of silkworm rearing house.

The Automated disinfection system will be installed for different type of rearing sheds popularized in the CSR&TI Mysuru command area. Working on removal of water hardness in the field for using automated disinfection system.

ARP-3597: Standardization and validation of LAMP (Loop mediated isothermal amplification reaction) technique for the detection of *Nosema bombycis* infection in silkworm, *Bombyx mori* L.

Standardized the technology by using different silkworm stages for detection of *N. bombycis* infection. Tested different concentration of *N. bombycis* inoculated samples 10^1 to 10^8. Received samples from different seed multiplication units for validation of the technology, total more than 4000 samples were tested and submitted the report. Will be standardized the egg/chawki larvae samples for large scale testing in the different seed multiplication levels.

Presently working on pebrine causative agent *Nosema bombycis* and different microsporidia spore's identification and characterization by using molecular techniques. And also, proposed research project, elucidation of immune signaling pathways that could be activated by NPV infection to further delineate the cellular signaling pathways involved in baculovirus infection and finding novel therapeutic targets for NPV will be studied. It is proposed to evaluate the inhibitory ability of seven oral drugs which target PI3K-Akt-pathway in BmNPV infected silkworms to inhibit viral proliferation in Bm cells and afterwards in silkworms for developing potential drugs for the management of Grasserie disease in silkworm. Hence in the present study through screening of differential gene expression will reveal the inhibitory factors associated with disease control and followed by selection of effective chemical compounds which can control the disease post infection to minimize the crop loss in sericulture.

Expertise

- Electrophoresis techniques
- Two-Dimensional Gel Electrophoresis
- Protein purification
- Blotting techniques
- PCR
- RAPD
- ELISA
- LAMP technology
- Microbiology Techniques

Seed analyst and Seed Officers

- Attended training programme on "**Orientation training on seed officers and analysts**" held at CSR&TI-Mysuru on **04.01.2019 to 05.01.2019**
- Attended training programme on "**Quarantine Procedures**" held at NSSO, Bangalore on **04.01.2017 to 06.01.2017**
- Training programme on **"Orientation training on seed officers and analysts".** Held at CSR&TI, Mysuru from **19th to 20th November, 2015.**

Krishimela

- Attended krishimela at CSR&TI-Mysuru-2019
- Attended krishimela at Hassan-2018
- Attended National Workshop on "Innovative technologies in sericulture" held on 17-18 November 2015 at CSRTI-Mysuru
- Worked accommodation and transport committee member in National Workshop on "Innovative technologies in sericulture" held on 17-18 November 2015 at CSRTI-Mysuru and Krishimelas in Doddaballapura (2017), Hassan (2018)

Official language Hindi workshops

- Attended official language Hindi workshops at CSR&TI-Mysuru on 17.08.2018
- Attended official language Hindi workshops on "Personal Contact Program" at Kendriya Sadan, Bangalore held on 13.12.2017
- Attended official language Hindi workshops at CSR&TI-Mysuru on 02.08.2017
- Attended official language Hindi workshops at CSR&TI-Mysuru on 02.02.2016
- Attended official language Hindi workshops at CSR&TI-Mysuru on 02.12.2015

Promotions / Awards received

- Promoted as a **Scientist-C** in silkworm Pathology Section at Central Sericultural Research and Training Institute, Mysuru, Central Silk Board, Karnataka (July 2019 to till to date).
- Joined as a **Scientist-B** in silkworm Pathology Section at Central Sericultural Research and Training Institute, Mysuru, Central Silk Board, Karnataka (Oct-2015 to June-2019).
- Awarded as a **Senior Research Fellow (2015)** by University of Agricultural Sciences, Dharwad, Karnataka, India.
- Awarded as a **Senior Research Fellow (2014-2015)** by University of Agricultural Sciences, Dharwad, Karnataka, India.
- Awarded as a **Project Fellow Fellowship (2009-2012)** by University Grants Commission, New Delhi, India.

Research publications/ attended conferences

Publications		Numbers
Research papers	:	11
Books	:	02
Research abstracts	:	09
Conference/Seminars/workshops	:	23
Pamphlets	:	03
NCBI sequence	:	04

Pamphlets

a. **"Automation in Disinfection of Silkworm Rearing House**"- Technical Bulletine No. 16 (English).
b. "**Pattupurugula Pempakagruhamulo Automated Disinfection Vyavastha**" – Technical Bulletine No. 16 (Telugu).
c. "**Reshme Hulu Sakaniyalli Swayamchalitha Sunku Nivarana Gataka**" – Technical Bulletine No. 16 (Kannada).

Books

1. Hand Book on "**Automated Disinfection System for Disinfection of Silkworm Rearing House"**. (English)
2. Hand Book on "**Automated Disinfection System for Disinfection of Silkworm Rearing House"**. (Kannada)

NCBI sequence submitted

1. **Accession No: MG831720**
   128 bp DNA linear PLN 29-JAN-2018 *Nosema* sp. isolate AA1 small subunit ribosomal RNA gene, partial sequence.
2. **Accession No: MG831719**
   124 bp DNA linear PLN 29-JAN-2018 *Nosema* sp. isolate NIK-1S small subunit ribosomal RNA gene, partial sequence.
3. **Accession No: MN416240**
   164 bp DNA linear PLN 12-SEP-2019 Nosema sp. voucher J, 2019 small subunit ribosomal RNA gene, partial sequence.
4. **Accession No: MN416241**
   158 bp DNA linear PLN 12-SEP-2019 *Nosema* sp. voucher J, 2019 small subunit ribosomal RNA gene, partial sequence.

Reviewer for two research journals

1. **Journal of 3Biotech**
2. **Journal of Applied Pharmaceutical Science**
3. **Jordan Journal of Biological Sciences**

Guided M.Sc Biochemistry students in their dissertation work

1. **Mr. Venkatesh A: M.Sc Biochemistry,** Dissertations entitled "Proteomic Analysis of the Silkworm Heamolymph during the *N. bombycis* Infection". (2018).
2. **Mr. Kishore K: M.Sc Biochemistry,** Dissertations entitled "Proteomic Analysis of the Silkworm Midgut during the *N. bombycis* Infection". (2018).
3. **Mr. Sandeep B: M.Sc Biotechnology,** Dissertations entitled "Expression of 90kDa protein in different silkworm *Bombyx mori* L. races after inoculation with different pathogens". (2019).
4. **Miss. Sufia Siddique Y: M.Sc Biotechnology,** Dissertations entitled "Proteomic analysis of different silkworm *Bombyx mori* L Bivoltine Breeds". (2019).
5. **Miss Varsha A: M.Sc Microbiology,** Dissertation entitled "Proteomic analysis of fungal pathogen isolated from silkworm *Bombyx mori* L". (2019).
6. **Miss Harshitha A: M.Sc Microbiology,** Dissertation entitled "Proteomic analysis of bacteria isolated from midgut of silkworm *Bombyx mori* L". (2019)

International/National conferences / workshops / meeting /training attended

- National Conference on "**Challenges and Innovative Approaches in Agriculture and Allied Sciences Research**". Held at Salem from 26.07.2019 to 27.07.2019.
- National Conference on "**Seri-Biomics: Challenges, Innovations and Solutions**". Held at Department of Studies in Sericulture Science, University of Mysuru. On 15-17 February 2018.
- Participation in the trainings and workshops on "**Theory Constraints, Lean, Six Sigma and Innovation**" at CSRTI-Mysuru, held on 25th August 2017.
- Participated in the workshop on "**Capacity Building with special reference to presentation, oral communication, body language**" at CSRTI-Mysuru, held on 7th November 2017.
- Attended national workshop on "**Innovative technologies in sericulture**" held on 17-18 November 2015 at CSRTI-Mysuru.
- Training program on **"Direct Trainer Skills".** Held at Administrative Training Institute, Mysuru from 17-07-2017 to 21-07-2017.
- Training program on **"Intensive Bivoltine Training".** Held at CSRTI, Mysuru, from 17-10-2016 to 26-11-2016.
- **Foundation training Program for Newly Inducted Scientist-B in CSB.** Held at CSB Bengalore, CSRTI Mysuru, CMERTI Lohdoigarh. On 29.02.2016 to 15.03.2016.

- National workshop on **"Innovative technologies and best practices in sericulture"** at CSR&TI, Mysuru, on 17th & 18th November, 2015.
- One day National Seminar on "**Recent Trends in Environmental Biotechnology and Sustainable Energy".** Held at Department of Biotechnology and Microbiology, Karnatak University, Dharwad. On 10 August 2015.
- **International Conference on Advance in bio polymer drug delivery systems (2014).** Held at Creative Educational Society's College of Pharmacy, Kurnool, Andhra Pradesh. On 30th to 31st January 2014.
- **National workshop on application of Bioinformatics Tools in Biological Science (2013).** Held at P.G. Dept of Biotechnology & Microbiology, Karnatak University. Dharwad, Karnataka. On 30th March 2013.
- **National Seminar on "Parasite fate in to living System**". Held at Department of Zoology, Mahatma Gandhi Mahavidyalaya, Ahmedpur, Maharastra. on dated 24th & 25th August 2012
- **National Conference on Biodiversity & Biotechnology for Sustainable Development (2011).** Held at P.G. Dept of Botany, Karnatak University. Dharwad, Karnataka. On 21st to 22nd March 2011.
- **International Conference on Genomics & Proteomics (2011).** Held at School of Biotechnology NIT Calicut, Kerala, 14th to 16 July, 2011.
- **One day workshop on Intellectual Property Rights (2011).** Held at Planning and Development Section, Karnatak University, Dharwad. On 29th June, 2011.
- **Role of real time PCR in the Diagnosis of Infectious Diseases (2011).** Held at S.S. Institute of Medical Sciences & Research Centre. Davangere on 30th April 2011.
- **State level workshop on using SPSS for Research and Data Analysis (2010).** Held at Kousali Institute of Management Studies, Karnatak University, Dharwad. On 21st November 2010.
- **Seminar on Capillary Electrophoresis PA 800 Plus A new tool in protein characterization and Small Molecule Analysis (2010).** Held at Beckman Coulter, Hyderabad. On 16th July 2010.
- **Awareness Training Programme on Biodiversity related issues and People's Biodiversity Register (2009).** Held at Dept of Applied Genetics, Karnatak University, Dharwad. On 25th May 2009.
- **National Seminar on Scenario of Seri biotechnological Research in India (2008).** Held at Dept of Sericulture, Sri Padmavathi Mahila Visvavidyalayam, Tirupati, Andhra Pradesh, 28th to 30th Aug, 2008.
- **International Colloquium on Nanotechnology (2008).** Held at S.D.M College of Engineering & Technology Dharwad, Karnataka, on 8th and 9th July, 2008**.**
- **International Conference on Trends in Seri biotechnology (2008).** Held at Dept of Sericulture, Sri Krishna Devaraya University, Anantapur. A.P, on 27th to 29th March, 2008.

List of Publications

- **G. Mallikarjuna**, A. Harshitha, E. Bhuvaneswari, L. Satish, N. Varsha, A.R. Narasimha Nayak and R.S. Teotia. (2019). Identification and characterization of gut microbiota in silkworm Bombyx mori L. ***Indian Journal of Sericulture***. (Accepted).
- Narasimha Nayaka A.R., Sharma SD., **Mallikarjuna G** and Teotia R.S. (2019). Histopathological studies of newly isolated microsporidian NIK-5hm infecting tissues of Silkworm, Bombyx mori L. ***International Journal of Multidisciplinary Research and Development***. 6(5): 104-106
- Venkatesh A., Kishore K., **Mallikarjuna G.**, Satish L., Mary Josepha A.V and Sivaprasad V. (2019). Comparative proteomic profiling of silkworm hemolymph during Nosema bombycis infection. ***Journal of Entomology and Zoology Studies***. 7(1): 754-759.
- Mudasir G., Mary Josepha A.V., Satish L., Chouhan S., **Mallikarjuna G.**, Mir N.A and Sivaprasad V. (2018). Prevalence and molecular characterization of viruses causing diseases in Bombyx mori L. (Lepidoptera: Bombycidae) from different climatic regions of India. ***Journal of Biological Control***. 32(4): 252-256.
- **G Mallikarjuna**, NK Neetha , B Manjunatha, V Sivaprasad and V Shyam kumar. (2016). A mini review of Functional proteins in silkworm *bombyx mori* L haemolymph. ***Indian journal of Science and Technology***. *Vol 9(38), DOI: 10.17485/ijst/2016/v9i38/73884, October 2016*
- Vootla SK, Lu MX, Kari N, **Gadwala M,** Lu Q. (2013). Rapid detection of infectious flacherie virus of the silkworm, *Bombyx mori*, using RT-PCR and nested PCR. ***Journal of Insect Science. 13:120***. Available online: http://www.insectscience.org/13.120
- **Mallikarjuna Gadwala**, Neetha N. Kari, Narayan Muger and Shyam Kumar V.* (2013). Effective solubilization procedure for analysis of silkworm haemolymph proteins by two-dimensional gel electrophoresis. ***Applied Biochemistry and Biotechnology. 169:1459–1466.***
- **Mallikarjuna Gadwala**, Neetha N. Kari and Shyam Kumar V.* (2012). Protein precipitation strategies for Two dimensional electrophoretic analysis of silkworm (*B. mori*) haemolymph proteins. ***Global Journal of Applied Agricultural Research. 2(1): 39-43.***
- M. K. Suparna, **G. Mallikarjun**, S. S. Ingalhalli, V. Shyam kumar and a. A. Hooli. (2011). Role of antibacterial proteins in different silkworm Strains against flacherie. ***The Bioscan. 6(3): 365-369.***
- Joy Harris Hoskeri, Krishna Venkatarangaiah., Santhosh Kondajji Hanumanthappa1, Shyam Kumar Vootla, **Mallikarjuna Gadwala**. (2011). CNS depressant activity of extracts from *Flaveria trinervia* Spring C. Mohr. ***Phytopharmacology, 1(4) 100-107.***
- Yanwen Wang, V. Shyam kumar, Neetha Kari and **Mallikarjun Gadwala**. (2009). Optimization of the conditions for RAPD analysis of Enterococci isolated from Silkworm *Bombyx mori*. ***Current Biotica. 3(2): 127-134.***

Abstracts

- Shyam kumar V., Darshan GH, and **Mallikarjuna G**. Fabrication of conductive Antheraea Mylitta silk fibroin hydrogels for nerve tissue engineering. International conference. Held at **Zhejiang university, China** on October 2019.
- **Mallikarjuna G.,** Satish L., Kishore K. K., Venkatesh A., Mary Josepha A.V., Madhusudhan KN., Santha P.C., Moorthy SM., Sivaprasad V and Teotia R.S. Molecular Characterization of Silkworm, *Bombyx mori* L. Midgut Protein at Different Days of Post Inoculation of Microsporidia, *Nosema bombycis*. **National Conference on "Challenges and Innovative Approaches in Agriculture and Allied Sciences Research"**. Held at Salem from 26.07.2019 to 27.07.2019.
- AR. Narasimha Nayaka., **G. Mallikarjuna.,** PC. Santha and V. Sivaprasad. Automated disinfection of silkworm rearing house. **National Conference on "Seri-Biomics: Challenges, Innovations and Solutions".** Held at Department of Studies in Sericulture Science, University of Mysuru. On 15-17 February 2018.
- V.Shyam Kumar, Julien Gautrot, Darshan G.H. and **Mallikarjun G.** Applications of Tasar and Muga Silk Sericin as Material for Drug Delivery. **International Conference on Advance in bio polymer drug delivery systems (2014). Held at Creative Educational Society's College of Pharmacy, Kurnool, Andhra Pradesh.** On 30th to 31st January 2014.
- V.Shyam kumar and **Mallikarjun Gadwala**. Screening of immune protein profile of silkworm Bombyx mori in different races using Two-Dimensional Electrophoresis. **National Seminar on "Parasite fate in to living System".** Held at Department of Zoology, Mahatma Gandhi Mahavidyalaya, Ahmedpur, Maharastra. on dated 24th & 25th August 2012
- **Mallikarjun Gadwala.,** V Shyam kumar., Neetha kari., Narayan Moger. and B.B.Kaliwal Screening of inducible immune proteins from silkworm bombyx mori by two dimensional electrophoresis. **VIIth International conference on Arthropods:Chemical physiological Biotechnological and environmental aspects**. Sept 18-23 2011 Poland.
- **Mallikajun G.,** Neetha N. Kari and Shyam kumar V. Two-dimensional Proteomic Analysis of Inducible Antibacterial proteins from Silkworm *Bombyx mori* L. **National Conference on Biodiversity & Biotechnology for Sustainable Development (2011).** Held at P.G. Dept of Botany, Karnatak University. Dharwad, Karnataka. On 21st to 22nd March 2011.
- **Mallikarjuna G.,** Neetha NK. and Shyam kumar V. Protein precipitation strategies for two dimensional electrophoretic analysis of silkworm (*B. mori*) haemolymh proteins. **International Conference on Genomics & Proteomics (2011).** Held at School of Biotechnology NIT Calicut, Kerala, 14th to 16 July, 2011.