G. SHARATH CHANDRA

Senior Research Fellow, **IIHR**
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https://www.researchgate.net/profile/Sharath_Chandra3

CAREER OBJECTIVE

To obtain a position that will allow me to use my skills gained in the field of Biotechnology. To be a part of an organization that has a long-term vision. Finally, to explore new domains by means of experimentation and constantly updating my knowledge in cutting-edge research in agriculture. I am confident of my functional abilities and looking forward to take up challenges.

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Permanent Address:

G. Sharath Chandra,
S/O. G.P. Subbarayudu,
H.No: 7-307, Nadigadda,
Nandyal, Kurnool District,
Andhra Pradesh-518501,
India.

Present Address:

G. Sharath Chandra,
C/o. Dr. R. Asokan, Division of Biotechnology, Indian Institute of Horticulture (IIHR),
Hesaraghatta Lake post,
Bengaluru-560089, Karnataka,
India.

Status:
Permanent Residency-India

Personal Data:

D.O.B: 31/08/1985
Nationality: Indian
Marital Status: Single
Languages: English, Hindi, Telugu, Kanada.
Interests: Cricket, Reading Books, Web browsing.

Technical Expertise:

Molecular Biology Techniques: Extraction of DNA and RNA from plant, insect & bacteria, Plasmid Isolation, *In vivo* and *In vitro* double-stranded RNA expression, extraction, labeling & analysis, Polymerase chain Reaction (Gradient, Touch-down, Nested, Overlap extension, Multiplex, Quantitative Real-time and Semi-quantitative PCR/s). Optimization of Real time PCR for expression & copy number analysis. Protein Expression in *E.coli*, Purification, rising of antibodies in rabbits. Protein extraction from insects and plants, Western blotting, Southern Blotting and Northern blotting, 5' and 3' RACE.

Genetic Engineering Techniques: Vector construction for Plant transformation, Cloning, Restriction digestion, Bacterial transformation, Electroporation. Transient expression of dsRNA in plants using Agroinfiltration.

Biochemical Assays: Activity staining (Zymograms) of trypsin, chymotrypsin, elastase and Cytochrome P450. Assaying the levels of trypsin, chymotrypsin, elastase, Aminopeptidase, Total Protease, Cytochrome P450 and Acetyl choline esterase of insects.

Plant Tissue culture: Optimization of transformation and regeneration of Tomato and Tobacco.

Bioinformatics: Primer & Probe designing, Phylogenetic analysis, protein structure prediction, Identification of miRNA and their targets prediction, *In silico* vector construction and analysis, promoter prediction, RNA folding prediction.

Communication skills: Prior patent search, Patent filing, Research Article writing and communication, reviewing of research article and presentation of research articles in conferences.

Computer skills: Installation of operating systems, windows XP, Vista. Windows 7, 8 & 10; Ms-office, computer Languages C, C++, oracle, Visual basics.

Patents filed

1. M. Manamohan, R. Asokan, N.K. Krishna Kumar and **G. Sharath Chandra.** Single PCR, single ligation and single transformation method to generate intron containing hairpin RNA for RNA interference in plants. Application No.1477/DEL/2011 A. Publication Date: 30/12/2011 (Indian patent).

Cumulative Impact Factor: 18.91; Average Impact Factor: 1.26; H-Index: 4, i10 Index: 1;
Total Citations: 48
Published Research Articles

Sl. No	Title of Paper	Authors List	Journal Name	Volume, Issue and Page No	Year of Publication	Impact factor	Citation Index (Cited in)
1	Modified competing polymerase chain reaction primer for single tube quantitative PCR	**G. Sharath Chandra**, R. Asokan, M. Manmohan	*Analytical Biochemistry*	427:175–177	2012	**2.243**	-
2	Evaluation of reference genes for quantitative Real-Time PCR normalization in Cotton bollworm, *Helicoverpa armigera*	**G. Sharath Chandra**, R. Asokan and M. Manamohan, N. K. Krishna Kumar, and T.	*Molecular Biology*	*48(6): 813-822*	2014	**0.612**	2
3	Cytochrome P450 isoforms transcriptional, larval growth and development responses to host allelochemicals in the generalist Herbivore, *Helicoverpa armigera*	**G. Sharath Chandra**, R. Asokan, M. Manamohan and T. Sita	*Current Science*	110(5): 901-906	2016	**0.927**	-
4	One-step DNA fragment assembly for expressing intron containing hairpin RNA in plants for gene silencing	M. Manamohan, **G. Sharath Chandra**, R. Asokan, H. Deepa, M.N. Prakash	*Analytical Biochemistry*	433:189–191	2013	**2.243**	3
5	Effect of diet delivered various concentrations of double-stranded RNA in silencing a midgut and a non-midgut gene of *Helicoverpa armigera*	R. Asokan, **G. Sharath Chandra**, M. Manamohan and N.K. Krishna Kumar	*Bulletin of Entomological Research*	103:555–563	2013	**1.761**	13
6	Response of various target genes to diet-delivered dsRNA mediated RNA interference in the cotton bollworm, *Helicoverpa armigera*	R. Asokan, **G. Sharath Chandra**, M. Manamohan, N.K. Krishna Kumar and T. Sita	*Journal of Pest Science*	87:163-172	2014	**3.103**	9
7	Anthocyanin enrichment in tomato fruit by metabolic engineering	M. Manamohan, **G. Sharath Chandra,** M. N. Prakash, H. Deepa, et al.,	*Current Science*	105(1):72-80	2013	**0.927**	4
8	An improved protocol for rapid and efficient *Agrobacterium* mediated transformation of tomato (*Solanum lycopersicum* L.)	M. Manamohan, M.N. Prakash, **G. Sharath Chandra**, R. Asokan and S. N. Nagesha	*Journal of Applied Horticulture*	13:3-7	2011	-	4
9	Tyrosine hydroxylase, a potential target for the RNAi mediated management of diamondback moth (Lepidoptera: Plutellidae)	R. Ellango, R. Asokan, **G. Sharath Chandra**, N. K. Krishna Kumar, et al.,	*Florida Entomologist*	99(3): 1-5	2016	**0.975**	-
10	Common siRNAs for various target genes of the fruit borer, *Helicoverpa armigera* Hubner (Lepidoptera: Noctuidae).	R. Asokan, S. N. Nagesha, M. Manamohan, N. K. Krishnakumar, H. M. Mahadevaswamy, M. N. Prakash, **G. Sharath Chandra**, et al.,	*Current Science*	102: 1692-1699	2012	**0.927**	3

11	Molecular diversity of *Helicoverpa armigera* Hubner (Noctuidae: Lepidoptera) in India	R. Asokan, S.N. Nagesha, M. Manamohan, N.K. Krishna kumar, H.M. Mahadevaswamy, K.B. Rebijith, M.N. Prakash and **G. Sharath Chandra**	*Oriental Insects*	46: 130-143	2012	**0.360**	4

Published Review Articles

Sl. No	Title of Paper	Authors List	Journal Name	Volume, Issue and Page No	Year of Publication	Impact factor	Citation Index (Cited in)
1	Key to the Successful RNA Interference (RNAi) mediated management of agricultural pests	**G. Sharath Chandra**, M. Manamohan and T. Sita	*International Journal of Agricultural Sciences and Research*	5 (5): 191-200	2015	-	-
2	Diet-delivered RNAi in *Helicoverpa armigera* - progresses and challenges	Zhi Xian Lim, Karl E. Robinson, Ritesh G. Jain, **G. Sharath Chandra,** et al.,	*Journal of Insect Physiology*	85: 86–93	2016	**2.267**	6

Papers under communication

Sl. No	Title of Paper	Authors List	Journal Name	Current status
1	Double-stranded RNA mediated suppression of trypsin like serine protease (t-SP) triggering over expression of another isoform of t-SP in *Helicoverpa armigera*	**G. Sharath Chandra**, R. Asokan, M. Manamohan, H.C. Sharma, R. Ellango and N.K. Krishna Kumar	*Insect Science*	Under review
	Enhancement of RNAi by using concatemerized double-stranded RNA.	**G. Sharath Chandra,** R. Asokan, M. Manamohan, N.K. Krishna Kumar	*Journal of Pest Science*	Under review
2	A comparative study of single and multiple genes silencing effect on cotton bollworm, *Helicoverpa armigera*	**G. Sharath Chandra**, R. Asokan and M. Manamohan, Rakesh Goswami	*Insect Biochemistry and Molecular Biology*	With Editor
3	Transgenic tomato producing Juvenile hormone acid methyl transferase (*JHAMT*) dsRNA of *Helicoverpa armigera* affects the larval growth and metamorphosis	M. Manamohan, M. N. Prakash, R. Asokan, **G. Sharath Chandra,** K. Prasad Babu	*Applied Biochemistry and Biotechnology*	Under review
4	Transgenic tomato expressing dsRNA for serine protease confers resistance to the bollworm *Helicoverpa armigera* Hübner (Lepidoptera: Noctuidae)	Prakash M. Navale, Manamohan Maligeppagol, Ramasamy Asokan, Krishna V, **G. Sharath Chandra**, Prasad Babu	*Scientia Horticulturae*	Under review

Abstracts published in conferences/ seminars

1. **G. Sharath Chandra**, R. Asokan, M. Manamohan, T. Sita. Enhancement of RNAi efficacy by targeting multiple genes in management of *Helicoverpa armigera*. World congress on Biotechnology. Held from 4-6 May 2012 at Leonia International Convention Centre, Hyderabad, India.
2. **G. Sharath Chandra**, R. Asokan, M. Manamohan, T. Sita. Control of Lepidopteran insect pest, *Helicoverpa armigera* (Hubner) through ingested RNA interference. International Conference on

Agricultural & Horticultural Sciences. Held on 14-15, September, 2012, at Hyderabad International Convention Centre, Hyderabad, India.

3. **G. Sharath Chandra**, R. Asokan, M. Manamohan, T. Sita. Enrichment of RNAi efficiency by simultaneous targeting of multiple genes in management of *Helicoverpa armigera*. Global conference on Horticulture for Food, Nutrition and a livelihood option.
4. **G. Sharath Chandra**, R. Asokan, M. Manamohan. *In silico* prediction of off-target minimized efficient RNA interference molecules for management of insect pests. International Conference on Statistics & Big Data Bioinformatics in Agricultural Research. Held on November 21-23, 2016 at ICRISAT, Hyderabad.
5. R. Asokan, **G. Sharath Chandra**, M. Manamohan, N.K. Krishna Kumar, S.N. Nagesha, K.B. Rebijith, R. Ellango, B.N. Chaitanya and H.M. Mahadevaswamy. RNAi: A Novel molecular tool in the management of the boll worm, *Helicoverpa armigera* (Lepidoptera: Noctuidae). National Seminar on "Current trends in Biotechnological Strategies for Eco-Friendly Crop Protection". Held on 16-17th December 201,1at Sun Agro Biotech Research Centre (SABRC) & Department of Zoology, University of Madras.
6. **G. Sharath Chandra,** Sundara Rajan, Naresh Dande. Anti-Diabetic activity of *Ocimum sanctum*. 95th Indian Science Congress. Jan 3-7, 2008 Vishakhapatnam.
7. M. Manamohan, M.N. Prakash, H. Deepa, **G. Sharath Chandra**, P. Hemanth and K. Prasad Babu. Cloning and functional validation of sorghum (sorghum bicolor) *dreb2* in Transgenic tomato (*Lycopersicon esculentum*). International conference on Plant Biotechnology for Food security: New Frontiers. Held on 21-24 February 2012, at National Agricultural Sciences, Pusa, New Delhi.
8. M. Manamohan, M.N. Prakash, H. Deepa, **G. Sharath Chandra**, U. Santhosh Kumar and K. Prasad Babu. Development of transgenic tomato plants expressing dsRNA of fruit borer, (*Helicoverpa armigera*) for pest management. International conference on Plant Biotechnology for Food security: New Frontiers. Held on 21-24 February 2012, at National Agricultural Sciences, Pusa, New Delhi.
9. Prakash MN , Manamohan M, Asokan R, Deepa H, Santhosh Kumar JU, Prasad Babu K. **Sharath Chandra G** and Krishna V. RNA interference: an attractive tool for the insect pest management. National conference on Biotechnology and Society (NCBS) - 2012.

Popular Articles

1. Science Last Fortnight. Stabilizing Omega-3 Fatty Acids - Improving human health. *Current Science*, 111, 7, 10 October 2016. Pp. 1136-1139.
2. Science Last Fortnight. Nano-Cauliflower to Detect Arsenic-Cheaper, Faster technique. *Current Science*, 111, 9, 10 November 2016.pp. 1444-1445.
3. Science Last Fortnight. Effective Ocular Delivery. *Current Science*, 111, 11, 10 December 2016.pp. 1736-1737.

Book chapters published

1. M. Manamohan, N. Prakash, and **G. Sharath Chandra**. Cucurbits. Advances In Horticulture Biotechnology - Gene Cloning & Transgenics. Vol 5. Westville Publishing House, 2011 (ISBN: 9788185873749).

Booklets

R. Asokan, **G. Sharath Chandra**, M. Manamohan, N.K. Krishna Kumar, K. Subramaniam, Nagesha, S. N. Gene Silencing (RNAi). Indian Institute of Horticultural Research.

Training manual

1. **G. Sharath Chandra**. Quantification of gene expression. Application of RNAi Tools in Pest Management, *held between June 23th to 29th March, 2013 at IIHR, Bangalore*.

2. M. Manamohan, R. Asokan**,** Prakash Navale and **G. Sharath Chandra**. Laboratory protocols for gene cloning. (*Summer school training on "Non-conventional approaches for the improvement of horticultural crops" held between June 16th to July 6th, 2009 at IIHR, Bangalore*).

NCBI accession No.: Total 43 Genbank accession numbers:

GU323796, GU323797, GU323795, GU323798, GU323799, HM209419, HM209420, HM209421, HM209423, HM209424, HM209425, HM209426, HM209427, HM209428, HM209429, HM209430, HM209431, HM209432, HM209433, HM209434, HM209435, HM209436, HM209437, HM209438, HM629432, HM629433, HM629434, HM629435, HM629436, HM629437, HM629438, HM629439, HM629440, HM629441, HM629442, HM629443, HM209422, KC844755, KR095601, KR095602, KR095600, KR095603 KR095604

Research Work Experience

Position 1: **Skilled Assistant**, Period: May 2009 to March 2011.

Project: Potential of RNA interference in insect pest management of *Helicoverpa armigera*

Responsibilities:

- Cloned & characterized 12 different genes of *H. armigera.*
- Developed Anthocyanin enriched tomato by engineering with two transcription factors namely *Delila* and *Rosea* from Snapdragon.
- Optimized tomato plant transformation and regeneration.
- Screened the transgenic plants for presence of transgenes using PCR, copy number determined using Sothern Blotting. Expression analysis was performed using Real-time quantitative PCR.
- Screened transgenic tomato and tobacco plants containing *Dreb1A* and *Dreb2* gene cassettes, respectively for drought tolerance.
- Developed a vector for simple and efficient assembling of intron containing hairpin RNA forming for plant transformation.

Position 2: **Senior Research Fellow (SRF)**, Period: April 2011 to June-2014
Project: ICAR network Project "NBIP project on Insect Biosystematics"
Responsibilities:

- Developed insect specific dsRNA expressing transgenic tomato.
- Developed pyramided hairpin RNAi constructs for *in planta* expression of dsRNA of vATPase subunit H and JHBP of *Aphis gossypii* and vATPase subunit B and JHBP of *Bemisia tabaci*.
- Isolated novel genes (v-ATPase A, fatty-acyl desaturase) from *H. armigera* using degenerate primers and RACE.
- Expression profiling was carried for above isolated insect specific genes at various developmental stages and in different tissues of *H. armigera*.
- Identified and designed off-target minimized and RNAi sensitive dsRNAs regions for dsRNA expression.
- dsRNA synthesized *in vitro* and *in vivo* using *E. coli* (HT115) strain.
- Insect Bioassay with different lengths and various concentrations of dsRNA.
- Quantification of silencing using Real-Time quantitative PCR, Semi-quantitative PCR and Northern Blotting.

Position 3: **Senior Research Fellow (SRF)**, Period: February 2015 to till date.
Project: ORP-Management of sucking pests in Horticultural Crops
Responsibilities:

- Developed hairpin RNAi constructs for *in planta* expression of pyramided dsRNA of vATPase subunit H and JHBP of *Aphis gossypii*; vATPase subunit B and JHBP of *Bemisia tabaci*.

- Optimized transient expression in tobacco using tdTomato fluorescent protein and dsRNA expressed transiently in tobacco.
- RNAi mediated disruption of pheromone biosynthesis to control *Helicoverpa armigera*, *Spodoptera litura* and *Tuta absoluta* population.
- Identified the leafhopper/s involved in transmitting aster yellow phytoplama to aster and marigold. Currently, working on understanding the interaction of phytoplama with insects in view to disrupt interaction.

Research Scholar: Worked as Research Scholar from June-2016 to Septmber-2016 at ICRISAT (International Crops Research Institute for Semi-Arid Tropics) under guidance of Dr. H.C. Sharma, Principal Scientist, Entomology. During this period, I have performed activity staining of gut proteases (trypsin, chymotrypsin, elastase), total activity assessment of gut proteases.

MSc Project Details

Title: Molecular and phenotypic screening of transgenic T0, T1 and T2 generation of *Solanum lycopersicum* (Tomato), *Nicotiana tabacum* (Tobacco), chilli (*Capsicum annum*) plants harboring *DREB1A, DREB2* and Trehalose Phosphorylase (*TP*) transgenes for abiotic (drought, salinity and high temperature) stress tolerance, at Indian Institute of Horticultural Research, from October 2008 to April 2009.

Ph.D. work Details

Ph. D in **Biotechnology** (Jawaharlal Nehru Technological University, India)-2016 which focused on Molecular Entomology, Plant Biotechnology & Molecular Biology

Thesis Title: Studies on RNAi mediated silencing of the host plant allelochemical detoxifying cytochrome P450 genes in the fruit borer, *Helicoverpa armigera* (Noctuidae: Lepidoptera)

Summary of Ph.D. thesis:

During my Ph.D. I have designed and conducted different experiments to understand molecular mechanism of insect resistance to plant allelochemicals. Recombinant proteins were produced in bacteria by genetic engineering. These recombinant proteins were purified and used for raising of polyclonal antibodies. RNAi mediated silencing of host plant allelochemicals detoxifying cytochrome P450 genes has rendered the larvae susceptible to natural levels of allelochemicals in host plants.

Academic Details

Examination	Academic Year	Marks obtained (%)	Board/University
Ph.D. – Biotechnology	2011-2016	79	Jawaharlal Nehru Technological University (JNTU), Hyderabad.
M.Sc. –Biotechnology	2006-2008	61.35	Bangalore university
B.Sc. – Biotechnology	2002-2005	56	Sri Krishnadevaraya (S.K) University, A.P.
Intermediate – BIPC	2000-2002	61	Board of Intermediate Education, A.P.
10^{th} class	2000	55	Board of Secondary Examination, A.P

Other qualifications:

1. Qualified Agricultural Research Service National Eligibility Test (**ARS-NET**) - **2013**.
2. Qualified Andhra Pradesh State Eligibility Test (**APSET**) -**2013** (Equivalent to UGC-NET).
3. Qualified Graduate Aptitude Test in Engineering (**GATE)-2016**.

4. Pursuing Post Graduate Diploma in Intellectual Property Rights (**PGDIPR**) at National Law School- Bangalore.

4. Completed Post Graduate Diploma in Computer Applications (**PGDCA**) at SIRCOM Computers, Nandyal, Andhra Pradesh (A.P).

5. I was selected and participated in the **Workshop on Science Writing** (Only 14 Participants were selected all over India by Competitive screening) held from 3rd -15th October 2016 at IISER, Thiruvannthapuram, Kerala.

References

Dr. R. Asokan, Principal Scientist, Division of Biotechnology, Indian Institute of Horticultural Research (IIHR), Hesaraghatta, Bangalore – 560089, India. Email: asokaniihr@gmail.com asokan@iihr.res.in Mobile: +91 9164592474	**Dr. H.C. Sharma,** Vice Chancellor, Dr. YS Parmar University of Horticulture & Forestry, Nauni-173230, Solan, Himachal Pradesh, India. Email:vcuhf@yahoo.com, H.SHARMA@cgiar.org Mobile: +91 9959036661	**Dr. M. Manamohan,** Principal Scientist, Division of Biotechnology, Indian Institute of Horticultural Research (IIHR), Hesaraghatta, Bangalore – 560089, India. Email: manamohan.s.m@gmail.com manmohan@iihr.res.in Mobile:+91 9945072686

I hereby declare that all the statements made above are true, complete and correct to the best of my knowledge and belief.

Place: Bangalore Yours sincerely,

Date : 23-12-2016 G.SHARATH CHANDRA