

Chandrakanth Emani Ph.D.

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EDUCATION

- **PhD** (Genetics), Osmania University, India, 1997.
- **M.Sc.** (Biochemistry), Pune University, India, 1991.
- **B.Sc.** (Genetics, Zoology and Chemistry), Nizam College, Osmania University, India, 1989.

PROFESSIONAL EXPERIENCE

- **Associate Professor**, Department of Biology, Western Kentucky University, 2016-Present.
- **Director**, Online Graduate Non-Thesis Program, Dept. of Biology, Western Kentucky University, 2016-Present.
- **Director**, Online Graduate Certificate Program, Dept. of Biology, Western Kentucky University, 2016-Present.
- **Adjunct Faculty**, Division of Mathematics and Sciences, Southcentral Kentucky Community and Technical College, 2019-present
- **Assistant Professor**, Department of Biology, Western Kentucky University, 2010-2015.
- **Adjunct Faculty**, Department of Biology, Owensboro Community and Technical College, 2010-2018.
- **Biology Instructor**, Division of Natural Sciences, Blinn College, Texas, 2009-2010.
- **Visiting Scientist**, Institute of Developmental & Molecular Biology, Texas A&M University, 2007-2009.
- **Microarray Core Facility Manager**. Center for Environmental & Rural Health, Texas A&M 2005-2007.

CURRENT TEACHING

- **Associate Professor**, Department of Biology, Western Kentucky University, **2010-present**
Teaching **General Biology for non-majors (Biol113)**, **Genetics Lab (Biol337)**, **Bioinformatics (Biol312)**, **Recombinant Genetics (Biol350)**, **Research problems (Biol399)**, **Biochemistry-online (Biol446/G)**, **Biochemistry lab (Biol447)**, **Recombinant DNA technology (Biol450)**, **Molecular Genetics (Biol495/G)**, **Plant Biotechnology (Biol496/G)**, **Introduction to Graduate Studies (Biol500)**, **Plant Biotechnology-online (Biol501)**, **Investigations (Biol516)**, **Graduate Seminar (Biol598)** and **Advanced topics in biology (Biol675)**

Integrate research in teaching curriculum aimed at training undergraduate and graduate research students

Design advanced courses in biology including bioinformatics, genetics, biochemistry and molecular biology

Student advising and mentoring

Serve on university academic committees

Keep current on developments regarding instructional methodology and make recommendations to division chairman regarding curriculum additions, deletions or revisions.

Provide grade evaluations on students' performances.

- **Adjunct Faculty**, Division of mathematics and Sciences, Southcentral Kentucky Community and Technical College, Bowling Green, KY **2019-present**

Teaching **Introductory General and Biological Chemistry (CHEM130)** and **Laboratory for General and biological Chemistry (CHEM135)** for science and non-science majors with emphasis on the elementary principles of **general, organic and biological chemistry**.

Maintain student advisory hours. Serve on college committees.

Keep current on developments regarding instructional methodology and make recommendations to division chair regarding curriculum additions, deletions or revisions.

Provide grade evaluations on students' performances.

STUDENT ADVISING/RESEARCH SUPERVISION

- Currently acting as primary advisor for **21 Master's online non-thesis students** at the Department of Biology, Western Kentucky University (2018-present)
- Currently acting as primary advisor for **20 online graduate certificate students** at the Department of Biology, Western Kentucky University (2018-present)
- Currently acting as primary advisor for **an undergraduate honors thesis student** at the Department of Biology, Western Kentucky University (2018-present)
- Currently acting as primary advisor for **3 undergraduate research students** at the Department of Biology, Western Kentucky University (2018-present)
- Currently acting as primary advisor for **a Gatton Academy high school student** at the Department of Biology, Western Kentucky University (2018-present)
- Currently acting as primary advisor for **15 undergraduate students** at the Department of Biology, Western Kentucky University (2018-present)
- Supervised **3 graduate and 8 undergraduate student research students** at the Department of Biology, Western Kentucky University-Owensboro in Plant Biotechnology (2010-2018).
- Assisted in **undergraduate research supervision** for 2 students, one from Department of Biochemistry and Biophysics (1999) and another from Department of Soil and Crop Sciences (2000), Texas A&M University.

- Assisted in **graduate research supervision** for a master's student from Department of Horticulture (2001), Texas A&M University.
- Assisted in **graduate research supervision** for a doctoral student from Department of Biochemistry and Biophysics (2001), Texas A&M University.

TEACHING EXPERIENCE

- **Adjunct Faculty**, Department of Biology, Owensboro Community and Technical College, **2010-2018**

Taught **Introductory Biology (BIO112)** for science and non-science majors with emphasis on **introductory biology, biochemistry, genetics, cellular and molecular biology, biotechnology, evolution and current issues in biology.**

Maintain student advisory hours. Serve on college committees.

Keep current on developments regarding instructional methodology and make recommendations to division chairman regarding curriculum additions, deletions or revisions.

Provide grade evaluations on students' performances.

- **Faculty (Biology Instructor)**, Department of Biology, Division of Natural Sciences, Blinn College, Bryan Campus, Texas, **2009-2010**

Taught **General Biology (BIOL1406)** for science and non-science majors with emphasis on **introductory biology, biochemistry, genetics, cellular and molecular biology, biotechnology and current issues in biology.**

Two classes of four-hour credit courses (classroom size -32 students) with six classroom hours and six lab hours per week.

Maintain student advisory hours. Serve on college committees.

Prepare course information sheets in compliance with Master Course syllabi.

Keep current on developments regarding instructional methodology and make recommendations to division chairman regarding curriculum additions, deletions or revisions.

Provide grade evaluations on students' performances.

- **Fellow of the Graduate Teaching Academy**, Texas A&M University, 2007

Teaching Certification of the Center for Teaching Excellence & Office of Graduate Studies, Texas A&M University.

One-year course consisted of lectures and workshops by faculty from various departments in the university, about teaching techniques, teaching technology, curriculum development and developing a teaching portfolio.

Conducted five classroom observations and discussed with a mentor professor in terms of effective teaching strategies in undergraduate and graduate classrooms.

- **Teaching Assistant**, Department of Biology, Texas A&M University, 2007-present

Taught **undergraduate Biology/Botany 101 course** of **introductory biology, plant science, genetics, cellular and molecular biology** (lectures and 9 wet lab sections (Classroom size – 216 students).

Graded assignments and quizzes.

Assisted in revising and redesigning the Biology/Botany 101 curriculum.

Taught laboratory techniques to sections of 24 students and trained students in writing accurate laboratory reports.

Assisted in developing and posting lecture notes and slides in the vista e-learning portal and preparing a student friendly DVD supplement to the prescribed textbook.

- **Teaching Assistant**, Department of Nutrition and Food Science, Texas A&M University, 2007

Taught **senior undergraduate seminar Nutrition 481 course on scientific writing and presentation** (Classroom size – 15 students).

Evaluated and graded research papers in terms of writing quality and format, and research presentations in terms of presentation format, clarity, time management and content.

- **Teaching Assistant**, Laboratory for Crop Transformation, Institute for Plant Genomics and Biotechnology, Texas A&M University, 1997-2003

Taught **laboratory courses for graduate Biotech 601 on genetic transformation techniques** (Classroom size – 20 students).

- **Instructor**, Center for Plant Molecular Biology, Department of Genetics, Osmania University, India, 1992-1997

Taught graduate level **introductory plant molecular biology course** (Classroom size – 20 students).

Taught **laboratory courses in plant molecular biology techniques**.

POST-DOCTORAL EXPERIENCE

- **National Science Foundation Post-Doctoral Research Associate**, Dept. of Biology, Texas A&M University, 2004-2005.
- **National Science Foundation Post-Doctoral Research Associate**, Norman Borlaug Center for Southern Crop Improvement, Texas A&M University, 2001-2004.
- **Rockefeller Foundation Visiting Scientist**, Crop Biotechnology Center, Texas A&M University, 1997-2000.

AWARDS, FELLOWSHIPS AND HONOR SOCIETIES

- **Early Investigator Award**, 2015, WKU Office of Research
- **Proficient Grant Proposer Award**, 2015 & 2016, WKU Office of Research
- **President (WKU chapter)**, Sigma Xi Scientific Research Society, 2013-present
- **Top Research Proposer** from an extended campus, 2012, WKU Office of Research
- **Full Member and Chapter Officer (President WKU chapter)**, Sigma Xi Scientific Research Society, 2012-2013.
- **Visiting Scientist Research Fellowship**, Rockefeller Foundation, USA, 1997 among 20 annual fellowships conferred internationally to carry out advanced research in Plant Molecular Biology
- **Doctoral Research Fellowship**, Hindustan Ciba-Geigy, India, 1994 among three fellowships nation-wide for doctoral research students in Agricultural Biotechnology
- **Junior Research Fellowship**, Rockefeller Foundation, USA, 1992 for carrying out advanced research in Plant Genetics.

RESEARCH GRANTS

- 2016 National Science Foundation (NSF)-EPSCoR Education, Outreach and Communication (EOC) Grant \$10,000 *The effect of plant extracts on apoptosis, stress response and cell cycle - A hands-on research project for high school and undergraduate students* (Collaborators-Dr. Chad Wilkerson, Owensboro Cancer Research Program; Dr. Natalie Mountjoy, Life Science academy, Owensboro)
- 2015 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Sassafras tissue culture extracts as plant based treatment options for cancer* (Undergraduate Student – Nicholas Johnson)
- 2015 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Tobacco as a potential plant-based pharmaceutical for cancer treatment* (Undergraduate Student – Bethany Oakes)
- 2015 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *A lab-based study documenting curcumin and black pepper extract as potential cure for polycystic kidney disease* (Undergraduate Student – Joshua Castlen)
- 2015 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Sorghum and Rice Tissue Cultures as phytopharmaceutical (plant based) treatment options for cancer* (Undergraduate Student – Brittany Dixon)
- 2015 National Science Foundation (NSF)-EPSCoR Research Scholars Program (RSP) Grant, \$25,000 *Phytoremediation strategy with transgenic stone pine to dispose salt wastewater from oilfields* (Undergraduate students – Hanady O. Adams, Jennifer Campbell)
- 2015 National Science Foundation (NSF)-EPSCoR Research Scholars Program (RSP) Grant, \$15,000 *Phytoremediation strategy with transgenic salt tolerant sorghum to dispose salt wastewater from oilfields* (Undergraduate students – Hanady O. Adams, Ginger Gilbert)
- 2015 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Basil and Rice tissue cultures as pharmaceutical sources to treat cancer* (Undergraduate Student – Jennifer Campbell)
- 2015 Biology Summer Undergraduate Research Experience (BSURE) Award, \$1500 *The effect of asbestos on cancer and the antagonistic action of natural plant extracts* (Undergraduate Student – Jennifer Campbell)
- 2015 Gatton Academy Research Internship Grant (RIG)), \$3000 *A high production hydroponic system for experimental and horticultural plants* (High School Student – Seth Marksberry)
- 2014 WKU Research and Creative Activities Program (RCAP) Award, \$12,000 *Basil as a phytopharmaceutical source to treat cancer* (Undergraduate Students – Bobby Voyles, Kevin Corneal, Jennifer Campbell, Bethany Oakes)
- 2014 Biology Summer Undergraduate Research Experience (BSURE) Award, \$1500 *The effect of basil leaf extract on human colon cancer cells* (Undergraduate Student – Kevin Corneal)
- 2013 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Using rice as a non-human model to study the effects of elevated monoamine oxidase on an organism* (Undergraduate Student – Bobby Voyles)
- 2013 WKU Faculty Undergraduate Student Exchange (FUSE) Award, \$3000 *Genetic transformation of basil to exploit its potential as a phytopharmaceutical* (Undergraduate Student – Roger Dame)

- 2013 Biology Summer Undergraduate Research Experience (BSURE) Award, \$1500
Production of the Acidothermus cellulolyticus cellulase gene in tobacco (Undergraduate Student – Bobby Voyles)
- 2011 WKU Research and Creative Activities Program (RCAP) Award, \$18,000
Environmental friendly transgenic sorghum engineered with a thermostable cellulase for production of fermentable sugars from biomass (Undergraduate Students – Joseph Guinto, Michael Alstott)

PROFESSIONAL SOCIETIES

- Sigma Xi Scientific Research Society (2005-present) Full member and President WKU chapter
- American Society for Plant Biologists (2015)
- Member Society for *In Vitro* Biology (2013-present)
- National Association of Biology Teachers (2009-present) Member and manuscript review board.
- Maize Genetics Cooperative Network (1997-present) Member.

SCHOLARLY PUBLICATIONS

Google Scholar Indices: Total citations = 585; since 2015 = 249; h-index = 8; i-10 index = 8
Research Gate Indices: RG score = 15.53

1. Mirzakamol S Ayubov, Mukhammad H Mirzakhmedov, Venkateswara R Sripathi, Zabardast T Buriev, Khurshida A Ubaydullaeva, Dilshod E Usmonov, Risolat B Norboboyeva, **Chandrakanth Emani**, Siva Prasad Kumpatla, Ibrokhim Y Abdurakhmonov (2019) Role of MicroRNAs and small RNAs in regulation of developmental processes and agronomic traits in *Gossypium* species. *Genomics* 111:1018-1025.
2. Venera S. Kamburova, Elena V. Nikitina, Shukhrat E. Shermatov, Zabardast T. Buriev, Siva P. Kumpatla, **Chandrakanth Emani**, and Ibrokhim Y. Abdurakhmonov (2017) Genome editing in plants: an overview of tools and applications. *International journal of Agronomy* 2017: Article ID 7315351, 15 pp.
3. Nicholas Johnson and **Chandrakanth Emani** (2016) Tracking the Molecular Evolution of Pax gene. *BMC Bioinformatics*, 17(Suppl 10): P4
4. **Chandrakanth Emani**, Hanady Adam, Ethan Blandford, Joel Campbell, Joshua Castlen, Brittany Dixon, Ginger Gilbert, Aaron Hall, Philip Kreisle, Jessica Lasher, Bethany Oakes, Allison Speer and Maximilian Valentine (2016) Molecular evolution of cancer driver genes. *BMC Bioinformatics*, 17(Suppl 10): P19
5. **Chandrakanth Emani** (2016) Transgenic cotton for agronomical useful traits (In) *Fiber plants: biology, biotechnology and applications*, K.G.Ramawat and M.R.Ahuja (eds.) Springer, Dordrecht, Heidelberg

6. **Chandrakanth Emani** (2014) Transgenic crops to preserve biodiversity (In) *Biotechnology and Biodiversity*, M. R. Ahuja and K.G. Ramawat (Eds.), Springer: NY.
7. **Chandrakanth Emani** (2014) The effect of transgenic crops on non-target organisms (In) *Biotechnology and Biodiversity*, M. R. Ahuja and K.G. Ramawat (Eds.), Springer: NY.
8. **Chandrakanth Emani** and Wayne Hunter (2013) Insect Resistance (In) *Genomics and breeding for climate resilient crops*, Chittaranjan Kole (Ed.), Springer: NY.
9. **Chandrakanth Emani** (2013) Transgenic Bamboo as a non-human model to understand the molecular basis of the non-neuronal acetylcholine expression. *In Vitro Cellular & Developmental Biology-Animal* 49, S56-S56
10. Depace C, Ricardii L, Kumar A, Pavan S, Lotti C, Dixit S and **Chandrakanth Emani** (2013) Identification of traits, genes and crops for future (In) *Genomics and breeding for climate resilient crops*, Chittaranjan Kole (Ed.), Springer: NY.
11. **Chandrakanth Emani** (2012) Focused plant biotechnological research to preserve plant biodiversity. *Journal of biodiversity management and forestry*. 1:1-2
12. **Chandrakanth Emani** (2011) *Gossypium* (In) *Wealth of wild crop relatives: genetic, genomic & breeding resources*, Volume 8: *Wild relatives of industrial crops*, Chittaranjan Kole (Ed.), Springer: NY.
13. **Chandrakanth Emani** (2010) Using the “DNA story” to inculcate a scientific thought process in the classroom. *American Biology Teacher* 72:410-413.
14. Mona B. Damaj, Siva Prasad Kumpatla, **Chandrakanth Emani**, Avutu Sam Reddy, Keerti S. Rathore, Terry L. Thomas and T. Erik Mirkov (2010) Stem-regulated, plant defense promoter and uses thereof in tissue-specific expression in monocots. *Planta* 231:1439-1458.
15. Miloslav Juricek, **Chandrakanth Emani**, Sunnee Kertbundit and Timothy C. Hall (2009) Metabolic engineering of pathways and gene discovery. (In) *Biotech crops: concepts, construction, contribution and concerns*, Chittaranjan Kole, Charles H. Michler, Albert G. Abbott and Timothy C. Hall (Eds.), Springer: NY.
16. **Chandrakanth Emani** and Timothy C. Hall (2008) Phaseolin: structure and evolution. *The Open Evolution Journal*, 2: 66-74.
17. **Chandrakanth Emani**, Yiming Jiang, Berta Miro, Timothy C. Hall and Ajay Kohli (2008) Rice. (In) *A compendium of transgenic crop plants*, Volume 1: *Cereals and forage grasses*, Chittaranjan Kole and Timothy C. Hall (Eds.), Wiley-Blackwell: New York.

18. **Chandrakanth Emani**, Juan Manuel Garcia, Emily Lopata-Finch, Maria Jose Pozo, Pedro Uribe, Dong-Jin Kim, Ganesan Sunilkumar, Douglas R. Cook, Charles M. Kenerley and Keerti S. Rathore (2003) Enhanced fungal resistance in transgenic cotton expressing an endochitinase gene from *Trichoderma virens*. *Plant Biotechnology Journal*, 1: 321-326.
19. Ganesan Sunilkumar, LeAnne Mohr, Emily Lopata-Finch, **Chandrakanth Emani** and Keerti S. Rathore (2002) Developmental and tissue-specific expression of CaMV 35S promoter in cotton as revealed by GFP. *Plant Molecular Biology*, 50: 463-474.
20. **Chandrakanth Emani**, Ganesan Sunilkumar and Keerti S. Rathore (2002) Transgene silencing and reactivation in sorghum. *Plant Science*, 162: 181-192.

BOOKS

1. **Chandrakanth Emani** (Ed). (Mar 2018) The biology of plant-insect interactions: a compendium for plant biotechnologists. Science Publishers/CRC Press, Taylor & Francis Group: FL 304pp, ISBN 9781498709736
2. **Chandrakanth Emani** (Ed). (To be published, December 2020) Bioinformatic applications for crop improvement: a compendium for plant biotechnologists, Science Publishers/CRC Press, Taylor & Francis Group: FL

RESEARCH PRESENTATIONS

1. Hanady O. Adam, Jennifer Campbell, Nicholas Johnson, Jessica Lasher, Stephen Sloan and **Chandrakanth Emani** (2016) Phytoremediation strategy utilizing stone pine to dispose salt wastewater from oilfields. Poster at the 2016 Annual International meeting of the American Society for Plant Biology, July 9-13, 2016, Austin, Texas
2. Brittany Dixon, Allison Speer and **Chandrakanth Emani** (2016) Tracking the Molecular evolution of the Flavanoid 3' Hydroxylase Gene in plants. Poster at the 2016 Annual International meeting of the American Society for Plant Biology, July 9-13, 2016, Austin, Texas
3. Jennifer Campbell, Bethany Oakes, Nicholas Johnson, Hanady Adam, Joshua Castlen, Jessica Lasher, Chad Wilkerson and **Chandrakanth Emani** (2016) Plant Extracts as Alternative and Integrative Treatment Options for Cancer. Poster at the 2016 Annual International meeting of the American Society for Plant Biology, July 9-13, 2016, Austin, Texas
4. Hanady O. Adam, Ginger Gilbert, Stephen Sloan and **Chandrakanth Emani** (2015) Phytoremediation strategy utilizing salt tolerant sorghum to dispose salt wastewater from oilfields. Poster at the 2015 Annual International meeting of the American Society for Plant Biology, July 26-30, 2015, Minneapolis, Minnesota

5. Stephen Sloan and **Chandrakanth Emani** (2015) Phytoremediation strategy utilizing evergreen trees to dispose salt wastewater from oil fields. Poster at the 79th Annual meeting of the Kentucky Oil and gas Association, July 14-16, 2015, Lexington, KY.
6. Roger Dame and **Chandrakanth Emani** (2014) genetic transformation of basil to exploit its transformation potential. Poster at the 2014 World forum on Biology, Joint meeting of the Society for In vitro biology and Society of Cryobiology, May 31-June 4, 2014, Savannah, Georgia.
7. **Chandrakanth Emani** (2013) Transgenic Bamboo as a Non-human Model to Understand the Molecular Basis of the Non-neuronal Acetylcholine Expression. Interactive poster at the 2013 World In Vitro Biology Meeting, June 15 – June 19, 2013 in Providence, Rhode Island
8. Hung, H., **Chandrakanth Emani**, Allan Fritz and Monica Menz (2007). Detection and characterization of a leaf rust (*Puccinia triticina*) resistant gene from *Triticum monococcum* in wheat using a PCR based marker. Poster presented at Plant, Animal and Microbe Genomes XV conference, San Diego, CA.
9. Hung, H., **Chandrakanth Emani**, Allan Fritz and Monica Menz (2006). Characterization of a gene from *Triticum monococcum* conferring resistance to leaf rust (*Puccinia triticina*) in wheat. Paper presented at the ASACSSA-SSSA International Annual meeting, November 12-16, Indianapolis, IN.
10. Keerti Rathore, **Chandrakanth Emani**, Ganesan Sunilkumar and Charles Kenerley (2005) Resistance to *Rhizoctonia solani* and *Alternaria alternata* in transgenic cotton expressing an endochitinase gene from *Trichoderma virens*. Paper presented at Beltwide Cotton Conferences, January 4-7, New Orleans, LA.
11. Mona B. Damaj, B.P. Reidel, S.P. Kumpatla, J.L. Collins, P.D. Bermand, **Chandrakanth Emani**, K.S. Rathore, T.E. Mirkov, A.S. Reddy and T.L. Thomas (2004) Transcriptional profiling of stem-specific defense-related sugarcane genes. Paper presented at Plant, Animal and Microbe Genomes XII conference, San Diego, CA.
12. Mona B. Damaj, S.P. Kumpatla, **Chandrakanth Emani**, J.M. Ivy, P.D. Bermand, K.S. Rathore, T.E. Mirkov, A.S. Reddy and T.L. Thomas (2003) Expression analysis of spatially regulated genes in sugarcane and other Monocotyledonous crops using functional genomics approach. Poster presented at Plant, Animal and Microbe Genomes XI conference, San Diego, CA.
13. Mona B. Damaj, S.P. Kumpatla, **Chandrakanth Emani**, P.D. Bermand, K. Bungard, K.S. Rathore, T.E. Mirkov, A.S. Reddy and T.L. Thomas (2003) Functional Genomic analysis of spatially regulated genes in sugarcane and other Monocotyledonous crops. Paper presented at Plant, Animal and Microbe Genomes XI conference, San Diego, CA.

14. Keerti S. Rathore, Ganesan Sunilkumar and **Chandrakanth Emami** (2002) Improved genetic transformation of important Texas crops – Cotton and sorghum. Poster presented at Plant, Animal and Microbe Genomes X conference, San Diego, CA.

PATENTS

1. **US Patent application filed titled** “Compositions, organisms, systems, and methods for expressing a gene product in plants 13/800,930 dated march 13, 2013
2. **Brazilian patent office** PI0406620-0 “Promoter de defesa vegetal stem regulated e seus usos em expressões tecido-específicas em monocotiledoneas”
3. **Brazilian patent office** PI0406624-3 “Promoter de defesa vegetal stem regulated e seus usos em expressões tecido-específicas em monocotiledoneas”
4. **US Patent** 7,973,217 dated July 5, 2011 “Stem-regulated Plant Defense Promoter and uses thereof in tissue-specific expression in monocots.”
5. **US Patent** 7,754,946 dated July 13, 2010 “Stem-regulated Plant Defense Promoter and uses thereof in tissue-specific expression in monocots.”
6. **US Patent** 7,323,622 dated: January 29, 2008 “Stem-regulated Plant Defense Promoter and uses thereof in tissue-specific expression in monocots.”
7. **US Patent** 7,253,276 dated August 7, 2007 “Stem-regulated Plant Defense Promoter and uses thereof in tissue-specific expression in monocots.”
8. **World Intellectual Property organization**, International Bureau, International Publication number WO2004/062365 A2 dated July 29, 2004. “Stem-regulated Plant Defense Promoter and uses thereof in tissue specific expression in monocots.”
9. **World Intellectual Property organization**, International Bureau, International Publication number WO2004/062366 A2 dated July 29, 2004. “Stem-regulated Plant Defense Promoter and uses thereof in tissue-specific expression in monocots.”
10. **European Patent Office**, A01N 1/00 1 589 813 A2 dated February 11, 2005 “Stem-regulated Plant Defense Promoter and uses thereof in tissue specific expression in monocots.”
11. **European Patent Office**, C12N 5/04 1 590 447 A2 dated February 11, 2005 “Stem-regulated Plant Defense Promoter and uses thereof in tissue specific expression in monocots.”

CURRENT RESEARCH PROJECTS

- **WKU Plant Molecular Biology Lab**, Department of Biology, Western Kentucky University
PROJECT 1: Plants as complementary and integrative phytopharmaceutical treatment options to treat cancer

The effect of plant extracts on apoptosis, stress response and cell cycle - A hands-on research project for high school and undergraduate students - NSF-EPSCoR-EOC Grant Basil as a phytopharmaceutical source to treat cancer- RCAP grant – Basil leaf extract testing for anti-tumor activity against colon, lung, breast and cervical cancer cells.

Developing a genetic transformation system in basil for anti-cancerous eugenol – FUSE grants - *Agrobacterium*-mediated genetic transformation system in basil plant using the GFP gene. The transformation system will be used to manipulate metabolic pathways to increase the production of the pharmaceutically important compound, eugenol.

PROJECT 2: In silico analysis of phytopharmaceutical enzymes and their potential targets Molecular evolution of the non-neuronal acetylcholine. Deciphering the evolutionary pathway for the non-neuronal acetylcholine using bamboo plant as a reference and tracing the origins from a probable ancestral precursor *in silico*.

Molecular evolution of eugenol synthase. Deciphering the evolutionary pathway of basil eugenol synthase to identify related phenyl propanoid enzymes of diverse plants that are an array of phytopharmaceutical options

PROJECT 3: Phytoremediation and biofuels from plants

Phytoremediation utilizing transgenic sorghum and pine plants to dispose salt wastewater from oil fields – NSF EPSCoR-RSP grants – Sorghum and pine plants transformation with DREB1A (Dehydration Response Element Binding) gene to increase their salt and drought stress tolerance. The inherent ability of the sorghum and pine to dispose salt water will be exploited for phytoremediation and reclaiming lands at oil fields.

Environmental-friendly transgenic sorghum engineered with a thermostable cellulase for production of fermentable sugars from biomass – RCAP grant #11-8021 - Expression of endoglucanase E1 gene from *Acidothermus cellulolyticus* (a gene coding for a hydrolytic enzyme that degrades plant biomass to produce biofuels) in sorghum. The hydrolytic enzyme produced in the resulting transgenic sorghum plants will be extracted from their stems, leaves and seeds and then be used for hydrolyzing the discardable biomass to produce fermentable sugars that are valuable sources of biofuels.

RESEARCH EXPERIENCE

- **Visiting Research Scientist (2007-2009)**, Institute of Developmental and Molecular Biology, Department of Biology, Texas A&M University.

Evolution of seed protein phaseolin. Deciphering the evolutionary pathway for the French bean seed protein phaseolin tracing its origins from a probable ancestral precursor *in silico*. Examining the evolutionary pathway for important structural and functional feature like introns/promoter structures, glycosylation and parallel evolution of proteases aimed at gathering insights for nutritional improvement of French bean.

- **Post-doctoral Research Associate (1999-2005):** Norman Borlaug Center for Southern Crop Improvement and Department of Biology, Texas A&M University.

Transgene silencing and reactivation in sorghum. Sorghum plants transformed with *gusA* and *bar* genes were used to study the phenomenon of transgene silencing in terms of copy number and methylation. Reactivation of silenced transgenes observed with demethylating agent, 5-azacytidine.

ORIGINAL RESEARCH CONTRIBUTION: Elucidation of the mechanism of transgene silencing in sorghum - This is the only comprehensive study carried out in the area of transgene silencing of sorghum listing out crucial points in the limitations encountered in sorghum transformation. The work resulted in a publication of a peer-reviewed article in *Plant Science*, which was one among only about 17 articles published in this area over a 15-year period. The article returned 17 independent citations (Sci-finder scholar).

Transgenic cotton plants expressing antifungal chitinase genes. Transgenic cotton plants generated with the chitinase gene of *Trichoderma virens* resistant to two fungi *Rhizoctonia solani* and *Alternaria alternata*.

ORIGINAL RESEARCH CONTRIBUTION: Generation of transgenic cotton plants resistant to fungal diseases - This was the first report of its kind in cotton wherein a single gene genetically engineered in cotton was shown to confer disease resistance against two different fungal organisms. Also, this was the first report of its kind in obtaining genetically engineered disease resistant cotton in a university/research institute environment. The study was also significant in its detailed exploration of gene expression in three generations of the large individual transgenic lines (over 80) generated outside of industry in an academic institution. The article returned 10 citations (Sci-finder Scholar).

Rice transformation. Rice transformation system was used to examine tissue-specificity of promoters isolated from sugarcane (**US patents 7,253,276, 2007 and 7,323,622, 2008**).

ORIGINAL RESEARCH CONTRIBUTION: Novel Promoters from sugarcane - Stem-regulated promoters were isolated from sugarcane for directing tissue-specific and defense-inducible expression of transgenes in monocots, which would help in developing effective gene constructs for use in plant genetic engineering in food crops. Six patents, two each from the United States Patent Office, the World Intellectual Property organization and European Patent Office were awarded from this work. This was also a first report of its kind from sugarcane crop.

Rice transformation. Antisense technology was used to examine functions of genes involved in chlorophyll metabolism, leaf rust of maize (*Hm-1* gene) and internode elongation.

Mapping disease resistance genes in wheat using molecular genetic technologies. AFLP, RGAP and SSR techniques were employed to analyze leaf rust resistance genes from a wheat population generated by crossing Chinese Spring with a disease resistant variety, D180.

Deciphering the molecular mechanisms related to the circadian clock of the cyanobacterium, *Synechocystis elongatus*. Defining relationship between circadian clock complex and cyanobacterial chromosome by bioinformatic analysis and antisense targeting of nuclear scaffolding and DNA topology proteins.

- **Rockefeller Foundation Visiting Scientist (1997-1999):** Norman Borlaug Center for Southern Crop Improvement, Texas A&M University.

Genetic transformation of sorghum and rice. *Agrobacterium*-mediated transformation was established in rice (with both super binary as well as regular *Agrobacterium* vectors in japonica, javanica and indica varieties) and particle bombardment-mediated transformation was developed in sorghum.

- **Ciba-Geigy Doctoral Research Fellow (1992-1997):** Center for Plant Molecular Biology, Department of Genetics, Osmania University, Hyderabad, India.

Doctoral dissertation - Construction of gene libraries and isolation of fatty acid desaturase gene in *Arachis hypogaea* (peanut). Project involved construction of genomic and

cDNA libraries for isolation of the fatty acid desaturase (*FAD3*) gene and studying its expression pattern by *in situ* hybridization.

LAB MANAGERIAL EXPERIENCE

- **Lab Manager (2010-2018):** Research Incubator Facility, Center for Business and Research, Owensboro.

In charge of the central instrumentation facility. Training of students in conjunction with the biotechnology companies within the research incubator facility.

- **Microarray Core Facility Manager (2005-2007):** Genomics and Bioinformatics Core Facility, Center for Environmental and Rural Health, Department of Nutrition and Food Science, Texas A&M University.

In charge of the microarray operations (cRNA prep, array processing and data management of human, mouse and rat microarrays). Training of technicians, researchers, students and faculty in the genomics core facility.

RESEARCH TRAINING

- **Developed Standard Operation Procedure (SOP) manual and trained technicians, researchers and an incoming employee** at the microarray unit of the Genomics and Bioinformatics Core Facility, Center for Environmental and Rural Health, Department of Nutrition and Food Science, Texas A&M University, 2005-2007.

- **Resource training person** for the “**Practical Workshop in the Analysis of Genotypic Data**” conducted at the Institute for Plant Genomics and Biotechnology, Norman Borlaug Center for Southern Crop Improvement, Texas A&M University, April 1&2, 2004.

- **Resource training person** for the **annual workshops** for university faculty and technicians (1992-1997) on **Plant Molecular Biology techniques** at Center for Plant Molecular Biology, Department of Genetics, Osmania University, India (1992-1997).

ACADEMIC SERVICE

- Biotechnology expert panel member, KCTCS-DACUM, 2011-2018.
- Editorial board member for International Journal of Evolution, Journal of Plant Physiology & pathology, and Journal of Biodiversity Management & Forestry 2012-present.
- Manuscript reviewer, American Biology Teacher, Plant Tissue and Organ Culture, PLOs One, Journal of Agricultural & Biological Sciences, Plant Physiology and biochemistry 2012-present.
- Undergraduate and Graduate Student Advisor, Western Kentucky University-Owensboro, 2010-present Undergraduate Scholarship Committee, Western Kentucky University-Owensboro, 2010-present
- Manuscript reviewer in biotechnology, cell biology and genetics– American Biology Teacher, 2009

- Chapter Officer, Chair – Membership committee, Sigma Xi, TAMU chapter, 2008-2009. Involved in a successful membership drive of 45 members in a single year, a feat recognized by the Sigma Xi Board.
- Selection committee – Distinguished Scientist Award, Sigma Xi, TAMU chapter, 2007 and 2008. Judge – Texas Junior Science & Humanities Symposium, January 17-19, 2008.
- Manuscript reviewer as a recognized expert in plant genetic transformation – Plant Biotechnology Journal, 2007.
- Judge – Student Research Week, Annual undergraduate and graduate student research conference, Texas A&M University, 2006.