

# Curriculum Vitae

## Shakunthala Nair

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### **EDUCATION**

#### **PhD (Entomology)**

August 2011

The University of Georgia, Athens, Georgia

Major Advisor : Dr. S. Kristine Braman, Professor, Dept. of Entomology. GPA : 3.97/4.00

#### **Master of Plant Protection and Pest Management (MPPPM)**

December 2007

The University of Georgia, Athens, Georgia

Major Advisor : Dr. John N. All, Professor, Dept. of Entomology. GPA : 3.98/4.00

#### **Master of Science (Agricultural Entomology)**

July 1996

College of Horticulture, Kerala Agricultural University, Thrissur, India

Major Advisor : Dr. Jim Thomas, Professor and Head, Dept. of Entomology. GPA : 9.0/10.0

#### **Bachelor of Science (Agriculture)**

October 1991

College of Horticulture, Kerala Agricultural University, Thrissur, India

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### **EMPLOYMENT**

#### **University of Arizona, Maricopa Agricultural Center, Maricopa, AZ**

##### **Assistant in Extension, Community Integrated Pest Management**

July 2013-present

- Develop and implement priority extension programs for Community Integrated Pest Management (IPM) statewide.
- Involve in national efforts to develop school and community IPM resources to benefit stakeholders nationwide.

#### **University of Georgia, Griffin, GA**

September 2011-June 2013

##### **Post-doctoral Researcher**

- Turf and landscape IPM projects
- Production of extension materials (video, pest hand-outs and bulletins, insect identification guide)
- Project on biological control of Chinese privet using exotic lace bug *Leptoypha hospita*
- Data analysis and manuscript preparation
- Teaching

#### **Kerala Agricultural University, Thrissur, India**

1999 - 2006

##### **Assistant Professor (Agricultural Entomology)**

- Activities during the period 1999 – 2006 : Appendix I, II, III, IV

#### **Kerala Horticulture Development Programme**

1997 – 1998

##### **Assistant Project Manager**

- Organized farmers of a region into 'self-help groups' for overall development in vegetable and fruit cultivation
- Assessed farmer needs in training, credit, farming inputs, technical advice, marketing channels, etc.

**M.S. Swaminathan Research Foundation, Chennai, India**

**1996 – 1997**

**Senior Research Fellow**

- Designed and implemented field and lab. experiments with various pests attacking crops in the region like cotton, sunflower, sorghum, groundnuts and millets
- Conducted pest surveillance and scouting involving local farmers for incidence of pests, monitored pest population dynamics and presence of new pests

**TEACHING EXPERIENCE**

➤ **Assistant Professor, Kerala Agricultural University, Thrissur, India**

**1999-2006**

**Undergraduate courses offered** (Details of courses: Appendix IV)

Course catalog No.	Course Title	Credit hours	Offered to
Ag. Ent.304	Economic Entomology-I	2 + 1	B.Sc.(Ag.) students 1995 admission Semester 5
Plpt. 203	Crop Pests and Diseases	2 + 1	B.Sc. (CB&M) students 1999 admission Semester 4
Plpt. 203	Crop Pests and Diseases	2 + 1	B.Sc. (CB&M) students 2000 admission Semester 4
Plpt. 203	Crop Pests and Diseases	2 + 1	B.Sc. (CB&M) students 2001 admission Semester 4
Plpt. 203	Crop Pests and Diseases	2 + 1	B.Sc. (CB&M) students 2002 admission Semester 4

- Member of Viva Board for conduct of Final Practical Examinations for the course Plpt. 203) : Crop Pests and Diseases
- Entrusted with revision of syllabus for the course Plpt. 203: Crop Pests and Diseases offered to B.Sc. (CB&M) students to make it more relevant in the present context.

**Postgraduate advising**

- Member of M.Sc.(Ag.) advisory committee of two M.Sc. (Ag.) students and one Ph.D. student

➤ **Graduate Teaching Assistant, Department of Biology, University of Georgia**

- BIOL 1108 L Principles of Biology II (Fall 2007)

Topics covered:

- microbial diversity and physiology
- plant and animal diversity
- growth, reproduction and physiology
- introductory ecology

Activities: Prepared and taught labs, designed assignments and examinations and graded them, helped students with their group activities and projects and evaluated their group and individual performances.

➤ **Graduate Teaching Assistant, Department of Entomology, University of Georgia**

- ENTO 2010 Insects and the Environment (Fall 2006, Spring 2007)

Course acquainted students with human dependence on and interaction with insects in today's world. I assisted with conducting exams, grading and tabulation of marks.

➤ **Instructor, Department of Entomology, University of Georgia**

- ENTO 4500/6500 Biological Control (Spring 2013) –Non-traditional format (Course is 95% online)  
Course acquainted students with the use of natural enemies to manage pest arthropods and weeds. Emphasis was on principles, with examples of use.  
Activities: Prepared and taught classes and labs, designed assignments and examinations and graded them, helped students with their group activities and projects and evaluated their group and individual performances.

- **Mentored Young Scholar with the Young Scholars Internship Program (Summer of 2010)**

As part of the Young Scholars Program, I was entrusted charge of Jamal Foster, a high school student who showed special talent in science. I worked closely with Jamal and introduced him to the basics of entomology as well as the different projects in progress in our lab. Together, we designed a summer project exclusively for him in which he screened different varieties of ornamental plants for their susceptibility to lace bugs. The plants and insects were provided from our lab but Jamal was entirely responsible for conducting the project, data collection, tabulation and analysis and interpretation of the results. At the end of his project, he gave a presentation on his findings, which was well appreciated by our lab members and his peers as well. Apart from his project, Jamal also helped with maintenance of lace bug colonies in our rearing facility and with treatments and observations in other projects also. He understood the importance of using resources economically and in a timely manner. This unique program helped us to encourage young people and direct them early in life towards a possible career in science. The students especially loved it because they earned money while learning new subjects and job responsibilities. They could also make use of several other personality development workshops and study tours arranged as part of this program.

## **RESEARCH**

Research focus: Integrated Pest Management

### **Current and recent research projects (2013 – present)**

- University of Arizona Community IPM Program (Funded through USDA-NIFA Extension Implementation Program Area (EIP) Institutional Grants)
- National Assessment of Bed Bug Impacts and Demonstration of IPM in High-risk Elder/Disabled Housing Facilities (Funded through USDA-NIFA Applied Research and Development Program Grant)
- Building Sustainable School IPM Inside and Out: Developing and Implementing Standardized Training Materials and IPM Proficiency Exams for Certification (Funded through EPA School IPM Grant)
- Enabling Schools to Practice and Implement Integrated Pest Management-Expansion of IPM in a Child's World (Funded through Cooperative Extension, University of Arizona State Signature Program Initiative)
- Quantifying the Financial Costs and Benefits of School IPM: A Collaborative Workgroup Project (Funded through Southern IPM Center IPM Enhancement Grant)
- Handbook of Pests in Community Environments in the Desert Southwestern United States (Funded through Western IPM Center Grant)

## Research Support Generated /Grants Funded

- 1) Name of grant: **'USDA-NIFA Extension Implementation Program Area (EIP) Institutional Grant 2014.**  
(My current position is an essential component of this grant). Awarding agency: United States Department of Agriculture – National Institute of Food and Agriculture. Performance period: 09/01/2014 – 08/30/2017. Award amount: \$858,000. Role: Implementation Team Member.
- 2) Name of grant: 'USDA-NIFA Applied Research and Development Program Grant- National Assessment of Bed Bug Impacts and Demonstration of IPM in High-risk Elder/Disabled Housing Facilities.' Awarding agency: United States Department of Agriculture – National Institute of Food and Agriculture. Performance period: 09/01/2014 – 08/30/2016. Award amount: \$124,998. Role: Implementation Team Member.
- 3) Name of grant: 'EPA School IPM Grant- Building sustainable school IPM inside and out: Developing and implementing standardized training materials and IPM proficiency exams for certification.' Awarding agency: US Environmental Protection Agency. Performance period: 04/01/2014 – 08/30/2016. Award amount: \$ 250,000. Role: Co- PI.
- 4) Name of grant: 'State Signature Program Initiative - Enabling Schools to Practice and Implement Integrated Pest Management-Expansion of IPM in a Child's World'. Awarding agency: Cooperative Extension, University of Arizona. Performance period: 01/01/2015 – 06/30/2016. Award amount: \$14,093. Role: Lead PI.
- 5) Name of grant: 'Southern IPM Center IPM Enhancement Grant-Quantifying the financial costs and benefits of school IPM: a collaborative workgroup project.' Awarding agency: USDA-NIFA through Southern IPM Center. Performance period: 03/01/2015 – 02/29/2016. Award amount: \$39,997. Role: Collaborator.
- 6) Name of grant: 'USDA-NIFA Extension Integrated Pest Management (EIPM) Institutional Grant 2013'.  
(My position was an essential component of this grant). Awarding agency: United States Department of Agriculture – National Institute of Food and Agriculture. Performance period: 09/01/2013 – 08/30/2015. Award amount: \$ 525,000. Role: Implementation Team Member.
- 7) Name of grant: 'Western IPM Center Grant- Handbook of Pests in Community Environments in the Desert Southwestern United States'. Awarding agency: USDA-NIFA through Western IPM Center. Performance period: 03/01/2014 – 02/28/2015. Award amount: \$30,000. Role: Lead PI.
- 8) Name of grant: 'Evaluation of APSA 80 as a wetting agent against pseudostem borer of banana'.  
Awarding agency: AMWAY India Ltd. Performance period: 2002-2004. Award amount: Rs. 10,000. Role: Lead PI.
- 9) Name of grant: 'Evaluation of botanicals against the pseudostem borer of banana *Odoiporus longicollis*'.  
Awarding agency: All India Co-ordinated Research Project, Indian Council of Agricultural Research. Performance period: 2002-2006. Award amount: Rs. 40,000. Role: Lead PI.

Grant efforts that involved significant investment of time and effort, led to further collaborations and networking, but were not funded:

- 1) Name of grant: 'Western IPM Center Grant: Western Region Public Health IPM Work Group 2014.' Awarding agency: USDA-NIFA through Western IPM Center. Performance period: 03/01/2014 – 02/28/2015. Award amount: \$30,000. Role: Co- PI.
- 2) Name of grant: 'Western Region School IPM Implementation and Outreach.' Awarding agency: USDA-NIFA through Western IPM Center. Performance period: 03/01/2014 – 02/28/2015. Award amount: \$30,000. Role: Co- PI.
- 3) Name of grant: 'State Signature Program Initiative - Integrated Pest Management Education in Elder/Disabled Housing Facilities.' Awarding agency: Cooperative Extension, University of Arizona. Performance period: 01/01/2015 – 06/30/2016. Award amount: \$14,600. Role: Co- PI.
- 4) Name of grant: '2015 HUD Healthy Homes Technical Studies Grant Program - Expansion of Multi-family Housing IPM in Western States.' Awarding agency: United States Department of Housing and Urban Development (HUD). Performance period: 10/01/2015 – 09/30/2018. Award amount: \$700,600. Role: Co- PI.
- 5) Name of grant: 'EPA Economics of School IPM Grant 2015- Quantifying the financial costs, benefits, and health related aspects of school IPM - a nationwide effort.' Awarding agency: US Environmental Protection Agency. Performance period: 01/31/2016 - 01/29/2018. Award amount: \$299,998. Role: Implementation Team Member.

**PUBLICATIONS (refereed)**

1. Menon, R., **Nair, S.**, Suma, A., P.R. Manju, Cherian, A.K., Patil, P. and Agrawal, A. 2015. Introduction, evaluation and adoption of an exotic banana (Musa AAB cv 'Popoulu') (EC320555) to Kerala, India. *Indian Journal of Plant Genetic Resources* **27 (3)**: 298 – 302.
2. S. Kristine Braman, P.L. Raymer, M. Harrison-Dunn and **Shakunthala Nair**. 2014. Antibiosis among selected *Paspalum* taxa to the fall armyworm (Lepidoptera: Noctuidae). *Journal of Entomological Science* **49 (1)**: 11 – 20.
3. S. Kristine Braman, Brian Schwartz, W.W. Hanna and **Shakunthala Nair**. 2014. Evaluation of Chinese centipedegrasses and other turfgrass species and cultivars for potential resistance to twolined spittlebug, *Prosapia bicincta* (Say). *Journal of Entomological Science* **49 (2)**: 1 – 9.
4. S. Kristine Braman, **Shakunthala Nair** and Evelyn Carr. 2013. Influence of temperature, CO<sub>2</sub> concentration, and species on survival and development of lace bugs. *Journal of Entomological Science* **48 (3)**: 1 – 4.
5. **Shakunthala Nair**, S. K. Braman and D. A. Knauff. 2012. Relative differences in susceptibility of *Pieris* taxa to *Stephanitis* lace bugs (Hemiptera: Tingidae). *Environmental Entomology* **41 (5)** : 1145 – 1152.
6. **Shakunthala Nair**, S. K. Braman and D. A. Knauff. 2012. Resistance mechanisms in *Pieris* taxa to *Stephanitis takeyai* (Hemiptera: Tingidae). *Environmental Entomology* **41 (5)** : 1153 – 1162.
7. **Shakunthala Nair**, S. K. Braman and D. A. Knauff. 2012. Host plant utilization within family Ericaceae by the Andromeda lace bug *Stephanitis takeyai* (Hemiptera: Tingidae). *Journal of Environmental Horticulture* **30 (3)**: 146 –149.
8. **Shakunthala Nair** and S. K. Braman. 2012. Integration of chemicals available to the home owner with natural enemy *Chrysoperla carnea* for management of azalea lace bug. *Journal of Entomological Science*

- 47(3):** 1 – 4.
9. **Shakunthala Nair** and S. K. Braman. 2012. A scientific review on the ecology and management of the azalea lace bug *Stephanitis pyrioides* (Scott) (Tingidae: Hemiptera). *Journal of Entomological Science* **47 (3):** 247– 263.
  10. S. Kristine Braman, Jim Quick, Marta Mead and **Shakunthala Nair**. 2012. Range of Japanese beetle response to field-grown crape myrtles. *Journal of Entomological Science* **47(2):** 1 – 5.
  11. R. Menon, A.K. Cherian, A. Suma, M.P. Mathew, **S. Nair** and K.C. Aipe. 2011. Developing resistant banana and plantain cultivars through conventional breeding techniques. *In: Proceedings of the International ISHS- ProMusa Symposium on Global perspectives on Asian Challenges* (eds. I. Van den Bergh, M. Smith, R. Swennen, C. Hermanto) Acta. Hort. **(897):** 207 – 214.
  12. **Shakunthala Nair** and Jim Thomas. 2001. Oviposition deterrence of *Acorus calamus* L. on melon fly, *Bactrocera cucurbitae* Coq. *Journal of Tropical Agriculture* **39 (2) :** 149 – 150.
  13. **Shakunthala Nair** and Jim Thomas. 2001. Evaluation of the chemosterilant effect of *Acorus calamus* L. extracts on melon fly, *Bactrocera cucurbitae* Coq. *Journal of Tropical Agriculture* **39 (2) :** 145 – 148.
  14. **Shakunthala Nair** and Jim Thomas. 2001. Effect of *Acorus calamus* L. extract on the longevity of *Bactrocera cucurbitae* Coq. *Insect Environment* **5 (1) :** 27.
  15. **Shakunthala Nair**, Prameela, P., Suma, A., Anita Cherian, K. and Babu, K.V. 2001. A new record of *Xylotrupes gideon* on okra (*Abelmoschus esculentus* L.). *Insect Environment* **7 (2) :** 71.
  16. **Shakunthala Nair** and Jim Thomas. 2000. Evaluation of toxicity of *Acorus calamus* L. extracts to various stages of *Bactrocera cucurbitae* Coq. *Entomon* **25 (4) :** 323 – 329.

#### **EXTENSION/OTHER PEER REVIEWED PUBLICATIONS** (When not first author, my role is in parentheses)

1. Gouge, D. H., L. Li, **S. Nair**, N. Pier, C. Sumner. 2016. Mosquitoes and the Great Outdoors. *Journal of Environmental Management Arizona*. Aug/Sept.: 5-6.
2. D.H. Gouge, Li, S., Walker, K., Sumner, C., **Nair, S.**, and Olson, C. June 2016. Mosquitoes: Biology and Integrated Mosquito Management. University of Arizona Cooperative Extension. Publication no. **AZ1706**. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1706-2016.pdf> [I provided significant inputs to the publication].
3. **S. Nair**, D. H. Gouge, S. Li, P. Warren., A. Fournier, M. Wierda, K. Umeda, D. Kopec. 2016. Honey bees in community environments – Identification and biology. University of Arizona. Arizona Pest Management Center. <http://cals.arizona.edu/apmc/docs/WildHoneyBeelPM1.pdf>
4. **S. Nair**, D. H. Gouge, S. Li, P. Warren., A. Fournier, M. Wierda, K. Umeda, D. Kopec. 2016. Integrated pest management for wild honey bees in community environments. University of Arizona. Arizona Pest Management Center. <http://cals.arizona.edu/apmc/docs/WildHoneyBeelPM2.pdf>
5. Li, S., Gouge, D.H., **Nair, S.**, Fournier, A. and Wierda, M. 2015. Head Lice. University of Arizona Cooperative Extension. Publication no. **AZ1687**. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1687-2015.pdf> [I authored significant portions of the manuscript].
6. **Nair, S.**, R. Senior, K. Umeda, P.C. Ellsworth, U. Schuch, D.H. Gouge, S. Li. 2015. Plant health care for ficus plants following ficus whitefly damage. University of Arizona Cooperative Extension IPM Short, June 2015. [http://cals.arizona.edu/apmc/docs/Ficus\\_Whitefly\\_Short3.pdf](http://cals.arizona.edu/apmc/docs/Ficus_Whitefly_Short3.pdf)
7. **Nair, S.**, R. Senior, K. Umeda, P.C. Ellsworth, U. Schuch, D.H. Gouge, S. Li. 2015. Identification and biology of the Ficus whitefly. University of Arizona Cooperative Extension IPM Short, June 2015. [http://cals.arizona.edu/apmc/docs/Ficus\\_Whitefly\\_Short2.pdf](http://cals.arizona.edu/apmc/docs/Ficus_Whitefly_Short2.pdf)
8. **Nair, S.**, R. Senior, K. Umeda, P.C. Ellsworth, U. Schuch, D.H. Gouge, S. Li. 2015. Integrated pest management of the Ficus whitefly. University of Arizona Cooperative Extension IPM Short, June 2015.

- [http://cals.arizona.edu/apmc/docs/Ficus\\_Whitefly\\_Short1.pdf](http://cals.arizona.edu/apmc/docs/Ficus_Whitefly_Short1.pdf)
9. Gouge, D.H., **Nair, S.** Li, S., Stock, T. 2015. Pest-proofing your home. University of Arizona Cooperative Extension. Publication no. **AZ1677**.  
<https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1677-2015.pdf> [I authored significant portions of the manuscript].
  10. Gouge, D.H., Li, S. and **Nair, S.** 2015. Bats. University of Arizona Cooperative Extension. Publication no. **AZ1675**. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1675-2015.pdf>. [I authored significant portions of the manuscript].
  11. Gouge, D.H., Stock, T., **Nair, S.**, Li, S., Bryks, S., Hurley, J., Fournier, A. 2015. Preparing your school integrated pest management (IPM) plan. University of Arizona Cooperative Extension. Publication no. **AZ1669**. <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1669-2015.pdf>. [I authored significant portions of the manuscript].
  12. Gouge, D.H., Li, S., **Nair, S.**, Stock, T., Bryks, S., Foss, C., Romero, A., Young, D.J., Code, A. 2014. Bed Bugs. University of Arizona Cooperative Extension. Publication no. **AZ1625**.  
<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1625-2014.pdf> [I authored significant portions of the manuscript].
  13. Li S., D.H. Gouge, A.J. Fournier, N. Pier, **S. Nair**. 2015. Bed Bug Information Card. University of Arizona Arizona Pest Management Center. <http://cals.arizona.edu/apmc/docs/Bed-Bugs-Card.pdf> [I provided inputs to text and images].
  14. **Nair, S.**, Gouge, D.H., Li, S., Umeda, K., Fournier, A., Ellsworth, P., Schuch, U., Kopec, D. and Baker, P. 2014. Integrated Pest Management Works Inside and Outside School Buildings. University of Arizona Cooperative Extension. Publication no. **AZ1579**.  
<http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1579-2014.pdf>
  15. School IPM Newsletters: Li, S., Gouge, D.H., **Nair, S.**, Fournier, A., Schuch, U., Baker, P., Umeda, K. and Kopec, D. The Arizona School IPM Newsletters have been distributed by the IPM Institute, all 4 regional school IPM work groups, several instate networks (including TX) and now the EPA school IPM lead from Region 10 is distributing it to the EPA regional leads. At this point it is the most widely distributed monthly school IPM communication. All Newsletters can be found at:  
<http://cals.arizona.edu/apmc/westernschoolIPM.html>. [I provide significant inputs to the manuscripts].
  16. **Nair, S.**, S. Brannon, W. Boozer, R. Bottjen and S. Weldon. 2012. 'Increasing natural enemy diversity among arthropods is compatible with the goals of biological control and IPM'. American Entomologist 58 (2): 94-104.
  17. **Shakunthala Nair**, Kris Braman and Ellen Bauske. 2012. Insect identification guide for southeastern landscapes. University of Georgia College of Agriculture and Environmental Sciences Publication B 1409.  
[http://www.caes.uga.edu/Publications/pubDetail.cfm?pk\\_id=8020](http://www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=8020)
  18. Beverly Sparks, S. Kristine Braman and **Shakunthala Nair**. 2012. Control of Lace Bugs on Ornamental Plants. University of Georgia College of Agriculture and Environmental Sciences Publication B 1102  
[http://www.caes.uga.edu/Publications/pubDetail.cfm?pk\\_id=6210](http://www.caes.uga.edu/Publications/pubDetail.cfm?pk_id=6210)  
[Updated the publication].
  19. **Shakunthala Nair**, Ellen Bauske and S. Kristine Braman. 2012. Managing garden insects begins with a question: Friend or foe? Video for UGA Center for Urban Agriculture.  
<http://www.youtube.com/watch?v=3k2Mqty1QU> or <http://vimeo.com/48026353>.
  20. **Nair, S.** 2011. Biography of ESA fellow Judith Willis. For Entomological Society of America.  
<http://www.entsoc.org/fellows/judith-h-willis-esa-fellow-2004>
  21. Fuest, J., **S. Nair**, K. Reddy, and S.V. Joseph. 2010. Current evaluation procedures of GMOs are adequate to determine their long-term impacts on the environment and human health. American Entomologist 56 (2): 106 – 114. [All authors contributed equally].
  22. Suma, A., **Shakunthala Nair**, Anita Cherian, K. and Rema Menon. 2005. Banana fiber – unending

- possibilities (Malayalam-vernacular). *Karshakan* 13 (8): 66 – 68 [Article deals with banana fiber and its production. I described how utilization of pseudostems to extract fiber can reduce the occurrence of pseudostem weevil, a major threat to banana cultivation. The pseudostems after harvesting banana bunches are usually left in the field or heaped in nearby areas where they serve as breeding grounds for the pest].
23. Suma, A., **Shakunthala Nair**, Anita Cherian, K. and Rema Menon. 2005. Towards Furadan-free bananas (Malayalam-vernacular). *Karshakan* 13 (8): 20 – 21 [Article deals with organic banana production. I described natural enemies, botanical insecticides and how they can be utilized in this production system].
  24. **Shakunthala Nair**, Anita Cherian, K., Rema Menon and Suma, A. 2005. A pest calendar for banana (Malayalam-vernacular). *Karshakan* 13 (8): 18 – 19
  25. Maicykutty P. Mathew, **Shakunthala Nair** and Rema Menon. 2005. A new enemy of banana cultivation (Malayalam-vernacular). *Karshakan* 13 (8): 17 [Article deals with the occurrence, spread and pest status of the banana mealy bug, a new pest of banana cultivation in Kerala. I described how to identify symptoms of the damage and how to distinguish them from other pest and disease symptoms].
  26. Anita Cherian, K., **Shakunthala Nair**, Suma, A. and Rema Menon. 2005. Control diseases for better yields (Malayalam-vernacular). *Karshakan* 13 (8): 15 – 16 [Article deals with disease control in banana cultivation. I described the role of insect and other arthropods in vectoring diseases and the importance of vector control in preventing spread of viral diseases].
  27. Rema Menon, Prameela, P., **Shakunthala Nair**, Suma, A. and Anita Cherian, K. 2005. Green manuring in banana (Malayalam-vernacular). *Karshakan* 13 (8): 9 – 11 [Article deals with the practices of green leaf manuring in banana cultivation. I described the effects of green manuring on pest incidence in the crop].
  28. Rema Menon, Suma, A., Anita Cherian, K. and **Shakunthala Nair**. 2005. Diversity in banana varieties (Malayalam-vernacular). *Karshakan* 13 (8): 6 – 10 [Article deals with the richness in banana diversity in Kerala. I described the pest susceptibility of selected varieties].
  29. **Shakunthala Nair**, Anita Cherian, K., Suma, A. and Rema Menon. 2003. New pests of banana (Malayalam-vernacular). *Kerala Karshakan* 49 (6) : 9 – 10
  30. **Shakunthala Nair**. 1999. Organic pesticides to avoid hazards (Malayalam-vernacular). *Deepika*. January 12, 1999.
  31. **Shakunthala Nair** and Padmanand, M. 1998. A new approach to credit in Malabar region of Kerala (Malayalam-vernacular). *Krishiyankanam* 4 (2) : 16
  32. Kris Braman and **Shakunthala Nair**. Flea beetles in nursery and landscape. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  33. Kris Braman and **Shakunthala Nair**. Japanese beetles in nursery and landscape. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  34. Kris Braman and **Shakunthala Nair**. Thrips in nursery and landscape. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  35. Kris Braman and **Shakunthala Nair**. Lace bugs on azaleas. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  36. Kris Braman and **Shakunthala Nair**. Lace bugs on hawthorn and pyracantha. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  37. Kris Braman and **Shakunthala Nair**. Lace bugs on oak. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  38. Kris Braman and **Shakunthala Nair**. Lace bugs on sycamore. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  39. Kris Braman and **Shakunthala Nair**. Lace bugs on ornamental grasses. University of Georgia College of Agriculture and Environmental Sciences Publication – in review.
  40. Gouge D.H., T. Stock, J. Hurley, **S. Nair**, A.J. Fournier, S. Li. 2015. School IPM Plan Template for Tribal

Communities (in review). University of Arizona Cooperative Extension publication. [I authored significant portions of the manuscript].

## BOOK

**Nair S.,** D.H. Gouge, M. Rust, S. Li, U.K. Schuch, A.J. Fournier, D.M. Kopec, K. Umeda, P.B. Baker, L.M. Brown, N. Duggal. 2015. **Handbook on pests of community environments in the desert southwest United States.** University of Arizona College of Agriculture and Life Sciences Cooperative Extension, Arizona Pest Management Center. (Funded by United States Department of Agriculture-National Institute of Food and Agriculture –Western Integrated Pest Management Center). Available online at <http://cals.arizona.edu/apmc/Handbook.html>

## BOOK CHAPTERS

1. Kris Braman and **Shakunthala Nair**. 2013. Lace bugs, tip midge, strawberry and cranberry rootworms. In D. L. Coyier and M. K. Roane (Eds.) Compendium of Rhododendron and Azalea Diseases 2<sup>nd</sup> Edition. APS Press, St. Paul, MN.
2. Suma, A., R. Menon, Anita Cherian, K., **S. Nair**, and M.V. Sudheesh. 2007. Banana fibre utilization-Problems and prospects with special relevance to Kerala. In '*Banana: Technological Advancements*' (eds. H.P. Singh and S. Uma). Association for the Improvement in Production and Utilization of Banana (AIPUB). Neelkanth Printers, New Delhi, India. p. 547 – 551.
3. **S. Nair**, R. Menon, A. Suma, Anita Cherian, K and M.V. Sudheesh. 2007. Ecofriendly management of pseudostem borer using neem based formulations. In '*Banana: Technological Advancements*' (eds. H.P. Singh and S. Uma). Association for the Improvement in Production and Utilization of Banana (AIPUB). Neelkanth Printers, New Delhi, India. p. 331 – 334.
4. **Shakunthala Nair** and Rema Menon. 2003. Pests of Banana. In Rema Menon, Suma, A., Anita Cherian, K., Jyothi Bhaskar, Prameela, P. and **Shakunthala Nair**. *Banana Varieties* (Malayalam). Kerala Agricultural University, Thrissur.

## PRESENTATIONS AT PROFESSIONAL MEETINGS (2009 - present)

(Also see Appendix I)

1. **Shaku Nair**, Dawn H. Gouge, Al Fournier, Kai Umeda, David Kopec, Ursula Schuch, Shujuan Li, Peter Warren, Michael Wierda. 2016. Arizona School IPM Inside and Out - Implementation of school integrated pest management programs in Arizona schools. International Congress of Entomology/Entomological Society of America Annual Meeting, Sep 25-30, 2016, Orlando, FL.
2. **Shaku Nair**, Dawn H. Gouge, Al Fournier, Kai Umeda, David Kopec, Ursula Schuch, Shujuan Li, Peter Warren, Michael Wierda. 2016. Arizona School IPM Inside and Out - Implementation of school integrated pest management programs in Arizona schools. NEHA Enhancing Environmental Health Knowledge (EEK): Vectors and Public Health Pests Virtual Conference, April 13-14, 2016.
3. **Shakunthala Nair**, D. H. Gouge, A. Fournier, K. Umeda, D. Kopec, U. Schuch, S. Li, P. Warren, P. Ellsworth. 2015. School IPM-Inside and Out: The Arizona School Integrated Pest Management Program. In University of Arizona CALS Extension Conference, 4-6 August 2015, Tucson, AZ. 200 participants.
4. Dawn H. Gouge, Shujuan, Li, **Shakunthala Nair**, et al. 2015. Impacts of bed bug (*Cimex lectularius* L.) infestations on quality of life of residents. In University of Arizona CALS Extension Conference, 4-6 August 2015, Tucson, AZ. 200 participants.
5. Dawn H. Gouge, Shujuan, Li, Al Fournier, Tim Stock, Alvaro Romero, Deb Young, **Shaku Nair**, Carrie Foss, Ruth Kerzee, Dave Stone and Megan Dunn. 2015. Quality of life impacts of bed bug (*Cimex lectularius* L.) infestations. In 8<sup>th</sup> International IPM Symposium, March 23-26 2015, Salt Lake City UT. 500 participants.

6. Dawn H. Gouge, **Shakunthala Nair**, et al. 2015. Stop School Pests: A national IPM standard training program. *In* 8<sup>th</sup> International IPM Symposium, March 23-26 2015, Salt Lake City UT. 500 participants.
7. Dawn H. Gouge, **Shaku Nair**, et al. 2014. Stop School Pests: A national IPM standard training program. *In* 62<sup>nd</sup> ESA National Meeting, November 16-19 2014, Portland OR.
8. **Nair S.**, D.H. Gouge, S. Li, A.J. Fournier, P.C. Ellsworth, K. Umeda, U.K. Schuch, D.M. Kopec, P.B. Baker. Community IPM-Integrated pest management for community environments. Poster presentation at CALS Research Poster Session, 10 November 2014, Tucson, AZ. 120 participants.
9. Li S., D.H. Gouge, A.J. Fournier, **S. Nair**. Assessment of bed bug impacts and practical methods of controlling bed bugs at home. Poster presentation at CALS Research Poster Session, 10 November 2014, Tucson, AZ. 120 participants.
10. **Shakunthala Nair**, S.K. Braman and Paul Raymer. 2013. Differences in susceptibility of zoysiagrasses, *Zoysia* spp., to the fall armyworm, *Spodoptera frugiperda*. *In* 61<sup>st</sup> ESA Annual Meeting, 10 – 13 November 2013, Austin, TX.
11. **Shakunthala Nair and** S.Kristine Braman. 2012. Resistance mechanisms in *Pieris* against the Andromeda lace bug. *In* 2012 Center for Applied Nursery Research Poster Competition at the 2012 Georgia Green Industry Association Tradeshow and Educational Symposium, February 2 2012, Duluth GA.
12. **Shakunthala Nair and** S.Kristine Braman. 2011. What protects *Pieris* against the Andromeda lace bug? *In* Georgia Entomological Society Annual Meeting, April 6-8 2011, Cordele, GA. Poster presentation, PhD Student competition.
13. **Shakunthala Nair**, S.K. Braman and D.A. Knauft. 2010. Gradients in susceptibility of *Pieris* taxa to *Stephanitis* lace bugs. *In* Georgia Entomological Society Annual Meeting, October 6-8 2010, Hickory Knob, South Carolina. Oral presentation, PhD Student competition.
14. **Shakunthala Nair**, S.K. Braman and D.A. Knauft. 2010. Gradients in susceptibility of *Pieris* taxa to *Stephanitis* lace bugs. *In* 84<sup>th</sup> Annual SEB ESA Meeting, 6 – 10 March 2010, Atlanta, GA. Oral presentation, PhD Student competition.
15. **Shakunthala Nair**, S.K. Braman and D.A. Knauft. 2009. Susceptibility of *Pieris* varieties to lace bugs (*Stephanitis* spp.) (Tingidae: Hemiptera). *In* Georgia Entomological Society Annual Meeting, April 2009, Hiwassee, GA. Poster presentation, PhD Student competition.
16. **Shakunthala Nair**, S.K. Braman and D.A. Knauft. 2009. Susceptibility of *Pieris* varieties to lace bugs (*Stephanitis* spp.) (Tingidae: Hemiptera). *In*: 83<sup>rd</sup> Annual SEB ESA Meeting, 8 – 11 March 2009, Montgomery, AL. Poster presentation, PhD Student competition.
17. R. Menon, A.K. Cherian, A. Suma, M.P. Mathew, **S. Nair** and K.C. Aipe. 2009. Developing resistant banana and plantain cultivars through conventional breeding techniques. *In*: International Society for Horticultural Science (ISHS) - ProMusa Symposium on Global perspectives on Asian Challenges, 14-18 September 2009, Gangzhou, China.
18. Cherian, A.K, Menon, R. Mathew, M.P. Suma, A., Aipe, K.C. and **Shakunthala Nair**. 2009. Current status, diagnosis and management of virus diseases of banana in Kerala, South-India. *In*: International Society for Horticultural Science (ISHS) - ProMusa Symposium on Global perspectives on Asian Challenges, 14-18 September 2009, Gangzhou, China.

**The following are presentations during the period 1996 – 2006.**

19. Suma, A., Rema Menon, Anita Cherian, K. and **Shakunthala Nair**. 2005. Biofertilizers for yield augmentation in banana. *In*: ICAR National Symposium on 'Biotechnological Interventions for Improvement of Horticultural Crops: Issues and Strategies', 10-12 January, 2005, Thrissur, Kerala, India.
20. Rema Menon, K.M. Sunny, Nisha Jose, P.A. Nazeem, R. Keshavachandran and **Shakunthala Nair**. 2005. Study of isozyme polymorphism in *Musa* cultivars of Kerala. *In*: ICAR National Symposium on

'Biotechnological Interventions for Improvement of Horticultural Crops: Issues and Strategies', 10-12 January, 2005, Thrissur, Kerala, India.

21. **Shakunthala Nair**, Rema Menon, Anita Cherian, K. and Suma, A. 2004. Effectiveness of traps to control the pseudostem borer of banana. *In: 1<sup>st</sup> International Congress on Musa – Harnessing Research to Improve Livelihoods*, 6 – 9 July, 2004, Penang, Malaysia.
22. **Shakunthala Nair**, Rema Menon, Anita Cherian, K. and Suma, A. 2004. Screening for resistance to nematodes at Kannara, India. *In: 1<sup>st</sup> International Congress on Musa – Harnessing Research to Improve Livelihoods*, 6 – 9 July, 2004, Penang, Malaysia.
23. Suma, A., Menon, R., **Nair, S.** and Anita Cherian, K. 2004. Organic plantain production for niche markets in Central Kerala, India. *In: 1<sup>st</sup> International Congress on Musa – Harnessing Research to Improve Livelihoods*, 6 – 9 July, 2004, Penang, Malaysia.
24. Menon, R., Suma, A., Anita Cherian, K. and **Nair, S.** 2004. Genetic improvement of the French Plantain 'Nendran' (*Musa* AAB) through conventional breeding. *In: 1<sup>st</sup> International Congress on Musa – Harnessing Research to Improve Livelihoods*, 6 – 9 July, 2004, Penang, Malaysia.
25. Menon, R., Anita Cherian, K., **Nair, S.** and Suma, A. 2004. Evaluation of improved hybrids in Kerala, India. *In: 1<sup>st</sup> International Congress on Musa – Harnessing Research to Improve Livelihoods*, 6 – 9 July, 2004, Penang, Malaysia.
26. Anita Cherian K., **Shakunthala Nair**, Rema Menon, Suma, A. and Beena, S. 2004. Current status of diseases of banana var. Nendran in Kerala. *In : National Seminar on Banana Industry-Present Scenario and Future Strategies*, 11 – 13<sup>th</sup> June, 2004, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal, India.
27. Suma, A., Rema Menon, Anita Cherian K. and **Shakunthala Nair**. 2004. Banana bio-waste utilization for income augmentation. *In : National Seminar on Banana Industry-Present Scenario and Future Strategies*, 11 – 13<sup>th</sup> June, 2004, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal, India.
28. Suma, A., **Shakunthala Nair**, Jyothi Bhaskar, Rema Menon and Anita Cherian K. 2004. Potassium fertilizer management for improved yield in banana var. Rasthali (AAB). *In : National Seminar on Banana Industry-Present Scenario and Future Strategies*, 11 – 13<sup>th</sup> June, 2004, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal, India.
29. **Shakunthala Nair**, Anita Cherian K., Suma, A. and Rema Menon. 2004. Pest status of pseudostem borer of banana in Kerala. *In : National Seminar on Banana Industry-Present Scenario and Future Strategies*, 11 – 13<sup>th</sup> June, 2004, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal, India.
30. **Shakunthala Nair**, Suma, A., Anita Cherian K. and Rema Menon. 2004. New pest complex on banana in Kerala. *In : National Seminar on Banana Industry-Present Scenario and Future Strategies*, 11 – 13<sup>th</sup> June, 2004, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal, India.
31. Sudheesh, M.V., Rema Menon, Suma, A., Anita Cherian, K. and **Shakunthala Nair**. 2002. Whiteshoot disorder in banana var. Nendran (AAB) – causes and management. *In: Global Conference on Banana and Plantain*, 28 – 31 October, 2002, Bangalore, Karnataka, India.
32. **Shakunthala Nair**, Rema Menon, Suma, A., Anita Cherian, K. and Sudheesh, M.V. 2002. Ecofriendly management of banana pseudostem borer – *Odoiporus longicollis* Oliv. using neem based formulations. *In: Global Conference on Banana and Plantain*, 28 – 31 October, 2002, Bangalore, Karnataka, India.
33. Anita Cherian, K., Rema Menon, Suma, A., **Shakunthala Nair** and Sudheesh, M.V. 2002. Impact of Banana bract mosaic diseases on the yield of commercial banana varieties of Kerala. *In: Global Conference on Banana and Plantain*, 28 – 31 October, 2002, Bangalore, Karnataka, India.
34. Suma, A., Rema Menon, Anita Cherian, K., **Shakunthala Nair** and Sudheesh, M.V. 2002. Utilization of banana fibre : Problems and prospects with special relevance to Kerala. *In: Global Conference on Banana and Plantain*, 28 – 31 October, 2002, Bangalore, Karnataka, India.

35. Rema Menon, Suma A., Anita Cherian, K., **Shakunthala Nair** and Sudheesh.M.V. 2002. Conservation and utilization of *Musa* AA diploids in breeding. *In: Global Conference on Banana and Plantain, 28 – 31 October, 2002, Bangalore, Karnataka, India.*
36. **Shakunthala Nair**, Rema Menon, Anita Cherian, K., Prameela, P. and Suma, A. 2002. Pest incidence in banana as influenced by weather parameters. *In: 14<sup>th</sup> Kerala Science Congress, 28-30 January, 2002, Kochi, Kerala, India.*
37. Anita Cherian, K., Babu, K.V., Rema Menon, **Shakunthala Nair** and Suma, A. 2002. New fungicides to control Yellow Sigatoka disease of banana var. Nendran. *In: 14<sup>th</sup> Kerala Science Congress, 28-30 January, 2002, Kochi, Kerala, India.*
38. Anita Cherian, K., Rema Menon, **Shakunthala Nair** and Suma, A. 2002. Screening banana varieties for resistance to Sigatoka Leaf Spot disease. *In: National Symposium on Crop Protection and WTO – An Indian Perspective, 22 to 25 January, 2002. Central Plantation Crops Research Institute, Kasargod, Kerala, India.*
39. Prameela, P., Rema Menon, **Shakunthala Nair** and A. Suma. 2001. Estimating losses from weeds at growth and development of banana (var. Palayankodan) and identification of critical stages. *In: 11<sup>th</sup> Swadeshi Science Congress, 7 – 9 November, 2001, Kerala Forest Research Institute, Peechi, Thrissur, Kerala, India.*
40. **Shakunthala Nair**, Lyla, K.R., Rema Menon, Anita Cherian K. and Suma, A. 2001. Management of pseudostem borer of banana – an emerging threat to banana cultivation. *In: National Seminar on Emerging Pest and Disease Problems and their Management, 11<sup>th</sup> – 13<sup>th</sup> October, 2001, TNAU, Coimbatore, Tamil Nadu, India.*
41. Rema Menon, Anita Cherian, K., Suma, A. and **Shakunthala Nair**. 2001. Genetic diversity of banana in Kerala – An Overview. *In: National Symposium on Biodiversity vis-à-vis Resource Exploration – An Introspection, 23 - 24 April, 2001, Port Blair, Andamans, India.*
42. **Shakunthala Nair** and Jim Thomas. 1999. Bioefficacy of *Acorus calamus* L. on repellency, feeding and oviposition of the melon fly, *Bactrocera cucurbitae* (Coq.). *In: International Seminar on Integrated Pest Management, 8-9 October, 1999, Indian Institute of Chemical Technology, Hyderabad, Andhra Pradesh, India.*
43. Charles, J.S.K., Raghunath, B.R., Krishnan, S. and **Nair, S.** 1996. Control of banana rhizome weevil (*Cosmopolites sordidus* Germar) by soil application of insecticides. *In: Conference on Challenges for Banana Production and Utilization in 21<sup>st</sup> Century, 24 – 25 September, 1996, National Research Centre on Banana, Trichy, Tamil Nadu, India.*

## INVITED TALKS

1. **Shakunthala Nair**. 2015. Landscape IPM-connecting the indoors to the outdoors. Pest Management and Pesticide Safety Seminar, November 13, 2015, Scottsdale, AZ. 30 participants.
2. **Shakunthala Nair**. 2015. Landscape pest identification and recognition. Pest Management and Pesticide Safety Seminar, November 13, 2015, Scottsdale, AZ. 30 participants.
3. **Shakunthala Nair**. 2015. Landscape IPM-connecting the indoors to the outdoors. Pest Management and Pesticide Safety Seminar, November 12, 2015, Sun City West, AZ. 45 participants.
4. **Shakunthala Nair**. 2015. Landscape pest identification and recognition. Pest Management and Pesticide Safety Seminar, November 12, 2015, Sun City West, AZ. 45 participants.
5. **Shakunthala Nair**. 2015. IPM Philosophy, Roles and Responsibilities - Why schools choose to use IPM. Inter-Tribal Council of Arizona (ITCA) School IPM Training, July 23-24, 2015, Chandler, AZ. 25 participants.
6. **Shakunthala Nair**. 2015. Ticks Biology and Control of Rocky Mountain Spotted Fever (RMSF). Inter-Tribal

- Council of Arizona (ITCA) School IPM Training, July 23-24, 2015, Chandler, AZ. 25 participants.
7. **Shakunthala Nair**. 2015. Sustainable Landscape Management or IPM - Protecting the Interface Between Landscapes and Structures. 24<sup>th</sup> Annual Desert Horticulture Conference, June 5, 2015, Tucson AZ. 75 participants.
  8. **Shakunthala Nair**. 2015. Controlling Pests in Gardens and Landscapes. *In* Water Wise Talk Series, U of A Cooperative Extension Cochise County, May 30, 2015, Sierra Vista, AZ. 60 participants.
  9. **Shakunthala Nair**. 2015. IPM in Community Environments. Summer science program at Historic Carr House, Friends of the Huachuca Mountains, May 31, 2015, Sierra Vista, AZ. 45 participants.
  10. **Shakunthala Nair**, et al. 2015. Stop School Pests – Wholesale education efforts to kick start a school IPM program. *In* 8<sup>th</sup> International IPM Symposium, March 23-26 2015, Salt Lake City UT. 35 participants.
  11. **Shakunthala Nair**. 2014. “Nuisance arthropods in turf and landscapes”. Golf Course Superintendents Seminar, 18 December 2014, Scottsdale, AZ.
  12. **Shakunthala Nair**, Dawn Gouge and Shujuan Li. 2014. “Bed Bugs: Biology and Management”. UNIVAR Pest Management Professionals Refresher Seminar, 30 October 2014, Tucson, AZ.
  13. **Shakunthala Nair** and Dawn Gouge. 2014. “School Integrated Pest Management-Practices and Implementation”. Inter-Tribal Council of Arizona (ITCA) Tribal Pesticide Inspector Training, 27 August 2014, Chandler, AZ.
  14. **Shakunthala Nair**. 2014. “Why and how IPM makes good sense”. Gila River Indian Community Integrated Pest Management Workshop, 15 July 2014, Chandler, AZ.
  15. **Shakunthala Nair**. 2014. “Happy, healthy plants through IPM”. Water Wise Talk Series, 3 May 2014, U of A Cooperative Extension Cochise County, Sierra Vista, AZ.
  16. **Shakunthala Nair** and Dawn Gouge. 2014. “Why IPM in schools, homes and child care facilities makes sense”. Arizona Environmental Health Association Spring Conference, 12 – 13 March 2014, Phoenix, AZ.
  17. **Shakunthala Nair**. 2013. Insect Uses: Usual and Unusual. 3<sup>rd</sup> Arizona Insect Festival, 15 September 2013, Tucson, AZ.
  18. **Shakunthala Nair** and S.K. Braman. 2013. A review on the azalea lace bug: Ecology and management. Georgia Entomological Society Annual Meeting, Amicalola, GA, April 2013
  19. **Shakunthala Nair**, S.K. Braman and D.A. Knauft. 2010. Does *Pieris* leaf wax affect the Andromeda lace bug? *In* Turf and Ornamental Symposium, 58<sup>th</sup> ESA Annual Meeting, San Diego, California, December 12-15, 2010.
  20. **Shakunthala Nair**, S. Brannon, W. Boozer, R. Bottjen and S. Weldon. 2010. ‘Increasing natural enemy diversity among arthropods is compatible with the goals of biological control and IPM’. Student Debate, 58<sup>th</sup> ESA Annual Meeting, San Diego, California, December 12-15, 2010.
  21. Abraham, C., S. Brannon, S.V. Joseph, **Shakunthala Nair**, and C. Scocco. 2009. ‘Biological control of insects has deleterious impacts on human health and agricultural food crops, while providing only temporary solutions to insect pest problems, and should be discontinued’. Student Debate, 57<sup>th</sup> ESA Annual Meeting, Indianapolis, Indiana, December 13-16, 2009.
  22. Fuest, J., **Shakunthala Nair**, K. Reddy, and S.V. Joseph. 2008. ‘Current evaluation procedures of GMOs are adequate to determine their long-term impacts on the environment and human health’. Student Debate, 56<sup>th</sup> ESA Annual Meeting, Reno, Nevada, November 16-19, 2008.

#### **Outreach activities and workshop presentations (2013 onwards)**

1. 05/23/2016. **S. Nair**. Insecticide selection criteria for pests. OPM CEU session. Maricopa County Cooperative Extension. 7 participants.
2. 05/05/2016. **S. Nair**, D.H. Gouge, S. Li. 2016. Bed bugs: biology and management. State Signature Program IPM Workshop, Cochise County, May 5, 2016. 45 participants.
3. 04/22/2016. **S. Nair**. Pests in community environments – live demo. Ak-Chin Earth Day Celebrations, Ak-Chin Recreation Center, Maricopa AZ. 500 participants.

4. 03/02/2016. **S. Nair**, D.H. Gouge, S. Li. 2016. Bed bugs: biology and management. State Signature Program IPM Workshop, Mohave County, March 2, 2016. 32 participants.
5. 02/27/2016. D.H. Gouge, **S. Nair**, S. Li, N. Pier. Bad bugs and IPM solutions. MAC ALARC Farm Science Day. Maricopa Ag. Center, Maricopa, AZ. 700 participants.
6. 11/21/2015. Dawn H. Gouge, **S. Nair**, S. Li, N. Pier, P. Ellsworth. Pests in community environments – live demo. MAC Family Farm Day. Maricopa Ag. Center, Maricopa, AZ. 2000 participants.
7. 09/22/2015. Dawn H. Gouge, **S. Nair**, S. Li. Itchy bug update: Training for school nurses, ESS facilitators, maintenance and administrative staff. Phoenix Union High School District Support Facility, Phoenix AZ. 26 participants.
8. 09/20/2015. Dawn H. Gouge, **S. Nair**, S. Li, N. Pier, P. Ellsworth, P. Warren. Home Pest Solutions. 5<sup>th</sup> Arizona Insect Festival, UA Main Campus Student Union Grand Ballroom, Tucson AZ. 5000 participants.
9. 09/16/2015. **S. Nair** and S. Li. Pests in community environments and public health pests- live demo. Agriculture, Gardening and Water Day, StarShine Academy, Phoenix AZ. 53 participants.
10. 05/26/2015. **S. Nair**. Insect pest identification and management in the landscape. OPM CEU session. Maricopa County Cooperative Extension. 7 participants.
11. 04/24/2015. **S. Nair** and S. Li. Pests in community environments – live demo. Ak-Chin Earth Day Celebrations, Ak-Chin Recreation Center, Maricopa AZ. 750 participants.
12. 04/22/2015. **S. Nair** and S. Li. Pests in community environments – live demo. Gila River Earth Day Celebrations, Ira Hayes Community Park, Sacaton AZ. 700 participants.
13. 03/03/2015. **S. Nair**. Pest ID practical and ID Handbook use; Top pest challenges in schools (2 presentations). Stop School Pests event. Maricopa County Cooperative Extension Office, Phoenix, AZ. 32 participants.
14. 02/25/2015. Gouge, D., S. Li and **S. Nair**. IPM Training for School Nurses, Superstition Mountain Elementary School/Apache Junction Unified School District, Apache Junction, AZ. 7 participants
15. 02/20/2015. **Nair, S.** and S. Li. Gila River Indian Community (GRIC) Dept. of Environmental Quality staff, Field tour of Maricopa Ag. Center, Maricopa AZ. 18 participants.
16. 02/14/2015. Gouge, D. and **S. Nair**. Experiments with household pests. “I Love Science” Arizona Museum of Natural History Outreach event, Mesa, AZ. 200 participants
17. 01/29/2015. **Nair, S.** Hands on pruning experience demo. Managing for Healthy Trees Workshop, Maricopa, AZ. January 29, 2014. 75 participants.
18. 10/4/2014. Gouge, D.H. and **S. Nair**. Pests in community environments – live demo. Central Arizona Cooperative Extension Centennial Celebration - Celebrating the Past, Envisioning the Future. Phoenix Zoo, Neely Center, 455 N Galvin Pkwy, Phoenix, Arizona 85008. 500 participants.
19. 04/25/2014. Gouge, D.H., **S. Nair** and S. Li. Pests in community environments – live demo. Ak-Chin Earth Day Celebrations, Ak-Chin Recreation Center, Maricopa AZ. 500 participants.
20. 04/23/2014. **Nair, S.** and D.H. Gouge. Roach-free zone; National School IPM Update (2 presentations). Seminar on School IPM-(State Signature Program Initiative Project-IPM in a Child’s World- Reducing Risks from Pests & Pest Management Practices in Public Schools). Yuma Cooperative Extension Office, Yuma, AZ. 29 participants. 91 AZ CEUs.
21. 3/14/2014. **S. Nair**. Wine-o-dino Speed Date a Scientist: Careers in Community Integrated Pest Management. Arizona Museum of Natural History Outreach event, Mesa, AZ. 50 participants.
22. 03/04/2014. **Nair, S.** and D.H. Gouge. Roach-free zone; National School IPM Update (2 presentations). Seminar on School IPM-(State Signature Program Initiative Project-IPM in a Child’s World- Reducing Risks from Pests & Pest Management Practices in Public Schools). Maricopa Cooperative Extension Office, Phoenix, AZ. 21 participants. 91 AZ CEUs.
23. 9/15/2013. Gouge, D.H., **S. Nair** and S. Li. Live insects, spiders, scorpions, and specimens at 3<sup>rd</sup> Arizona Insect Festival, Tucson. >5000 participants.
24. 7/8/2013-7/11/2013. Gouge, D.H., **S. Nair** and S. Li. Going Buggy: 4-day junior summer camp for school

- children. Arizona Museum of Natural History, Mesa, AZ. 26 participants.
25. 06/10/2013. **S. Nair** and K. Braman. Introduction to Integrated Pest Management and Landscape Pest Identification. University of Georgia Young Scholar Program Seminar, Griffin GA. 36 participants.
  26. 04/04/2013. **S. Nair** and K. Braman. Integrated Pest Management for the Landscape. Central Georgia Bibb County Master Gardener Training, University of Georgia, Griffin GA. 23 participants.

## **PROFESSIONAL ACTIVITIES/SERVICE**

### **• Member of Review Committee of the Journal of Extension (JOE)**

#### **JOE Papers reviewed in 2015**

- 1) Assessing Integrated Pest Management Implementation and Knowledge Gaps in South Dakota
- 2) Brown Marmorated Stink Bug in the Mid-Atlantic States: Assessing Grower Perceptions, Economic Impact, and Extension Progress
- 3) Educational Needs and Opportunities with Aging Adults: Listening to Limited Resource Elderly Homeowners
- 4) Opportunity to Improve Public Perception of Arthropods and Arthropod-Related Benefits
- 5) Transforming the Knowledge Gap for Local Planning Officials: Measuring Impacts of Continuing Education in Michigan's Master Citizen Planner Program
- 6) Examining the Effects of an Extension Youth Science Center on Underserved Middle School Student Science Comprehension

### **• Reviewer of scientific publications in online access journals**

#### **Papers reviewed in 2015**

- 1) Fatty acid profile of the seeds of some *Acacia* taxa from Central Sudan: Open Access Library Journal <http://www.oalib.com/journal>
- 2) Cotton flea beetle, *Podagrica puncticollis* Weise (Coleoptera: Halticidae) in Metema, Northern Ethiopia: Yield loss assessment and management: Open Access Library Journal <http://www.oalib.com/journal>
- 3) A review of Nigerian agricultural budget in achieving food security: The case of National Horticultural Research Institute: Journal of Agriculture and Biodiversity Research [www.onlineresearchjournals.org/JABR](http://www.onlineresearchjournals.org/JABR)
- 4) Evaluation of synergistic effect of neem and poultry manure on root knot nematode (*Meloidogyne* spp.) infecting rice: Open Access Library Journal <http://www.oalib.com/journal>
- 5) The Genus *Echinochloa* in the North Nile Delta, Egypt: Open Access Library Journal <http://www.oalib.com/journal>
- 6) Improvement Cycle of Yield Ability of Crop Variety: Open Access Library Journal <http://www.oalib.com/journal>

### **• Reviewer of extension publications from Land Grant Universities**

- 1) Green fountain grass: University of Nevada Cooperative Extension publication.
- 2) Aphids: University of Arizona Cooperative Extension publication.
- 3) General Entomology for Master Gardeners: University of Arizona Cooperative Extension publication.

### **• Judge of school science fairs and events**

- 1) 2/20/2014. Mesa High School Science and Engineering Fair, Mesa AZ.
- 2) 3/22/2014. Arizona Envirothon, Maricopa AZ.

### **• Student Volunteer at ESA National meetings**

- 1) 2009 (Indianapolis, IN)

2) 2010 (San Diego, CA)

## PROFESSIONAL MEMBERSHIPS

- **Member**, Entomological Society of America (ESA)
- **Member** of US-Environmental Protection Agency funded project: Stop School Pests- Program Development and Review Committee (2013-2016).
- **Member** of Western Region School Integrated Pest Management Work Group (2013-present).
- **Member** of 8<sup>th</sup> International Integrated Pest Management Symposium (March 23-26, 2015) Awards Committee, Salt Lake City, Utah.
- **Member of debate team** representing the University of Georgia in the following **ESA Debates**. (Arguments are published in the “American Entomologist”)
  - *The Impact of Genetically Modified Organisms in Entomology*. 56<sup>th</sup> ESA Annual Meeting, Reno, Nevada, November 16-19, 2008.
  - *Implications of Insect Management for Human Survival*. 57<sup>th</sup> ESA Annual Meeting, Indianapolis, Indiana, December 13-16, 2009.
  - *Issues Surrounding Biodiversity*. 58<sup>th</sup> ESA Annual Meeting, San Diego, California, December 12-15, 2010.
- **Member of the Linnaean Games team** representing the University of Georgia at SEB Meetings –
  - 2008 (Jacksonville FL)
  - 2009 (Montgomery AL)
  - 2010 (Atlanta GA)
  - ESA National Meeting 2010, San Diego, California
- Member of Plant Protection Committee of BRS, Kannara, Kerala Agricultural University (1999 – 2006)
- Member of Plant Protection Co-ordination Group of Kerala Agricultural University (2005)

## HONORS, RECOGNITION AND AWARDS

- **Featured Woman Entomologist** in “Insight Pest Solutions-Women in Pest Control and Entomology 2015” survey. Available at <http://www.insightpest.com/women-in-pest-control/>
- **Featured Alumna** in University of Georgia College of Agricultural and Environmental Sciences Magazine ‘Southscapes’, Spring 2015 Issue. “Buggin’ Out”. Available at <http://www.caes.uga.edu/alumni/news/southscapes/spring15/buggin-out.html>
- **2012 ASHS** (American Society for Horticultural Science) **Extension Division Educational Materials Award** for video “Managing Garden Insects Begins with a Question: Friend or Foe?”
- **U.E. Brady Award 2011 for Runner-Up Poster by a Student** at the Annual Meeting of the Georgia Entomological Society, Lake Blackshear, Cordele, GA, April 2011.
- **Linnaean Games Semi Finalist at National Linnaean Games**, 58<sup>th</sup> Annual Meeting of the ESA, December 2010, San Diego CA.
- **ESA Student Debate Winner** on Issues Surrounding Biodiversity at the 58<sup>th</sup> Annual Meeting of the ESA, December 2010, San Diego CA.
- **Linnaean Games Champion**, ESA Southeastern Branch (84<sup>th</sup> Annual SEB ESA Meeting, March 2010, Atlanta

GA).

- **C.M. Beckham Award 2010 for Best Paper by a PhD Student** at the Annual Meeting of the Georgia Entomological Society, Hickory Knob State Park, October 2010.
- **ESA Student Debate Winner** on Implications of Insect Management for Human Survival at the 57<sup>th</sup> Annual Meeting of the ESA, December 2009, Indianapolis, IN.
- **Poster Display Recognition** “*Susceptibility of Pieris varieties to lace bugs (Stephanitis spp.) (Tingidae: Hemiptera)*” at the Annual Meeting of the Georgia Entomological Society, Hiawassee GA, April 2009.
- **First place** in Insect Interpretive Art, Lund Week Competitions, March 2009.
- **ESA Student and Young Professional Participation Award** at the 56<sup>th</sup> ESA Annual Meeting, Reno, Nevada, November 16-19, 2008.
- H.O. Lund **Outstanding M.S. Student** Award 2007.
- Won the prize for the **second best oral presentation** at the *National Seminar on Emerging Pest and Disease Problems and their Management, 11<sup>th</sup> – 13<sup>th</sup> October, 2001, TNAU, Coimbatore.*
- Qualified the **National Eligibility Test** in Agricultural Entomology for recruitment of Assistant Professors and Lecturers in State Agri. Universities, conducted by ASRB, ICAR, New Delhi in December, 1996.
- Indian Council of Agricultural Research **Junior Research Fellowship Award** 1992.

## THESIS OR DISSERTATION RESEARCH

**Master of Science (Agricultural Entomology) thesis:** “Evaluation of the active principles of the rhizome extracts of *Acorus calamus* L. for the management of melon fly, *Bactrocera cucurbitae* (Coq.) (Tephritidae: Diptera)”.

The melon fruit fly *Bactrocera cucurbitae* (Coq.) (Tephritidae: Diptera) is one of the highly destructive pest species attacking cucurbits. The habit and habitat of the fly along with the environmental conditions and cultivation practices followed in the region make its management difficult. As part of testing newer and safer means to solve this problem, I evaluated the insecticidal and insectistatic properties of sweet flag *Acorus calamus* L. Effects like repellency, feeding deterrency, oviposition deterrency, ovidical action, topical contact, toxicity to larvae, pupae and adults and chemosterilant action of the extracts were tested. The repellent and feeding and oviposition deterrent effects of the extracts were proved by reduced alightment and oviposition of flies on treated substrates. The LC50 of methanol extracts to the eggs was found to be 0.03% and to adult flies, 0.07%. The methanol extracts were found to inhibit mating completely in adult flies fed with the extracts at 0.1 to 0.01% from the day of emergence. The average survival period of these flies was also significantly lower, because of which, fecundity realization was not seen. The sizes of reproductive organs in the treated flies were found to be considerably reduced, probably due to regression or oosorption in the ovaries, or general atrophy of the organs, caused by the feeding of the extracts. This damage to the reproductive organs might have caused a hormonal imbalance, which resulted in the mating being inhibited.

**PhD (Entomology) thesis:** “*Stephanitis* lace bugs affecting ericaceous plants: Host range, mechanisms of resistance and management”

My doctoral research was on lace bugs which are important pests of landscape. My research has yielded several useful results that will add to information on managing landscape pests.

I screened over 60 taxa of the ericaceous ornamental *Pieris* for susceptibility to the andromeda lace bug *Stephanitis takeyai* and the azalea lace bug *Stephanitis pyrioides* and obtained gradients in susceptibility to these pests. The taxa *P. phillyreifolia* and *P. japonica* 'Variegata' were consistently tolerant to both species of lace bugs while *P. japonica* 'Cavatine' was consistently susceptible to both. *P. japonica* 'Temple Bells' was notable in being highly susceptible to *S. takeyai*, but tolerant to *S. pyrioides*. I examined the possible role of leaf parameters like toughness, moisture content, epicuticular wax, and stomatal characters in resistance of selected *Pieris* taxa to *S. takeyai*. Experiments with extracts of leaf-surface lipids revealed that unlike observations in the related plant azalea, *Pieris* leaf wax does not have a role in resistance. Leaf toughness measurements indicated significantly higher force was required to puncture *P. phillyreifolia* leaves. This species also had higher fiber, lignin and cellulose content and lower leaf moisture content. Ultrastructural studies on leaves of selected *Pieris* taxa revealed significant differences in the number and size of stomata. Therefore, resistance in *Pieris* taxa to *S. takeyai* appears to be a combination of different factors among which leaf toughness, moisture and stomatal characters may have a significant role. In experiments testing host range of *S. takeyai* on different ericaceous hosts, the lace bugs showed highest preference for *P. japonica*. Another of my projects was on integration of chemicals available to the homeowner with natural enemies, for the management of lace bugs. We found that green lacewings did not significantly affect control of lace bugs, and chemical control is still the most economical and effective option.

## INTERNSHIP EXPERIENCE

Participation in the Crop Protection internship as part of the MPPPM program gave me first-hand experience of a field research program with a goal to develop practical IPM approaches that are economically efficient and sustainable. We screened new insecticides against major pests in cotton, soybean and corn and used various methods of scouting cotton and monitoring insect populations, familiarized with data collection and interpretation using SAS.

## COURSES TAKEN IN RECENT DEGREE PROGRAMS (Cumulative GPA 3.97/4.0)

Towards MPPPM program

Course	Title	Credit	Grade	Date Taken	Term Avg	Cum. Avg
CRSS 6340	Weed Science	3.0	A	Fall 2006		
CRSS 6340L	Weed Sci Lab	1.0	A	Fall 2006		
ENTO 6000	General Ent	3.0	A	Fall 2006		
ENTO 8000	Ento Seminar	1.0	S	Fall 2006		
ENTO 8000	Ento Seminar	1.0	S	Fall 2006		
ENTO 8900	Problems in Entomology	4.0	A	Fall 2006		
PATH 6280	Diagnosis and Mgt. of Plant Diseases	4.0	A	Fall 2006	4.00	4.00
CRSS 6260	Forage Management and Utilization	3.0	A-	Spring 2007		
ENTO 6250	Pesticides and Transgenic Crops	3.0	A	Spring 2007		
ENTO 6740	Integrated Pest Management	3.0	A	Spring 2007		
ENTO 8050	Principles of Systematics	2.0	A	Spring 2007		
PATH 6300	Clinical Plant Pathology	2.0	A	Spring 2007	3.97	3.97
ENTO 6130	Crop Protection Internship	1.0	S	Fall 2007		

ENTO 8900	Problems in Entomology	2.0	A	Fall 2007	3.98	3.98
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Towards PhD program

Course	Title	Credit	Grade	Date Taken	Term Avg	Cum Avg
ENTO 6010	Insect Taxonomy	5.0	A	Fall 2007		
STAT 6210	Statistical Methods I	3.0	A	Fall 2007		
WIPP 7001	Pedagogy of Writing in the Disciplines	3.0	S	Fall 2006	4.0	4.0
ENTO 8250	Insect Physiology	3.0	A	Spring 2008		
ENTO 8900	Problems in Entomology	3.0	A	Spring 2008		
STAT 6220	Statistical Methods II	3.0	A	Spring 2008	4.0	4.0
ENTO 8570	Molecular Entomology	3.0	A	Fall 2008		
CRSS 8010	Research Methods	3.0	A	Fall 2008		
HORT 6050	Greenhouse Management I	3.0	A	Fall 2008	4.0	4.0
ENTO 8900	Problems in Entomology (Morphology)	2.0	A	Spring 2009		
STAT 8200	Experimental Designs	3.0	A-	Spring 2009		
STAT 6360	Programming in SAS	3.0	A	Spring 2009	3.97	3.97
HORT 6050	Plant Breeding	3.0	A	Fall 2009	3.97	3.97

#### SKILLS

- Well versed in SAS and MS Office applications like MS word, MS Excel and MS PowerPoint.
- Talented in scientific illustration
- Proficient in technical writing, including preparation of reports, presentations and manuscripts for publication
- Proof-reading

#### RESEARCH/PROFESSIONAL INTERESTS

- Community Integrated Pest Management-Pest management at the community level
- Plant-insect interactions
- Host plant resistance assessment
- Insect morphology and ultrastructure
- Non-chemical methods of pest management
- IPM evaluation

#### NON-ACADEMIC INTERESTS

- Creative writing
- Music
- Painting and sketching
- Photography

## REFERENCES

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3. Dr. John All, Professor  
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## Appendix I

### **Activities as Assistant Professor (Agricultural Entomology) during the period 1999 – 2006 (Part of report prepared for Annual Assessment of Faculty at Kerala Agricultural University)**

I joined Kerala Agricultural University as Assistant Professor (Agricultural Entomology) on 3-4-1999 and was posted at Banana Research Station, Kannara. Although research, extension and teaching are the mandatory duties of all university faculty my position at the station was 50% research, 40% extension and 10% teaching, in addition to the other responsibilities assigned. The following are the major activities undertaken and work performed during the period (1999-2005).

Targets set	Targets achieved
<b>Research</b>	
Handling of trials on entomology and nematology in operation at the station.	In charge of all trials on entomology (in banana and jackfruit) and nematology (in banana) in operation at the station (List of projects attached – Appendix II)
Handling of externally aided projects	Co-PI of the EAP sponsored by AMWAY, India, Ltd. : 'Evaluation of APSA 80 as a wetting agent against pseudostem borer of banana'.
Formulation of new trials according to the need of farmers	Formulated and conducted trials on evaluation of neem based insecticides and botanicals against pseudostem borer of banana.
Handling of product testing experiments related to pests of banana	Conducted the evaluation of the product 'Actara' (Thiamethoxam) against pseudostem borer of banana
Association with trials in other disciplines	Associated with trials on plant pathology, agronomy, horticulture (crop improvement, varietal evaluation) (List of projects attached – Appendix II)
Communication and discussion of results obtained with scientists and workers from elsewhere	Attended and participated in various seminars, symposia, conferences and workshops (at state, national and international levels), communicated research findings through research paper presentations (oral and poster) and had useful interactions with other scientists and workers (List of seminars/symposia attached)
Participation in refresher courses/trainings to update existing knowledge	Participated in summer/winter schools and other relevant trainings (List attached and Appendix II).
<b>Extension</b>	
Transferring of technology generated to farmers through various means	Conducted farm trials on evaluation of neem based insecticides against pseudostem borer of banana, in four districts of Kerala. (List of trials handled attached – Appendix II).
	Conducted Adaptive Trials and Frontline Demonstrations of selected promising results of research relating to pest control in vegetables, coconut and banana (List of trials handled attached – Appendix II).
	Handled classes/sessions in seminars handling classes for farmers and extension officers as part of training programmes conducted by Department of Agriculture and

	other organizations like FACT, VFPC, etc. (List of extension activities attached – Appendix III).
	Resource person in Research-Extension Interfaces organized by Department of Agriculture in different districts (List of extension activities attached – Appendix III).
	Consultancy services to farmers and extension personnel regarding all aspects of cultivation of banana.
	Free diagnostic services by visiting farmers fields
	Prepared leaflets on cultivation practices of banana to be distributed to farmers.
	Dissemination of information by publication of articles and books (List of publications provided)
<b>Teaching</b>	
Undergraduate courses	Offered the course Plpt. 203 (Crop Pests and Diseases 2+1) to students of CCBM, Vellanikkara, since 1999 (Details attached – Appendix IV)
	Offered the course Ag. Ent.304 (Economic Entomology – I) for B.Sc.(Ag.) students 1995 Admission – Semester 5 (Details attached – Appendix IV)
Post-graduate students	Member of advisory committee of two M.Sc.(Ag.) and one Ph.D. student of the Department of Entomology, College of Horticulture, Vellanikkara
<b>Other work undertaken</b>	
Compilation of reports	Compilation and preparation of all reports submitted from the station – Monthly, Quarterly, Annual.

### MEMBERSHIP OF COMMITTEES

Member of Plant Protection Committee of BRS, Kannara (1999 – 2006)

Member of Plant Protection Co-ordination Group of KAU (2005)

### FACULTY IMPROVEMENT PROGRAMS - PARTICIPATION IN REFRESHER COURSES/SUMMER INSTITUTE:

Sl. No.	Title of the course	Duration	Name of the Organizing Institution
1.	Winter School on Emerging Trends in Microbial Control of Crop Pests	14/11/00 to 13/12/00 (30 days)	Dept. of Agrl. Entomology, Tamil Nadu Agricultural University, Coimbatore, India
2.	Summer School on Optimizing Learning Teaching and Development of Multimedia Courseware	6/6/03 to 26/6/03 (21 days)	National Academy of Agricultural Research Management, Hyderabad, India
3.	Training on “Integrated Pest Management in Horticultural Crops”	24/09/01 to 1/10/01 (10 days)	Indian Institute of Horticultural Research, Bangalore, India
4.	Training-cum-workshop on Recent Advances for Eco-friendly	16/3/04 to 18/3/04 (3 days)	National Research Centre on Banana, Trichy, India

Management of Banana Nematodes		
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**PRESENTATIONS IN SCIENTIFIC/PROFESSIONAL MEETINGS (1996-2006): 25 (Listed on page 5)**

**SEMINARS/SYMPOSIA/CONFERENCES/WORKSHOPS ATTENDED:**

1. Participated in the **International Seminar on IPM**, held at the Indian Institute of Chemical Technology, Hyderabad, on 8 & 9 October, 1999.
2. Attended the **National Seminar on Emerging Pest and Disease Problems and their Management**, held at TNAU, Coimbatore from 11.10.01 to 13.10.01 and gave an oral presentation of the paper entitled "Management of pseudostem borer of banana – an emerging threat to banana cultivation".
3. Participated in the **DAE- BRNS Regional Workshop on "The Impact of Applications of Radiation on Food and Agriculture"** held on December 27-28, 2001 at Kerala Agricultural University Central Auditorium, Vellanikkara.
4. Attended and participated in the **Global Conference on Banana and Plantain**, Bangalore from 28 to 31.10.02.
5. Attended and participated in the **National Seminar on "Banana Industry – Present Scenario and Future Strategies"**, held at Farmer's Training Centre, Bidhan Chandra Krishi Viswavidyalaya, Kalyani 741235, Nadia, West Bengal from 11-6-04 to 13-6-04.
6. Attended and participated in the **"International Congress on Banana and Plantain – Harnessing Research to Improve Livelihoods"**, organized by INIBAP (International Network for Improvement of Banana and Plantain) held at Penang, Malaysia from 6-7-04 to 9-7-04.
7. Attended the **Workshop on Biocontrol of Coconut Mite** held at the College of Agriculture, Vellayani on 17 & 18 April, 2000
8. Participated in the **National Level Training Workshop on Natural Resource Management** held at Central Auditorium, Vellanikkara from 21 – 24/2/03.
9. Attended the **Training in "Manglish" software** held at RARS, Pattambi, on 4/11/99.
10. Attended the **"Training on Bamboo – Cane cultivation and management"**, held at Kerala Forest Research Institute, Peechi on 3.5.02.
11. Attended the **Training on Narrowcasting – Preparation of Script**, held at Communication Centre, Mannuthy on 7&8.10.02.

## Appendix II - RESEARCH

### PROJECTS HANDLED as PRINCIPAL INVESTIGATOR

#### AICRP - All India Co-ordinated Research Project (Tropical Fruits) - BANANA

1. FF/ 03-00-09/ KNR (4/88) ICAR  
Survey studies on insect pests of banana
2. ICAR 5.2.2.  
Biology and population dynamics of pseudostem borer of banana
3. ICAR 5.2.3 (a)  
Chemical control of pseudostem weevil using Acephate
4. ICAR 5.2.3. (c)  
Management of pseudostem borer of banana using different bait traps
5. ICAR 5.2.3 (d)  
Evaluation of commercially available neem based insecticides for control of pseudostem borer of banana.
6. ICAR 5.2.3 (e)  
Evaluation of botanicals against the pseudostem borer of banana *Odoiporus longicollis*.
7. FF/03-00-06/ KNR (4/83) ICAR  
Survey and identification of banana nematodes
8. FF/03-00-05/ KNR (4/89) ICAR  
Control of banana nematodes using intercrops
9. FF/ 03-00-04/KNR (4/81) ICAR  
Screening of banana germplasm against nematode pests

#### AICRP (TF) – JACKFRUIT

1. ICAR 5.5.1.  
Survey and incidence of insect pests

#### EXTERNALLY AIDED PROJECTS

Amway India Ltd. Testing the efficacy of APSA-80 as a wetting agent against major pests and diseases of banana – Evaluation of APSA-80 against pseudostem borer of banana.

#### PRODUCT TESTING EXPERIMENTS

Evaluation of “Actara” (Thiamethoxam), product of Syngenta Ltd. against pseudostem borer of banana.

#### Farm Trials

Name of trial : **Evaluation of neem based insecticides against pseudostem borer of banana**

Locations : Four districts (Kottayam, Ernakulam, Thrissur and Palakkad)

Period : 2003 – 2005

#### Adaptive Trials & Frontline Demonstrations

1. Name of trial : **Mite control in coconut**

Locations : Four panchayats of Thrissur district (S.N.Puram, Engandiyur, Anthikkad and Nattika) Period : 2000 – 2001

2. Name of trial : **IPM in vegetables**

Locations : One panchayat (Vallissery Haritha Sangham in Avinissery Panchayat of Thrissur district)  
Period : 2000 – 2001

3. Name of trial : **Nematode management in banana**

Locations : Two districts (Ernakulam – Koovappady and Thrissur - Pananchery)  
Period : 2000 – 2001

**PROJECTS HANDLED as Associate**

**AICRP[TF] - [I] BANANA**

**Crop Improvement and management**

1. FF/01-00-01 / KNR(10/73) ICAR  
Collection .conservation and evaluation of banana germplasm
2. ICAR 1.2.2. (b)  
Clonal selection.
3. ICAR 1.2.3 (a)  
Improvement through hybridization
4. ICAR 1.2.3 (b)  
Improvement through mutation breeding
5. FF/02-00-63-99/KNR (10) ICAR  
Time of planting trial in banana var. Nendran (AAB)
6. ICAR 2.2.1. (a)  
High density planting and sucker arrangement in banana.
7. ICAR 2.2.3  
Improving the propagation efficiency in banana.
8. ICAR 3.2.1 (d)  
Effect of micronutrients on growth and yield of banana var. Poovan(AAB)
9. ICAR 3.2.1 (b)  
Effect of bio-fertilizers on growth, yield and quality of banana
10. ICAR 3.2.1 (c)  
Effect of different sources of Nitrogen on yield and quality of banana.
12. ICAR 3.2.3  
Fertigation studies in banana
13. ICAR 3.2.5  
Cropping system studies
14. FF/02-00-66-99/KNR (10) ICAR (Demonstration trial)  
Effect of bunch cover on yield and quality of banana var. Nendran (AAB).
15. ICAR 4.2.1 (a)  
Effect of bio-regulators on growth and yield of banana (Demonstration trial)
16. ICAR 4.2.1 (b)  
Chemical manipulation for higher yield and quality in banana

### **Disease Management**

17. FF/ 03-00/ KNR (5/90) ICAR  
Screening of banana germplasm against leafspot ,bunchy top and Fusarium wilt
18. FF/ 03-00-06 / KNR (4/ 83) ICAR  
Survey of fungal and viral diseases of banana
19. FF/ 03-00-21-99 / KNR (5) ICAR  
Studies on *Fusarium* isolates in relation to Panama Wilt of banana.
20. FF/ 01-00-03-15-90/ KNR-ICAR  
Control of Panama Wilt of banana.
21. FF/ 01-03-01-75 / KNR-ICAR  
Control of Sigatoka leaf spot disease of banana.
22. ICAR 6.2.3 (a)  
Epidemiology of Sigatoka Leaf spot disease of banana
23. ICAR-6.2.4. (b)  
Chemical control of rhizome rot (Tip over) of banana.
24. FF/ 01-03-14-89/ KNR-ICAR  
Virus diseases of banana.
25. ICAR 6.2.2 (c)  
Management of *Fusarium* and nematode complex in banana

### **[II] JACKFRUIT**

26. ICAR 1.5.1.  
Survey, identification and selection of mother plants to establish high yielding, superior clonal stocks
27. ICAR 1.3.2  
Varietal trial
28. ICAR 2.5.1.  
Standardization of propagation methods
29. ICAR 2.5.2  
Effect of rootstocks on the performance of jackfruit
30. ICAR 6.5.1.  
Survey and incidence of diseases

### **EXTERNALLY AIDED PROJECTS**

AMWAY India Ltd. Testing the efficacy of APSA-80 as a wetting agent against major pests and diseases of banana – Evaluation of APSA 80 against Sigatoka leaf spot of banana.

### **ALL INDIA CO-ORDINATED RESEARCH PROJECT -TROPICAL FRUITS (AICRP–TF) GROUP DISCUSSIONS (National Level) ATTENDED**

- XI<sup>th</sup> Group Discussion and Biennial Workshop of the Scientists of AICRP (TF) held at Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, from 5 to 8 January, 2000.
- XII<sup>th</sup> Group Discussion and Biennial Workshop of the Scientists of AICRP (TF) held at TNAU, Coimbatore from 18 – 21 March, 2002.
- XIII<sup>th</sup> Group Discussion and Biennial Workshop of the Scientists of AICRP (TF) held at S.V. Agricultural College, ANGRAU, Tirupati from 7<sup>th</sup> – 10<sup>th</sup> February, 2004

## Appendix III-EXTENSION

### Zonal Research and Extension Advisory Committee (ZREAC) Meetings attended

Participated in the 21<sup>st</sup> ZREAC Meeting held at RARS, Pattambi on 4.6.99.  
Participated in the 22<sup>nd</sup> ZREAC Meeting held at RARS, Pattambi on 8.6.2000.  
Participated in the 23<sup>rd</sup> ZREAC Meeting held at RARS, Pattambi on 26.5.01.  
Participated in the 24<sup>th</sup> ZREAC Meeting held at RARS, Pattambi on 30.5.02  
Participated in the 25<sup>th</sup> ZREAC Meeting held at RARS, Pattambi on 6.5.03.  
Participated in the 26<sup>th</sup> ZREAC Meeting held at RARS, Pattambi on 15.5.04.

### Highlights of activities

1. Conducted Seminar on Banana Cultivation and Management in connection with Farmer's Day Celebration on 17/8/99 at Erimayur Panchayat\*.
2. Conducted Seminars on "Mite Infestation in Coconut and its Management" at Poyya and Vettilappara on 4/12/99 and 7/12/99 respectively.
3. Conducted a Seminar on "Mite Problem in Coconut" in Anthikkad Panchayat on 31/7/2000.
4. Participated as Resource Person in the Farmer-Scientist Interaction Session on Agroclimatic Zone basis held at RARS, Pattambi on 12/7/2000.
5. Handled a class on 'Pest and disease management in banana' as part of a Seminar organized by FACT at Pananchery, on 21.7.01.
6. Participated as Resource Person in the Research – Extension Interface for Malappuram district organized by the Department of Agriculture on 17.1.02.
7. Handled classes on banana cultivation for women farmers at Erimayur and Alathur Panchayats, Palakkad district on 28/4/03.
8. Handled a class on Integrated Pest Management for farmers at Peruvembu Krishi Bhavan, Palakkad district on 19/5/03.
9. Handled a class on IPM Concepts as part of the refresher course for Agricultural Officers and Assistants# at Krishi Bhavan, Nadathara on 27.11.02.
10. Handled a class on Banana Cultivation as part of the refresher course for farmers conducted by Regional Agricultural Technology Training Center, Vyttila at Kothamangalam on 11.12.02.
11. Participated as Resource Person in the Farmer-Scientist Interface for Palakkad district held at Regional Agricultural Research Station, Pattambi on 22/3/03.
12. Conducted a discussion on problems in banana cultivation as part of Karshaka Dinam (Farmer's Day) 2003 on 17.8.2003 at Kalady

13. Classes on Export oriented Banana Cultivation for farmers – Agro-Export Zone, Department of Agriculture on 26.9.03, 7.10.03, 8.10.03, and 20.11.03 at various locations in Ernakulam district.
14. Monthly Workshop of Department of Agriculture, Palakkad at Kunnannur Farm, Palakkad on 15.1.04.
15. Member of diagnostic team appointed by the Vice Chancellor to visit problem areas in Kannur district and identify field problems.

\*Panchayat: An area similar to county

#Agricultural Officers and Assistants: Positions similar to County Extension Agents

**Appendix IV – TEACHING**  
**Details of courses taught at Kerala Agricultural University**

**Ag. Ent. 304. Economic Entomology – I (2+1)**

**Course content: Pests of crops and stored grains and their management**

Distribution, biology, nature and symptoms of damage and management strategies of insect pests of rice, wheat, maize, sorghum, ragi, coconut, arecanut, oil palm, rubber, cashew, mango, banana, pomegranate, guava, sapota, citrus, grapevine, apple, sugarcane, cotton, pulses, groundnut, castor, gingelly, sunflower, brinjal, bhindi, tomato, moringa, amaranthus, chillies, curry leaf, cruciferous and cucurbitaceous vegetables, tapioca, potato, sweet potato, colacasia, pepper, cardamom, ginger, turmeric, vanilla, onion, coffee, tea and ornamental and medicinal plants.

Stored grain pests – Introduction. Causes of storage losses. Coleopteran and lepidopteran pests- biology and damage. Preventive and curative methods of management.

**Practical (Labs)**

Identification of pests, damage symptoms and management of rice, coconut, arecanut, oil palm, rubber, cashew, mango, banana, pomegranate, guava, sapota, citrus, apple, sugarcane, cotton, pulses, groundnut, castor, gingelly, sunflower, brinjal, bhindi, tomato, moringa, amaranthus, chillies, curry leaf, cruciferous and cucurbitaceous vegetables, tapioca, potato, sweet potato, colacasia, , pepper, cardamom, ginger, turmeric, vanilla, coffee, tea, ornamental and medicinal plants. Coleopteran and lepidopteran pests of stored products and their biology and damage.

**Plpt . 203. Crop Pests and Diseases (2+1)**

**Course content:**

Pest status and pest concept. Types of pests. Population and damage levels, loss assessment. Biodiversity-concept and importance. Concept of agroecosystem in pest management – community, ecosystem and agroecosystem. Principles of agroecosystem based pest management. IPM for major pests of crops. Concept of plant disease - definition – classification of plant diseases – types of diseases based on symptom – general study of diseases with symptomatology – etiology – epidemiology – physiology of parasitism – patho physiology. Damping off and seedling blight of root and fruit diseases, blight, spot and anthracnose, downy mildew, powdery mildew, rust, smut, bunt diseases. The leaf curl, mosaic, yellows, galls, witches broom, scab, post-harvest diseases. Management of plant diseases through chemical, cultural, biological and other means.

**Practical (Labs)**

Agroecosystem analysis – recording of data on weather parameters, other factors contributing to yield and yield attributes – finalizing and adoption of the pest management strategies in major crops.

Study of the different types of symptoms of diseases – host parasite relationships and their management.