Sirex Science Advisory Panel

Report

January 9 & 10, 2006
Annapolis, MD

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A *Sirex noctilio* female was found in a trap placed for exotic bark beetle in Fulton, NJ on September 7 of 2004 and identified in February of 2005. Since that time, through visual and trap-based surveys, an established population has been found in the area around Oswego and Fulton, NY. Trap catches indicate that the population may extend at least 46 miles southeast of Oswego. A total of 85 females were captured in NY. In addition, trap surveys in Canada, along the north shore of Lake Ontario and the St. Lawrence River, captured five additional females. One of these was captured as far east as the town of Prescott (Proviena).

*Sirex noctilio* is native to EurAsian and only has become a primary pest of *Pinus* species when it was accidentally introduced into areas where pines are being commercially grown. It is now known to occur in New Zealand, Australia, South Africa, Brazil, Chili, and Argentina. In these areas of the world, most of the damage has been reported on North American species of pine, which have been cultivated for fiber and lumber production. Risk assessments and economic analysis predict that direct *S. noctilio* impacts in the United States would amount to billions of dollars (appendix 1).

To address the discovery of established populations in New York, APHIS requested the formation of a science advisory panel to formulate an appropriate response and to respond to specific questions posed by federal and state officials and by stakeholders. The following report is the result of the initial meeting of the *Sirex* Science Advisory Panel (SSAP) in Annapolis, Maryland on January 9 & 10, 2006. These recommendations are based on the best available information at the time of the meeting and are subject to change as new information becomes available.

**Survey**

The Science Panel believes that the actual area infested by *Sirex* in the U.S. likely extends beyond the current area that is known to be infested, and that proper delimitation of the population should be given high priority. Accurate delimitation will allow us to: (1) refine boundaries of regulatory zones, (2) make better decisions regarding possible program options and allocation of resources, and (3) identify locations for various program actions (control, future survey, etc.).

**Trapping**

Trapping should be the primary delimitation method. Traps should be spaced on a grid system; within areas delineated by the grid. Sites containing pine (giving preference to sites with hard pines in poor condition) should be selected for trapping. The delimitation grid should extend to areas within 150 miles of Oswego. The trapping area should also include a band on the U.S. side of the St. Lawrence Seaway to cover *Sirex* captures in Canada. Overall trap density should ideally be one trap per 5 square miles in this area, however, if resources are limiting this area, it
should be covered, but at a lower trapping density. Trapping efforts can be substantially reduced within 50 miles of Oswego, as the bulk of that area is already known to be infested. Statisticians with experience in detection trapping systems should be consulted on survey design. Coordinate this delimitation program with CAPS and the FS-ED/APHIS programs to ensure adequate detection survey for *S. noctilio* beyond the scope of the delimitation trapping effort. Also, coordinate this with Canada so that a clear picture of *Sirex noctilio* distribution emerges.

**Semiochemical-baited traps** (synthetic lures) still need developmental work, but these are the least expensive and logistically simplest of the currently available trapping tools and technology which can be used for delimiting surveys.

**Log-baited traps** appear at this time to be more efficient than traps baited with synthetic lures, but are relatively more complicated logistically. The mesh cylinders used for these traps are not commercially available and trappers must coat them with sticky substances in the field. For optimal attraction, logs must be freshly cut and changed frequently (every 2-3 wks).

**Trap trees** are thought, under most circumstances, to be the most effective trapping system that is currently available. Trap trees should be used in the U.S. for *S. noctilio* programs, but that use should be limited, due primarily to logistical issues. Trap trees for survey and for establishing nematodes are killed using herbicides. The optimal time for applying herbicides may fall into a relatively narrow window (as short as several weeks) in order to minimize attack from other bark and wood feeding insects. Beetle-attacked trees are thought not to support *Sirex*. USFS and APHIS-PPQ-CPHST will cooperatively develop the best technique and timing for creating effective trap trees and provide recommendations for timing these treatments for the 2006/2007 field season. Another consideration is that trap trees must be felled for evaluation. Felling and peeling/splitting to detect *Sirex* life stages is time consuming.

Trap-tree methodology, however, needs to be developed for U.S. climate and tree species because trap trees will be used for inoculating areas with nematodes (see control section below). The SSAP’s recommendation is to depend on semiochemical-baited traps for most of the delimiting effort, but include trap trees throughout (perhaps in an array radiating from Oswego) to: (1) give the program experience with trap trees, (2) get information on relative effectiveness of traps and trap trees under different conditions (e.g., different densities of *Sirex*, hole tree density, etc.), and (3) enhance the sensitivity of the overall survey effort.

**Aerial survey**

Aerial survey may be able to be used to identify high-risk areas for selecting trap sites and perhaps for locating infested trees. If aerial survey techniques are used, the survey results should be ground-truthed so that results are confirmed. Information should be collected on tree species and host condition to determine if this technique can be utilized for a survey site location. It is unknown at this point if *Pinus* species in the U.S. will display the same needle symptoms as on *Pinus radiata*, etc. in New Zealand, Australia, etc. These surveys can be most effective if conducted when leaves are not present on deciduous trees. The utility of this technique will have to be evaluated on different species of North American pines.
**Softwood mills**  
Mills should be surveyed for *Sirex* damage. Ends of logs can be examined periodically (as inventory turns over) for signs of larvae or larval damage. If infested material is found, it should be traced back to the point of origin. An effort should be made to educate mill personnel to conduct these surveys, even though conflict-of-interest issues could arise. This relates to the next area of discussion.

**Outreach**  
Initiate an outreach program to educate the public, and especially forestry professionals, non-industrial woodlot owners, arborist, and the timber industry about *S. noctilio*. This outreach effort should be national in scope as the public is often our primary detection method in areas remote from known infested areas and because almost all of the U.S. is susceptible to infestation. Also, silvicultural guidelines should be developed to describe best stand management practices to minimize impacts of *Sirex* infestations. Known infested areas, such as Oswego, should be used for on-site training of program personnel and to show the impact to the stakeholders.

**Regulatory Actions**

Movement of logs and green lumber of hard (2- and 3-needle) pines from infested areas (currently the five NY counties) should be regulated. These logs go for such uses as utility poles, pulp, and firewood. Movement of *S. noctilio* in logs or lumber is a concern, as it could create infestations in areas remote from the known infested area(s). Chipped wood may also be a concern, depending on the size of the chips and how they are processed. Chipping or grinding to 1” or less results in no emergence of the emerald ash borer (EAB) from infested wood, but it will be necessary to verify this treatment on *Sirex*. Compliance agreements can be used to allow movement of these commodities during periods when emergence of adults is not a risk.

**Control**

**New York Population**  
The Science Advisory Panel believes that eradication of *S. noctilio* is not a feasible option at this point in time. Tree removal also does not appear to be feasible as an overall control method, and generalized use of pesticides is problematic from a number of viewpoints, including a lack of known effective compounds, expense of application over large areas, and environmental impacts. Comprehensive biological/cultural control programs have been effective against introduced populations of *S. noctilio* in New Zealand, Australia, and South America. These programs consist of three basic parts, all of which are complimentary and critical for success: 1) dissemination of parasitoids and parasitic nematodes, 2) silvicultural practices that promote tree health and vigor, and 3) systematic survey and surveillance. We believe that this approach should be initiated in North America. This approach will require adjustments when applied in North America because of difference in host species, abundance, distribution, and forest composition. Other facts that must be considered are climate effects and land management patterns.
The parasitoid species that have been most effective in classical biological control programs in other areas where *S. noctilio* has been introduced are North American species and some have already been found parasitizing *Sirex* in New York (Mastro unpublished). The effectiveness of these agents in New York should be assessed; however, they have not, in themselves, provided sufficient control in other areas, and preliminary data suggest that this will not be the case in North America either. A program to deploy the nematode, *Beddingia siricidicola*, is imperative and should be initiated as quickly as possible if we are to minimize impacts of *S. noctilio* in North America. Cooperation with other countries, including Australia, South Africa, Brazil (or other South American countries with *Sirex* infestations), and Canada, may be desirable. For the overall nematode program, the successful Australian program should be used as a model. The critical steps that must be taken include:

- **Possible regulatory barriers to the release of this nematode should be identified and addressed.** The nematode is highly host-specific – the non-infective stage of the nematode requires the wasp’s symbiotic fungus (*Amylostereum areolatum*) for development, and this fungus species is not used by North American siricids. Regardless, assessments of possible effects on non-target species may be required and should be completed as soon as possible. A survey should also be conducted to determine if the nematode, *B. siricidicola*, was, by chance, introduced along with the wasp. Note that the presence of the nematode associated with the introduced North American *S. noctilio* population(s) would not preclude a nematode release program and could even complicate it if the strain present here has less-than-desirable virulence (defective strains).

- **Sources of nematode cultures should be identified or developed.** Long-term, will require that the U.S. and Canada develop the capacity to produce the nematode. Both the production of the nematode and management of the strain require care in order to ensure an effective product. A dedicated facility that is equipped to handle sterile media and maintain sterile technique (comparable to a microbiology laboratory) will be required.

- **Trap trees and/or infested pine bolts are used for propagation and dissemination of the nematode in the field.** The capability to conduct this work, and the design of the program to meet these needs, has to be carefully considered and developed. The capacity to monitor the effectiveness and distribution of the nematodes also needs to be developed as an integral part of the program.

Prior to the deployment of the nematodes, trees that are found to be infested, and are well within the known infested area, do not need to be controlled for program purposes. Landowners, though, could be encouraged to remove and destroy infested trees. In addition, outreach activities should include information on, and encouragement of, steps to improve overall health of pine stands. Sites where trees are known to be infested can also be viewed as opportunities to obtain insects for purposes of research and for inoculating trap trees that will be used as part of the nematode distribution program.

**Outside the infested area**

If populations of *S. noctilio* are discovered long distances from the area that is known to be infested and are not well established, eradication should be considered if the population is sufficiently small and spatially contained. Successful spot eradication of *Sirex* have been achieved in South America when they were detected early and the discoveries acted on
aggressively. Public education, outreach, and focused surveys should aid in discovery of these outliers.

Overall

An electronic data management system should be used to record and document all of the program’s activities, regardless of jurisdiction, including survey, control, and regulatory activities. All survey, biocontrol release, and evaluation locations should be geo referenced to facilitate mapping and data interpretation. Ideally, field personnel will be equipped with hand-held electronic units for data collection and geo-referencing.

As quickly as possible, an integral evaluation component should be integrated into the program activities. This will aid the program in tracking and analysis of its information, improving its delivery and providing documentation for planning purposes, and demonstrate the program’s impacts.
Research Priorities
(not necessarily in order of priority)

1. Develop improved semiochemical lures for *S. noctilio* and improved trapping devices.
2. Determine optimal methods, tree species, types and doses of herbicide, and timing for creating trap trees for survey and biological control.
3. Assess host potential of various North American conifers, including commercially and ecologically important species of *Pinus* that exist outside of the infested areas.
4. Evaluate ecology of *S. noctilio* in North America as it relates to the effectiveness of native biological control agents (and other mortality agents) and pest risks.
5. Develop better methods for identification of the various life stages of *S. noctilio* and related organisms.
6. Transfer the technology for nematode rearing from Australia to the U.S.
7. Describe adult *Sirex* behavior as it relates to mating and to oviposition-site selection.
8. Develop/verify regulatory treatments relevant to *Sirex*-infested materials (methyl bromide, chipping, heat treatments, phosphine, etc.).
10. Conduct surveys for nematodes, which are already present in U.S., for *S. noctilio* populations.
11. Conduct an economic analyses of possible impacts of *S. noctilio* in U.S. and in North America.
12. Develop a phenological prediction model for vulnerable areas in the U.S.
13. Evaluate aerial detection/remote as survey tools and compare with other potential methods.
15. Develop a better understanding of the interactions of the nematode fungus and wasp.
16. Determine nematode spread rates and evaluate how site characteristics impact these.

Priority should be given to items that are likely to lead to the successful use and establishment of the nematode system as quickly as possible. Other priorities should be dictated by the needs of the program. The science panel members suggest that after two years, any research progress be evaluated. Both the research and program priorities should be evaluated yearly as the program progresses and new findings become available.
# Sirex Meeting Attendees

**January 9, 2006**

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Appendix 1

RESULTS OF A SURVEY FOR THE EUROPEAN WOOD WASP, SIREX NOCTILIO, IN SOUTHEASTERN ONTARIO.

Introduction

On 5 July 2005, the Systematic Entomology Laboratory in Beltsville Maryland confirmed that the European wood wasp, Sirex noctilio Fabricus, had established a reproducing population in pine trees collected from Fulton, New York, which is less than 100 km south of Kingston, Ontario. This is the first report of an established population in North America and represents a very significant and disturbing finding. This work followed the find of a single female adult captured in a trap on 7 September 2004 near Fulton. The European wood wasp feeds on many species of pine and is a serious pest of plantations in Australia, South America and South Africa. Based on the climatic conditions its native range (Europe, Asia and northern Africa), the wood wasp could establish in any climate zone of North America where pine grows. The wasp is rated as a “very high risk” in a risk assessment for North America.

Survey results reported on 5 August 2005 by US authorities confirmed that the wasp had been caught at a 30 km radius from the initial find. In response to this finding, the Canadian Forest Service and the Ontario Ministry of Natural Resources in collaboration with the Canadian Food Inspection Agency established a rapid trap survey of sites along the Canada-US border extending west from Cornwall to Prince Edward County south of Belleville, Ontario. As of 14 November 2005, US authorities reported finding 85 female S. noctilio in delimiting trap surveys, including six females between the 20-70 mile radius trap circles from Fulton NY.

Results from the surveys in Ontario indicated the presence of S. noctilio in four locations. This report, presents a brief description of the survey methods and of the locations found positive for this insect. It should be noted that the trap results only indicate that these wasps were captured in the area and does not necessarily mean that we have established reproducing populations at these sites.

Survey methods

A total of 36 sites were located from Sandbanks Provincial Park southeast of Wellington, Ontario to Cornwall (Figure 1). This area and corridor was chosen as it was closest to the known area of S. noctilio infestation in New York. Sites contained either two or three needle hard pine, and ranged from small residential and roadside plantings, small plantations, and natural forests. Thirteen sites contained Scots pine (Pinus sylvestris), followed by 12 Austrian pine (P. nigra), four red pine (P. resinosa), four jack pine (P. banksiana), two pitch pine (P. rigida) and one Mugho pine (P. mugo) sites. Tree height ranged from 4 to 20 m. 12-unit Lindgren funnel traps were in pine approximately 1 m away from the tree trunk and the bottom of the trap at least 0.5 m above ground. Each trap was baited with alpha-pinene, beta-pinene, both, or a formulation of both. Traps were deployed between 23 August and 2 September 2005. All insects were collected
from the traps between 19-23 September, and again on 10-13 October 2005, when the traps were taken down. Traps were deployed late in the season, but as quickly as possible after the 5th August disclosure, and 16th August Sirex update and training session in Oswego, New York.

Insect collections were submitted to the Insect Identification Lab at the Great Lakes Forest Centre, Canadian Forest Service for processing and identification. The collections were submitted on 3 November 2005 to the Centre for Plant Quarantine Pests, Canadian Food Inspection Agency for confirmation. Species were confirmed by CFIA on 17 November 2005.

In addition to five adult females of *Sirex noctilio*, adults of *Sirex behrensii*, *S. edwardsii*, *S. juvencus* and *S. nigricornis* were collected, as well as *Tremex columba*, and *Urocerus cressoni*.

**Description of sites where Sirex noctilio was found**

**Site 28:** Sandbanks Provincial Park, Prince Edward County; Scots pine plantation, 18 m tall, semi-mature, west aspect, full stocked stand in decline; two adult females captured with alpha-pinene.

**Site 29:** Simpson Road, Milford, Prince Edward County; Private land, Scots pine plantation, 15 m tall, semi-mature, flat, full stocked stand; one adult female captured with alpha-pinene.

**Site 30:** Morrison Point Road, Black River, Prince Edward County; Private land, Predominately red pine with some Austrian and Scots pine, 15 m tall, young to semi-mature, flat, partially stocked stand (front lawn planting); one adult female captured with alpha-pinene.

**Site 36:** Hwy 416, 4.2 km north of Hwy 401, near Prescott, Ontario; Provincial Crown land, Scots pine, 9 m tall, young to semi-mature, flat, partially stocked stand (road side planting); one adult female captured with alpha-pinene.

**CFS and OMNR staff involved with this survey**

**OMNR:** Taylor Scarr, Wayne Ingram, Ed Czerwinski.
**CFS:** Peter de Groot, Hugh Evans, Kathryn Nystrom, Ron Fournier, Tony Hopkin.

**Report prepared 23 November 2005 by:** Peter de Groot, Hugh Evans, Kathryn Nystrom and Ron Fournier.
Figure 1. Location of *Sirex noctilio* trap sites in southeastern Ontario (23 August -13 October 2005). Locations where *S. noctilio* were found are indicated in red.
Appendix 2

CURRICULUM VITAE

Name: Dr Robin Anthony Bedding

Born: 13 June 1940 in Chelmsford, England

Citizenship: Australian

Private address: 5, Booth Crescent, Cook, ACT, Australia, 2615. Tel (02) 62512125

Business address: CSIRO Division of Entomology, P.O. Box 1700, Canberra, ACT, Australia, 2601. Tel (02) 62464292

EMAIL robin.bedding@CSIRO.au

1959-1962 The Royal College of Science, Imperial College of Science and Technology, London University

1962 Bachelor of Science, (BSc Hons) Associate of the Royal College of Science (ARCS).

1962-1965 Imperial College of Science and Technology, London University

Essex County Scholarship

ARC Scholarship

Marshal Prize for Biological Research at Imperial College.

Demonstrator in Zoology (2yrs)

University of London colours (Judo).

Doctor of Philosophy (PhD)

Diploma of Imperial College (DIC)

1965-1969 Employed by Australian High Commission to work for CSIRO on nematode parasites of Sirex at Silwood Park, UK

1969 Indefinite appointment to CSIRO. Division of Entomology Transferred to Hobart, Tasmania to work on nematodes of Sirex.

1969-1971 Research Scientist

1971-1976 Senior Research Scientist,

1976-1985 Principal Research Scientist
<table>
<thead>
<tr>
<th>Year(s)</th>
<th>Position/Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-present</td>
<td>Group Leader, Nematodes to Control Insects</td>
</tr>
<tr>
<td>1985</td>
<td>Best Economic Paper Award Society of Nematology (International)</td>
</tr>
<tr>
<td>1988</td>
<td>Transferred to Canberra to head new laboratory for nematode control of insects</td>
</tr>
<tr>
<td>1989</td>
<td>Chief Research Scientist Consultant to EMBRAPA, Brazil Urabrae Award for Agricultural Research</td>
</tr>
<tr>
<td>1992</td>
<td>Consultant to FAO on sirex.</td>
</tr>
<tr>
<td>1993</td>
<td>CSIRO medal Sir Ian McLennan Award Commendation</td>
</tr>
<tr>
<td>1994</td>
<td>Plaque from Academia Sinica, Guangzhou for sign. contribution to entomopath. nematode research in China Chief Research Scientist 2 Scientific Auditor of Horticulture Research International</td>
</tr>
<tr>
<td>1995</td>
<td>International Plant Protection Congr. award of distinction to Entomology Division for nematode research Clunies Ross National Science and Technology Award Consultant to South Africa on Sirex</td>
</tr>
<tr>
<td>1997</td>
<td>Elected Fellow of the Australian Academy of Science Sir Ian McLennan Achievement for Industry Award</td>
</tr>
<tr>
<td>1998</td>
<td>Elected Fellow of the Society of Nematologists (International)</td>
</tr>
<tr>
<td>1975-Present</td>
<td>Convenor &amp; Chairman of Sessions at 8 International Congresses</td>
</tr>
<tr>
<td>2002</td>
<td>CSIRO Honorary Fellow</td>
</tr>
<tr>
<td>2003</td>
<td>Australian Centenary Medal</td>
</tr>
<tr>
<td>2005</td>
<td>Consultant to Homegrown/Dudutech in Kenya on entomopathogenic nematodes for vegetables</td>
</tr>
</tbody>
</table>
CURRICULUM VITAE

ANGUS J. CARNEGIE B.Sc. (HONS) Ph.D

NAME: Dr Angus J. Carnegie
ADDRESS: Forest Resources Research
          NSW Department of Primary Industries
          PO Box 100, Beecroft, NSW 2119
          Australia
E-MAIL: angusc@sf.nsw.gov.au

KEY SKILL AREAS:
• Forest health surveillance
• Forest pathology
• Pest and disease diagnosis
• Pest and disease damage assessment
• Pest and disease management

QUALIFICATIONS:
PhD, The University of Melbourne, School of Forestry, Australia, 2000.

Bachelor of Science Honours, La Trobe University, School of Botany, Australia, 1991. Thesis title: The susceptibility of certain Eucalyptus species and provenances to infection by Mycosphaerella spp. and other leaf parasites.

I have extensive experience in forest health surveillance being with the Forest Health Survey Unit (FHSU) since 1996, and prior to that with post-graduate study in forest pathology. My expertise lies in forest health surveillance, pest and disease diagnosis, fungal taxonomy and tree breeding. During my time with the FHSU I have significantly improved forest health surveillance methodology, including the use of GIS-GPS interface during aerial and ground surveys, training of field staff, and being involved in a national team to improve and standardise eucalypt tree crown assessment. I have made, and continue to make, original contributions to the national and international field of forest health research.

I am a recognised national authority within the field of forest health. Evidence for this is provided by my contribution to external reports and workshops, being a member of Forestry and Forest Products Committee’s Research Working Group 7 (Forest Health) and being called to review scientific manuscripts and research dissertations. I have also been invited to participate in three World Congress’, as a convenor and a speaker, and I am a regular guest lecturer on forest health for Southern Cross University. I was recently invited to assist with South Africa’s Sirex Management Program.

My current research results are assisting in the selection of improved planting stock for both hardwood and softwood plantations, a major corporate objective of Forests NSW/NSW DPI. Work I have conducted since joining Forests NSW/NSW DPI has identified significant pests and diseases that impact on our planted forest estate, with follow-up research on quantifying and managing the impact of these. Research I am currently working on will further quantify the impact of pests and diseases in softwood and hardwood plantations and provide spatial, GIS-based models for pest risk management.

I have developed influence among the broader scientific community through my national and international collaborative research programs and my supervision of post-graduate students.
EMPLOYMENT:
2003-current: Research Scientist & Team Leader of Forest Health Survey Unit, Forest Resources Research, NSW Department of Primary Industries (formerly State Forests of NSW). Duties: Manage and conduct forest health surveys in softwood and hardwood plantations in NSW. Conduct research on tree improvement and the impact and management of insect pests, fungal diseases, parasites, invertebrate pests and nutritional disorders in plantations.

1998-2003: Research Officer & Team Leader of Forest Health Survey Unit, State Forests of NSW. Duties: Manage and conduct forest health surveys in softwood and hardwood plantations in NSW. Conduct research on tree improvement and the impact and management of insect pests, fungal diseases, parasites, invertebrate pests and nutritional disorders in plantations.

1996-1998: Project Officer / Forest Health Survey Officer, Forest Health Survey Unit, State Forests of NSW. Duties: Conduct forest health surveys in softwood and hardwood plantations in NSW.

1992-1995: Full time student, PhD studies, The University of Melbourne

1990-1991: Full time student, B.Sc. Honours studies, La Trobe University

1985-1989: Full time student, B.Sc. studies, La Trobe University

MEMBERSHIP OF PROFESSIONAL SOCIETIES:
- Australasian Plant Pathology Society
- Australasian Mycological Society
- Entomological Society of Australia
- National Geographic Society

PUBLICATIONS:

Books

Refereed Scientific Journals:


Conference proceedings:


Kent, D.S. and **Carnegie, A. J.** (2001). Three bugs and a maggot in the limelight for forest health in NSW. Australian Entomological Society 32nd

CURRICULUM VITAE

Peter de Groot

February 2006

ADDRESS

Home          Work
RR # 1         Great Lakes Forestry Centre
Richard's Landing, Ontario  Canadian Forest Service, Natural Resources Canada
P0R 1J0        1219 Queen St. East
               Sault Ste. Marie, Ontario
               P6A 2E5

PERSONAL DATA

Birthdate:  14 August, 1954, Amsterdam, Nederland
Citizenship:  Canadian
Marital Status:  Married, 2 children

EDUCATION

Simon Fraser University, Burnaby, British Columbia (Entomology) Ph.D. (1991)
Lakehead University, Thunder Bay, Ontario HBSc Forestry (1981)
Pauline Johnson High School, Brantford, Ontario (1972)

AWARDS/HONOURS

Canadian Forest Service, Excellence in Technology Transfer (1993)
Gold Medal, Canadian Institute of Forestry, (1981)
First Class Honours, B. Sc. Forestry (1981)
Presidents Award, Lakehead University, (1981)
First Class Honours, Forest Technician Diploma (1975)

EMPLOYMENT

1982-1992    Research Forester, Insect Pest Management, Canadian Forest Service
1981-1982    Research Forester, Field Efficacy Section, Canadian Forest Service
1975-1981    Research Technician, Virology Section, Canadian Forest Service
1974-1974    Field Technician, Ontario Ministry of Natural Resources

TEACHING

1999-          Adjunct Professor, Faculty of Forestry, University of Toronto
1997-1999      Lecturer, Alberta Environmental Training Centre
1997-          Graduate student supervisor, Committee member for graduate students, University of Toronto
1994-2004    Adjunct Professor, Faculty of Forestry, Lakehead University, Thunder Bay
1992-1993    Guest Lecturer and co-instructor of forest entomology courses, Lakehead University, Thunder Bay
1990-          Guest Lecturer at the Faculties of Forestry at the University of Toronto, Lakehead University and Sault College
ACTIVITIES AND SERVICES FOR PROFESSIONAL SOCIETIES OR ORGANIZATIONS
(Selected)

- Guest Editor, Special issue of the Canadian Entomologist, Volume 132(6), 2000
- Scientific reviewer for USDA, Small Business and Innovations Group, 2000
- Scientific reviewer for the Canadian Innovation Centre
- Director, Entomological Society of Canada 1999 to 2002
- Associate editor for The Canadian Entomologist, 1995-2001
- Associate editor for The Forestry Chronicle, 1999-
- Steering committee member, North American Forest Insect and Disease Work Conference, Edmonton, Alberta, 2000-2001
- Steering committee member, North American Forest Insect and Disease Work Conference, San Antonio, Texas, 1995-1996
- Chair, Cone and Seed Pest Working Party, Canadian Tree Improvement Association, 1985- 2000
- Symposium chairman, Recent Advances in Pest Management, Canadian Institute of Forestry, 1989-1990.
- Member of the editorial board for, and contributor to the book, Trees in Canada. 1988-1992
- Chair, Pest Control Working Group, Canadian Institute of Forestry, 1985-1988

PUBLICATIONS

Refereed journals


Books


Book Chapters


Published Government Reports


Published Proceedings
2000-2005


1995-1999 (selected)


1985-1994 (selected)


Posters and Presentations

2000-2005


Turgeon JJ, Gasman B, de Groot P, Orr M, Smith MT, Ric J, Doyle J. Battling the Asian Long-Horned Beetle in Ontario: An up-to-date. Presented as guest speaker during a technology transfer session organized by the Ontario Ministry of Natural Resources. (14 Sep)


1995-1999 (selected)


27


1983-1994 (selected)


de Groot, P. Integrated pest management. Lectures to the degree and diploma Forestry students at Lakehead University, September 1992 - to present.

de Groot, P. Pest management of insects in seed orchards. Presentation to the 3rd year Forestry students, University of Toronto., October 1991.


Kevin J. Dodds
USDA Forest Service, Forest Health Protection
271 Mast Road
Durham, NH 03824
603-868-7743
kdodds@fs.fed.us

Experience
Forest Entomologist
January 2005 to present, USDA Forest Service, Durham, NH
- Exotic and native insect surveys
- Extension responsibilities to federal, state, and tribal partners
- Develop management plans for damaging insects

Research Associate
January 2004-January 2005, University of Minnesota, Grand Rapids, MN
- Researched an introduction of Douglas-fir beetle into northern MN
- Developed large-scale monitoring program for bark beetles
- Developed ecological risk assessments for indigenous exotic insects

Graduate Research Assistant
January 2000 to December 2003, Oregon State University, Corvallis, OR
- Developed and validated Douglas-fir beetle hazard and risk ratings
- Improved knowledge on Douglas-fir beetle pheromone-baited traps
- Conducted basic biological studies on Douglas-fir beetle

Research Technician – Forest Entomology
May 1999 to September 1999, University of Arkansas, Fayetteville, AR
- Biological control of southern pine beetle
- Large scale surveys and monitoring of southern pine beetle infestations
- Evaluation of biological control efficacy

Education
Oregon State University, Department of Forest Science, Corvallis, OR
January 2000 to December 2003
- Ph.D., Forest Science, emphasis Forest Ecology

University of Arkansas, Department of Entomology, Fayetteville, AR
August 1997 to December 1999
- M.S. in Entomology

Frostburg State University, Frostburg, MD
August 1990 to December 1996
- B.S., Wildlife Biology

Interests
Bark beetle biology and management, invasive species management,
Cerambycidae, Buprestidae, chemical ecology, trapping, survey methods
CURRICULUM VITAE

René H. Germain, Associate Professor, State University of New York
College of Environmental Science and Forestry, 1998 - present
Syracuse, NY 13210
Phone: (315) 470-6698 Email: rhgermai@mailbox.syr.edu

Education: Ph. D. in Forest Resources Management
STATE UNIVERSITY OF NEW YORK
COLLEGE OF ENVIRONMENTAL SCIENCE & FORESTRY

Master of Science in Business Administration.
BOSTON UNIVERSITY

Bachelor of Science. Major: Forestry.
UNIVERSITY OF VERMONT.

Current Responsibilities:
- Teaching: undergraduate and graduate courses in Principles of Management, Forestry Consulting and Wood Procurement and Integrated Resources Management;
- Research: sustainable forestry systems, parcelization/fragmentation of private forestlands, wood supply issues and projects associated with the New York City Watershed Model Forest program, continuing education, environmental dispute resolution;
- Continuing education/outreach: develop and conduct workshops for natural resource professionals; coordinate New York City Watershed Model Forest Program
  - Developed and administered over 40 workshops since 1998

Past Work Experience:
Vice President, Resource Management.

  Responsibilities:
  - forest management of company's 4500 acres.
  - initiated landowner assistance program as well as an easement and lease program.
  - conducted company financial planning and budget analysis.
  - supplied logs to sawmill with an annual production level of 8 million board feet.
  - managed log yard and coordinated scaling and grading of incoming logs.

Professional Service:
Member – Board of Directors - New York Logger Training, Inc., 1994 – present
Chair – New York Logger Training Curriculum Committee, 1995 – present
Member – Watershed Forestry Program Committee, 1997 – present
Chair – Watershed Forestry Model Forest Program, 1997 – present
Member – New York State Green Certification Advisory Committee, 1999
Member – New York State Best Management Practices Committee, 1997-2000
Member – New York Sustainable Forestry Initiative Committee, 1996 – 1998
Executive Committee Member - New York Society of American Foresters, 1993 - 1997
Selected Refereed Publications:


Awards:
2001 New York Society of American Foresters Outreach Forester of the Year
RESUME: FRED P. HAIN

ACADEMIC RANK
Professor of Entomology
Full Member Graduate Faculty

BIRTH DATE/PLACE
November 21, 1944
Milwaukee, Wisconsin

DISTRIBUTION OF EFFORT
76% Research  24% Academic Affairs

SPECIALIZATION AND AREAS OF INTEREST
Research: Biology and management of balsam woolly adelgid and other arthropod pests of Fraser fir and Fraser fir Christmas trees. Investigations of meteorological and predatory factors that regulate populations of the spruce spider mite. Dynamics of low-level populations of southern pine beetles. Evaluating host tree reaction to southern pine beetle attack. Population dynamics of gypsy moths at the leading edge of the generally infested area. Impact of Entomophaga maimaiga on non-targets. Biological control of the hemlock woolly adelgid. Integrated pest management of the Nantucket pine tip moth in Virginia pine Christmas tree plantations.

Teaching: ENT 402 (FOR) Forest Entomology (offered every spring), ENT (FOR) 565 Advanced Forest Entomology (offered every other spring), ENT 604/804 Insect Natural History and Field Ecology (offered every fall).

EDUCATION
B.S. - Stetson University, DeLand, FL. 1969. Biology
M.F. - Duke University, Durham, NC. 1969. Forestry
Ph.D. - Michigan State University, East Lansing, MI. 1972. Entomology

PROFESSIONAL EXPERIENCE
1972-74 Postdoctoral Fellow, Texas A&M University
1974-76 Research Associate, Department of Entomology, NCSU
1976-78 Assistant Professor, Department of Entomology, NCSU
1978-85 Associate Professor, Department of Entomology, NCSU
1985- Full Professor, Department of Entomology, NCSU
1989-94 Chairman, Ecology Program, NCSU
2005- Director of Graduate Programs, Dept. of Entomology, NCSU

GRADUATE STUDENT ADVISEMENT
Total Career Graduate Student Committees: 28; Chairman or Co-Chairman: 14 M.S., 2 M.A., 12 Ph.D.

POSTDOCTORAL ADVISEMENT
Total Career Postdoctorates: 5

PUBLICATIONS: Total Career Books/Chapters: 32; Refereed Articles: 82; Extension and Other: 21.
Pertinent Articles:
Dr. DENNIS A. HAUGEN  
USDA Forest Service  
FOREST ENTOMOLOGIST

Dennis has been working on sirex woodwasp for 18 years. In Australia, he implemented a biological control program for a sirex outbreak during 1987-1991. Also, he was the lead author on the National Sirex Management Strategy for Australia. After returning to the US, he was a consultant to the US Forest Service on the Pest Risk Assessment for pine from New Zealand. He has been working in Brazil with the National Forest Research agency (Embrapa) on a sirex biological control program since 1997.

Dennis has been with the USDA Forest Service, St. Paul Field Office, Forest Health Protection unit since February 1993. He works with the states of Indiana, Iowa and Missouri on issues concerning forest insects. He has assisted with the Asian longhorned beetle project in Chicago since it was detected in July 1998. He has been on the Pest Risk Assessment team for projects on eucalypts from South America and from Australia, and for solid wood packing material.

Post-doc – University of California-Davis -- 1992-1993
Post-doc – Waite Agricultural Research Institute, University of Adelaide -- 1987-1991
Post-doc – Clemson University -- 1985-1987
Ph.D. -- Iowa State University (Entomology and Forest Biology) -- 1985
M.S. -- University of Arkansas-Fayetteville (Entomology) -- 1982
B.S. -- Iowa State University (Forestry and Entomology) -- 1979

Selected publications on sirex woodwasp:


Curriculum vitae-Edson Tadeu Iede

PERSONNAL INFORMATION
Surname: Iede
Name: Edson Tadeu
Nationality: Brazilian.
Date of Birth: December 18th, 1954.
Address: Rua Pamphilo d’Assumpção, 1446
CEP 80.220-041, Curitiba, Paraná, Brazil.
Phone: 55(41)-332-7355
e-mail: iedeet@cnpf.embrapa.br

PROFESSIONAL ADDRESS
Empresa Brasileira de Pesquisa Agropecuária-EMBRAPA
Centro Nacional de Pesquisa de Florestas
Address: Estrada da Ribeira Km 111
83.411-000, Colombo, Paraná, Brazil
Phone/fax: 55(41)- 666-1313

GRADUATION AND POS-GRADUATION
Biologist. Faculty of Biology, Federal University of Paraná. Curitiba, Brazil 1977.
Master in Entomology, Federal University of Paraná. Curitiba, Brazil 1980.
Specialization Course, "International Training Program In Biological Control", 160 hours- International Center for Integrated and Biological Control- University of California at Berkeley – USA-March to April, 1982

LANGUAGES AND COMPRENSION
Portuguese – Very good speaking, writing and reading.
English – Regular speaking and reading, regular writing.
Spanish – Good speaking and reading, regular writing.

PROFESSIONAL EXPERIENCE
-Technical Coordinator of the Woodwasp Integrated Pest Management Program from the National Fund for Woodwasp Control-1989-2006
-Brazilian Government Representative for the Working Group of Forest Health from the Southern Cone Committe of Plant Health - COSAVE-1992-2006
-Counterpart of the Cooperative Project USDA-Forest Service/ EMBRAPA “Development of an integrated pest management program for the woodwasp Sirex noctilio (HYmenoptera: Siricidae) a serious pest of exotic pines in Brazil, 1997-2000”
-Counterpart of the Cooperative Project CSIRO_Austrália/ Embrapa/ National Council of Technology and Scientific Development (CNPq) – Biological Control of Weeds-1979/1981
-Administrative Chief of the National Center of Forest Research – EMBRAPA-1985/1987
-Coordinator of the Ecology and Forest Protection Technical Area of the National Center of Forest Research EMBRAPA 1990/1991
-Technical Chief of the National Center of Forest Research – EMBRAPA-1990/1992
-Member of the Technical Cientific Committee of the National Center of Forest Research- 1985 and 2003-2006.
-Member of the Technical Panel on Forest Quarantine- FAO-2005/2006.
-Member of the Expert Workingo Group on Debarking and Bark Freedom- FAO-2005.
PARTICIPATION IN CONGRESSES AND MEETINGS FROM 2000 TO 2003

03/2000- Lecture presentation in the 1o Simposium of the Southern Cone about Integrated Pest Management in pine plantation. Curitiba-PR
06/2000- Lecture presentation in the XIV Silvotecna -Plagas Cuarentenarias. Riesgos para el sector forestal y efectos em el comercio internacional. Concepción, Chile
07/2000- Lecture presentation in the Workshop Plant Health Quarantine-Brasília-DN
08/2000- Lecture (2) and coordinator of Symposium in the section 10- XXI International Congress of Entomology. Foz do Iguaçu.
08/2000- Lecture presentation in the IX National Meeting of Phitosanitary Experts. Foz do Iguaçu
11/2000- Lecture presentation in the Forest Protection Seminar. Curitiba
05/2001- Lecture presentation in the 1o Latin América Simposium about Forest Pests. Poços de Caldas
06/2001- Lecture presentation and pôster presentation in the VII Biological Control Simposium. Poços de Caldas.
07/2001- Lecture presentation in the I Forest Pests Seminary. Curitiba
09/2001- Panel member of the XV Technical meeting of Working Group in Forest Health of the COSAVE. Canela.
09/2001- Lecture presentation in the Regional meeting about the Woodwasp. Ponta Grossa.
03/2002- Lecture presentation in the Reforestation Technical Meeting in Palmas Region- Palmas.
04/2002- Lecture presentation in the Woodwasp Technical Meeting/Klabin, Telêmaco Borba.
04/2002- Lecture presentation in the 12º. State Committee of Agropecuary Sanitary(CONESA) Technical Meeting
05/2002- Lecture presentation in the First Forest Technical Meeting of Rivera-Uruguay
05/2002- Panel member of the XVI Meeting of the Working Group of Forest Plant Health of the COSAVE. Montevideo, Uruguay
06/2002-Poster presentation in the Brazilian National Congress of Entomology. Manaus.
08/2002- Lecture presentation in the I Lecture Cicle- "Association of Insects to Forest Species: Interaction and Biodiversity"-Universidade Federal Rural do Rio de Janeiro-Seropédica-RJ
07/2003- Panel member of the 38ª National Fund of Woodwasp Control (FUNCEMA) Technical Meeting. Florianópolis.
10/2003- Lecture presentation in the Council of the Forest Development of the Cone Sul.1 -CEDEFOR. Curitiba

**Special Courses Participation**

06/1998- Professor, Control Quarentenary Control of Solid Wood Packing Material Course- COSAVE Embrapa Florestas / Servicio Agricola y Ganadero Chile. Colombo
11/2000- Professor, Disciplina of Forest Ecophysiology(AS 705)-Forestry School-UFPR.
03/2001- Professor, Plant Health Certificate- State System Course. UFPR-Curitiba.
05/2001- Professor, Plant Health Certificate- State System Course. Maringá.
07/2001- Professor, Field Day about Sirex Monitoring and Control . Telêmaco Borba.
11/2001- Professor, Quarentenary Pests of Wood Course. Curitiba.
04/2002- Professor, course of Plant Health Capacitation for the Technical Staff of the Rio de Janeiro State Agriculture Secretary . Araruamá.
07/2002- Professor, Origen Phytosanitary Certificate Course. Canoinhas.
07/2002- Professor, Origen Phytosanitary Certificate Course. Ponta Grossa.
07/2002- Professor, Origen Phytosanitary Certificate Course. Escola de Florestas-UFPR-Curitiba.
09/2002- Professor, Origen Phytosanitary Certificate Course – Agronomy School-UFPR-Curitiba.
10/2002- Professor, Sirex-Monitoring and Control Course. Arapoti.
08/2003- Professor, Forestry Pests Course for Agronomy students of Catholic University. Curitiba.
08/2003- Professor, Woodwasp Monitoring and Control Course- UNICENTRO- Irati
AWARD

2004 – PRÊMIO MÉRITO FLORESTAL DO ESTADO DO RIO GRANDE DO SUL- FOREST AWARD MERIT FROM RIO GRANDE DO SUL STATE.

CURITIBA,  23/02/2006.

Edson Tadeu Iede
CURRICULUM VITAE
DAVID R. LANCE

Entomologist (1999 - present)
USDA-APHIS-PPQ-CPHST
Otis Plant Protection Center
Bldg. 1398
Otis ANG Base, MA 02542

Voice: 508-563-9303
Facsimile: 508-564-4398
Email: david.r.lance@aphis.usda.gov

EXPERIENCE:
1996-1999 Director, USDA-APHIS-PPQ, Hawaii Plant Protection Center, P.O. Box 1040, Waimanalo, HI 96795
1981-1985 Research Assistant, Dept. of Entomology, Univ. of Mass., Amherst, MA 01003 (Stationed at the USDA-APHIS Otis Methods Development Center).
1979-1981 Research Associate, Dept. of Entomology, Univ. of Mass., Amherst, MA 01003 (Stationed at the USDA-APHIS Otis Methods Development Center).
1976-1979 Research Assistant, Dept. of Entomology, Univ. of Mass., Amherst, MA 01003.

ACADEMIC TRAINING:
1976-1979 Univ. of Massachusetts, Amherst; M.S. in Entomology, September 1979.
Thesis title: The relationship between the host tree and larval dispersal in the gypsy moth, Lymantria dispar (L.).
1981-1985 Univ. of Massachusetts, Amherst; Ph.D. in Entomology, May 1985.
Dissertation title: Density-related factors affecting population quality in the gypsy moth, Lymantria dispar (L.) (Lepidoptera: Lymantriidae).

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS:
American Society for Testing and Materials
Entomological Society of America
Hawaiian Entomological Society

PROFESSIONAL INTERESTS AND ACTIVITIES:
Insect behavior and ecology, especially as it pertains to applied use of semiochemicals in pest management and to the production, delivery, and quality control testing of insects for use in Sterile Insect Technique (SIT) programs. Development of biorational tactics for detecting, monitoring, and suppressing populations of pest insects. Current program responsibilities include projects in detection and/or semiochemical-based management of a variety of exotic invasive insect pests, Asian longhorned beetle control, detection, and rearing, and emerald ash borer detection.

Additional activities and responsibilities (current): Chair of an ASTM task group (E10.01-cc) that developed and is responsible for the maintenance of a standard (ISO/ASTM Standard 51940:2004) entitled “Standard guide for irradiation of insects for sterile release programs”. Member of science advisory panels for programs to manage or eradicate following exotic insect pests: Citrus longhorned beetle (Tukwila, WA [Chair]), emerald ash borer (Michigan & surrounding states), Asian longhorned beetle (2: Toronto, ON and Sacramento, CA).
PUBLICATIONS AND PRESENTATIONS:
Numerous manuscripts in refereed scientific journals, including 27 as senior author; four chapters in books and co-editor of a multi-paper ARS technical publication. Numerous presentations at professional meetings, workshops, symposia, and seminars; organizer and/or co-organizer of several symposia, workshops, etc.

Selected publications:
Curriculum Vitae

Victor C. Mastro  
Center Director/Entomologist GS-0414/14  
Otis Plant Protection Center  
Building 1398  
Otis ANGB, MA 02542

Office telephone: 508-563-9303 Ext. 212; Fax: 508 564-4398 ; E-mail: vic.mastro@aphis.usda.gov

EDUCATION

M.S., Entomology, 1973. Texas A&M University, College Station, Texas  
B.S., Forestry, 1970. Stephen F. University, Nacogdoggles, Texas  
Associate in Forestry, 1968. The Pennsylvania State University, Mont Alto Campus, Mont Alto, PA.

EXPERIENCE

2002 – 2006 Laboratory Director, Otis Pest Survey Detection and Exclusion Laboratory  
Mission Arcar Director. Responsible for technical support for APHIS pest exclusion, pest survey and detection, point-of-origin, risk mitigation and pathway identification and analysis.

February 1998-2002: The mission areas for the laboratory include the following. Under this structure, I supervised three laboratories including Oxford, North Carolina; Beltsville, Maryland and the Otis Plant Protection Center, Otis ANGB, Massachusetts.


March 1977, April 1979, and October 1983: Entomologist at Otis Methods Development Center.

April 1974-March 1977: Research Assistant, Department of Entomology, The Pennsylvania State University, State College, PA.

January 1970-April 1973: Graduate Research Assistant, Department of Entomology, Texas A&M University, College Station , TX.

PROFESSIONAL MEMBERSHIP AND ACTIVITIES

Entomological Society of America: 1972 – present  
  Editorial Board Entomological Techniques  
National Gypsy Moth Management Board  
  Board of Directors: 1992 – 2002  
  Chair of the Program Committee 1998  
Program Committee Annual Gypsy Moth Interagency Research Forum 1992-present  
Sigma Xi  
Phi Kappa Phi  
HONORS AND AWARDS

Entomological Society of America Distinguished Achievement Award for Regulatory Entomology, 1996.

PROFESSIONAL TRAINING

Risk Analysis, a USDA, APHIS Course.
Epidemiology, a USDA, APHIS, Veterinary Service Course
Biological Control, a USDA Course
Certified Pesticide Applicator

SELECTION OF INVITED LECTURES

Numerous Invited Lectures

PUBLICATIONS

Authored or coauthored publications.
CV

Name and Address:

Richard Carl Reardon
180 Canfield Street
Morgantown, WV 26505
(304) 285-1566
rreardon@fs.fed.us

Date of Birth: October 20, 1943

Education Background:

1. B.S. – Wildlife/Fisheries Management – Utah State Univ. – 1966
2. M.S. – Forestry/Entomology – Univ. of Michigan – 1968

Professional Experience:

1969-1970 – Teaching Fellow and Teaching Assistant, School of Natural Resources, University of Michigan

1970-1972 – Entomologist, USDA APHIS, Otis ANG, MA and Niles, MI

1972-1975 – Research Entomologist, USDA Northeastern Forest Experiment Station, Hamden, CT

1975-1978 – Entomologist, USDA-Gypsy Moth Program, Northeastern Area, State and Private Forestry, Forest Service, Hamden, CT

1978-1983 – Research Entomologist, USDA Pacific Southwest Forest and Range Experiment Station, Davis, CA


1988-1993 – Entomologist and Project Leader for Appalachian Gypsy Moth IPM Project, Northeastern Area, State and Private Forestry, USDA Forest Service, Morgantown, WV

1993-1995 – Program Manager for National Center of Forest Health Management, Northeastern Area, State and Private Forestry, USDA Forest Service, Morgantown, WV

1995-Present – Program Manger (Biopesticide and Biological Control Programs) for Forest Health Technology Enterprise Team, State and Private Forestry, USDA Forest Service, Morgantown, WV

Publications:

Over 80 authored publications
Born Johnson City, Tn 1946 (casualty of the war)
Grew up in Asheville, NC (Grad. HS 1964)
Attended Western Carolina College (‘64-’67)
BS Forestry Univ. of GA 1969
Fla. Div of Forestry-FIA and Co. Forester '69-'73
NC DFR-Field Forester-Lenoir '74-'76
NC DFR-Service Forester-Elizabeth City-'77
NC DFR-Pest Control Forester - Morganton-'78-'97
NC DFR-Forest Health Monitoring Coord.- Clayton '98
NC DFR-Program Head, Pest Control -Raleigh - '99 to present
CURRICULUM VITAE

Nathan M. Schiff
USDA Forest Service, Southern Hardwoods Laboratory
P.O. Box 227
Stoneville, Mississippi, 38776

PH: 662-686-3175, FAX: 662-686-3195    E-Mail: nschiff@fs.fed.us
nschiff@asrr.ars.usda.gov

HOME ADDRESS: 501 Cypress Lane, Apt. 1201
Greenville, MS 38701

EDUCATION:
University of California at Los Angeles: 1975-1979: B.A., Biology

PROFESSIONAL EXPERIENCE:
2004-present. Adjunct Faculty, Dept. of Biology, University of Mississippi, Oxford, MS.


**GRANTS:**

1993-1995 NRICGP CSRS USDA awarded to Sheppard and Schiff co-PI’s. Project title "Genetic diversity of feral and commercial honey bee populations in the U.S."

1999-2000 Arkansas Natural Heritage Commission Grant (33-C-99-650) to Devall and Schiff co-PI’s. Project title “Ecology of pondberry.”

1999-2000 USDA Forest Service Challenge Cost Share Award to Devall and Schiff co-PI’s. Project title “Ecology of pondberry.”


2001-7 Army Corps of Engineers Grant to Devall, Schiff, Gardiner, Leininger, Hamel, Connor and Wilson. Pondberry ecology: flooding, light availability, competition, population genetics and disease.

2002-2003 USFWS Grant to Devall and Schiff. Pondberry assessment at the Hester site, Bolivar Co., MS.

2005 Australian Biological Resources Study Participatory Grant to John Jennings and Nathan Schiff. Taxonomy of Australian woodwasps (Hymenoptera: Siricoidea: Xiphydriidae).

2005-6 Forest Health Protection Grant to Schiff and Wilson. Develop DNA methods for identification of immature stages of *Sirex noctilio*.


**PUBLICATIONS:**


Smith, C.G., P.B. Hamel, M.S. Devall and N.M. Schiff. 2004. Hermit thrush is the first observed dispersal agent for pondberry (*Lindera melissifolia*). Castanea 69:1-8


Schiff, N. M. & W.S. Sheppard. 1996. Genetic differentiation in the queen breeding population of the western United States. Apidologie. 27:77-86.


BOOK CHAPTERS, OBITUARIES, NON REFEREED PUBLICATIONS, CD’S:


Schiff, N. M. 1998. An entomologist reads Borneo. In “The exploration of Gunung Buda.” J. Lane and T. Burks (eds.) Published by Subterranean Explorers, Sarawak, Malaysia


**Submitted:**


**IN PREPARATION:**


Schiff, N.M. Insects associated with forest fires in Northern California and Oregon.

Schiff, N. M. and A. D. Wilson. Identification of the fungal symbiont of *Xiphydria maculata* Say.
Wilson, A.D and N. M. Schiff. Competitive interactions of xiphydriid wood wasp fungal symbionts.
Wilson, A.D. and N.M. Schiff. Wood decay potential of xiphydriid wood wasp fungal symbionts.
Schiff, N.M. and L.P. S. Kuenen. Stepwise helical locomotion by a primitive hymenopteran larva.
Schiff, N.M. and W.S. Sheppard. Haplodiploidy does not result in reduced heterozygosity for sawflies (Hymenoptera: Symphyta).
Schiff, N.M., Webb, D., and M.D. Devall. Insects associated with the endangered shrub, Pondberry (*Lindera melissifolia* Walt [Blume]).

**INVITED PRESENTATIONS:**


2004 Insects associated with forest fires in Northern California and Oregon. Invited symposium “Special Adaptations of Insects to Fire.” XXII International Congress of Entomology, Brisbane, Australia (15-21 August).


2000 Insect and disease research of SRS with emphasis on symbiotic associations of American woodwasps. Shikoku Research Station, Kochi, Japan.

1998 Honey bee population systematics and sawfly studies. SEL, Beltsville, MD.


1996 Genetic characterization of U.S. honey bee populations. USDA ARS WRRC.

1996 Genetic characterization of U.S. honey bees. University of Massachusetts, Amherst.
1992    Assessment of mitochondrial DNA variation in feral honey bees: potential for monitoring
future movement of Africanized honey bees in the United States. USDA ARS Beltsville
MD.
1991    Evolutionary aspects of transcriptional regulation.  USDA ARS Beltsville, MD.
1990    Dietary self-selection by the corn earworm. Department of Biology, Vanderbilt
University.

CONTRIBUTED POSTERS AND PRESENTATIONS:
2005. Identification of a New York siricid larva.  ESA National Meeting, Fort Lauderdale,
(6-10 November).
2005. Linking stakeholder research needs and the federal data quality act: A case study of
an endangered forest shrub in the Southern United States.  XXII IUFRO World
Congress. 8-13 August 2005, Brisbane, Australia.  B. R. Lockhart, E. S. Gardiner, T.
D. Leininger, K. F. Connor, M. S. Devall, P. B. Hamel, T. Hawkins, D. A. Wilson, N.
M. Schiff, and G. L. Young.  Ecology of the endangered pondberry Lindera melissifolia [Walt.] Blume.  Devall, M.
and N. Schiff.  Pondberry Fact-Finding Symposium requested by the Mississippi
Department of Environmental Quality, Stoneville, MS (5 April).
N. Schiff and S. Skojac.  International Congress of Botany, Vienna, Austria.  (July)
2005. Black twig borer, a potential vector of the Botryosphaeria stem canker and dieback
fungus of pondberry in the Delta National Forest of Mississippi.  Wilson, A. D., N. M.
National APS Meeting, Austin, TX.  30 July-Aug 3 (Published Abstract)
2005. The role of stem canker and dieback in pondberry health and survival.  Wilson, D.
and N. Schiff.  Pondberry Fact-Finding Symposium requested by the Mississippi
Department of Environmental Quality, Stoneville, MS (5 April).
Pondberry Fact-Finding Symposium requested by the Mississippi Department of
Environmental Quality, Stoneville, MS (5 April).
2005. A study of the early fruit characteristics of the endangered plant pondberry (Lindera
melissifolia).  K. Connor, T. Leininger, M. Devall, E. Gardiner, P. Hamel, D. Wilson,
N. Schiff.  13th BSSRC Memphis, TN.  2-4 March 2005.
2005. Micropropagation of an endangered clonal shrub, pondberry (Lindera melissifolia
Walt [Blume]).  N. Schiff, M. Devall, D. McCown, K. Connor, E. Gardiner, P. Hamel,
Fifth Longleaf Alliance Regional Conference, Longleaf Pine: Making Dollar$ and Sense
2004. Homalodisca coagulata can vector sycamore bacterial leaf scorch disease.  ESA


2004 Reproductive biology of pondberry (*Lindera melissifolia* [Walt.] Blume). Devall, M.S., Schiff, N., Skojac, S. Coauthors. Botanical Society of America Annual Meeting, Salt Lake City, Utah. 31 July-August 5. (Abstract Published)


2003  Wood decay potential of mycosymbionts from siricid and xiphydriid woodwasps of eastern hardwoods. The American Phytopathological Society 95th annual meeting, August 9-13, 2003, Charlotte, NC.  Coauthor A.D. Wilson presented (Extended Abstract Published).


2003  Pondberry (*Lindera melissifolia*) recovery on protected sites in Mississippi.  Coauthors M. Devall (presented) and S. Skojac.  12th Biennial Southern Silvicultural Research Conference, Biloxi, MS (24-27 Feb 2003).


2002  Drought modifies effects of predators and parasitoids on the goldenrod gall fly. IUFRO, Forest Restoration in the Boreal and Temperate Zone, Vejle, Denmark.  Coauthor P. B. Hamel (presented) and O. Cross. (Extended Abstract Published).

2002  Goldenrod gall flies on Sharkey Site: if you build it they will come. IUFRO, Forest Restoration in the Boreal and Temperate Zone, Vejle, Denmark.  Coauthor P. B. Hamel presented.  (Extended Abstract Published).


2000 Insects associated with forest fires in Northern California and Southern Oregon. ESA National Meeting, Montreal, Canada.
2000 Host recognition in xiphydriid woodwasps. XXI International Congress of Entomology, Iguassu Fall, Brazil. A.D. Wilson, L.R. Williams III coauthors (presented by Williams) (Abstract Published).
1999 Siricoidea and their fungal symbionts. 4th International Hymenopterists Conference, Canberra, Australia. (A.D. Wilson coauthor) (Abstract published)
1998 The ecology of pondberry (Lindera melissifolia; Lauraceae), an endangered species. U.S. For. Ser. Southern Region All Scientists Meeting, Atlanta, GA. (Margaret Devall coauthor)
1997 Genetic characterization of cottonwood leaf beetle populations. ESA National meeting, Nashville, TN
1995 High heterozygosity in haplodiploid Symphyta. (W.S. Sheppard coauthor). ESA National meeting, Las Vegas, NE.
1994 Mitochondrial DNA and allozyme analyses of commercial honey bee populations from the southern United States. ESA National meeting, Dallas, TX. (W. S. Sheppard coauthor).
1993 Historical genetic contributions to a feral honey bee population: inferences from mitochondrial DNA. ESA Eastern Branch meeting, Williamsburg, VA. (W. S. Sheppard, G. Loper, H. Shimanuki coauthors).


1991 Conserved promoter elements direct glucose dehydrogenase expression in Drosophila. ESA National meeting. Reno, NE.


1988 The roles of sensory and metabolic feedbacks in nutrient self-selection by the corn earworm. ESA National meeting, Louisville, KY (S. Friedman, G. P. Waldbauer coauthors).


PROFESSIONAL SOCIETIES
American Association for the Advancement of Science.
Society for the Study of Evolution.
Entomological Society of America.
Pacific Coast Entomological Society.
Genetics Society of America (’88-’90).
International Society of Hymenopterists.
Lepidopterists Society.
Southern Lepidopterists Society.
Association for Tropical Lepidoptera.
Coleopterists Society.
Entomological Society of Washington.
Maryland Entomological Society.
American Entomological Society.
International Carnivorous Plant Society.
Le Pou Agouti (Forest Conservation in French Guiana).
Field Associate of the Bohart Museum of Entomology, U.C. Davis.
Research Associate Florida State Collection of Arthropods.
CURRICULUM VITAE

JAMES H. TUMLINSON, III

Ralph O. Mumma Professor of Entomology, Department of Entomology, The Pennsylvania State University, 111 Pesticide Research Laboratory, University Park, PA 16802

EDUCATION:

<table>
<thead>
<tr>
<th>Degree</th>
<th>Institution</th>
<th>Year</th>
<th>Major(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.S.</td>
<td>Virginia Military Institute</td>
<td>1960</td>
<td>Chemistry</td>
</tr>
<tr>
<td>M.S.</td>
<td>Mississippi State University</td>
<td>1966</td>
<td>Organic Chemistry, Entomology minor</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>Mississippi State University</td>
<td>1969</td>
<td>Organic Chemistry, Biochemistry minor</td>
</tr>
</tbody>
</table>

PROFESSIONAL EXPERIENCE:

1964-1969 Chemist, USDA-ARS, Boll Weevil Research Laboratory, State College, MS.
1970-1972 Research Chemist, USDA-ARS, Insect Attractants, Behavior and Basic Biology Research Laboratory, Gainesville, FL.
1970-1975 Adjunct Assistant Professor; University of Florida, Institute of Food and Agriculture (IFAS), Department of Entomology and Nematology, Gainesville, FL.
1975-1982 Adjunct Associate Professor and member of Doctoral Faculty; University of Florida, IFAS, Department of Entomology and Nematology, and Department of Chemistry, Gainesville, FL.
1982-Present Adjunct Professor and member of Doctoral Faculty; University of Florida, IFAS, Department of Entomology and Nematology, and Department of Chemistry, Gainesville, FL.
1972-2003 Research Leader, USDA, ARS; Center for Medical, Agricultural, and Veterinary Entomology (formerly, Insect Attractants, Behavior and Basic Biology Research Laboratory), Gainesville, FL.
2003-Present Ralph O. Mumma Professor of Entomology, Department of Entomology, The Pennsylvania State University, University Park, PA.

FIELD OF SPECIALIZATION:

Insect chemical communication and chemical ecology: defining chemical communication systems, including pheromones and other semiochemicals that mediate insect-insect and plant-insect interactions; biosynthesis of pheromones and plant chemical signals; insect behavior, including learning, mediated by semiochemicals. Emphasis is on developing fundamental knowledge and principles that can be applied in environmentally safe, ecologically sound, sustainable pest management programs.
HONORS:

1968 USDA, ARS Award for "Outstanding research which achieved the isolation, identification, and confirmation by synthesis of the male boll weevil sex attractant complex."

1975 USDA Superior Service Award (Boll Weevil Pheromone Development Group) "In recognition of the discovery of and for pioneering the development of the pheromone of the boll weevil as a technique for detection, survey, suppression, or elimination of the pest."

1979 ARS Award "For outstanding research and leadership accomplishments in identifying chemicals mediating the behavior of insects."

1983 USDA Superior Service Award (Insect Chemistry Research Group) "For outstanding service in the isolation, identification, and synthesis of pheromones of a number of major pest insects and providing science and industry with chemicals for insect research and control."

1984 ARS Distinguished Research Scientist of the Year.

1986 Burdick and Jackson International Award for Research in Pesticide Chemistry, presented by Agrochemicals Division of the American Chemical Society.

1989 ARS Fellowship to study at the Center for Insect Science, University of Arizona.

1990 J.E. Bussart Memorial Award from the Entomological Society of America for research accomplishments in the area of insect semiochemicals and associated behavior.

1991 Florida Entomological Society Annual Research Award (Jointly with W. J. Lewis and T. C. J. Turlings)

1994 LeTourneau Memorial Lecture, University of Idaho.

1995 USDA, The Secretary of Agriculture’s Award for Personal and Professional Excellence “For Pioneering Research on Insect Pheromones that Provided the Basis for Control of Major Insect Pests, Including the Boll Weevil, Thereby Reducing Environmental Contamination by Pesticides”.

1996 Elected a Fellow of the Entomological Society of America

1997 Vice President, International Society of Chemical Ecology

1997 Elected to the National Academy of Sciences.

1998 President, International Society of Chemical Ecology

1998 Distinguished Lecturer in Life Sciences, Boyce Thompson Institute for Plant Research, Cornell University, Ithaca, NY.

1998 Alfred M. Boyce Lecturer, University of California at Riverside.

1998 Inducted into ARS Hall of Fame.

1999 Strickland Lecturer, University of Alberta, Edmonton.

1999 Joseph LeConte Lecturer, Georgia Southern University, Statesboro.

2000 Recognition Award in Insect Physiology, Biochemistry and Toxicology, from the Entomological Society of America, Montreal, Canada.

2002 Kenneth A. Spencer Award for Outstanding Achievement in Agricultural and Food Chemistry

2002 ISI Essential Science Indicators; listed Tumlinson’s publications in the top 1% in terms of total citations earned in the field of Environment/Ecology.

2003 Presidential Rank Award as a Meritorious Senior Professional in USDA, ARS.

2003 Jean-Marie Delwart Foundation International Prize (with Dr. W.J. Lewis) for chemical communication.

2005 Silver Medal Award of the International Society of Chemical Ecology

OTHER RELATED PROFESSIONAL ACTIVITIES:

- FAO consultant to Greek Scientists, Nuclear Research Center, Demokritos, Greece, on identification of olive fly pheromone, 1974

- Member of Editorial Board of the Journal of Chemical Ecology, 1977-present.

- Member Program Committee, Pesticide Chemistry Division, American Chemical Society, 1978-1982.
- Member Executive Committee, Pesticide Chemistry Division, American Chemical Society, 1979.
- Member of team of six scientists selected to visit USSR to participate in bilateral exchange program and symposium on integrated pest control, 1980.
- Member of team of five scientists selected to visit Japan, under Japan/USA Agreement on Cooperation in Science and Technology, to participate in First Japan/USA Joint Symposium on IPM, 1981.
- Participated in workshops in the U.S. on *Trichogramma* and on larval parasites of U.S. and European scientists to develop a trans-Atlantic cooperative research effort on the foraging behavior of *Trichogramma*, Wageningen, The Netherlands, 1984.
- Member of panel selected by National Academy of Sciences to prepare briefing report for President's Science Advisor on "Biotechnology in Agriculture," 1985.
- Assisted in organizing and participated as a member in the Western Regional Coordinating Committee on Natural Product Chemistry as a Resource for Biorational Methods of Insect Control, 1991-1993; assisted in reorganizing into Western Regional Project WRRC-82 and in developing a plan to obtain funding for this project, 1993.
- Presented four lectures on semiochemicals mediating insect behavior in Brazil Summer School on Organic Chemistry, at the invitation of the Universidade Federal de São Carlos, São Carlos, Brazil, February, 1993.
- Assisted in organizing and participated in “Planning Session for Pest Management Needs in a Shifting Agriculture in the Southeast”, Tifton, GA, April 13, 1995. Meeting attended by growers, extension agents, ARS and University of Georgia Research Scientists, a representative of the Georgia Conservancy, and the USDA, ARS South Atlantic Area Director.
- Participated in a workshop sponsored by Northeast Region SARE to develop a brochure with the working title of Designing Agroecosystems to Minimize Pest Pressure, Las Vegas, NV, November, 1998.
- Member of the editorial boards of the Journal of Chemical Ecology and of Biological Control: Theory and Application in Pest Management.
- Member, Board on Agriculture and Natural Resources, National Research Council, National Academy of Sciences, April, 2001-2003.

**RECENT INVITED PRESENTATIONS:**

h. “Plant signals guide natural enemies to insect herbivores”, in symposium: International Award for Research in Agrochemicals: Ralph O. Mumma An Overview of Plant-Insect Interactions,
Immuoassay, and Agrochemical Fate at National meeting of American Chemical Society, Chicago, IL, August 27, 2001.


p. Presented two invited lectures, “Host location by parasitoids” and “Chemical signals that mediate tritrophic plant-insect interactions”, in Special Course on Host Recognition, Institute of Zoology, University of Neuchâtel, Neuchâtel, Switzerland, September 8-10, 2004.

q. Keynote speaker, Molecular and Environmental Plant Sciences symposium, Texas A&M University, March 8, 2005.


s. Chemical Ecology of Tritrophic Plant-Insect Interactions, Symposium Kyoto University, Kyoto, Japan, November 1-4, 2005.

GRADUATE STUDENTS AND POST DOCTORALS

Masters Students

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basilios E. Mazomenos</td>
<td>1978 Greece</td>
<td>Greece</td>
</tr>
<tr>
<td>Thomas M. Dykstra</td>
<td>1994</td>
<td>U.S.</td>
</tr>
<tr>
<td>Mary Donohue</td>
<td>2000</td>
<td>U.S.</td>
</tr>
<tr>
<td>Nurian, Badillo-Vargas</td>
<td>current</td>
<td>U.S.</td>
</tr>
</tbody>
</table>

Doctoral Students

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peter E. A. Teal</td>
<td>1981</td>
<td>Canada</td>
</tr>
<tr>
<td>Fred J. Eller</td>
<td>1990</td>
<td>U.S.</td>
</tr>
<tr>
<td>Ted C. J. Turlings</td>
<td>1991</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Ursula Rose</td>
<td>1997</td>
<td>Germany</td>
</tr>
<tr>
<td>Yasmin Cardoza</td>
<td>2002</td>
<td>Honduras</td>
</tr>
<tr>
<td>Ezra Schwartzberg</td>
<td>current</td>
<td>U.S.</td>
</tr>
<tr>
<td>Emily Hohlfeld</td>
<td>current</td>
<td>U.S.</td>
</tr>
</tbody>
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Post Doctors

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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</tr>
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<tbody>
<tr>
<td>Hajime Sugie</td>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td>Tatsugi Chuman</td>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td>Stuart Krasnoff</td>
<td></td>
<td>U.S.</td>
</tr>
<tr>
<td>Hans Alborn</td>
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<td>Sweden</td>
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<tr>
<td>Philip McCall</td>
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<td>England</td>
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<td>Nianbai Fang</td>
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<td>China</td>
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<tr>
<td>John Loughrin</td>
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<tr>
<td>Yoav Gazit</td>
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<tr>
<td>Paul Pare</td>
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<td>Eric Schmelz</td>
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<td>U.S.</td>
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<tr>
<td>Consuelo De Moraes</td>
<td></td>
<td>Brazil</td>
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<tr>
<td>Alonzo Suso</td>
<td></td>
<td>Honduras</td>
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<tr>
<td>Jurgen Engleberth</td>
<td></td>
<td>Germany</td>
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<tr>
<td>Cameron Lait</td>
<td></td>
<td>Canada</td>
</tr>
<tr>
<td>Naoki Mori</td>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td>Baldwyn Torto</td>
<td></td>
<td>Ghana</td>
</tr>
<tr>
<td>Juan Huang</td>
<td></td>
<td>China</td>
</tr>
<tr>
<td>Katalin Boeroeczky</td>
<td></td>
<td>Hungary</td>
</tr>
</tbody>
</table>

Recent Publications (Total 265)


Engelberth, J., Schmelz, E.A., Alborn, H. T., Cardoza, Y. J., Huang, J. and Tumlinson, J. H. Simultaneous quantification of Jasmonic acid and Scilicylic acid in plants by vapor phase extraction


DAVID W. WILLIAMS
8 Court End Avenue
Middleborough, Massachusetts 02346, USA
(508) 947-3790 Dafydd47@aol.com

Education

Research
The ecology of exotic invasive insect species; application of remote sensing Interests
technology to the survey and detection of invasive insect populations; the theory and practice of biological control; regional dynamics of insect populations under the influence of weather variability and climate change; the population ecology of arthropod herbivores, predators, and parasitoids; mathematical modeling of plant, herbivore, and insect natural enemy systems.

Research Experience
7/03 - present Entomologist, USDA APHIS, PPQ, CPHST, Pest Survey, Detection, and Exclusion Laboratory, Otis ANGB, Massachusetts.

Coordinating a project to apply remote sensing technologies, including hyperspectral imaging and LIDAR, to the survey and detection of emerald ash borer populations. Exploring natural forests in South Korea in support of a classical biological control program for emerald ash borer. Developing a program for implementing biological control of Sirex noctilio using the parasitic nematode, Beddingia siricidicola, and evaluating natural control by native parasitoids.


Investigated the ecology of Asian longhorned beetle in natural forest stands in South Korea. Investigated the susceptibility and vulnerability of forests in the Delaware River Basin to invasive insect pests, including gypsy moth, hemlock woolly adelgid, and Asian longhorned beetle, using geographic information systems and multivariate analyses. Investigated potential effects of climate change on the geographical distributions of outbreaks of forest defoliators and bark beetles using GIS and multivariate analyses. Analyzed the effects of weather and dispersal on the population dynamics and regional synchrony of forest defoliators using time series methods and spatial modeling.

4/88 - 3/92 Research Entomologist, USDA Agricultural Research Service, Beneficial Insects Research Laboratory, Newark, Delaware.

Investigated the population ecology of the gypsy moth in New Jersey using historical data. Investigated the functional response to host density of a larval parasitoid of gypsy moth in the field. Developed a detailed computer simulation model of a host-parasitoid system. Designed databases and developed an electronic bulletin board for the National Biological Control Institute.

Carried out field experiments on the Mediterranean fruit fly in Guatemala in support of an Environmental Impact Assessment of the MOSCAMED program.

10/84 - 1/88 Integrated Pest Management (IPM) Systems Specialist, University of California Statewide IPM Project, University of California, Davis.

Developed crop models for wheat and citrus and associated pest models. Continued development of a grape agroecosystem model. Coordinated research efforts in the cereals, citrus and grape commodity groups.

7/82 - 9/84 Postdoctoral Modeler/Analyst, University of California Statewide IPM Project, University of California, Berkeley.

Developed a computer simulation model of grapevine growth. Constructed arthropod pest and plant pathogen population models for linkage with the vine model. Developed and coordinated, with University of California Cooperative Extension personnel, a project for the field validation of the grapevine model.

7/81 - 6/82 Postdoctoral Fellow, Texas A & M University.

Investigated the population dynamics and natural control of the boll weevil and *Anthonomus hunteri* on wild cotton and *Hampea* in Yucatan, Mexico.

References Available on request.

Publications List available on request.