

Table of Contents

Proposal Cover Page (Form CSREES-2002)	1
Table of Contents	2
Project Summary (Form CSREES-2003)	3
Project Description	4
References	20
Appendices to Project Description	21
CIPM Members and Supporters	21
Projects Funded and/or Managed by CIPM	22
Internet Sites Developed/Maintained by CIPM	30
Letters of Support/Commitment	34
Key Personnel	35
Collaborative Arrangements (including Letters of Support)	41
Conflict-of-Interest List (Form CSREES-2007)	42
Budget (Form CSREES-2004)	45
Budget Narrative	51
Matching Funds	52
Current and Pending Support (Form CSREES-2005)	53
Assurance Statement(s) (Form CSREES-2008)	56
Compliance with the NEPA (Form CSREES-2006)	57
Page B, Personal Data on Project Director	58

6. Project Description

A Proposal to USDA/CSREES for the Establishment of the Southern Region Integrated Pest Management Center within the NSF Center for IPM at North Carolina State University

(a) Identify goals for the Center

Center Mission and Role

The mission of this proposed Southern Region Integrated Pest Management Center (SRIPMC) will be to coordinate, enhance, and facilitate the flow of resources and information in integrated pest management on a regional basis, including grants management, data acquisition and sharing, infrastructure development, and the documentation needed to provide accountability for resources used. The Center will focus its efforts on meeting the challenges described in the developing *National Roadmap for Integrated Pest Management*, while maintaining the regional (site-specific) nature required for effective IPM programs (Kogan 1998)

The Center will provide leadership and coordination for the identification and priority setting of IPM needs and issues through multi-state and multi-organization collaboration in the Southern Region. The Center will provide the infrastructure for the development and sharing of current and new pest management technologies among federal and state agencies, impacted organizations and pest managers. The SRIPMC will be a major focus of the current NSF Center for Integrated Pest Management (CIPM).

Our approach will consider not only traditional agricultural needs, but also recreational, urban and human health pest concerns such as right-of-way and park management, IPM in schools, new health pests such as West Nile Virus carriers, and potential bioterrorism threats. CIPM is already involved in all of these areas with information dissemination of IPM recommendations on a state, regional and national level. CIPM has an 11-year history (\$6+ million) of support for and management of IPM research and extension programs throughout the US, with projects ranging from IPM challenges in genetically enhanced crops, to field comparisons of conventional, organic and IPM systems in vegetables, to information systems for invasive species.

The Center for Integrated Pest Management was established in 1991 to serve a lead role in technology development, program implementation, training, and public awareness for IPM at the state, regional, and national level. CIPM is an organizational unit within the College of Agriculture and Life Sciences at North Carolina State University. It is composed of faculty members from all academic departments in the College and involves all relevant disciplines impacting on IPM. CIPM also involves scientists from other universities across the nation through grants, contracts, or other formal working relationships. CIPM is a National Science Foundation-founded Industry / University Cooperative Research Center, that works to support and further Integrated Pest Management through the evaluation of emerging technologies, information management and dissemination, environmental stewardship, estimation of economic consequences, resistance management tools and systems, and integration of disciplinary expertise.

CIPM fosters the development and implementation of pest management programs based on a high level of knowledge of pest biology coupled with choices of monitoring tools and control technology, resulting in economically sound, environmentally compatible, and socially responsible integrated crop production. The Southern Region Integrated Pest Management Center would be a major and key part of CIPM and CIPM would coordinate its activities and mission with the SRIPMC to provide a holistic approach to IPM research and training. The SRIPMC will function as a project within CIPM, with its own specific accounting code, and following all University regulations pertaining to CSREES grants. SRIPMC will also have separate communications, with its own letterhead, phone number and email addresses. The PI (RES) has 20% of his time devoted to handling CIPM administration, as separate from SRIPMC activities.

CIPM is housed in a suite of five offices on the NCSU Centennial Campus. We have close access to meeting rooms that can handle 25-80 participants in modern facilities. The Raleigh area is served by five major airlines with convenient scheduling throughout the US.

(b) Identify the Center Director and other key personnel that will comprise the Center personnel

Center Personnel – Rationale, Duties, Expertise

No one person can have all of the expertise and skills needed for the diverse activities of a regional center. These activities include general management, grants management, overall IPM field and technology knowledge, pesticide regulation and use experience, and telecommunications expertise. We have chosen to partition these responsibilities among four positions, not all full-time within the Center, but all with full-time responsibilities to Center-related activities.

PI and Director: Ron Stinner (40%, note that rest of PI's time is in administration and information technology efforts closely tied to the Regional IPM Centers)

Duties: overall coordination of activities, grants management, administrative supervision of information systems

Experience/Expertise: 36 years in IPM, 11 years as CIPM Director (grants management, interstate and multidisciplinary program coordination, strong interaction with government, industry, grower and other non-profit organizations), 9 years in internet technologies

Associate Director - Regulatory Affairs: Steve Toth (40%, rest in state IPMC effort)

Duties: coordinate federal/state interactions, fulfill standard crop and pesticide information requests, assist Director, coordinate with other IPM-related programs (e.g., IR-4, PSEP)

Experience/Expertise: 20 years with pesticide regulation, use and safety information collection/distribution (Pesticide Impact Assessment), 8 years with pest management information collection/distribution, and 3 years with Pest Management Center in North Carolina. CIPM Core Coordinator for Pesticides and Alternatives.

Associate Director - IPM: (50%, 50% Regional IPM or other) TBA

Duties: promote IPM in Southern Region, assist Director, coordinate IPMC activities with other related programs (e.g., RIPM, SARE, Water Quality)

Experience/Expertise: 10+ years in IPM, experience with regional/national IPM program, basic knowledge of information systems

Administrative Assistant: Jo-Anne Scoggins (100%)

Duties: handle correspondence, maintain administrative and project files, maintain internal administrative databases, arrange meeting and review panel details, help with accounting and contracts

Experience/Expertise: BA in Management, 3 years as Administrative Assistant at CIPM

Editor/Writer: TBA (100%)

Duties: prepare monthly newsletter, copy-editing of all reports, preparation of press releases, success stories for public release, develop positive relationship with agricultural and environmental news reporters.

Experience/Expertise: BA in English or related field, at least 3 years experience with newsletter preparation, copy editing and similar activities

(c) Describe the Center management process for: establishing program priorities; involving stakeholders, partner institutions and other government agencies, aggregating and disseminating information; and coordinating Center activities with other entities

Center Management Process

The proposed Center will operate as a major program within the NSF Center for Integrated Pest Management (CIPM) located at North Carolina State University. CIPM has been established for over 10 years and is a recognized, functioning unit within the College of Agriculture and Life Sciences (Stinner 2003). The Center maintains its own NCSU accounting code, with grants management experience that includes over 120 projects (160+ scientists in 36 states and over \$6 million). CIPM employs a full-time Director, 2 faculty Core Coordinators (a third will be named shortly), a full-time Administrative Assistant, 6 Internet application specialists (2 part-time), 3 Senior Researchers, and 15 Research Assistants (most working on invasive species issues with USDA/APHIS/CPHST).

CIPM currently has on-going programs with a number of diverse organizations (see table below). CIPM will use the experience gained with 11 years of stakeholder involvement with our Industry Advisory Board to coordinate the activities and functioning of the proposed SRIPMC stakeholder committees described below. The committees will establish program priorities through stakeholder input and consensus building involving all stakeholder segments. The two committees detailed below will have representatives from federal and state government programs, 1862 and 1890 land-grant institutions, and organizations representing growers, agribusiness, and environment.

Although the major SRIPMC activity and coordination will occur through the committees described below, CIPM will use the relationships it has already established with its 35+ members and supporters to coordinate activities, and to aggregate and disseminate information. For example, the National Alliance of Independent Crop Consultants (NAICC) is involved in

discussions with EPA to provide the agency with "activity timelines" that describe consultant activities in the field for various crops. This discussion and any resulting products are now external to the current PMC's. Because CIPM maintains the NAICC website and NAICC is a member of the CIPM Industry Advisory Board, we would propose to integrate the results of their activities within the new SRIPMC information system. The IPMC's would not even be aware of this activity without our current relationship with NAICC.

Similar examples can be provided for programs such as IR-4, the Organic Transitions Consortium, industry information groups, and regulatory programs. We have already begun aggregation and dissemination activities through our efforts with the PMC Information System. In a system called New Pest Management Technologies (www.pestmanagement.info/NPMT), we have seamlessly aggregated and integrated data from IR-4 (new chemistries database), OPMP (Pipeline database), and EPA (section 18 labels and the yearly EPA Work Plan). The system allows planners to search out new and upcoming technologies by crop, pest or pesticide, then see overlap among programs, determine where a product is in the EPA Work Plan, and actually see the registration label, if the product is already registered by EPA. We are also currently working with the Western, North Central and Northeastern Regional PMC's information technology personnel to develop Web Services for seamless sharing of all information on the national System (see Xia, et al., 2002a,b). The present Southern Region PMC does not have IT capabilities and we provide that service for them. Obviously, we would continue that effort with this proposal.

Specific activity coordination with other programs is discussed under the detailed activity descriptions provided in later sections of this proposal.

(d) Describe the process that will be used to establish an advisory team of pest managers and stakeholders, including producers, who represent the diversity of capabilities, institutions, and pest management issues found in the region. Demonstrate capabilities to facilitate an interactive process designed to identify pest-related issues and opportunities to be developed through a multi-state approach

Process to establish stakeholder advisors

How will these committees remain dynamic? How were they chosen?

Committees – two committees: an Advisory Council that meets annually to establish policy, priorities, and general activity direction of the Center; and a smaller Steering Committee that meets semi-annually, and by phone as necessary, to see that the Center is carrying out its obligations in accordance with the directives of the Advisory Council. Committee members will be selected in a manner that provides equitable representation for the diverse stakeholder groups, states and disciplinary areas involved in pest management, as discussed below.

- Advisory Council - will determine general policies for Center operation; determine needs and set general priorities for programs based on surveys and other data based on stakeholder opinion; suggest new/innovative focus areas for center activities; and help develop and promote interaction with stakeholder organizations. The Council will consist of 25-40 members and will meet at least annually. The Council will also appoint both standing (e.g., Commodity Working Groups) and ad-hoc sub-committees (e.g., EPA "targets" Focus Groups) as needed. The Advisory Council will also develop, at least annually, a prioritized list of regional needs and recommendations for research/extension programs to meet these needs. Such lists will be

provided to CSREES and all Funding Panels operating within the SRIPMC. Where appropriate, the Advisory Council will recommend specific needs for funding with core SRIPMC funds.

- Steering Committee - will consist of approximately twelve voting members and ten non-voting members and will meet semi-annually. The Steering Committee will provide guidance for executive decisions and administrative management, determine how to implement policies from Advisory Council, and determine the application of priorities to Center efforts through the selection of activities that promote the focus areas recommended by the Advisory Council.

Should this proposal be successful, we would like to facilitate as smooth and rapid a transition as possible. To that end, the initial committee members have already been identified through discussions with numerous individuals already associated with CIPM through funding to/from CIPM, current membership on the CIPM Industry Advisory Board, and existing cooperative partnerships. They have been selected to represent a diverse group of stakeholders from many disciplines and organizations throughout the South. It was felt that having these committees operational from the start of the grant would be critical to success and a smooth transfer from the current Southern Region Pest Management Center (SRPMC).

After the first year, we will ask the SRIPM, SRSARE, SRIPMC Project Leaders, and other Federal programs to select the representatives from their organizations. Other representatives will be asked to serve 2-year terms, with one-half initially serving only a one-year term, so that a staggered membership can be retained. The Steering Committee will develop a list of organizations/nominees yearly, and the Advisory Committee will be asked to make the actual selection of representatives. Because of the dynamic nature of emerging critical issues and unexpected personnel changes, the IPMC Director or CSREES representative will have the authority to appoint temporary, non-voting, members to either committee, subject to approval of the Advisory Council at the next scheduled meeting. The overriding concern will be to maintain a diverse set of perspectives from all stakeholder factions on the committees.

The initial committee members have been selected to provide expertise from universities (extension, research and teaching; 1862 and 1890 institutions), growers (individuals, state and national organizations), agricultural and ecological non-profit associations, industry (agrochemical, biotechnology, food processing, PCO), specific federal programs (e.g., IR-4), and a wide array of state and federal agencies.

Diverse disciplines are involved: plant pathology, entomology, crop science, economics, sociology, statistics, toxicology, wildlife management, and ecology. We propose having a representative from RTI International serve on the Advisory Council. RTI is a nationally recognized non-profit organization that focuses on numerous areas, including surveys and survey analyses, rural sociology and economics, environmental concerns, and technology. RTI has working relationships with statisticians, rural sociologists and economists throughout the US.

We have also strived for a wide array of commodity and focus area representation. By using representatives from both the state IPM committees and the current SRPMC stakeholder committee, together with specific commodity/focus area representatives (currently cotton, soybeans, strawberry, PCOs, and consultants), we expect to have the needed representation.

However, once the Advisory Council is established, should we find key areas not represented (e.g., animal IPM or school IPM), we will work with the Advisory Council members to appoint additional members to speak for those areas.

If successful with this proposal, we will work with the current Southern Region Pest Management Center personnel for a smooth transition. We have worked with them for the past 3 years in our role as manager for the National Information System, and they are aware of our development of this proposal. As part of the transfer, we would include at least five members of their current Stakeholder Committee, identified by the current SRPMC as key to active stakeholder input.

Finally, geographic diversity has been sought, not only from the Southern Region, but where appropriate, nationally. All Southern Region states with IPM Committees will be asked to name a representative from their committee. For those states without IPM committees, the SRIPMC IPM Facilitator will identify an appropriate representative and work with the state for the establishment of an IPM committee.

Committee Makeup

Advisory Council

- Representatives from SERA-IEG-03 (2 individuals)
- SR ESCOP/ECOP IPM Committee representative
- National Plant Board - TBA
- USDA/Animal and Plant Health Inspection Service - David Kaplan, National Science Program Leader for IPM
- USDA/Agricultural Research Service (Regional) - TBA
- USDA/Natural Resources Conservation Service - TBA
- USDA/National Agricultural Statistics Service - TBA
- Crop Data Management Systems - Jim Craig
- Kerr Center for Sustainable Agriculture - Jim Horne
- Food Processors - TBA
- United Soybean Board - Stephen Muensch
- North Carolina Strawberry Association - Debby Wechsler
- National AG Consulting Services, Inc. - Earl Tryon
- PCO Representative - Mike Connell, Orkin Regional Services Coordinator
- Key Growers - TBA
- RTI International - Mary Muth
- The Nature Conservancy: TBA
- 5 Members of current PMC Stakeholder Committee

Steering Committee

- | | |
|---|------------|
| • IPMC Director | Non-Voting |
| • IPMC Associate Director | Non-Voting |
| • IPMC Associate Director and IPM Facilitator | Non-Voting |

- USDA (CSREES) - Mike Fitzner Non-Voting
- USDA (OPMP) - Kent Smith Non-Voting
- Environmental Protection Agency - TBA Non-Voting
- Regional ESCOP/ECOP Director or rep Non-Voting
- CIPM Industry Advisory Board Chmn Non-Voting
- IR-4: Jerry Baron Non-Voting
- 1890 (NCA&T IPM) - Jimo Ibrihim, Voting
- Chairman, IPMC Advisory Council Voting
- Secretary, IPMC Advisory Council Voting
- SERA-IEG-03 Representative: Ames Herbert Voting
- SR SARE Representative: Geoff Zehnder Voting
- IPMC Project Leader Representative: TBA Voting
- Organic Volunteers, Inc: Grayson Schaffer Voting
- National Alliance of Independent Crop Consultants - TBA Voting
- Monsanto: John Anderson Voting
- Insecticide Resistance Action Committee: Gary Thompson Voting
- Cotton Incorporated: Pat O'Leary Voting
- Food Processors: TBA Voting

Ad-hoc Committees

Where new or emerging issues/problems warrant, and at the request of the Advisory Council or Steering Committee, the SRIPMC Director will appoint *ad-hoc* committees to address such issues. These committees may involve specific commodities and/or pests issues or emergency topics (replacement technologies, a new invasive species). Funding for the activities of such committees shall be provided by the program with the advice of the Steering Committee.

Panels for Funding Decisions

For managing specific grants programs, the Center will establish Scientific Review Panel(s) with the advice of the Steering Committee. To avoid potential conflicts of interest, these Panels will consist of experts chosen from outside the Southern Region, where possible. Based on CSREES Guidelines for specific programs, and with the priorities established by the above Committees in consultation with CSREES, the Panels will review program proposals and provide documented recommendations for project funding. Where appropriate and desired, external reviews may also be requested and used by the Panels to arrive at recommendations to CSREES for funding. The cost of panel meetings will be borne by the specific grant program. However, where feasible, single RFA's will be issued covering multiple programs, and single or joint panel meetings held to limit administrative costs.

(e) Describe the process for outsourcing functions, activities and projects to effectively and efficiently fulfill the Center role and mission.

Outsourcing Process

The manner in which particular activities are outsourced will depend on the activity, in-house expertise, and critical time requirements. For all competitive programs, a science-based review process including independent reviewers and stakeholder panels will be used. We will use both the Advisory Council and Steering Committee (see below) to provide the necessary scientific expertise and stakeholder input for reviewer selection. Individuals involved in writing any RFA will not be eligible to compete for funds from that program. More details are provided under the individual program components and stakeholder sections.

(f) Present a plan that demonstrates the capacity to form and operate interactive communication networks that cross traditional institutional, disciplinary, programmatic and geographic boundaries to address regional IPM priorities

Expected Center Activities

USDA/EPA information requests - the Center will provide specific pest management information to USDA and EPA, related to FQPA regulatory issues. This will include formal reports, surveys and expert opinion information. The SRIPMC will also serve as a focal point for collaborative team building on IPM issues engaging broad-based stakeholder participation.

Examples include Crop Profiles, PMSPs and other preplanned information needs (e.g., workshops - see Stinner, et al, 1998, Ragsdale and Stinner 1999). Priority-setting with regard to Crop Profiles and PMSPs will rely heavily on EPA needs as listed in the EPA priority list provided to the Centers by Jonathan Becker. In addition, funding for priority IPM needs identified by the Advisory Council and Steering Committee will be addressed in this activity. Projects here could include funding for establishment of commodity working groups, development of management tactics for new invasive species, or topical issues such as research on new technologies to replace current products being lost to resistance or regulatory changes. This will be a competitive program using a Review Panel, but it is expected that CIPM will continue in its role of providing the national online database of the Crop Profiles, PMSPs, and CSREES State Contacts, with separate funding.

Short turnaround, "emergency" information needs – non-competitive outsourcing to key experts or in-house if appropriate. CIPM maintains the current PM Centers' National IPM Expertise Database. We have worked with numerous state and national grower organizations and land-grant universities to develop a large network of IPM expertise on which to draw. Within the last 18 months, we have also developed and deployed (with 2 weeks notice) two online surveys, scouting activities and level of nutrient management expertise, for NAICC, EPA and NRCS (see Stinner and Bacheler 2002 for more information). CIPM has had over 10 years experience in handling small contracts with universities, non-profits, and individuals (with funds from Cotton Inc., APHIS, CSREES, NSF, and CIPM membership funds). Our accounting personnel have worked closely with CIPM and we have the knowledge of the different rules for varying funding sources, and the infrastructure to handle these types of contractual obligations rapidly and efficiently.

Coordination with other agencies - a significant part of the Regional Center's focus must be on developing and maintaining contact and program coordination among the many government agencies and programs involved with Integrated Pest Management and related activities. CIPM is already actively involved with numerous agencies in providing and delivering pest management-related information. We propose to continue these activities, separately funded, with a focus on integrating both activities and information within the SRIPMC framework. These agencies and our present activities are listed below. In addition, CIPM has cooperated with Toxicology Communications for 2 years in providing short courses on topics involving toxicology training for non-toxicologists. In addition to industry, individuals from CSREES and EPA have taken these short courses (see www.toxicologycommunications.com). We propose to continue this relationship and integrate this effort with SRIPMC activities, at no cost to the SRIPMC program.

Agency	Current Activities	Potential Integration/ Collaboration
USDA/Animal and Plant Health Inspection Service	Developing Global Pest and Disease Database (Stinner, et al, 2001)	Integrate with IPMC invasive species warnings and other databases (see Ridgway, et al. 1999)
Dept of the Interior	Invasive species workshops/ management planning	Integrate with IPMC invasive species warnings/ recreation IPM
USDA/ARS - National Agricultural Library	Review and recommend changes to ISAC website	Create dynamic linkage with IPMC Information System
USDA/Natural Resources Conservation Service	Survey of NAICC on nutrient management expertise	Additional surveys, with rapid response time
USDA/APHIS/CPHST	Agricultural Internet Monitoring of illegal product sales (Rotstein, et al 2002)	Provide linked information on the losses due to alien species and fact sheets to AIM
Environmental Protection Agency	Searchable label access Crop Timeline software New Pest Mngt Technologies Cotton scouting survey	Expand present information and make available to Web Services sharing Surveys as requested Commodity production training for BEAD scientists and economists Training in toxicology
USDA/National Agricultural. Statistics Service	Online pesticide use data (Xia and Stinner 2002)	Add new years and data Integrate more fully with Web Services
USDA/Interregional Project 4 - Minor Crops	Maintain website, online data New Pest Mngt Technologies	Add new projects Integrate more fully with Web Services

North American Plant Protection Organization	Maintain Phytosanitary Alert System	Integrate with Web Services
USDA/CSREES/IPM	Maintain Performance, Planning and Reporting System	Integrate success stories, other info, w/IPMC using Web Services
USDA/CSREES/PSEP	Maintain Performance, Planning and Reporting System	Integrate annual reports, other info, w/IPMC using Web Services
USDA/CSREES/Regional Pest Mngt Centers	Develop and maintain National Web Information System	Continue integration using Web Services
USDA/CSREES/Regional Diagnostic Clinics		Establish data sharing using Web services
PMAP, SRIPM		Manage grants program as part of integrated activity of Center, if requested

Grants programs coordination - CIPM already maintains a small grants program funded by our members. We propose to integrate present CIPM funding activities to focus on innovative areas and approaches by involving new expertise, using mini-grants leveraged with non-federal CIPM membership funds. To this end, the Chairman of the CIPM Industry Advisory Board will be a non-voting member of the SRIPMC Steering Committee to maintain the highest level of liaison. Areas could include Urban IPM, IPM in Schools and Health-Related IPM. CIPM already has a record of support for activities in areas where federal funding has been limited (see Appendix). Details of our proposed system for grants management are given below

As part of the Center activities, we propose to maintain a full program of public notification about pest management activities in the Southern Region, integrated with national news. We propose to develop and disseminate general public awareness information providing details of new pest management technologies and IPMC program activities/successes, using press releases, brochures, multimedia, and dynamic, web-based applications.

Identify and prioritize IPM research, extension, and outreach needs on a multi-state basis - as described under the Advisory Council above, the Council will set general priorities for all programs based on surveys and other stakeholder opinion instruments, and suggest innovative focus areas. The Advisory Council will also provide these priorities to all funding Scientific Review Panels, and all needs/priority lists will be publicly disseminated via email, the web, and written communications to all identified stakeholder groups, including 1862 and 1890 institutions, other research institutions, grower newsletters and other periodicals. We will provide an easily accessible web-based email sign-up system for interested parties.

Conduct a competitive process to fund projects that address the needs. RFA's will be developed by the SRIPMC, with guidance from the Steering Committee and review by CSREES. The RFA's will be widely distributed through stakeholder channels and direct contact with potential applicants. If permitted by CSRESS, online submission will be enabled to simplify the proposal process. CIPM has had an online preproposal submission process for 6 years. If approved by

CSREES, CIPM will establish a secure system for online external review, similar to that used by NSF and by CIPM for the last 3 years with scores and comments then made available electronically to Scientific Review Panel members. Actual funding decisions will be made by Scientific Review Panels (see committees above), based on the priorities and clearly stated quality criteria. The SRIPMC Director and Associate Directors will share responsibilities for managing the competitive processes.

Notify potential applicants of funding opportunities. Our primary notification approach will be with email. Although we will develop and maintain a list of postal addresses for those potential stakeholders without email, this communication tool has become so ubiquitous that it must be our first choice. In addition to a highly visible email sign-up on our Regional web site, we will use the CSREES Contacts Database for emails to all Southern Region IPM, PSEP, and IR-4 state contacts and current IPMC Project Leaders. The software for this is already written and available to all IPMC's at the National IPMC web site. We will also target all of the Southern Region IPM experts in the IPM Expertise Database, with an "op-out" Option for those that do not wish to receive the notices. We will make this software available to all IPMC's.

Organize regional, institutional and individual expertise to address multi-state IPM issues - The Advisory Council will appoint both standing (e.g., Commodity Working Groups) and ad-hoc sub-committees (e.g., Focus Groups) using experts from throughout the region to address multi-state issues identified by the Council. They will also recommend funding for studies by these committees through institutional grants developed in a competitive program, preferably as enhancements to related grants already established.

Serve as a focal point for collaborative team building on IPM issues engaging broad-based stakeholder participation (e.g., PMSPs) - The Associate Directors will coordinate key activities such as the development of Pest Management Strategic Plans and Regional Grower Committee development with the assistance of members of the Advisory Council and their organizational contacts. The diverse nature of the Councils' membership will ensure the participatory nature of these activities. CIPM has already been active from an early stage in the development of PMSPs for Southeastern crops (team building, hosting workshops, publication, etc.). We will specifically seek proposals and priorities from 1890 Land-Grant Institutions, 1994 Land-Grant Institutions, Hispanic-serving institutions, and/or other institutions that serve high-risk, under-served, or hard-to-reach audiences and international relationships. The PI (RES) has just completed a report to USAID on their IPM program that outlines the need for more cooperation and coordination with the Regional IPM Centers (Gutierrez et al 2003).

Establish a relationship with existing programs in the four-year degree granting institutions (e.g., the Land Grant System's multi-state research and extension committees and programs related to IPM) - The inclusion of representatives from SARE, SRIPM-IEG, 1890 institutions, land-grant administration and other university representatives will provide the initial contact with these programs. We expect that the stakeholder committees and USDA/CSREES will put requirements/priorities on some funding programs managed by the SRIPMC that will strongly encourage multi-state projects. It is expected that the SRIPMC will provide modest funds for establishing and coordinating organizational meetings of multi-state groups seeking

research/extension funding for specific priorities/needs (e.g., development of regional Pest Management Strategic Plans).

Organize and develop multi-state communication networks that engage state IPM programs - CIPM has a strong history of developing multi-state communication networks, both in terms of person-to-person contacts and electronic. For many years, CIPM has funded and/or managed multi-state programs that required close coordination and cooperation. Examples include initial funding of what is now the "Herbicide Application Decision Support System (webHADSS)", a cotton information system for Cotton Incorporated, and the National IPM Network. We foresee, and will support if priorities so dictate, multi-state programs in commodities where the expertise within individual states has reached a critical low (e.g., peanuts and small fruits in the Southeast).

From the electronic networking perspective, CIPM has a strong technical staff, including six Internet applications specialists. No funding is requested in this grant for these individuals, but several are partially supported with funding from the IPMC National Information System. We will continue to aid both other regions and the SR states with technical support and Internet applications that will allow them to integrate national database information (e.g., Crop Profiles, funding opportunities, success stories) with their own state's web site.

Promote open communication and facilitate the exchange of information and resources - CIPM will use the framework provided by the Advisory Council to facilitate communication among groups that would otherwise not normally interact. For example, with the inclusion of organic agriculture, wildlife, and independent consultant representatives, the potential for cooperative program development among these three groups would increase significantly. We would propose to provide modest organizational funding where priorities dictate.

Provide a communication network to other related CSREES programs (e.g., SARE, Water Quality, Food Safety) - Again, within our Advisory Council framework, we have included representatives of almost all of the major USDA/CSREES programs. We will encourage collaboration through funding of priority efforts and direct solicitation of additional funds from the respective programs. We have already demonstrated our ability to bring together such diverse programs to meet a common need with the New Pest Management Technologies program that integrates information from IR-4, OPMP and EPA, and included additional input from NASS and several university representatives.

Identify approaches and processes for developing linkages with other programs in the region (NRCS, EPA, Interior) - CIPM already has established linkages with a number of other agencies and departments, both regionally and nationally (see table above). We propose to build on these current programs, within the priorities established by our Committees. Where appropriate, CIPM would seek to expand these programs to include other states and integrate with other states' programs. With the current contacts in these organizations, we propose to enable and facilitate a personal communications network through the Advisory Council meetings and inclusion of agenda items that will allow the SRIPMC to explore new collaborations.

Manage regionally focused IPM grants programs with funds that reside at CSREES and demonstrate effective technologies to promote user adoption - This section has been discussed above in terms of priority-setting and funding panel selection. We would expect that one of the Advisory Council's main concerns would be the adoption of new IPM technologies. "Promoting adoption" is often a goal with no adequate measurements attached. To that end, we have included a representative from the Triangle Research Institute, an internationally recognized organization that specializes in social science survey and analysis. We propose to use their expertise to help devise both adoption approaches and measurement.

Enhance and broaden opportunities for scientists and stakeholders to identify and obtain new resources - Our main thrust here will be through the activities of the IPM Facilitator in personal contact with both funding agencies and researchers, with the SRIPMC providing the management services with which researchers are often unaccustomed and frustrated. We also propose to provide regional content for a web-based, searchable database of funding sources and opportunities presently being developed by the current NEIPMC. The software was written by CIPM and is currently being modified by the NEIPMC.

Capacity for Interactive Communications Networks

CIPM has an 11-year history of stakeholder involvement. The center infrastructure is already supported by members from industry, government and non-profit agricultural organizations. Our information network includes demonstrated collaboration with diverse stakeholders (over 150 scientists at 40 public and private universities and research organizations) and continuing research/extension information sharing with grower organizations (10 North Carolina and 2 national), non-profit associations (NAICC, IRAC, HRAC, SCOAR, NC Center for Environmental Farming Systems, and Organic Volunteers), and industry (Monsanto, Syngenta, Dow AgroSciences, and Valent). CIPM also maintains the Performance Planning and Reporting System for CSREES (IPM and PSEP) and the CSREES online database of state coordinators for IPM, PSEP and IR-4.

CIPM has had, and continues to have, collaboration with experts in information technology, pesticides and alternatives, risk assessment and modeling, biotechnology, and commodity-based research (see perspective by Stinner 2000). CIPM has worked effectively with government, industry and non-profit organizations. Details on our collaboration history, projects and web applications are available on our CIPM website, <http://cipm.ncsu.edu>. Through the use of our advisory committees, stakeholders will be involved in all aspects of the SRIPMC's activities under CIPM management.

g) Present a plan for a regional, Web based, IPM information and communication network that is linked to other regional and national systems.

Plan for Regional Web-based Information System

CIPM has already developed the IPMC National Information System that includes the Southern Region server. As part of that effort, CIPM already maintains a number of IPMC-related

websites and databases including the Crop Profiles, Pest Management Strategic Plans, and NASS Pesticide Use Data. The software developed for all of these searchable databases already includes "by region" accessibility and technology that allows regions/states to access the information in a manner that allows customization and "local" server URLs.

CIPM has a staff of six full-time Internet application specialists and three part-time programmers, with expertise in standard html, online databases, JAVA, asp, Cold Fusion, and Web Services. We maintain three commercial rack-mounted servers running MS Advanced Server 2000, SQL Server, Cold Fusion 5 and Cold Fusion MX with secure Web Services. The servers have redundant RAID systems with off-site backup. We also maintain two Linux servers in-house and SUN Solaris servers available on-campus. We are connected in-house to Internet II gigabyte service. Our production servers have an up-time record of over 99.9% for the last two years, averaging over two million hits per month.

CIPM maintains the USDA/CSREES Performance Planning and Reporting System for IPM and PSEP. The system is a secure online reporting system for state coordinators. Security information on state coordinator access to this system is obtained dynamically from the separate CSREES Contacts Database (also maintained by CIPM, but updated remotely by CSREES Staff).

CIPM has a demonstrated unique capacity for Internet applications and website development that includes over 50 pest management related websites for USDA (CSREES, IR-4, NASS, APHIS), EPA, non-profit and grower organizations (IRAC, HRAC, NAICC, NC Strawberry Association, 3 organic sites, 1 sustainable agriculture site, Cotton Pickin Web - see Stinner 1997, Virtual Information Center for Biological Control, and the WWW Virtual Library for Agriculture)

CIPM maintains the websites for industry's Herbicide Resistance Action Committee and Insecticide Resistance Action Committee. These sites contain key information on resistance modes of action and management, which can be integrated into the Information System. As part of this effort, we maintain tables of modes of action, meeting minutes, and an Insecticide Resistance Management Online Training website.

In cooperation with Iowa State, Ohio State, Michigan State and NCSU, the Center has developed a new portal for science-based Organic Farming Information, with in-depth information on transition strategies. The information on this site could be integrated with traditional IPM information to provide new alternatives for pest control. The web address is www.organicaginfo.org.

CIPM is also working with USDA/APHIS to provide database-driven information on invasive species. CIPM has developed online databases involving identification of invasive species (APHIS Regulated Pest List, Federal Noxious Weeds List, Exotic Forest Pest System for North America, and NANIAD, see www.invasivespecies.org and www.ExoticForestPests.org). CIPM has been awarded two new contracts with APHIS: 1) development of a secure online application to monitor websites offering illegal organisms for sale trade (AIM - Agricultural Internet Monitoring) and 2) development and maintenance of a complex, secure, distributed database called the Global Pest and Disease Database (GPDD). GPDD will be an interactive, current

database of pests not yet in the US for use by port officers, risk assessors, and the new USDA Regional Plant Pest Diagnostic Centers.

All of the above information will be integrated into the Regional Information System, where appropriate and legal. Because we have separate funding for development of the IPMC's National Information System, most of the tools developed under that funding would be used by this Regional Center.

We would continue to expand capabilities of the regional information system by inclusion of appropriate targeted email and discussion group software, incorporation of wireless web technology being developed with other funding, and development of online proposal handling applications. All software developed will be shared freely with the other regional Centers and state IPM programs.

(h) Provide a plan, including milestones to assess progress and accomplishments throughout the project.

Assessing Progress and Accomplishments (incl. Milestones)

Center progress and accomplishments will be determined by analysis of reports of measurable goals. These goals will include fulfilling program targets within the timeframes indicated in this proposal, with timely reports prepared that detail these accomplishments.

Each of the committees established by the Center will be asked to prepare semi-annual reports on their specific responsibilities and on the Center management of the programs with which they are involved. These reports will also include recommendations for changes in management and protocols used by the Center.

At the end of the second year, CIPM will develop a contract for an independent, external review. Review panel members will include IPM stakeholders. The actual review process will be coordinated with CSREES.

It is critical that the work supported by the SRIPMC supports the goals and measurement criteria established by the *National Roadmap for Integrated Pest Management*. To that end, the Steering Committee and Advisory Council will establish research priorities within the context of objectives that provide economic benefit, protect public health, and preserve natural resources. Within the federal guidelines for the programs that the SRIPMC will manage, all grants panels (and internal funding decisions) will be focused on those areas listed in the *Roadmap*. In addition, CIPM will provide additional leadership with regard to the following efforts:

Production agriculture - reducing negative off-target impacts in major grain and fiber crops; maintaining quality while protecting agricultural workers and keeping dietary pesticide exposure within acceptable safety standards in fruits, vegetables and other specialty crops. CIPM will continue to be involved in all aspects of pest management in production agriculture, focusing not only on Crop Profiles and PMSP's, but also on new projects, e.g., to provide WPS information more readily, already being developed with Dr. Earl Tryon of NACS.

Natural resource and recreational environments - maintaining these environments within a framework designed to protect natural resources and public health. CIPM already has significant

resources engaged in identifying information and management options for invasive species, including many that potentially threaten our natural resources in cooperation with APHIS and US Forest Service. We are exploring opportunities to expand that collaboration to include the Department of the Interior with Dr. Gordon Brown, Invasive Species Coordinator for DOI.

Residential and institutional facilities - collaboration and coordination in school IPM and IPM for interiorscapes, with expansion to living and working environments that greatly enhance public health protection. Working with Mike Linker at NCSU, CIPM already maintains websites for IPM in schools and interiorscapes. The University of Florida and the IPM Institute of North America maintain excellent School IPM sites as well. We will facilitate expansion of work in this area as recommended by the Advisory Council.

As permitted by CSREES guidelines, all grants programs managed by the SRIPMC will be required to document progress using the metrics listed in the *National Roadmap for Integrated Pest Management*. We will develop an online reporting system similar to the CSREES Performance Planning and Reporting System and require all Principal Investigators to submit reports that contain these metrics. These reports will be submitted annually to CSREES, but will also be publicly available online. The reporting system software will be made available to other IPMC's that request it, or set up on a National basis if requested by CSREES.

We will document in a SRIPMC Report, at least annually, the establishment of committees and panels, full contact information for these committee members, all RFA's and meeting minutes, and results of all awards processes. These reports will also include detailed information on Crop Profiles developed and revised, Pest Management Strategic Plans and Crop Timelines developed, cooperative programs established, publication lists, and complete web statistics for all online information maintained by the SRIPMC. All reports will also be available online, with a prominent link for public comments.

The process of identifying measurable (and useful) goals and successes is a difficult task that has generally eluded IPM programs in the past. In addition to the above, we will seek to work with the other Centers to develop a consistent and reliable system of metrics against which our progress can be measured.

During the first year, we will:

1. establish key committees and transition from Univ. Florida (6 months);
2. develop the mechanism for priority setting and establish initial priorities (6 months);
3. develop RFAs for SRIPMC and SRIPM (8 months);
4. establish new relations with key partners (e.g., 1890 partners, non-profits - 9 months);
5. establish and fund key subcommittees and facilitate first meetings;

Without the previous 3 years to establish our committees and priorities (as the other Regions have been able to do), we cannot address specific milestones for years 2 through 4 without first having the stakeholder involvement required by the RFA. To do so defeats the purpose of the Center and the impact of stakeholder involvement. Their input is critical to the entire process.

7. References

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8. Appendices to Project Description

As evidence of the ability of CIPM to maintain the Southern Region IPM Center, we are including three sets of appendices that document our experience and expertise in developing stakeholder collaborations, managing local and multi-state projects, and integrating electronic information systems.

Appendix A. CIPM Members and Supporters

BASF 1993-1999
Consortium for International Crop Protection 1996-2002
Corn Growers of North Carolina 1996 - 2003
Dow AgroSciences 1994-2003
DuPont 1993-1999
Insecticide Resistance Action Committee 2001-2003
Monsanto 1993-2003
Mycogen 1996-2000
National Alliance of Independent Crop Consultants 1999-2003
NC Cotton Promotion Association 1997-2003
NC Peanut Growers Association 2001-2003
NC Small Grain Growers Association 1995-2003
NC Soybean Producers Association 1996-2003
NC Strawberry Association 1999-2003
NC Sweet Potato Commission 1999-2003
NC Tobacco Research Association 1996-2003
NC Vegetable Growers Association
Syngenta 1993-2003
United Soybean Board 1994-2003
Toxicology Communications 2001-2003
Turfgrass Council of NC 1998-2003
Valent 2001-2003

Supporters

National Science Foundation
Environmental Protection Agency
Department of Energy
Cotton Incorporated
USDA/CSREES
USDA/APHIS
USDA/OPMP
USDA/Forest Service

Appendix B. Projects Funded and/or Managed by CIPM

Since 1992, total project funding through CIPM has been \$6,208,264.

Genomics, Biotechnology and Diagnostics			
Project Title	Dates	PIs	Organization
A search for novel <i>Bacillus thuringiensis</i> strains that overcome resistance	10/01/96-12/31/99	Gould, Fred	NCSU
An evaluation of the farm-level impacts of transgenic crops in the US	10/01/00-12/30/01	Marra, Michele	NCSU
An integrated approach to monitoring plant virus and insecticide resistance in sweetpotato whitefly	07/01/94-12/31/99	Brown, Judith K ffrench-Constant, R.	University of Arizona University of Wisconsin
Corn earworm, <i>Helicoverpa zea</i> , resistance development to Bt endotoxin and deployment scenarios for Bt transgenic corn and cotton in a host diverse environment	06/01/98-06/01/99	Van Duyn, John W Gould, Fred Kennedy, George G Storer, Nick	NCSU
Development and survival of corn earworm, <i>Helicoverpa zea</i> , on corn hybrids containing advanced CryIAb and IRM gene events	06/01/99-12/31/01	Van Duyn, John W	NCSU
Development of novel bioassays and biochemical assays for monitoring Bt resistance in the tobacco budworm and diamondback moth	07/01/94-06/30/96	Roe, R Michael Kennedy, George G Gould, Fred	NCSU
Economic and environmental impacts of first generation biotechnologies	10/01/00-12/31/02	Kalaitzandonakes, N G	University of Missouri - Columbia
Evaluation of the impacts of GMOs	08/01/00-12/31/02	Stinner, Ronald E	NCSU
Evaluation of varieties/breeding lines new chemistry to manage phytophthora of peppers	01/01/00-12/31/01	Louws, Frank J	NCSU
Genetic analysis of <i>Heliothis</i> host range: a step toward invisible crop plants	03/01/96-02/28/97	Gould, Fred	NCSU
Genetic mapping as a tool for developing resistance management strategies for the Colorado potato beetle	08/01/95-05/15/97	Hawthorne, David Gould, Fred Kennedy, George G	Cornell University NCSU NCSU
Impacting Hessian fly	01/01/00-12/31/01	Van Duyn, John W Heiniger, Ronnie W	NCSU
Interactions between pests and natural enemies in mixtures of normal and Bt-expressing engineered plants	07/01/94-06/30/95	Gould, Fred	NCSU
Interplanting small grain cover crop in spring planted pickling cucumbers	01/01/00-12/31/01	Schultheis, J R Jester, Wilfred R	NCSU NCSU
Modification of a spatially explicit computer simulation model for predicting resistance development in corn earworm to Bt transgenic plants	05/01/97-12/30/98	Van Duyn, John W Gould, Fred Kennedy, George G	NCSU
Monitoring gene flow among soybean looper populations using AFLP to assess migration's role in insecticide resistance development	07/01/98-06/30/01	Boethel, David J Baur, Matthew E	Louisiana State University
Novel assays for monitoring insecticide resistance in lepidopterous pests	07/01/92-06/30/94	Roe, R M., et al	NCSU

Novel field test kit for the management of tobacco budworm resistant to chemical and Bt insecticides in tobacco	09/15/96-03/31/98	Roe, R Michael Kennedy, George G Gould, Fred	NCSU
Performance of CRY-X cotton genotypes against CryI _{Ac} resistant and susceptible strains of bollworm, <i>Helicoverpa zea</i>	06/01/99-12/31/03	Van Duyn, John W Bradley, Jr, J R Gould, Fred	NCSU
Plant growth - promoting bacteria for suppression of plant parasitic nematodes on cotton	01/01/00-12/31/01	Koenning, Steven R Barker, Kenneth R	NCSU
Precision agriculture technology for vegetable production	01/01/00-12/31/00	Roberson, Gary T	NCSU
Rotation for management of root knot nematode in cotton	01/01/00-12/31/01	Koenning, Steven R Edmisten, Keith L Jordan, David L	NCSU
Study of the digestive system of crop pests; A genomics-based approach	01/01/02-12/31/02	Thompson, Deborah M	NCSU
The combined efficacy of bioengineered pesticidal plants and natural enemies	07/01/91-06/30/94	Gould, Fred	NCSU
The impact of insect pest behavior on the evolution of resistance to Bt toxin	07/01/94-06/30/95	Gould, Fred	NCSU
Toxicology, insect specificity and chemistry of a novel peptidic insecticide trypsin modulating oostatic factor (TMOF)	10/01/99-12/31/02	Stinner, Ronald E Roe, R Michael Hodgson, Ernest Linderman, Russell	NCSU
Commodity-based Research			
Project Title	Dates	PIs	Organization
A study of multiple stress factors and their interactions in row crops	07/01/91-06/30/94	Bradley, Jr, J R, et al	NCSU
Assessing refugia's role in managing European corn borer resistance to transgenic corn	03/01/96-06/30/99	Hellmich, Richard Weiss, Michael J Buhler, Douglas Lewis, Leslie C	USDA/ARS North Dakota State Univ Iowa State University
Comparing tillage, pesticide use and legume cover crops in vegetable production systems	04/01/94-03/31/97	Hoyt, G D, et al	NCSU
Comparing tillage, rotation, cover residue and pesticide use in vegetable production	01/01/00-12/31/01	Hoyt, Greg D, et al	NCSU
Comparison of disease management systems under drip and sprinkler irrigation	05/01/02-04/30/03	Lanier, James E	NCSU
Comprehensive IPM Principles for Golf Turf in the Northeast Region	08/01/00-12/31/01	VanKirk, James R	Cornell University
Cotton Pickin' Web - Alabama	01/01/97-12/31/99	Zehnder, G W Rumph, Mark A	Auburn University
Cotton Pickin' Web - Arizona	07/01/97-12/31/01	Ellsworth, Peter C	University of Arizona
Cotton Pickin' Web - Arkansas	01/01/98-12/31/01	Johnson, Donald R	University of Arkansas
Cotton Pickin' Web - Georgia	01/01/98-12/31/01	Douce, G Keith	University of Georgia
Cotton Pickin' Web - Mississippi	01/01/98-12/31/01	Williams, Michael R	Mississippi State Univ

Cotton Pickin' Web - New Mexico	07/01/97-12/31/99	Ball, Shane T	New Mexico State Univ
Cotton Pickin' Web - Oklahoma	07/01/97-12/31/00	Cuperus, Gerrit W Fitzner, Michael	Oklahoma State Univ
Cotton Pickin' Web - Search Engine	07/01/97-12/31/98	Baker, Thomas C VanDyk, John	Iowa State University
Cotton Pickin' Web - Tennessee	01/01/98-12/31/98	Newman, Melvin A	University of Tennessee
Cotton Pickin' Web - Texas	07/01/97-12/31/99	Jackman, John A Lemon, Robert A	Texas A&M University
Crop-pest interaction in conventional ultra-narrow row cotton management systems	07/01/98-06/30/01	Wells, Randy Edmisten, Keith L Bacheler, Jack S	NCSU
Developing anthracnose-free plants for fruit production	04/01/00-03/31/01	Pesic-VanEsbroeck, Z. Louws, Frank J Bish, Eric B	NCSU
Development of cyst nematode resistant soybean cultivars	04/01/97-03/31/99	Burton, Joseph W Koenning, Steven R	NCSU
Development of insect management strategies as part of an integrated cotton production system in North Carolina	07/01/96-06/30/97	Orr, David B Van Duyn, John W	NCSU
Double-cropping, conservation tillage, rotation, and row-width effects on population dynamics and management of arthropods, nematodes and weeds in cotton and soybean in the southeastern coastal plain	07/01/97-09/30/01	Manley, Donald G Durant, John A McCutcheon, G S	Clemson University
Estimated proportion of the general population of <i>Helicoverpa zea</i> moths that complete larval development during the F3 generation	05/01/02-04/30/03	Jackson, Ryan E	NCSU
Evaluating the impact of feral vegetation field border strips on pest management in NC cotton and soybean fields	07/01/99-12/30/02	Sorenson, Clyde E	NCSU
Feasibility of augmentative releases of <i>Trichogramma exiguum</i> for suppression of Heliothine pests in cotton	01/01/96-06/30/96	Orr, David B Van Duyn, John W	NCSU
Integrating tobacco budworm-resistant tobacco into tobacco pest management systems	01/01/98-12/31/99	Sorenson, Clyde E	NCSU
Management of perennial weeds in a corn-wheat-soybean rotation grown under conservation tillage practices	07/01/98-06/30/00	Witt, William W Green, J D Martin, J R	University of Kentucky
Management of sclerotinia blight and use of fluzinam	07/01/01-06/30/02	Bailey, Jack E Isleib, Thomas G	NCSU
Management of silvery thread moss (<i>Byrum argenteum</i>) in bentgrass greens	07/01/98-06/30/00	Yelverton, Fred H Ruffy, Tom	NCSU
Management strategies for <i>Helicoverpa zea</i> in transgenic Bt cotton	06/01/99-05/30/00	Turnipseed, Sam G	Clemson University
Mini-grant program to more fully involve NCSU graduate students in Center for IPM activities	01/01/02-12/31/02	Roe, R Michael Stinner, Ronald E	NCSU
Mite management in North Carolina	04/01/99-03/30/00	Sorensen, Kenneth A	NCSU
Monitoring of corn rootworm in soybean	01/01/02-12/31/02	Bossaer, Gregory J	Purdue University

Optimization of insecticide application timing for management of Oriental fruit moth and codling moth in apples	05/01/02-04/30/03	Borchert, Daniel M	NCSU
Optimization of management strategies for lepidopterous pests in transgenic Bt cotton	07/01/97-06/30/98	Turnipseed, Sam G	Clemson University
Pheromone mediated mating disruption of a leafroller complex in apples	09/01/94-08/31/96	Walgenbach, J F Hull, Larry A Pfeiffer, Douglas G	NCSU Penn State Univ VPI
Potential for management of sclerotinia blight with the biological control agent Coniothyrium minitans	05/01/02-04/30/03	Partridge, Darcy E	NCSU
Precision timing for fungicide use in wheat	07/01/98-06/30/99	Bailey, Jack E Bowman, Daryl T	NCSU
Quantification of Helicoverpa zea Production on Crop Hosts in North Carolina	07/01/02-06/30/03	Bradley, Jr, J R Van Duyn, John W Jackson, Ryan E	NCSU
Screening wheat varieties for scab resistance	07/01/99-06/30/00	Bailey, Jack E Bowman, Daryl T	NCSU
Soybean seed mixtures: A novel integrated weed management strategy	03/01/02-02/28/03	Norsworthy, Jason K	Clemson University
Strawberry crop phenology and integrated management of botrytis gray mold	04/01/94-03/30/97	Louws, Frank J Fernandez, Gina E	NCSU
Sweetpotato insect management: Tactics and delivery	05/01/02-04/30/02	Sorensen, K A	NCSU
Weed control by decreasing N excretion from N2-fixing soybean	01/01/00-12/31/01	Rufty, Tom Burton, Joseph W York, Alan C	NCSU
Weed management in matted-row strawberries	04/01/00-03/31/01	Bish, Eric B Monks, David W	NCSU
Western corn rootworm in North Carolina: studies leading to improved understanding and management	02/01/98-12/31/01	Sorenson, Clyde E Van Duyn, John W Bradley, Jr, J R	NCSU
White-tailed deer in agricultural ecosystems: habitat use, movements and behavior of juvenile and adult females as related to crop damage on Chesapeake Farms	01/01/97-12/31/99	Lancia, Richard A	NCSU
Information Technology and Dissemination			
Project Title	Dates	PIs	Organization
A National Pest Management Information System	01/17/01-09/14/02	Stinner, Ronald E	NCSU
A scholarship program for students attending the "Conference on Emerging Technologies in IPM: Concepts, Research, Implementation"	01/01/98-12/31/00	Sutton, Turner B Kennedy, George G	NCSU
Accelerating transitions: A web-centered approach to rapid IPM research results publication and grower education	01/01/02-12/31/02	Jones, Jennifer S, et al	University of Arizona
An information management system for early detection (BONAP)	07/01/99-06/30/00	Kartesz, John T	UNC-CH
Analyze User Requirements and Access Options for Implementation of InvasiveSpecies.gov	09/06/02-09/05/03	Stinner, Ronald E	NCSU

APS Pest Pathogens Fact Sheets	07/01/99-06/30/01	Madden, Laurence V	American Phytopath Soc
Combined pest management training and demonstrations for extension agents and agribusiness professionals	07/01/92-09/01/98	Linker, H Michael, et al	NCSU
Cotton Pickin Web	09/01/96-12/31/02	Stinner, Ronald E	NCSU
Cotton Pickin' Web - GEMINI search	07/01/97-12/31/97	Chu, Ping-Chu	Fayetteville State Univ
Development and implementation of NIPMN server network for integrated pest management	10/01/97-09/30/99	Stinner, Ronald E	NCSU
ESA Fact Sheets	10/01/98-09/30/00	Meckley, Kathryn O	Entomol Soc America
Establishment of an outdoor facility for the demonstration and dissemination of integrated pest management strategies	07/01/97-06/30/98	Binning, Lawrence K	Univ of Wisc - Madison
Expert IPM Decision Support System	04/01/99-06/30/01	Janssen, Terry	Expert Decision Support Systems, Inc
Giving growers access: organizing cotton information on the internet	07/01/97-09/30/99	Stinner, Ronald E	NCSU
Implement a computer-aided pest management information and decision support system	04/01/99-06/30/01	Stinner, Ronald E	NCSU
Implementation of the National IPM Network	09/01/98-08/31/01	Stinner, Ronald E	NCSU
Implementation of the NIPMN: interactive web-based utilities	06/01/99-08/31/01	Stone, Nick	Virginia Polytechnic Inst
Improving the National IPM Network, Northeast Region contribution	09/01/98-08/31/01	VanKirk, James R	Cornell University
In-depth IPM materials and training for school pest managers in Florida	03/01/02-03/31/03	Koehler, Philip G Oi, Faith M	University of Florida
In-field delivery of pest information to/from web-enabled phones and wireless PDA's	07/01/01-06/30/02	Stinner, Ronald E	NCSU
Internet-based database for USDA-APHIS-PPQ's New Pest Advisory Group	01/01/99-06/30/99	Smith, Garry D	Mississippi State Univ
IPM Images: The Source for Integrated Pest Management Images for the Southeastern U.S.	01/15/02-12/31/02	Douce, G Keith Moorhead, David J	University of Georgia University of Georgia
IPMnet	08/01/95-06/30/00	Stinner, Ronald E	NCSU
Maintain and develop a website devoted to the new pest management technologies	08/19/02-07/18/03	Stinner, Ronald E	NCSU
NAICC website development	10/01/99-09/30/02	Stinner, Ronald E	NCSU
National IPM Network - North Central Server	03/15/95-09/01/97	Geiger, Carl R	Purdue University
National IPM Network - Northeast Server	03/15/95-09/01/95	Tette, Jr, James P	Cornell University
National IPM Network - Southern Server	06/01/95-05/30/96	Ravlin, F William	Virginia Polytechnic Institute
National IPM Network - Western Server	04/15/95-12/30/95	Holtzer, Thomas O MacRae, Ian V	Colorado State University

Online IPM expertise database	07/01/00-06/30/02	Stinner, Ronald E	NCSU
Open-source categorical search engine for the National Integrated Pest Management Network	09/01/98-08/31/01	Pedigo, Larry P VanDyk, John	Iowa State University
OrganicAgInfo.org	09/01/00-08/30/03	Stinner, Ronald E	NCSU
Pest Management Information System for the Regional Pest Management Centers	07/01/01-06/30/03	Stinner, Ronald E	NCSU
Private incentives for IPM in the upper Midwest: where are they, and how much are they worth?	07/01/98-12/31/99	Vorley, William T	Inst for Agriculture and Trade Policy
Support for a conference on emerging technologies in IPM: concepts, research, implementation	01/01/98-12/31/98	Sutton, Turner B Kennedy, George G	NCSU
The integration of the National IPM Network search engine to the Western Region IPM site.	05/01/99-08/31/01	Holtzer, Thomas O	Colorado State University
The National IPM Network	09/01/94-12/31/96	Stinner, Ronald E	NCSU
World Wide Web IPM Textbook	07/01/97-12/31/98	Radcliffe, E B Hutchinson, W D	University of Minnesota
Pesticides, Alternatives and FQPA			
Project Title	Dates	PIs	Organization
Alternatives to methyl bromide for production of plasticulture strawberries in NC	04/01/99-03/31/02	Fernandez, Gina E Louws, Frank J	NCSU
Alternatives to methyl bromide for production of plasticulture strawberries in NC. Phase II: research station, on farm and nursery trials	04/01/00-03/31/01	Fernandez, Gina E Louws, Frank J	NCSU
Designing and developing trap crops for diamondback moth	07/01/02-06/30/03	Nault, Brian A Shelton, A M Nyrop, Jan P	Cornell University
Develop and maintain a global website for the Insecticide Resistance Action Committee	07/01/01-06/30/02	Stinner, Ronald E	NCSU
Developing a method to reduce the use/risk of aldicarb and other pesticides by precision application of at-planting pesticides	07/01/98-06/30/00	All, John N Guillebeau, L Paul Roberts, Phillip M	University of Georgia
Development and maintenance of the IR-4 website and online database connectivity	10/01/99-09/30/02	Stinner, Ronald E	NCSU
Development of integrated management strategies to control Phytophthora in pepper	04/01/99-03/30/00	Louws, Frank J	NCSU
Evaluate methyl bromide alternatives for cantaloupe, pepper and tomato	04/01/99-12/31/01	Sanders, Douglas C	NCSU
Exploring resistance management strategies for the cotton bollworm	07/01/99-06/30/01	Rose, Randy	NCSU
Impact of pesticides on yield of peaches	09/01/95-04/30/97	Ritchie, David F	NCSU
Impact of vegetable rotation systems on yield and the environment	04/01/99-03/30/00	Sanders, Douglas C	NCSU
Interaction of carbamates and pyrethroids on insecticide resistance and its impact on integrated pest management	07/01/94-06/30/96	Roe, R Michael Rose, Randy Hodgson, Ernest	NCSU

Management of insect resistance to pesticides in cotton using old and new chemistries	01/01/00-06/30/01	Roe, R Michael	NCSU
New insecticidal chemistry in tobacco: Implications for tobacco budworm management in a tobacco-cotton agroecosystem	01/01/02-12/31/02	Sorenson, Clyde E	NCSU
On-line resistance management training	06/01/01-06/30/02	Stinner, Ronald E	NCSU
Partners In IPM: A shared mission to ensure a safe and sustainable food and fiber system	01/01/96-12/30/96	Stinner, Ronald E Linker, H Michael	NCSU
Runoff potential and chemical transport in relation to tillage system	09/01/92-02/28/94	Wagger, M G, et al	NCSU
Site-specific applications of fluometuron in cotton	01/01/02-12/31/02	Khalilian, Ahmad	Clemson University
Support for Evaluating National Integrated Pest Management Programs	09/15/01-09/14/03	Stinner, Ronald E	NCSU
Use of Bacillus-based phyllosphere colonists to improve performance of systemic fungicides and preserve use by fungicide resistance management	07/01/98-06/30/00	Jacobsen, Barry J Kiewnick, Sebastian	Montana State University
Use of necrotic winter wheat for weed control in potatoes	08/01/97-12/31/99	Eberlein, C V Souza, Edward J	University of Idaho
Pest Risk Assessment and Modeling			
Project Title	Dates	PIs	Organization
Advancing the weed control decision model HERB: the basis for resource competition between soybean and sicklepod	04/01/96-03/31/97	Rufty, Tom Coble, Harold D Wilkerson, Gail G	NCSU
An integrated weed management study to evaluate Palmer amaranth competition in cotton	06/01/97-05/31/98	Baumann, Paul A Chandler, M A	Texas A&M University Texas A&M University
APHIS online databases	01/01/99-06/30/01	Stinner, Ronald E	NCSU
Creating an invasive plant management online textbook	01/01/02-12/31/02	Kelly, Susan B Dewey, Steven A Radosevich, S R	Montana State Univ Utah State University Oregon State Univ
Decision support system for weed management	07/01/96-06/30/97	Wilkerson, Gail G Coble, Harold D	NCSU
Development and maintenance of a CPHST Website and online database connectivity	06/01/01-12/31/01	Stinner, Ronald E	NCSU
Development and maintenance of the Safeguarding.org website and online database connectivity	01/01/00-12/31/01	Stinner, Ronald E	NCSU
Development of a system for field weed mapping using geographic information systems and global positioning	01/01/96-12/31/96	Coble, Harold D Wilkerson, Gail G	NCSU
Early detection of potato late blight using hyperspectral remote sensing	07/01/99-06/30/00	Christ, Barbara J	The Pennsylvania State University
Exotic Forest Pest System for North America	09/01/01-08/31/02	Stinner, Ronald E	NCSU

HERB-peanut: an interactive computer decision aid for post-emergence weed management in peanuts	01/01/95-06/30/97	Coble, Harold D Bridges, David C Brecke, Barry J	NCSU University of Georgia University of Florida
Information Management Support for Invasive Species	09/18/00-09/30/03	Stinner, Ronald E	NCSU
Integrated decision-aid for multi-crop pest management	07/01/92-06/30/95	Wilkerson, Gail G, et al	NCSU
Internet discovery and surveillance: identifying and interacting with online sources of seeds, plants, mollusks and other organisms	06/15/02-06/14/03	Stinner, Ronald E	NCSU
Internet Discovery and Surveillance: Identifying and Interacting with Online Sources Part II: Prohibited Animal products and Byproducts	09/01/02-08/31/03	Stinner, Ronald E	NCSU
Mechanistic modeling of yield loss in wheat infected with powdery mildew and leaf rust and determination of yield returns of flusilazole sprays, triadimenol seed treatments, and resistant cultivars	07/01/92-06/30/94	Leath, Steven W	NCSU
New remote sensing technology for more economical weed control	05/01/97-06/30/00	Lass, Larry W Thill, Donald C	University of Idaho
Remote monitoring of weather for disease and insect predictions	01/01/95-12/31/95	Bailey, Jack E Brandenburg, R L	NCSU
Remote sensing and IPM scouting and diagnosis in cash grains in the mid-Atlantic region	05/01/96-06/30/99	Conner, Mark C Whalen, Joanne M	Chesapeake Farms, MD University of Delaware
Riparian buffer zones to reduce arthropod and weed pests of agricultural crops	01/01/02-12/31/02	Walsh, Douglas B Williams II, M M	Washington State Univ
Weather forecasts and a rapid model development technique to deploy weather-based pest advisories	01/01/96-12/31/97	Bailey, Jack E Brandenburg, R L	NCSU
Center Administration			
Project Title	Dates	PIs	Organization
NSF support for CIPM ('93-'96)	07/01/93-06/30/96	Stinner, Ronald E	NCSU
NSF support for CIPM ('97-'01)	07/15/96-12/31/01	Stinner, Ronald E	NCSU
Secretarial support	01/01/00-12/30/03	Stinner, Ronald E	NCSU

Appendix C. Internet Sites/Applications Developed and/or Maintained by CIPM

Because IPM is information intensive, CIPM has a major focus on the electronic dissemination of science-based pest management information. Below is a list of web sites maintained by the Center's staff of Internet Application Specialists.

Website [Organization]	Description	Databases
International		
Agricultural Internet Monitoring – <i>Secure Site</i> [USDA/APHIS/PPQ]	Internet application being developed to identify and track US and foreign websites selling illegal plant and animal products in the US.	5+
Bayer Codes for Pests – <i>cipm.ncsu.edu/names/index.cfm</i> [CIPM]	Extracted from EPPO-updated version 2.1 of the Bayer Code System.	1
Exotic Forest Pest Information System for North America - <i>www.ExoticForestPests.org/</i> [North American Forest Commission]	Searchable exotic forest pest database, including biology, symptoms, pathways and other risk information.	1
Global Pest and Disease Database – <i>Secure Site</i> [USDA/APHIS/PPQ]	A searchable database of pests not known to occur in the US, but of regulatory and biosecurity concern. Contains public and sensitive information. Under development	4+
Herbicide Resistance Action Committee – <i>www.PlantProtection.org/hrac/</i> [Herbicide Resistance Action Committee]	The Herbicide Resistance Action Committee (HRA Advisory Council) is an international body founded by the agrochemical industry as part of the GCPF organization.	0
Insecticide Resistance Action Committee – <i>www.PlantProtection.org/IRAC/</i> [Insecticide Resistance Action Committee]	The mission of IRAC is to develop resistance management strategies to enable growers to use crop protection products in a way to maintain their efficacy	1
International Association for the Plant Protection Sciences – <i>www.PlantProtection.org/</i> [International Association for the Plant Protection Sciences]	The IPPC is the only international congress that embraces the totality of plant protection.	0
North American Non-Indigenous Arthropod Database - <i>www.invasivespecies.org/NANIADSearch.cfm</i> [USDA/APHIS]	Database of 2,273 species of non-indigenous insects and arachnids developed by K. C. Kim and A.G. Wheeler, Jr. in 1991	1
Phytosanitary Alert System - <i>www.PestAlert.org/</i> [North American Plant Protection Organization]	The Phytosanitary Alert System adapts to the basic needs of the plant protection services of the member countries, serving as a readily accessible, user friendly aid to the daily operations of both field and headquarters staff.	1
Vascular Plants of North America Database - <i>www.InvasiveSpecies.org/BONAP/</i> [Biota of North America Project]	Interactive distributional database of vascular plants in the US. Now part of the USDA Plants database.	1
WWW Virtual Library for Agriculture - <i>cipm.ncsu.edu/agvl/</i> [WWW VL]	Part of the WWW Virtual Library network, with links to agricultural sites around the world.	1
National		
APHIS - Federal Noxious Weeds -	Database derived from the "Federal	1

www.invasivespecies.org/fedweeds.html [USDA/APHIS]	Noxious Weed Inspection Guide - Noxious Weed Inspection System" (prepared in 1991 by Dr. Randy G. Westbrooks, USDA-APHIS-PPQ)	
APHIS Regulated Pest List - www.invasivespecies.org/NewInitiatives.html [USDA/APHIS]	Database of an official USDA-APHIS list of Regulated Plant Pests of concern to the US, providing focus to APHIS' safeguarding activities, part of the GPDD	1
Biological Control Virtual Information Center - ipmwww.ncsu.edu/biocontrol/biocontrol.html [CIPM]	Links to key biocontrol information throughout the US	0
Center for Plant Health Science and Technology - www.cphst.org [USDA/APHIS/PPQ/CPHST]	Information for and about the APHIS Center for Plant Health Science and Technology	1
Cotton Pickin Web - www.cottoninc.com/cottonpickin [Cotton Incorporated and USDA/CSREES]	Organized pest management and crop production information for cotton in the US, from the land-grant university system. Also includes identified links to commercial information.	1
Crop Profiles - cipm.ncsu.edu/CropProfiles/cropprofiles.cfm [USDA/CSREES]	Profiles provide the complete production story for a commodity and a look at current research activities directed at finding replacement strategies for the pesticides of concern. Crop Profiles include typical use information (not simply what pesticide labels state) and have a common format for ease of use.	1
CSREES Planning, Performing and Reporting System - www.PPRS.info [USDA/CSREES]	The Web-based Performance Planning and Reporting System (PPRS) provides access to information about the Cooperative Extension Service Integrated Pest Management efforts at land-grant universities by providing descriptions of the program plans and accomplishments online.	2
ESCOPE PMSS Biological Control Working Group - ipmwww.ncsu.edu/biocontrol/bcwg/bcwg.html [US Land Grant University System]	The Biological Control Working Group (BCWG) fosters the development and implementation of biological control of pests and pathogens as the central component of an ecologically based approach for integrated pest management (IPM).	0
Funded Research Projects - cipm.ncsu.edu/fqparesearch/Search.CFM [USDA/CSREES]	Searchable database of research related to FQPA and funded by USDA/CSREES.	1
GrowFood.org - www.growfood.org [Willing Workers On Organic Farms]	This site is a cultural exchange. They gather a list of sustainable projects and organizations that, from time to time invite volunteers to help. People interested in a sustainable lifestyle use our list to make contact with hosts	1
Identified Plant Pests Regulated by APHIS - www.invasivespecies.org/ippra.html	Interactive database of plant pests regulated by the US Department of Agriculture,	1

[USDA/APHIS]	Animal and Plant Health Inspection Service.	
Information Management System for Invasive Species - www.InvasiveSpecies.org/ [USDA/APHIS/PPQ]	Provides access to invasive species information of concern to USDA/APHIS.	3
Insecticide Resistance Management Training - www.plantprotection.org/irmtraining/ [CIPM]	Information on insecticide resistance management in biotech cotton and corn. Includes explanations of EPA requirements.	0
Interregional Research Project #4 - The Minor Crops Program - pestdata.ncsu.edu/IR-4/ [USDA/CSREES]	IR-4 provides pest management solutions to growers of fruits, vegetables and other minor crops. People who benefit from IR-4 are minor crops growers, food processors and consumers.	2
NASS Pesticide Use Data - www.pestmanagement.info/nass [USDA/NASS]	Searchable database of pesticide use information by state, crop and pesticide active ingredient.	1
National Alliance of Independent Crop Consultants - www.naicc.org/ [National Alliance of Independent Crop Consultants]	NAICC is the national society of agricultural professionals who provide research and advisory services to clients for a fee.	1
National IPM Network - National Site - www.reeusda.gov/nipmn/ [USDA/CSREES]	Organized links to, and a search engine for, pest management and crop production information provided by the Cooperative Extension Services of the US land-grant university system.	1
NCFAP Pesticide Use Database - pestdata.ncsu.edu/ncfap/search.cfm [National Center for Food and Agricultural Policy]	Searchable pesticide use data for US published by Leonard Gianessi of NCFAP	1
New Pest Management Technologies - www.pestmanagement.info/npmt/ [CIPM/USDA/EPA]	NPMT is a collection of three separate but similar pesticide databases that provides information on new and upcoming products and product uses being considered by EPA.	3
Organic AgInfo - www.OrganicAgInfo.org/ [Land-grant University Consortium]	This website is being developed by an Organic Agriculture Consortium funded by the United States Department of Agriculture as a complete source of science-based information on organic agriculture.	1
Organic Volunteers - www.organicvolunteers.com [Willing Workers On Organic Farms]	Same site as www.growfood.org	1
Pest Damage-Yield Web Database - ipmwww.ncsu.edu/napiap/search.html [EPA]	This database was established to help with benefits assessments by providing information from the published literature on yields as related to pest density or damage indices.	1
Pest Management Databases - www.pestmanagement.info [CIPM]	This site is the future site of a number of pest management related databases. Under development	0
Pest Management Strategic Plans - cipm.ncsu.edu/pmsp/ [USDA/CSREES]	Pest Management Strategic Plans are documents developed by stakeholder groups to plan for further needs, strategies, and technologies for commodity production	1

	under FQPA.	
Pesticide Pipeline Database of Federal Tolerances and Registrations - pestdata.ncsu.edu/Pipeline/ [USDA/OPMP]	The Pesticide Pipeline database summarizes new uses in the area of agricultural pest management that have been recently registered or are being considered for registration by the United States Environmental Protection Agency (EPA).	1
Regional Pest Management Centers Information Network - www.pmcenters.org/ [USDA/CSREES]	The Pest Management Centers help USDA and its partner institutions identify, prioritize and coordinate a national pest management research, extension, and education program implemented on a regional basis.	3
USDA/APHIS Safeguarding Review - www.SafeGuarding.org/ [National Plant Board]	A Stakeholder Review of the APHIS-PPQ Safeguarding System.	2
Virtual Center for Integrated Pest Management - cipm.ncsu.edu [CIPM]	Information from and about the NSF Center for Integrated Pest Management	2
Regional		
SERA-IEG 3 Integrated Pest Management - ipmwww.ncsu.edu/Southern_Region/SERAIEG/ [USDA]	Southern Extension/Research Activities/Information Exchange Group for Integrated Pest Management	0
SERA-IEG-23 Cotton Insects - ipmwww.ncsu.edu/Southern_Region/SAAESD/cotton.html [USDA]	Southern Extension/Research Activities/Information Exchange Group for Cotton Insects	0
Southern Region Project S-1006 - cipmtest.ent.ncsu.edu/S1006 [USDA/CSREES]	Integrated Management of Arthropod Pests of Livestock and Poultry	0
Southern Soybean Disease Workers - ipmwww.ncsu.edu/SSDW/ [USDA]	The SSDW is an organization of pathologists, nematologists, extension scientists, industry personnel, and private consultants involved with soybean production and research in the southern US	0
State		
National IPM Network - North Carolina Component - ipm.ncsu.edu/ [CIPM]	Crop production and pest management information for the North Carolina public.	0
North Carolina Agricultural Consultants Association - www.naiccaffiliates.org/NCAAdvisory_CouncilA/ [North Carolina Agricultural Consultants Association]	A state organization that promotes and upgrades the agricultural consulting profession in North Carolina.	0
North Carolina Entomological Society - ipmwww.ncsu.edu/ncentsoc/ [North Carolina Entomological Society]	North Carolina Entomological Society was established to promote entomological accomplishment and to cultivate a closer relationship among its members.	0
North Carolina Pest Management Information Program - ipm.ncsu.edu/ncpmip/ [NCSU]	Provides links to major pest management information sources of interest in North Carolina.	0
North Carolina Strawberry Association - www.ncstrawberry.org [North Carolina Strawberry Association]	Provides information about strawberry production and use in North Carolina	1

Appendix D. Letters of Support/Commitment

Cotton Incorporated

Crop Data Management Systems

IR-4

Kerr Center for Sustainable Agriculture

Monsanto

National AG Consulting Services, Inc.

National Alliance of Independent Crop Consultants

National Plant Board

North Carolina Strawberry Association

North Carolina A&T University

Organic Volunteers, Inc

ORKIN

Regional IPM (Ames Herbert)

Regional SARE (Geoff Zehnder)

RTI International

USDA/APHIS

USDA/OPMP

United Soybean Board

9. Key Personnel

PI and Director: Ron Stinner (40%, note that rest of PI's time is in administration and information technology efforts closely tied to the IPM Centers)

Duties: overall coordination of activities, grants management, administrative supervision of information systems

Experience/Expertise: 36 years in IPM, 11 years as CIPM Director (grants management, interstate and multidisciplinary program coordination, strong interaction with government, industry, grower and other non-profit organizations), 9 years in internet technologies

Associate Director - Regulatory Issues: Steve Toth (40%, rest in state IPMC effort)

Duties: coordinate federal/state interactions, fulfill standard crop and pesticide information requests, assist Director, coordinate with other IPM-related programs (e.g., IR-4, PSEP)

Experience/Expertise: 20 years with pesticide regulation, use and safety information collection/distribution (Pesticide Impact Assessment), 8 years with pest management information collection/distribution, and 3 years with Pest Management Center in North Carolina

Associate Director - IPM Facilitator: (50%, 50% Regional IPM) TBA

Duties: promote IPM in region; coordinate IPMC activities with other related programs (e.g., RIPM, SARE, Water Quality)

Experience/Expertise: 10+ years in IPM, experience with regional/national IPM program, basic knowledge of information systems

10. Collaborative Arrangements

There are no consultative arrangements with other organizations. Organizations and individuals are represented on the advisory groups in this proposal and subcontracts are described in the project description section.