Indiana Cooperative Agricultural Pest Survey

2009 Semi Annual Report

1 January – 30 June

Department of Entomology at Purdue University

Indiana Department of Natural Resources (IDNR)

United State Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ)

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Indiana CAPS Accomplishment Report

State: **Indiana** Year: **2009**
Is this a quarterly, semi annual or final report? **Semi Annual Report**
List dates covered by this report: **1 January 2009 – 30 June 2009**
Cooperator: **Philip T. Marshall, Indiana Department of Natural Resources**

Cooperators Project Coordinator:

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This final report follows the form of, and provides information required by, 7 CFR 3016.40 and 7 CFR 3019.51.

A. Compare actual accomplishments to objectives established for the period as indicated in the work plan. When the output of the project can be quantified, a computation of cost per unit of output is required when useful.
B. If appropriate, explain why objectives were not met.
C. Where appropriate, explain any cost overruns.

The following information will be included for surveys:

1. Survey Methodology (trapping protocol)
2. Rationale underlying survey methodology
3. Survey dates
4. Taxonomic services
5. Benefits and results of survey
6. NAPIS database submissions: Program pest and date of submission per state as they appear on the NAPIS web site

Accomplishments

Indiana CAPS Work Plan Objectives-2009;

Objective 1. Maintain a State Cooperative Agricultural Pest Survey Committee that will meet at least once a year to discuss fostering goals of CAPS.

1A. State CAPS Primary Committee:

Indiana State Survey Coordinator (SSC): Larry W. Bledsoe
Purdue University, Department of Entomology
901 West State Street
West Lafayette, Indiana 47907

Cooperative Agreement Representative
State Plant Regulatory Official (SPRO): Philip Marshall
Indiana Department of Natural Resources
Division of Entomology and Plant Pathology
402 West Washington, Room W-290
Indianapolis, Indiana 46204

State Plant Health Director (SPHD): Gary Simon
USDA APHIS PPQ
1305 Cumberland Ave, Suite 102
West Lafayette, Indiana 47906

Department of Entomology
(Department Head) Dr. Steve Yaninek
901 West State Street
West Lafayette, Indiana 47907

1B. Full committee

Name	Organization	Discipline
Bruce Bordelon	Purdue University	Horticulture
Steve Cain	Purdue University, EDEN	Disaster Education & Outreach
Thomas Creswell	Purdue University, PPDL	Plant Pathology
Jodie Ellis	Purdue University	Entomology/Outreach Education
Dr. Peter Hirst	Purdue University	Horticulture
Dr. Jeffery Holland	Purude University	Entomology, Forest Landscape Ecology
Dr. Carole Lembi	Purdue University	Invasive Aquatic Plants
Dr. Ray Martyn	Purdue University	Center for Crop Biosecurity
Glenn Nice	Purdue University	Weed Science
Dr. Chris Oseto	Purdue University	Entomology/ Identification
Gail Ruhl	Purdue University, PPDL	Plant Disease Diagnostics
Tom Creswell	Purdue University, PPDL	Plant Disease Diagnostics
Dr. Cliff Sadof	Purdue University	Ornamental Pests/ Identification
Susan Schechter	Purdue University, CERIS	National Ag Pest Information Svc
Dr. Robert Waltz	Purdue University	Indiana State Chemist
Cloyce Hedge	IN Dept. Natural Resources	Plant Ecology/ Identification
Doug Keller	ID Dept. Natural Resources	Invasive Aquatic Plants
James Manor, PSS	USDA APHIS PPQ	Regulatory Science
Ellen Jacquart	The Nature Conservancy	Plant Ecology/ Identification

1C. Committee Meetings:

i. 25 February. Grapevine Yellows Survey planning meeting
ii. 23 March. Grapevine Yellows Survey planning meeting
iii. 23 March. CAPS administrative (core) group review and planning meeting
iv. 14 May CAPS 2009 review/2010 planning meeting

Objective 2. Cooperate with agencies carrying out field surveys, trapping, and data collection, setting emphasis on pest/diseases particularly identified that may pose an immediate risk to the agriculture of this state and the United States. Responsible for coding and uploading Indiana information to NAPIS database only.

2A. Emerald Ash Borer, *Agrilus planipennis*.

Date Range: 01-01-2009 thru 06-30-2009

Target Pest	Counties	Sites*Plants	Traps	Positive	Negatives	
Emerald Ash Borer	9	39		39	0	
VISUAL						
Agrilus planipennis						
EMERALD ASH BORER SURVEY						
Emerald Ash Borer	1		1	1	0	
TRAP						
Agrilus planipennis						
TRAP;EAB PROTOTYPE; PURPLE						

2B. Gypsy Moth, *Lymantria dispar*. Aproximately 2,410 traps deployed by state and federal personnel.

Date Range: 01-01-2009 thru 06-30-2009
No data received during period

2C. Karnal Bunt, *Tilletia (Neovossia) indica*
Date Range: 01-01-2009 thru 06-30-2009
No data received during period

2D. Bacterial Leaf Scorch, *Xylella fastidiosa*
Date Range: 01-01-2009 thru 06-30-2009
Survey to be conducted July 1 through September 30 by IDNR nursery inspectors.

Objective 3. Have representation at National and/or Regional annual meetings.

3A. 2-5 March. Central Plant Board Annual Meeting (Des Moines, IA)

Objective 4. Utilize Cooperator and APHIS program funding, as outlined in the Financial Plan within the authorized parameters to support survey and detection activities. In addition, specific appropriated funding in the level authorized by the PPQ Eastern Region will be dedicated to the delivery of CAPS objectives.

4A. Old world bollworm survey, *Heliocoverpa armigera*

1. Survey Methodology (trapping protocol): Survey sites with optimum hosts (vegetable and grain production) were located in La Port, Tippecanoe, Randolph, and Knox counties. Five Heliothis traps (Scentry corp.) baited with *Helicoverpa armigera* pheromone were placed at least 200 ft apart at each site and geo-referenced. Moths were collected weekly, placed in containers labeled by location-date-trap number and transported to the laboratory. *H. armigera* lures were replaced every two weeks.

2. Rationale underlying survey methodology: Survey methods were adapted from the CAPS Pest Risk Assessment publication by Vennette, et al. 2003. Mini Risk Assessment, Old World Bollworm *Helicoverpa armigera*, Hubner [Lepidoptera : Noctuidae].

3. Survey dates;
   Trap locations and initiation dates were;
   1. Knox Co. Southwest Purdue, Vincennes, IN, set 19 June.
   2. Randolph Co. Davis-Purdue Agricultural Center Farmland IN set 26 June,
   3. La Port Co. Pinney Agricultural Center, Wanatah, IN, set 26 June.
   3. Tippecanoe Co. Meigs-Purdue Horticultural Center, Lafayette, IN, set 27 June.

   Trap period will extend to mid September.

4. Taxonomic services: *H. armigera* and *H. zea* are indistinguishable by external characteristics and *H. amigera* lure will attract *H. zea.* During the course of a trapping season, this results in hundreds (sometimes thousands) of moths to screen. Development of diagnostic tools for discriminating H. armigera/zea began in January. Fifty diagnostic microscope slides of H. zea genitalia were prepared. About 20 slides were distributed at the March Central Plant Board annual meeting to SSCs and others. A collaborator in Africa was found (Dr. Moussa Noussourou Entomologist, Institut d'Economie Rurale, Bamako, Mali) to provide *H. armigera* abdomens for additional microscope slides. As of 30 June the abdomens had not arrived. These will be distributed to interested SSC when they are available. (PPQ has also recently released additional diagnostic aids.) Also, in the spring of 2009, we began microscopic screening several thousand *Heliocoverpa* specimens caught in OWB pheromone traps in Indiana from 2006 to 2007. As of 30 June, the backlog has not been cleared.

5. Benefits and results of survey: The Indiana CAPS program collaborates in a national pest survey program that results in information about the presence or absence of OWB in United States. Knowledge of the existence of this pest is crucial to Indiana agriculture as the state grows nearly 12 million acres of corn and soybeans (two hosts

of *H. armigera*). These two principal field crops in Indiana have an average farm gate value slightly over $3 billion dollars. The production of alfalfa in Indiana averages approximately $140 million dollars annually. The annual value of tomatoes and other vegetables in Indiana exceeds $35 million dollars.

6. NAPIS database submissions: Date Range: 01-01-2009 thru 06-30-2009

As of 30 June, 100 trap-days yielded 5 *Heliocoverpa* moths, however, these moths were not prescreened by microscopic observation of genitalia until July 10.

Target Pest	Counties	Sites* Plants	Traps	Pos	Neg
Helicoverpa armigera, Old World Bollworm	4		20		

4b. Risk-Based Survey-National Exotic Woodborers/Bark Beetles (RBS-EBB) in cooperation with PPQ statewide trapping network.

1. Survey Methodology (trapping protocol): This was a national APHIS-PPQ/CAPS collaborative survey. PPQ was responsible for surveying 50 Indiana sites. Sites were identified as locations where solid wood packing materials (dunnage) were received, or by recognition of apparent risk. Three Lindgren funnel traps containing dilute propylene antifreeze glycol were placed at each site. Traps contained one of the following lures: Ultra High Release (UHR) ethanol, UHR ethanol+alpha-pinene, and Tri-lure. A pine shoot beetle survey that overlaid the RBS-EBB survey (80 locations/single Lindgren traps, UHR ethanol) was incorporated into this objective. CAPS received, prescreened, pinned/pointed indentified and archived specimens. A forest regeneration project, the Hardwood Ecosystem Experiment (24 locations single traps) is also providing additional data. Near identical protocols are used.

RBS-EBB target insects included:

Scientific Name:	Common Name:
Anoplophora chinensis (Forster)	Citrus longhorned beetle
Anoplophora glabripennis (Motschulsky)	Asian longhorned beetle
Callidiellum rufipenne (Motschulsky)	Small Japanese cedar longhorned beetle
Chlorophorous annularis Fabricius	Bamboo/tiger bamboo longhorned beetle
Hesperophanes (Trichoferus) campestris (Faldermann)	Chinese longhorned beetle
Hylurgops (Hylurgus) palliatus Gyllenhal (conifer)	Exotic bark beetle
Hylurgus ligniperda (Fabricius)	Golden-haired bark beetle
Ips sexdentatus (Boerner)	Six-spined engraver beetle
Ips typographus (Linnaeus)	European spruce bark beetle
Monochamus alternatus Hope	Japanese pine sawyer beetle
Pityogenes chalcographus (Linnaeus)	Six-toothed spruce engraver
Sirex noctilio (Fabricius)	European wood wasp (Sirex)
Tetropium fuscum (Fabricius)	Brown spruce longhorned beetle
Tomicus minor (Hartig)	Lesser pine shoot beetle
Tomicus piniperda (Linnaeus)	Common pine shoot beetle
Trypodendron domesticum (Linnaeus)	European hardwood ambrosia beetle
Xyleborus spp.	Exotic bark beetles
Xylotrechus spp.	Exotic longhorned beetles
Agrilus planipennis Fairmaire	EBB/Emerald ash borer

2. Rationale underlying survey methodology: The Indiana survey methodology used in 2009 was adapted for Indiana by Shayne Galford (PPQ/Indiana) from the National Exotic Woodborer/Bark Beetle Survey Plan, 2003/2004.

3. Survey dates: Traps for the three sources of data were deployed approximately mid-April in southern Indiana and mid May to mid July in central Indiana and mid/late June in northern Indiana. Traps are serviced about every two weeks until early-October (approximately 6 to 12 sampling dates). Visual surveys for invasive wood boring beetles and metallic wood boring beetles also occurred approximately bi-weekly.

4. Taxonomic services: Preliminary identification of potential target organisms was coordinated by the Larry Bledsoe (SSC), Mr. Arwin Provonsha (curator of the Purdue University Entomological collection), and Dr. Jeffery Holland (forest landscape entomologist). Suspect targets were confirmed by Dr. Robert Brown, USDA APHIS-PPQ Area identifier.

5. Benefits and results of survey: In Indiana, over 4.3 million acres of high quality hardwood forests support an industry which employs 47,000 Hoosiers. These hardwood forests are at risk of exotic invasive bark beetles and other wood boring insects. Businesses and warehouses in Indiana that receive exotic, solid wood packing material (SWPM) represent potential focal points of pest introduction into the United States. The intent of this survey is early detection of threats to the forest products industry.

6. NAPIS database submissions: Date Range: 01-01-2009 thru 06-30-2009.

RBS-EBB samples have been slow to arrive this year. This may be due to cooler/wetter than normal conditions in April through July, and due to PPQ trapper staffing difficulties. As of 15 July 09, traps are still being established by PPQ in central Indiana. As of 30 June 09, the Indiana CAPS program has received, processed, identified (in collaboration with Arwin Provonsha and Bobby Brown), and archived only 294 samples. The only NAPIS justified record is *Tomicus piniperda* captured 06/15/09, but not received, identified and logged until 9 July 09. There were 63 records of EBB species (5 genera) of interest to Indiana CAPS captured during the period, but are not included in the RBS objective target list below.

Target Pest	Counties	Sites* Plants	Traps	Pos	Neg
Anoplophora chinensis (Forster)					
Anoplophora glabripennis (Motschulsky)					
Callidiellum rufipenne (Motschulsky)					
Chlorophorous annularis Fabricius					
Hesperophanes (Trichoferus) campestris (Faldermann)					
Hylurgops (Hylurgus) palliatus Gyllenhal (conifer)					
Hylurgus ligniperda (Fabricius)					
Ips sexdentatus (Boerner)					
Ips typographus (Linnaeus)					
Monochamus alternatus Hope					
Pityogenes chalcographus (Linnaeus)					
Sirex noctilio (Fabricius)					
Tetropium fuscum (Fabricius)					
Tomicus minor (Hartig)					
Tomicus piniperda (Linnaeus)					
Trypodendron domesticum (Linnaeus)					

Xyleborus spp.
Xylotrechus spp.
Agrilus planipennis Fairmaire

4C. P. Ramorum National Nursery Survey, Sudden oak death survey, *Phytophthora ramorum*.

1. Survey Methodology: In 2009 Indiana Department of Natural Resources (IDNR) personnel selected symptomatic parts of *Camellia, Rhododendron, Viburnum, Pieris,* and *Kalmia* (generally) from Indiana nurseries and other landscape plant retail outlets for the presence of diseases and insects. Samples were kept cool and shipped overnight to The Purdue University Pest & Plant Diagnostic Laboratory (P&PDL). As of 30 June 2009 P&PDL received 220 samples and tested using an enzyme-linked immunosorbent assay (ELISA) specific to *P. ramorum*. ELISA positive samples were forwarded to Michigan State University for conclusive testing using polymerase chain reaction (PCR). No positive samples have been reported. Approximately 300 samples are expected in the next month.

2. Rationale underlying survey methodology: Methods were consistent with the *Phytophthora ramorum* Nursery Survey Manual (Revised April 30, 2007) USDA-PPQ.

3. Survey dates: 19 May to 24 June 2009. (Data first received on 15 July.)

4. Taxonomic services: Prescreening was performed by the Purdue University Pest & Plant Diagnostic Laboratory. Confirmations of suspect positive samples were performed by Michigan State University.

5. Benefits and results of survey : In Indiana, over 4.3 million acres of high quality hardwood forests support an industry which employs 47,000 Hoosiers. According to the Indiana University Center for Urban Policy and the Environment, the horticulture industry employed over 25,700 employees and paid $5.66 for every $1,000 in total Indiana wages paid in 2004. Further, the total economic contribution in 2004 attributable to the horticultural industry in Indiana was nearly $2.05 billion. If *P. ramorum* is detected in Indiana, rapid response would limit the spread of the pathogen and to prevent its introduction into nursery and forest products industries.

6. NAPIS database submissions:

Date Range: 01-01-2009 thru 06-30-2009.

Target Pest	Counties	Sites* Plants	Traps	Pos	Neg
Sudden Oak Death; *Phytophthora ramorum*					

As of the date of first data received (15 July 09), no positive *P. ramorum* samples were found in Indiana.

4D. Grape Commodity Survey, *Candidatus* Phytoplasma australiense Grapevine Yellows

1. Survey Methodology: On 10-11 June 2009, Dr. Bruce Bordelon, Purdue Department of Horticulture and Landscape Architecture, and the SSC visited and established seven vineyards as sample sites. The sites are in Knox (2), Posey, Clark, Harrison, Dearborn, and Tippecanoe Counties. Susceptible grape varieties were identified and sample zones established. Monthly genetic evaluations (n=4) of leaf and insect samples and monthly leafhopper visual/microscopic evaluations will occur. Leaf (5 leaves per variety) and leafhopper (100 sweeps of 15 inch diameter net) sweep net samples were taken on 10-11 June and transferred to Purdue Plant Disease Diagnostic Laboratory for genetic detection of the pathogen. As of 15 July, no results have been received from a commercial testing lab. Leafhopper samples for taxonomic identification were taken on 30 June-1 July. A leafhopper principle vector of GY (found in New York and Virginia) is *Scaphoideus titanus*. Other potential vectors include the leafhoppers *Agallia constricta*, *Exitianus exitiosus*, *Macrosteles quadrilineatus* and *Endria inimical*. As of 30 June, tentative results suggested that none of these leafhoppers had been detected in the sweep samples. (A second set of leaf and insect samples for genetic sampling was made on 9 July).

2. Rationale underlying survey methodology: Survey and processing techniques were based on the Grape Commodity-Based Survey Guidelines, 11 August 2008, for Phytoplasmas and on 2 meetings with 2 plant pathologists and a viticulturalist.

3. Survey dates: Approximately biweekly following survey initiation on10-11 June 09 until late September.

4. Taxonomic services: Purdue Plant Disease Diagnostic Laboratory and Agdia Inc, 30380 County Road 6, Elkhart, IN. Leafhopper identification assistance is available as needed in the Purdue University, Dept. of Entomology.

5. Benefits and results of survey: There are 32 Indiana vineyards/wineries growing grapes on about 400 acres. About one million visitors to Indiana wineries add about $33 million dollars to the state economy annually. The Indy International Wine Competition coordinated by the Indiana Wine Grape Council at Purdue University is one of the largest wine competitions in the United States. Entries in 2009 came from 42 states and 11 countries. The aim of this survey is first detection of an important disease and vectors that could threaten the Indiana wine industry.

6. NAPIS database submissions: Date Range: 01-01-2009 thru 06-30-2009. Genetic evaluations of leaf and leafhopper tissues and insect taxonomic verifications have not been received as of 15 July.

Target Pest	Counties	Sites* Plants	Traps	Pos	Neg
Candidatus Phytoplasma australiense in leaf tissue	7	14			
Candidatus Phytoplasma australiense in leaf hopper tissue	7	14			
Scaphoideus titanus	7	14			
Agallia constricta	7	14			
Exitianus exitiosus	7	14			
Macrosteles quadrilineatus	7	14			
Endria inimical.	7	14			

Other CAPS activities

The SSC is cooperating in a pathway analysis of the western corn rootworm (WCR), *Diabrotica virgifera*, between the US and Europe with Dr. Peter Baufeld; Julius Kühn-Institut (JKI), Bundesforschungsinstitut für Kulturpflanzen, (Julius Kuehn Institute, Federal Research Centre for Cultivated Plants), Institut für nationale und internationale Angelegenheiten der Pflanzengesundheit, (Institute for National and International Plant Health), Stahnsdorfer Damm 81, 14532 Kleinmachnow, Germany. The study entails monitoring ventilated luggage that contains WCR pheromone and floral scents for beetles that may have entered luggage vent holes during aircraft baggage handling and stowage. The responsibility of the SSC is to check the interior of the luggage after passing through customs and shipped to Purdue for stow-away WCR. The luggage is then returned to originator. There is no cost to the Indiana CAPS program.

Executive Summary; The Indiana CAPS program committee was active February through May with 4 meetings (committee and subcommittee) addressing summer survey activities and 2009 work plan development. Old world bollworm survey is being conducted in four areas of intensive vegetable and field crop production. Diagnostic tools are being developed to aid discrimination of *Helicovera* genitalia. A Risk-Based Survey for Exotic bark beetles and other wood boring insects is being conducted in collaboration with USDA-PPQ personnel at about 50 locations. Two additional sources of EBB data using matching protocols have been pooled with the 50 PPQ locations. A sudden oak death (SOD) survey is underway in cooperation with Indiana Department of Natural Resources nursery inspectors. There have been no confirmed cases of SOD in 220 tissue samples to date. A grape commodity survey was set up at the beginning of June at 7 locations. Grape leaves and leafhopper samples are being genetically tested for *Candidatus* Phytoplasma australiense Grapevine Yellows (GY) monthly through September. Potential leafhoppers vectors are being sampled monthly for taxonomic identification. Additional activity includes cooperating with a pathway analysis for the western corn rootworm in airline routes between the US and Germany. As of 30 June, there were no CAPS overruns or budget issues.

Signatures

Approved and signed by

_____ Date: _____

Cooperator

_____ Date: _____

ADODR