

Indiana Cooperative Agricultural Pest Survey

2009 Annual Report

1 January – 31 December



Department of Entomology Purdue University

Indiana Department of Natural Resources

United State Department of Agriculture
Animal and Plant Health Inspection Service, Plant Protection and Quarantine

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Purdue University

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Indiana CAPS Accomplishment Report

State: **Indiana** Year: **2009**

Is this a quarterly, semi annual or final report? **Final Report**

List dates covered by this report: **1 January 2009 – 31 December 2009**

Cooperator: **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 -2009;

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.

A1. Infrastructure Work Plan

Objectives: The overall infrastructure objectives were the development, coordination, execution, and archiving results of surveys intended to detect and/or monitor exotic pest threats to commodities that are of National and Indiana concern. Infrastructure objectives represented program administration and were interrelated. Each accomplishment listed in the bullet list below fulfills one or more of these goals. The execution and the archiving of data for each survey will appear in survey-specific work plans.

Accomplishments

- The Cooperative Agricultural Pest Survey (CAPS) Indiana State Survey Coordinator (SSC), Larry Bledsoe, maintained an office in the Department of Entomology at Purdue University, West Lafayette, Indiana 47907-2089.
- The SSC managed a total program budget of \$109, 963. These funds were allocated under a federal budget continuing resolution that resulted in original program work plan budgets being amended twice by the coordinator. Contracting and accounting interactions between US Department of Agriculture (USDA), Indiana Department of Natural Resources (IDNR) and Purdue University (PU) related to the federal continuing resolution funding made managing CAPS budgets a challenge. A conservative budgeting approach was used throughout 2009 because reliable balances for all work plan budgets were not available at any time of the year.
- The SSC directly and indirectly managed 4 temporary interns who worked both full time and/or part time relative to specific duties and time of year.
- The SSC maintained laboratory infrastructure, 2 trucks, and a wide assortment of survey traps and equipment.
- The SSC cooperated with agencies and third parties by coding and uploading invasive pest information to NAPIS database for the following non work plan pests:
 - emerald Ash Borer, *Agilus planipennis*
 - gypsy Moth, *Lymantria dispar*
 - light brown apple moth, *Epiphyas postvittana* (2008 data)
 - giant Hogweed, *Heracleum mantegazzianum*
 - black swallow wort, *Cynanchum louiseae*
- SCC represented Indiana CAPS program at Central Plant Board, Des Moines IA, 3-4 March 2009.

- The SSC conducted outreach by presentations to 12 Indiana Master Gardener meetings.
- CAPS sub committee on the Grapevine Yellows survey and CAPS primary committee met on 23 March 2009. Full committee met on 14 May and 21 July 2009.

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

Full Committee	Organization	Discipline
Dr. 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. 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

A2. Old World Bollworm, *Helicoverpa armigera*, Survey Work Plan

Objective: This was a detection survey for the Old World bollworm, a pest that is not known to be established in the US.

1. Survey Methodology (trapping protocol): Survey sites with optimum hosts (vegetable and grain production) were located in La Port (one of five traps was in Porter), 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 in coolers containing ice to the laboratory, and frozen. *H. armigera* lures in traps were replaced every two weeks.
2. Rationale underlying survey methodology: Survey methods were adapted from Vennette, et al. 2003. Mini Risk Assessment, Old World Bollworm *Helicoverpa armigera*, Hubner [Lepidoptera : Noctuidae]. (CAPS Pest Risk Assessment publication).
3. Survey dates: Trapping began 26-27 May and ended 1-2 October 2009.
4. Taxonomic services: *H. armigera* and *H. zea* are indistinguishable by external characteristics and *H. armigera* lure will attract *H. zea*. The SSC prescreened six accidentally caught *H. zea* moths by internal genitalia using approved protocols. No suspect *H. armigera* moths were found.
5. Benefits and results of survey: The Indiana CAPS program collaborated 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. No *H. armigera* were detected.
6. NAPIS database submissions: Date Range: 01-01-2009 thru 12-31-2009

Target Pest	Counties	Sites		Traps	Pos	Neg
		Plants				
<i>Helicoverpa armigera</i> , Old World Bollworm	5			340	0	340

A3. Sudden Oak Death, *Phytophthora ramorum*, Survey Work Plan

Objectives: Species known to be susceptible to Sudden Oak Death (SOD) disease can be grown outdoors in Indiana, including witch hazel, Douglas fir, Japanese pieris, rhododendrons, viburnums and lilacs. In addition, many other plants can serve as hosts on which this fungus-like organism can form spores and then spread to other

susceptible plants. The objective of this survey was to randomly assess commercial sources of known hosts of SOD and to identify host origin(s) of any positive samples.

1. Survey Methodology: In 2009 Indiana Department of Natural Resources (IDNR) personnel selected symptomatic parts of Camellia, Rhododendron, Viburnum, Pieris, and Kalmia (generally) from 21 out of about 600 Indiana nurseries and other landscape plant retail outlets inspected annually for the presence of diseases and insects. Samples were kept cool and shipped overnight to The Purdue University Pest & Plant Diagnostic Laboratory (P&PDL). P&PDL tested 400 samples using an enzyme-linked immunosorbent assay (ELISA) specific to *P. ramorum*. Suspect positive samples were forwarded to Michigan State University, Center for Integrated Plant Systems for conclusive testing using polymerase chain reaction (PCR).
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 10 August 2009
4. Taxonomic services: Prescreening was performed by the Purdue University Pest & Plant Diagnostic Laboratory. Confirmation of suspect positive samples was performed by Michigan State University, Center for Integrated Plant Systems.
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. No positive *P. ramorum* samples were found in Indiana in 2009.
6. NAPIS database submissions: Date Range: 01-01-2009 thru 12-31-2009

Target Pest	Counties	Sites*		Traps	Pos	Neg
		Plants				
Sudden Oak Death; <i>Phytophthora ramorum</i>	17	400			0	400

A4. Grapevine Yellows, *Candidatus Phytoplasma australiense*, Survey Work Plan

Objectives: Australian Grapevine Yellows (GY) is an important disease of many crops in Asia and Europe and is a high priority CAPS target for the US. The objective of this first Indiana survey was to obtain experience in GY survey methodology and to obtain base line data for the presence of the GY disease organism and potential vectors in southern counties where the risk to the grape industry is considered highest

1. Survey Methodology: Six vineyards in southern counties and one vineyard in a northern county were identified. At each site, three high-risk cultivar rows were marked and sampled monthly from June to September. At each location, one composite sample of 5 leaves and 100 sweeps with a 38cm diameter net through the vegetation at the base of a row were obtained for each of three cultivars for genetic testing. An additional composite leafhopper sample of 100 sweeps with a 38cm diameter net through the vegetation at the base each of three cultivars was obtained for insect species determination. Samples were sent to Agdia Inc. for PCR determination for the presence of Phytoplasma spp. Phytoplasma positive samples were sent to Dr. Robert Davis USDA-ARS Molecular Plant Pathology Laboratory, Beltsville, MD 20705, for species determination. Samples were screened for the leafhoppers, Scaphoideus titanus, Agallia constricta, Exitianus exitiosus, Macrosteles quadrilineatus and Endria inimica. Leafhoppers and planthoppers were identified by the SSC in consultation with a USDA area identifier and the curator of the Purdue Entomological Research Collection in the Department of Entomology, Purdue University.
2. Rationale underlying survey methodology: General protocols followed guidelines found in the Grape Commodity-based Survey Reference (CAPS December 2007). Exceptions to the published reference were 1) visual symptoms of GY-infected plants/leaves were impossible to distinguish from many endemic grape diseases, therefore, random leaf samples were genetically tested for the presence of the disease. 2) The regional complex of potential leafhopper/planthopper vectors is unknown. Therefore a leafhopper composite of 100 sweeps was genetically tested to determine if the disease resides in transplanted stock only and/or resides in potential vectors. No attempt was made to isolate individual leafhopper species for disease determination in 2009. The potential leafhopper, Scaphoideus titanus has been reported from New York and Virginia. Other potential vectors include the leafhoppers Agallia constricta, Exitianus exitiosus, Macrosteles quadrilineatus and Endria inimica. The distribution and abundance of these species will assist in understanding risks of GY.
3. Survey dates: Multiple days were required to sample all sites each month. Sampling dates for genetic evaluations of grape leaf and leafhopper/planthopper samples were; 10 and 11 June, 9 and 16 July, 13, 14, and 17 August, and 9 and 10 September. Dates for leafhopper/planthopper taxonomic determinations; 29 and 30 June, 1 and 24 July, 27 and 28 August, and 30 September and 1 October.
4. Taxonomic services: Samples were sent to Agdia Inc. for PCR determination for the presence of Phytoplasma spp. Phytoplasma positive samples were sent to Dr. Robert Davis USDA-ARS Molecular Plant Pathology Laboratory, Beltsville, MD, for species determination.
5. Benefits and results of survey: This initial survey served to (1) develop and refine Indiana GY survey methodologies allowing for more efficient and effective future survey efforts; (2) demonstrate the occurrence of endemic non symptomatic Phytoplasmas (P. pruni-peach X disease and P. astori-astor yellows) in Indiana grape stock and in native leafhopper; (3) known vectors of GY were not detected (4)

initial base data on the regional leafhopper/planthopper guild has been obtained. (5) taxonomic services were clarified and refined. (6) GY and its primary vector in the US, *Scaphoideus titanus*, were not detected in this survey. However, four endemic species known or considered capable of transmitting plant disease were detected.

6. NAPIS database submissions Date Range: 01-01-2009 thru 12-31-2009

<u>Target Pest</u>	<u>Counties</u>	<u>Sites</u>		<u>Pos</u>	<u>Neg</u>
		<u>Plants</u>	<u>Traps</u>		
Australian Grapevine Yellows; <i>Candidatus Phytoplasma australiense</i>					
Grape leaves	6	86		0	86
Leafhoppers/planthoppers composite	6	77		0	77
Aster Leafhopper, <i>Macrostelus quadrilineatus</i>	6	81		14	67
Painted Leafhopper, <i>Endria inimica</i>	6	81		8	73
Gray Lawn Leafhopper, <i>Exitianus exitiosus</i>	6	81		10	71
Leafhopper, <i>Agallia constricta</i>	6	81		48	33
Leafhopper, <i>Scaphoideus titanus</i>	6	81		0	81

A5. Exotic Bark Beetle and Wood-Boring Insects Survey (RBS-EBB) Survey Work Plan

Objective: This was a APHIS-PPQ/CAPS collaborative survey of high-risk sites for exotic bark beetles and other wood-boring insects, most of which are not know to occur in the US.

1. Survey Methodology. PPQ was responsible for surveying 50 Indiana sites with multiple lures and the CAPS SSC was responsible for insect preparation, identification, archiving, and reporting to NAPIS. Trap sites were identified through Emergency Action Notifications or by recognition of apparent risk from importation of high-risk materials. Three Lindgren funnel traps containing dilute propylene 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. All trap samples sent to CAPS SSC were screened and pinned/pointed. Potential target organisms were identified and archived. All records were entered into the NAPIS database by 1 December 09.

Target Insects:

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

2. Rationale underlying survey methodology: The Indiana survey methodology used in 2009 was adapted for Indiana by Indiana PPQ from the National Exotic Woodborer/Bark Beetle National Survey Field Manual, 3/10/2006.
3. Survey dates: Traps were deployed approximately late March in southern Indiana and early June in central and northern Indiana and serviced every two weeks until September in southern Indiana and (approximately 12 sampling dates). Visual surveys for invasive wood boring beetles and metallic wood boring beetles also occurred bi-weekly.
4. Taxonomic services: Preliminary identification of potential target organisms was coordinated by the CAPS SSC and Mr. Arwin Provonsha, curator of the Purdue University Entomological collection, and suspect target organisms 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. Pine shoot beetle and European hardwood ambrosia beetle and two species of Xyleborus beetles were detected.

6. NAPIS database submissions: Date Range: 01-01-2009 thru 12-31-2009
 Negative data allowed only where approved lure was used.

Target Pest		Counties	Sites/ Plants	Traps	Pos	Neg
Citrus Longhorned Beetle	Anoplophora chinensis	23	232		0	232
Asian Longhorned Beetle	Anoplophora glabripennis	23	232		0	232
Chinese Longhorned Beetle	Hesperophanes campestris	23	232		0	232
Japanese Cedar Longhorn Beetle	Callidiellum rufipenne	23	232		0	232
Bamboo Borer	Chlorophorus annularis	23	232		0	232
Lesser Spruce Shoot Beetle	Hylurgops palliatus	23	50		0	50
Redhaired Pine Bark Beetle	Hylurgus ligniperda	23	50		0	50
Sixtoothed Bark Beetle	Ips sexdentatus	23	51		0	51
European Spruce Bark Beetle	Ips typographus	23	49		0	49
Japanese Pine Sawyer Beetle	Monochamus alternatus	23	50		0	50
Sixtoothed Spruce Bark Beetle	Pityogenes chalcographus	23	5		0	5
Sirex Woodwasp	Sirex noctilio	23	50		0	50
Lesser Pine Shoot Beetle	Tomicus minor	23	232		0	232
Pine Shoot Beetle (PSB)	Tomicus piniperda	23	51		1	50
Eur. Hardwood Ambrosia Beetle	Trypodendron domesticum	23	50		0	50
Scolytid Beetle	Xyleborus atratus	9	16		16	0
Ambrosia Beetle	Xyleborus pelliculosus	5	9		9	0

B. If appropriate, explain why objectives were not met. All objectives were met.

C. Where appropriate, explain any cost overruns. There were no cost overruns and 93 percent of the budget was expended.

Executive Summary; Indiana CAPS sub and full committees were active with three meetings and multiple phone and direct communications addressing survey activities and 2010 work plan development. The SSC was directly involved with four national surveys (Old World Bollworm, Sudden Oak Death, Grapevine Yellows, and Exotic Bark Beetles and Wood Boring insects) and indirectly (data processing) with two other national/state surveys (Emerald Ash Borer and Gypsy Moth). The SSC was a representative of the Indiana CAPS program at the Central plant board. The SSC conducted outreach by presentations to 12 Indiana Master Gardener meetings. Three species of now-endemic wood boring beetles were detected. No exotic, invasive target pests were found, however, Astor Yellows disease and Peach-X disease were identified in previously unknown hosts/locations in Indiana. All survey data were uploaded to the National Agricultural Pest Information System (NAPIS).

Signature Page

Approved by

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