

Indiana Cooperative Agricultural Pest Survey

2010 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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09 July 2010

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Indiana CAPS Accomplishment Report

State: **Indiana**

Year: **2010**

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

List dates covered by this report: **1 January 2010 – 30 June 2010**

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-2010;

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
Tom Creswell	Purdue University, PPDL	Plant Disease Diagnostics
Jodie Ellis	Purdue University	Entomology/Outreach Education
Dr. Peter Hirst	Purdue University	Horticulture
Dr. Jeffery Holland	Purdue University	Entomology, Forest Landscape Ecology
Dr. Carole Lembi	Purdue University	Invasive Aquatic Plants
Dr. Ray Martyn	Purdue University	Center for Crop Bio-security
Glenn Nice	Purdue University	Weed Science
Dr. Chris Oseto	Purdue University	Entomology/ Identification
Gail Ruhl	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. approx 21 April. Oak Commodity planning meeting (Jeff Holland)
- ii. 09 March. CAPS administrative (core) group review and planning meeting
- iii. 02 June. CAPS 2010 review/2011 planning meeting (committee)
- iv. 14 June. Grape Commodity Survey planning meeting (Tom Creswell)

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: 01-01-2010 thru 06-30-2010

Target Pest	Counties	Sites	Traps	Pos	Neg
Emerald Ash Borer	10	37		39	0
VISUAL					
<i>Agrilus planipennis</i>					
EMERALD ASH BORER SURVEY					

2B. Gypsy Moth, *Lymantria dispar*.

Date Range: 01-01-2010 thru 06-30-2010
No data received during period

2C. Pine Shoot Beetle Survey *Tomicus spp.*

Date Range: 01-01-2010 thru 06-30-2010

76 traps in 10 counties and 8 dates yielded 215 samples (vials). Specimens have been pinned/pointed and are being taxonomically evaluated. No results as of 30 June.

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

- 3A. 8-11 March. Central Plant Board Annual Meeting (Minneapolis, MN)

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. Soybean Commodity survey

- 1. Survey Methodology (trapping protocol): Four high-risk trap sites (Tippecanoe, Knox, Randolph, and La Porte Counties) that have high concentrations of grain crops (soybean and field corn), vegetable (primarily tomato, sweet bell pepper, and sweet corn), and alfalfa hay were chosen for this survey. Trap numbers and types placed at each site

include: five Scentry® Heliiothis traps with *Helicoverpa armigera* lure and Egyptian cotton leafworm lure *Spodoptera littoralis* (per Soybean Commodity Guildelines, 25 July 2007); five red paper delta traps with summer fruit tortrix, *Adoxophyes orana* lure; five universal bucket traps (green/yellow/white) with silver Y-moth *Autographa gamma* lure, five universal bucket traps (green/yellow/white) with golden twin-spot moth, *Chrysodeixis chalcites* lure, Traps were set on 24-27 May and have been serviced weekly. Several species of tortricid moths have responded to the specific pheromones resulting in large numbers of moths to screen. Morphology and/or dissection screening is underway. No target species have been identified.

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] and the CAPS Soybean Commodity Guildelines (25 July 2007).

3. Survey dates; Trap locations and initiation dates were;

1. Tippecanoe Co. Meigs-Purdue Horticultural Center, Lafayette, IN, set 24 June.
2. La Porte Co. Pinney-Agricultural Center, Wanatah, IN, set 25 May.
1. Knox Co. Southwest-Purdue, Vincennes, IN, set 26 May.
2. Randolph Co. Davis-Purdue Agricultural Center Farmland IN set 27 May,

Trap period will extend to mid September.

4. Taxonomic services: The SSC is screening all moths in consultation with USDA area identifiers. Moth morphology and genitalia are being used to discriminate targets from hundreds of endemic moths (primarily Noctuidea and Tortricidae) that are being attracted to the specific pheromones.

5. Benefits and results of survey: This is a national soybean commodity survey that results in information about the presence or absence of exotic pest in the United States. Knowledge of the existence of these pests is crucial to a state that grows nearly 12 million acres of corn and soybeans. 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: 01-01-2010 thru 06-30-2010
As of 30 June, no target moths were detected by gross morphology, microscopic observation of genitalia, or wing venation. No data have been uploaded.

Target Pest	Counties	Sites	Traps	Pos	Neg
<i>Helicoverpa armigera</i> , old world bollworm	4	20			
<i>Spodoptera littoralis</i> , Egyptian cotton leafworm	4	20			
<i>Adoxophyes orana</i> , summer fruit tortrix	4	20			
<i>Autographa gamma</i> , silver Y-moth	4	20			
<i>Chrysodeixis chalcites</i> , golden twin-spot moth	4	20			

4b. Exotic Woodborers/Bark Beetles (in cooperation with PPQ statewide trapping network).

1. Survey Methodology (trapping protocol): This was an APHIS-PPQ/CAPS collaborative survey. PPQ set up 135 traps at 45 sites in 21 counties. Sites were identified as locations where solid wood packing materials were received, or by recognition of apparent risk. One to four (varies by site) 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, IPS Tri-lure, or Chalcogran.
2. Rationale underlying survey methodology: The survey methodology used in 2010 was adapted for Indiana from the National Exotic Woodborer/Bark Beetle Survey Plan, 2003/2004.
3. Survey dates: Traps (n=135) for the three sources of data were deployed approximately mid-April in southern Indiana, mid May in central Indiana, and mid/late May in northern Indiana. Traps are serviced about every two weeks until early-October. As of 30 June, the earliest received sample was 22 April and the latest was 21 June.
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 will be 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: 01-01-2010 thru 06-30-2010.

CAPS staff have pinned/pointed specimens from 298 vials from 5 sample dates as of 30 June. Specimens are being taxonomically evaluated and no results are available as of 30 June.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites* Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>
<i>Hylurgops (Hylurgus) palliatus</i>					
<i>Hylurgops ligniperda</i>					
<i>Ips sexdentatus</i>					
<i>Ips typographus</i>					
<i>Monochamus alternatus</i>					
<i>Tomicus destruens</i>					
<i>Tomicus piniperda</i>					

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

1. Survey Methodology: In 2010 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 to test for the presence of *P. ramorum*. Samples were shipped overnight to the Purdue University Pest & Plant Diagnostic Laboratory (P&PDL). As of 30 June 2010, P&PDL received and tested 261 samples using an enzyme-linked immunosorbent assay (ELISA) specific to *P. ramorum*. Thirty nine ELISA positive samples were forwarded to Michigan State University for conclusive testing using polymerase chain reaction (PCR). No conclusive positive samples have been reported. Approximately 200 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: 2 June to 30 June 2010. Additional dates to mid August.
4. Taxonomic services: Screening was performed by the Purdue University Pest & Plant Diagnostic Laboratory. Confirmation testing 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: 01-01-2010 thru 06-30-2010.

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

As of the latest date of data received (7 July 10), no positive *P. ramorum* samples were found in Indiana.

4D. Grape Commodity Survey

1. Survey Methodology: On 9-10 June 2010 the SSC visited and established seven vineyards as sample sites to survey for *Phytoplasma australensis* and leafhopper vectors. 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 9-10 June and transferred to Purdue Plant Disease Diagnostic Laboratory for genetic detection of the pathogen. As of 09 July, two leafhopper composite samples have tested positive (PCR) and will be transferred to CAPS-approved lab for confirmation DNA sequencing. Leafhopper samples for taxonomic identification were taken on 9-10 June. Potential vectors include the leafhoppers *Scaphoideus titanus*, *Agallia constricta*, *Exitianus exitiosus*, *Macrosteles quadrilineatus* and *Endria inimical*. As of 30 June, none of these leafhoppers have been confirmed in the sweep samples.

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 meetings with plant pathologists and a viticulturalist.
3. Survey dates: Monthly following survey initiation on 9-10 June 10 to 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. Robert Davis, USDA, Molecular Plant Pathology Laboratory, USDA-Agricultural Research Service, Bldg. 004, Room 223, BARC West, 10300 Baltimore Avenue, Beltsville, MD 20705 (301) 504-6290
5. Benefits and results of survey: There are 45 Indiana vineyards/wineries growing grapes on about 500 acres. About one million visitors to Indiana wineries add about \$35 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: 01-01-2010 thru 06-30-2010. Genetic confirmations of leafhopper tissues and insect taxonomic verifications have not been received as of 9 July.

Target Pest	Counties	Sites*			
		Plants	Traps	Pos	Neg
<i>Lobesia botrana</i>	7				
<i>Adoxophyes orana</i>	7				
<i>Autographa gamma</i>	7				
<i>Spodoptera littoralis</i>	7				
<i>Spodoptera litura</i>	7				
<i>Candidatus</i> Phytoplasma australiense in leaf tissue	7				
<i>Candidatus</i> Phytoplasma australiense in leaf hopper tissue	7				
<i>Leafhopper complex</i>					
<i>Scaphoideus titanus</i>	7				
<i>Agallia constricta</i>	7				
<i>Exitianus exitiosus</i>	7				
<i>Macrosteles quadrilineatus</i>	7				
<i>Endria inimical</i> .	7				

4E. Oak Commodity Survey

1. Survey Methodology: This survey is integrated with a current hardwood pest-monitoring program under the direction of Dr. Jeffery Holland, assistant professor of spatial ecology and biodiversity, Purdue University. Methods were adapted according to the Oak Commodity Survey Guidelines, 25 April 2007. Ten hardwood sites in six counties that had been harvested within the last two years were selected. One set of traps was placed at each site. Recently harvested hardwood sites have been shown to emit large volumes of volatile compounds that are highly attractive to the families of beetles that include the exotic species, *Agrilus biguttatus*, *Playpus quercivourus*, and others. Visual and nonselective trapping methods are being used to sample these pests. These methods have been used in Indiana at hardwood harvest sites with great success in capturing woodboring and longhorned beetles for several years. Traps were placed between 17 to 28 May and have been serviced every 3 weeks. Pheromone traps for exotic lepidopteran pests, *Adoxophyes orana*, and *Spodoptera littoralis*, will be included at all sites according to methods in the current Oak Survey Guidelines.
2. Rationale underlying survey methodology Methods were adapted according to the Oak Commodity Survey Guidelines, 25 April 2007.
3. Survey dates: Traps were placed between 17 to 28 May and have been serviced every 3 weeks.
4. Taxonomic services: All samples will be screened by Dr. Jeff Holland, Purdue University and suspect specimens confirmed by a 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 workers. Indiana has 22 species of oak that constitute a major component of its hardwood forests. This survey is expected to result in the early detection of exotic oak pests in Indiana hardwoods. Early detection and outreach education are the goals of this survey. As of 30 June, no target species have been detected.
6. NAPIS database submissions: Date Range: 01-01-2010 thru 06-30-2010. As of 30 June, no target species have been detected.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites*</u>			
		<u>Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>
<i>Agrilus biguttatus</i>	6				
<i>Playpus quercivourus</i>	6				
<i>Adoxophyes orana</i>	6				
<i>Spodoptera littoralis</i>	6				

Objective 5. Farm Bill Projects

5A. *Lobesia botrana* (enhanced Grape Commodity) Survey

1. Survey Methodology: This project is an enhancement to the CAPS Grape Commodity Survey that includes *Lobesia botrana*. Monthly sampling will begin in June and continue through September. The enhanced survey includes *Ampelovirus* sp. (Grapevine leaf roll

associated virus 1&3 [GLRaV-1& 3]), and *Nepovirus* spp. (Tomato ringspot virus (ToRSV), Tobacco ringspot virus (TRSV), Grapevine fan leaf virus (GFLV) and Peach rosette mosaic virus (PRMV). The bacterial disease, *Xylella fastidiosus*, (Pierce’s Disease) and it vector, the glassy winged sharpshooter. *Homalodisca vitripennis*, will be included.

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 meetings with plant pathologists and a viticulturalist.
3. Survey dates: Monthly following survey initiation on 10 June to September.
4. Taxonomic services: Purdue Plant Disease Diagnostic Laboratory and Agdia Inc, 30380 County Road 6, Elkhart, IN
5. Benefits and results of survey: There are 45 Indiana vineyards/wineries growing grapes on about 500 acres. About one million visitors to Indiana wineries add about \$35 million dollars to the state economy annually. The International Wine Competition coordinated by the Indiana Wine Grape Council held 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: 01-01-2010 thru 06-30-2010. To date, 26 samples have been submitted and 130 ELISA tests completed. There were four unconfirmed positives for the grape leaf roll virus and one unconfirmed positive for tomato ringspot virus. The glassy winged sharp shooter was not detected. Two to three more sampling dates are anticipated.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites* Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>
<i>Ampelovirus</i> sp. (Grapevine leaf roll virus 1&3 [GLRaV-1& 3])	4				
<i>Nepovirus</i> spp. (Tomato ringspot virus (ToRSV)	4				
<i>Nepovirus</i> spp. Tobacco ringspot virus (TRSV)	4				
<i>Nepovirus</i> spp. Grapevine fan leaf virus (GFLV)	4				
<i>Nepovirus</i> spp. Peach rosette mosaic virus (PRMV)	4				
<i>Xylella fastidiosus</i> , (Pierce’s Disease)	4				
<i>Homalodisca vitripennis</i> (glassy winged sharpshooter)	4				

5B. Plum Pox Virus Survey (PPV)

As of 8 July 2010, the optimum timing for this survey had not occurred and no samples had been taken.

1. Survey Methodology: Detection surveys for PPV in orchards are based on the use of a hierarchical sampling method. This Hierarchical Sampling method (25% sampling, 4 leaves per tree) –involves sampling from 25 percent of the trees in an orchard. Trees that are sampled are grouped into quadrates (groups of four trees) that are related spatially to one another. A total of 16 leaves (4 leaves from each tree) are collected from the four trees being ELISA tested as two 8 leaf samples. Peach orchards in three Indiana counties

will be selected. Approximately 500 samples will be collected.

2. Rationale underlying survey methodology: Suggested by CAPS program guidelines.
3. Survey dates: Mid to late summer. As 8 July 2010, the optimum timing for this survey had not occurred.
4. Taxonomic services: Agdia Inc, 30380 County Road 6, Elkhart, IN
5. Benefits and results of survey: Although the amount of stone fruit acres in Indiana is not large, additions to the knowledge of Plum Pox distribution will benefit regional regulatory processes.
6. NAPIS database submissions: Date Range: 01-01-2010 thru 06-30-2010. As 8 July 2010, the optimum timing for this survey had not occurred and no samples had been taken.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites* Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>
<i>Potyvirus</i> (Plum Pox)	4				

5C. Honey Bee/Apiary Survey

1. Survey Methodology:
2. Rationale underlying survey methodology.
3. Survey dates:
4. Taxonomic services:
5. Benefits and results of survey.
6. NAPIS database submissions: Date Range: 01-01-2010 thru 06-30-2010. None

<u>Target Pests</u>	<u>Counties</u>	<u>Sites* Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>

5D. Sudden Oak Death (*Phytophthora ramorum*) Water Survey

1. Survey Methodology:
2. Rationale underlying survey methodology.
3. Survey dates:
4. Taxonomic services:

5. Benefits and results of survey.

6. NAPIS database submissions: Date Range: 01-01-2010 thru 06-30-2010. None

<u>Target Pests</u>	<u>Counties</u>	<u>Plants</u>	<u>Traps</u>	<u>Pos</u>	<u>Neg</u>
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Sites*

Signature Page

Approved by

_____ Date: _____
Philip T. Marshall (Cooperator)

_____ Date: _____
Gary W. Simon (ADODR)