

Indiana Cooperative Agricultural Pest Survey

2011 Annual Report

1 January – 31 December



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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13 March 2012

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Indiana CAPS Accomplishment Report

State: **Indiana**

Year: **2011**

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

List dates covered by this report: **1 January 2011 – 30 June 2011**

Cooperator: **Philip T. Marshall, Indiana Department of Natural Resources**

Cooperators Project Coordinator:

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This 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 submissions per state as they appear on the NAPIS web site

Accomplishments

Indiana CAPS Work Plan Objectives-2011;

Objective 1. Infrastructure-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

<u>Name</u>	<u>Organization</u>	<u>Discipline</u>
Bruce Bordelon	Purdue University	Horticulture
Tom Creswell	Purdue University, PPDL	Plant Disease Diagnostics
Dr. Peter Hirst	Purdue University	Horticulture
Dr. Jeffery Holland	Purdue University	Entomology, Forest Landscape Ecology
Dr. Ray Martyn	Purdue University	Center for Crop Bio-security
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. 09 March. CAPS administrative (core) group review and planning meeting
- ii. 02 June. CAPS 2010 review/2011 planning meeting (committee)

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. SSC is responsible for coding and uploading Indiana information to NAPIS database.

2A. Emerald Ash Borer, *Agrilus planipennis*. (IND DNR)

Date Range: 01-01-2011 thru 12-31-2011

Counties	Sites	Traps	Pos	Neg	
27			50	55	0

2B. Gypsy Moth, *Lymantria dispar*. (IND DNR and PPQ)

Date Range: 01-01-2011 thru 12-31-2011

Counties	Sites	Trap/	Pos	Neg
86		13,242	1,062	12,180

2C. Pine Shoot Beetle Survey *Tomicus piniperda*. (PPQ)

Date Range: 01-01-2011 thru 12-31-2011

Counties	Sites	Trap/days	Pos	Neg
10	80	88	3	85

2D. Miscellaneous pests

Date Range: 01-01-2011 thru 12-31-2011

	Counties	Sites	Trap/days	Pos	Neg
Black Timber Beetle <i>Xyleborus (Xylosandrus) germanus</i>	2	2		2	0
Brown Marmorated Stink Bug <i>Halyomorpha halys</i>	9	8	4	12	0
Pear Blight Beetle, <i>Xyleborus dispar</i>	1	1		1	0
Banded Elm Bark Beetle, <i>Scolytus schevyrewi</i>	9		23	23	0
Bark Beetle <i>Trypodendron retusum</i>	6		10	10	0
European Bark Beetle, <i>Hylastes opacus</i>	7		16	16	0
Eur. Hrdwd Ambrosia Btle <i>Trypodendron domesticum</i>	10	15	77	77	0
Japanese Stilt Grass, <i>Microstegium vimineum</i>	1	1		1	0
Thousand Cankers Disease <i>Geosmithia morbida</i>	78	1860		0	1860
Camphor Shot Borer <i>Cnestus (Xylosandrus) mutilatus</i>	3		5	5	0
Chinese Longhorned Beetle <i>Trichoferus (Hesperophanes) campestris</i>	6	25	226	0	226
Granulate Ambrosia Beetle <i>Xylosandrus crassiusculus</i>	1	1		1	0

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

3A. 7-10 March 2011. Central Plant Board Annual Meeting (St Louis, MO)

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 universal bucket traps (green/yellow/white) with lure and kill strips for each of old world bollworm, *Helicoverpa armigera*, Egyptian cotton leafworm, *Spodoptera littoralis*, and silver Y-moth *Autographa gamma*; five red paper delta traps (2 sides sticky with ends open) with lure for summer fruit tortrix, *Adoxophyes orana*; and five wing traps with lure for golden twin-spot moth, *Chrysodeixis chalcites*. Traps were set on 10-13 May and have been serviced weekly. Like last year, several species of tortricid moths have responded to the specific pheromones resulting in large numbers of moths to screen. Morphology and/or dissection screening was completed 18 January 2012.
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 Guidelines (25 July 2007).
3. Survey dates; Trap locations and dates were;
 1. La Porte Co. Pinney-Agricultural Center, Wanatah, IN, 10 May-2 August.
 2. Knox Co. Southwest-Purdue, Vincennes, IN, 11 May - 4 August
 3. Randolph Co. Davis-Purdue Agricultural Center, Farmland, IN, 12 May- 4 August
 4. Tippecanoe Co. Meigs-Purdue Horticultural Center, Lafayette, IN, 13 May- 4 August
4. Taxonomic services: The SSC (or his aid under close supervision) screened all moths in consultation with USDA area identifiers. Moth morphology and genitalia were used to discriminate targets from hundreds of endemic moths (primarily Noctuidea and Tortricidae) that were attracted to the specific lure pheromones.
5. Benefits and results of survey: This is a priority soybean commodity survey that demonstrated the absence of specific exotic soybean pests in Indiana. 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. No pest targets were detected. Survey objectives were met and there were no cost overruns.

6. NAPIS database submissions: Date Range: 01-01-2011 thru 12-31-2011
 No target moths were detected by gross morphology, microscopic observation of genitalia, or wing venation.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites</u>	<u>Trap</u>		
			<u>samples</u>	<u>Pos</u>	<u>Neg</u>
<i>Helicoverpa armigera</i> , old world bollworm	4		240	0	240
<i>Spodoptera littoralis</i> , Egyptian cotton leafworm	4		240	0	240
<i>Adoxophyes orana</i> , summer fruit tortrix	4		240	0	240
<i>Autographa gamma</i> , silver Y-moth	4		240	0	240
<i>Chrysodeixis chalcites</i> , golden twin-spot moth	4		240	0	240

4B. Exotic Woodborers/Bark Beetles (in cooperation with PPQ statewide trapping network) including Risk Based, Chinese longhorn beetle, and European hardwood ambrosia beetle surveys.

1. Survey Methodology (trapping protocol): These surveys were an APHIS-PPQ/CAPS collaborative effort. PPQ set up and sampled traps and CAPS processed and identified samples.
 - a. One hundred seventy seven Lundgren funnel traps were set at 52 risk-based sites in 22 counties. Sites were identified by recognition of apparent risk of receiving target pests through commerce. One to four (varies by site) Lindgren funnel traps with a capture well containing dilute propylene glycol antifreeze were placed at each site. Traps contained one of the following lures: Ultra High Release (UHR) ethanol, UHR alpha-pinene, IPS Tri-lure. Screening and identification were complete on 29 November 2011.
 - b. Chinese longhorn beetle was surveyed at 25 sites in 6 counties using unapproved UHR ETOH in Lindgren funnel traps and approved visual methods. Pine shoot beetle was trapped at 80 sites in 10 counties using UHR alpha-pinene in Lindgren funnel traps. Trap samples dated 1 March to 4 June were received and processed with 3 positive records.
 - c. European hardwood ambrosia beetles were trapped at 15 sites in 10 counties using lineatin lure in Lindgren funnel traps. Trap dates: 1 March to 24 June.
 - d. Pine shoot beetles were trapped at 80 sites using alpha-pinene as lure.

2. Rationale underlying survey methodology: The survey methodology used in 2011 was adapted for Indiana from the National Exotic Woodborer/Bark Beetle Survey Plan, 2003/2004.

3. Survey dates: Traps from four statewide and regional surveys were deployed approximately late February in southern Indiana, mid May in central Indiana, and mid/late May in northern Indiana. RBS traps were set from 10 March to 18 October. Chinese longhorn traps were set and visual observations were made from 5 May to 15

September. European hardwood ambrosia beetle was trapped from 17 February to 17 October. The pine shoot beetle survey occurred from 1 March to 4 June.

4. Taxonomic services: CAPS staff pinned or pointed specimens from 1,160 vials. Preliminary identification of potential target organisms was coordinated by Larry Bledsoe (SSC), Mr. Arwin Provonsha (curator of the Purdue University Entomological collection), and Dr. Jeffery Holland (forest landscape entomologist). All screening and identifications were complete by 29 November 2011. 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. Only the endemic species, *Tomicus piniperda*, had positive records (17). Survey objectives were met and there were no cost overruns.

6. NAPIS database submissions: Date Range: 01-01-2011 thru 12-31-2011.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites* Plants</u>	<u>Trap samples</u>	<u>Pos</u>	<u>Neg</u>
<i>Hylurgops (Hylurgus) palliatus</i>	27		661		661
<i>Hylurgops ligniperda</i>	27		661		661
<i>Ips sexdentatus</i>	23		435		435
<i>Ips typographus</i>	23		435		435
<i>Monochamus alternatus</i>	23		435		435
<i>Orthotomicus erosus</i>	23		435		435
<i>Tomicus destruens</i>	27		661		661
<i>Tomicus piniperda</i>	24		449	14	435
<i>Tomicus piniperda</i> (PSB survey)	10		88	3	21

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

1. Survey Methodology: In 2011 Indiana Department of Natural Resources (IDNR) personnel selected symptomatic parts of *Azalea*, *Camellia*, *Rhododendron*, *Viburnum*, *Syringa*, *Pieris*, and *Kalmia* (generally) from Indiana nurseries and other landscape plant retail outlets (18 counties) to test for the presence of *P. ramorum*. Samples were shipped overnight to the Purdue University Pest & Plant Diagnostic Laboratory (P&PDL). P&PDL tested 396 samples using an enzyme-linked immunosorbent assay (ELISA) specific to *P. ramorum*. No positive samples were present. Survey objectives were met and there were no cost overruns.
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 29 July 2011.

4. Taxonomic services: Purdue University Pest & Plant Diagnostic Laboratory performed foliar screening. Diagnostic Services, Michigan State University performed confirmation testing (PCR) for suspect positive sample.
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. *P. ramorum* was not detected. Survey objectives were met and there were no cost overruns.
6. NAPIS database submissions:
Date Range: 01-01-2011 thru 12-31-2011.

<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>	18	396		0	396

4D. Grape Commodity Survey

1. Survey Methodology: Seven vineyards were established as survey sites for *Phytoplasma australiense* and potential leafhopper vectors. The sites are in Knox (2), Monroe, Clark, Harrison, Dearborn, and Tippecanoe Counties. Susceptible grape varieties were identified and sample zones established. Leaf (8 leaves per variety) and leafhopper (100 sweeps of 15 inch diameter net) sweep net samples were transferred to 95% ethyl alcohol and sent to Agdia Laboratory for genetic PCR detection of the pathogen. Four grape pest moths (*Adoxophyes orana*, *Autograph agama*, *Spodoptera littoralis*, *Spodoptera litera*) were sampled every two weeks from 7-8 June to 14-15 September. No moth targets were detected. This survey was enhanced to include *Lobesia botra* and additional sample dates for the previous pest moths using US Farm Bill funding. The enhanced survey period is 15 July 2011 to 14 July 2012 and will be reported separately for Farm Bill projects at the completion of the project.
2. Rationale underlying survey methodology: Survey and processing techniques were based on the Grape Commodity-Based Survey Guidelines, 11 August 2008 and on consultations with plant pathologists and a viticulturalist.
3. Survey dates: Monthly following survey initiation on 7-8 June 11 to September. The enhanced survey period was 6-7 July to 26-27 October 2011.
4. Taxonomic services: Purdue Plant Disease Diagnostic Laboratory and Agdia Inc, 30380 County Road 6, Elkhart, IN provided PCR confirmations for *P. australiense*. Leafhopper identification assistance was provided by the Dept. of Entomology,

Purdue University. 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 provided assistance. Moth morphology and genitalia were used to discriminate targets from hundreds of endemic moths (primarily Noctuidae and Tortricidae) that were attracted to the specific lure pheromones.

5. Benefits and results of survey: There are 45 Indiana vineyards/wineries growing grapes on about 600 acres. About one million visitors to Indiana wineries add about \$35 million dollars to the state economy annually. The goal of this survey is first detection of an important disease and potential vectors that could threaten the Indiana wine industry. No foliar samples were positive for *P. australiense*. One leafhopper composite samples tested positive (PCR), however, since no *P. australiense* was detected in foliar samples and endemic *Phytoplasmas* have been detected in previous year's surveys, no molecular sequencing will be attempted at this time. No target species were detected. Survey objectives were met and there were no cost overruns. An accounting error resulted in an invoice for taxonomic services being paid twice. This resulted in a credit of \$1,594.26 after the survey period closed.

6. NAPIS database submissions: Date Range: 01-01-2011 thru 12-31-2011.

<u>Target Pest</u>	<u>Counties</u>	<u>Sites*</u>	<u>Trap</u>		
		<u>Plants</u>	<u>samples</u>	<u>Pos</u>	<u>Neg</u>
<i>Adoxophyes orana</i>	6		84	0	84
<i>Autographa gamma</i>	6		84	0	84
<i>Spodoptera littoralis</i>	6		84	0	84
<i>Spodoptera litura</i>	6		84	0	84
<i>Candidatus australiense</i> Phytoplasma in leaf tissue	6	84		0	84
<i>Candidatus australiense</i> Phytoplasma in leaf hopper tissue	6	83**		0	83
<u>Total <i>Candidatus australiense</i></u>		167			167

** one sample pending confirmation.

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. Ten hardwood sites in seven counties that had been harvested within the last 2 to 3 years were surveyed. Survey sites were located in the following Indiana counties; Allen, Brown, Carroll, Monroe, Montgomery, Morgan, and Wells. Methods were adapted according to the Oak Commodity Survey Guidelines, 25 April 2007. One set of traps was placed at each site. Traps with lure were monitored between 10 May and 16 September and were serviced every 2-3 weeks. Pheromone traps with lures for exotic lepidopteran pests, *Adoxophyes orana*, *Tortrix veridan*, *Archips xylosteanus*, and *Spodoptera littoralis*, were 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 11 to 27 May and were serviced every 2-3 weeks until 16-17 August 2011.
4. Taxonomic services: Samples were screened by Dr. Jeff Holland and Larry Bledsoe, Purdue University. Moth morphology and genitalia were used to discriminate targets from hundreds of endemic moths (primarily Noctuidae and Tortricidae) that were attracted to the specific lure pheromones.
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 is the goal of this survey. No target species were detected. Survey objectives were met and there were no cost overruns.

6. NAPIS database submissions: Date Range: 01-01-2011 thru 12-30-2011.

Target Pest	Counties	Sites* Plants	Trap samples	Pos	Neg
<i>Archips xylosteanus</i>	7		50	0	50
<i>Tortrix viridana</i>	7		50	0	50
<i>Adoxophyes orana</i>	7		50	0	50
<i>Spodoptera littoralis</i>	7		50	0	50

Signatures:

Approved by

_____ Date: _____
Philip T. Marshall (Cooperator)

_____ Date: _____
Gary W. Simon (ADODR)