

Final (January 1 – December 31) Progress Report for FY 2006
USDA-APHIS Cooperative Agricultural Pest Survey for Maine
Cooperative Agreement: 06-8223-0360-CA

Year: 2006

State: Maine

Agency: Maine Department of Agriculture, Food & Rural Resources

I. Core level funding activities

A. State Survey Coordinator (SSC)

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B. No state member serves on the National CAPS committee

Eastern Region CAPS committee member: Ann Gibbs, State Horticulturist, SPRO and President of Eastern Plant Board; MDAFRR

C. Objectives of Core level funding activities:

1. Determine Maine's training needs to further develop CAPS programs, and provide and assist in training.
2. Coordinate actions of agencies involved in surveys through oversight of survey work plans.
3. Facilitate the distribution of funds to other cooperating parties conducting surveys.
4. Create new and reinforce existing networks with other state, county, federal and public entities to evaluate risks, conduct surveys and manage cooperative pest programs.
5. Create a rapid response mechanism so that if an exotic pest or an invasive species is detected, it can be appropriately addressed in a timely manner with minimal disruption to our state's food supply and plant resources.
6. Network with other survey programs through attendance at state, regional and national CAPS committee meetings.
7. Organize pest detection data and maintain information in NAPIS database.

Accomplishments of Core level funding activities for 2006:

1. The SSC and MDAFRR staff completed ICS 100 and 200 training (1/06) and NPDN First Responder Training (1/10/06). The SSC participated in the Early Detection / Rapid Response Scolytidae training in Ithaca, NY (3/06). The SSC trained 2 summer helpers in bark beetle

- identification (6/06). The SSC and MDAFRR staff attended and participated in the Maine Emergency Exercise with other agencies (9/06).
2. The SSC coordinated with MDAFRR staff, the Maine Forest Service (MFS), and the University of Maine Cooperative Extension (UMCE) to conduct the following surveys for the 2006 CAPS Program. Other coordination efforts selecting survey sites, obtaining trapping supplies, tracking expenses, disseminating funds, and requesting reports.
 - a. MFS; Exotic woodborer and bark beetle, Gypsy moth, European larch canker, Pine shoot beetle, Siberian silk moth
 - b. UM Cooperative Extension; Sudden Oak Death (SOD), *Ralstonia solanacearum*
 - c. MDAFRR; SOD, Exotic nematodes, Swede midge, European wireworms, Leek moth, Old world bollworm
 - d. MFS; Winter moth survey
 3. Funds for above surveys were distributed upon submission of bills and / or completion of required reports.
 4. Pest risk evaluation and survey selection were based on information obtained through existing state and federal networks by means of state pest committee meetings (2) and pest risk assessments provided through the CAPS Program. New networks were made with other states, such as Connecticut, Massachusetts, New Hampshire, New York, Vermont, etc. while attending the Eastern Plant Board and the Eastern Region CAPS meetings. New networks were forged with University and amateur entomologists at the BugMaineia outreach event.
 5. Rapid response mechanisms have been created for some pests, but this goal is still a work in progress.
 6. The SSC attended and participated in the following meetings and conferences to enhance the Maine CAPS Program through education and networking:
 - a. SSC teleconference calls; 2006
 - b. Vegetable Growers Assoc. meeting; Augusta, ME; 1/06
 - c. New England Grows; Boston, MA; 2/06
 - d. State CAPS roundtable meeting; Augusta, ME; 3/06
 - e. Early Detection / Rapid Response Scolytidae training; Ithaca, NY; 3/06
 - f. Eastern Plant Board; Rehoboth Beach, DE; 4/06
 - g. State CAPS Steering Committee Meeting; Hermon, ME; 5/06
 - h. Bug Maineia exhibition; Augusta, ME; 9/06
 - i. ER CAPS Meeting; Raleigh, NC; 11/06
 7. All survey data for 2006 has been entered into NAPIS

D. Objectives were met.

E. There were no cost overruns.

F. State CAPS Committee:

Name	Organization	Title
Robert Batteese	MDAFRR	Director, Plant Industry
Karen Coluzzi	MDAFRR	Entomologist, SSC
Ann Gibbs	MDAFRR	State Horticulturist; SPRO
Dave Struble	Maine Forest Service (MFS)	Director, MFS; Entomologist
Jim Dill	UMaine Coop. Ext. (UMCE)	IPM Specialist
Glen Koehler	UMCE	IPM Specialist
Bruce Watt	UMCE	Plant Pathologist

Patsy Hartley	USDA-APHIS-PPQ	SPHD
John Crowe	USDA-APHIS-PPQ	PSS

State CAPS Roundtable Meeting, Augusta, ME; March 16, 2006.

In attendance:

Frances Baker	USDA-APHIS-PPQ
John Crowe	USDA-APHIS-PPQ
Bruce Watt	UMCE
Frank Drummond	UMO
Dave Lambert	UMO
Paul Gregory	Maine Dept. of Environmental Protection
Charlene Donahue	MFS
Dave Struble	MFS
Kathy Murray	MDAFRR
Karen Coluzzi	MDAFRR
Ann Gibbs	MDAFRR
Sarah Scally	MDAFRR
Terry Bourgoin	MDAFRR

Agenda:

9:30 A.M.	Welcome and Introductions
9:45 A.M.	Review of 2005 CAPS Program Surveys
10:15 A.M.	Summary of 2006 CAPS Program Surveys
10:30 A.M.	Roundtable Discussion – Highlights of other state pests and survey activities
Noon-ish	Lunch / Break
12:30 P.M.	Continuation of Roundtable, if needed
1:00 P.M.	2007 CAPS Target Pests / CAPS Program Changes and Updates / Submitting Work Plans for 2007 / Other Discussion
2:00 P.M.	Adjourn

State CAPS Committee Meeting, Hermon, ME; June 1, 2006.

In attendance:

John Crowe	USDA-APHIS-PPQ
Patsy Hartley	USDA-APHIS-PPQ
Bruce Watt	UMCE
Dave Struble	MFS
Karen Coluzzi	MDAFRR
Ann Gibbs	MDAFRR
Robert Batteese	MDAFRR

Agenda:

1:30 P.M.	Welcome and Introductions
1:40 P.M.	Issues on <i>Phytophthora spp.</i> and exotic woodborers
2:00 P.M.	Discussion of 2007 National Target Pests
4:00 P.M.	Finalize Maine's 2007 CAPS survey activities
4:30 P.M.	Discussion to add Core committee members
5:00 P.M.	Adjourn

G. NAPIS Database submissions (Table 1. Pg 22)

II. CAPS Survey Activities

A. Core level funding surveys (Part I):

1. *Ralstonia solanacearum*
2. National Exotic Bark Beetle/Woodborer
3. Chrysanthemum White Rust
4. Vegetable Pest Survey (Leek Moth, European Wireworms, Old World Bollworm, Brown Marmorated Stink Bug (BMSB))
5. Soybean Pest Survey (Soybean Pod Borer, Soybean Rust, BMSB, Old World Bollworm)

1. *Ralstonia solanacearum* – MDAFRR

Ralstonia solanacearum race 3 biovar 2 is a bacterial pathogen not known to occur in the US. It causes common wilt in geraniums and infects several important agricultural crops such as potatoes, tomatoes, peppers and eggplant. It is a major concern for the potato industry because the disease survives well in cold temperatures and renders potatoes unmarketable.

In 2003, through nursery inspections, one greenhouse in Maine was found with infected plants. These plants were subsequently destroyed under APHIS supervision to prevent the spread of the disease. For 2006, the department's horticulture staff surveyed a number of greenhouses for wilt of geraniums as part of routine nursery inspections. The seed potato inspection occurred in the second half of the year.

- a. Survey Methodology (trapping protocol) – Nursery geraniums - visual inspections of geraniums were conducted at 20 greenhouses in 5 counties. Seed potatoes – tubers displaying symptoms of bacterial ring rot (BRR) were tested for BRR; those testing negative for BRR were tested for *R. solanacearum* with AGDIA test strips.
- b. Rationale underlying survey methodology – Nursery geraniums - Select a group of greenhouses with spring geranium crops from various sources. Seed potatoes – symptoms of *R. solanacearum* in potato tubers are similar to BRR. If tubers test negative for BRR, they may have *Ralstonia*.
- c. Survey dates – Nursery geraniums - April 2006 to May 2006. Seed potatoes – August 2006 to October 2006.
- d. Taxonomic services – Nursery geraniums - Suspect samples would be sent to the UM Plant Diagnostic Lab for testing. No symptoms were observed, so no samples were sent. Seed potatoes – Suspect samples would be sent to the NPDN lab at Cornell University for verification of race and biovar.
- e. Benefits and results of survey – Nursery geraniums - By surveying a group of greenhouses across the state growing geraniums we can determine if *Ralstonia* is present in Maine. Approximately 138,000 geraniums were surveyed. No symptoms of *Ralstonia* were observed. Seed potatoes – By testing suspect tubers for *Ralstonia* that tested negative for BRR, we would have a reasonable survey of *Ralstonia*-positive tubers. Out

of 18 suspect samples, 2 tested negative for BRR. Unfortunately, the Certified Seed Inspection lab forgot to test the two negative samples for *Ralstonia*.

- f. Compare actual accomplishments to objectives established for the period - Nursery geraniums – Objectives met. Seed potatoes – Objectives not met.
 - g. If appropriate, explain why objectives were not met* - Seed potatoes – Lab did not remember they were supposed to test BRR-negative tubers for *Ralstonia*.
 - h. Where appropriate, explain any cost overruns*- No cost overruns.
 - i. NAPIS database submissions - Yes; all negative data.
2. National Exotic Bark Beetle/Woodborer – MDAFRR
See B. 2.
3. Chrysanthemum White Rust – MDAFRR

Chrysanthemum white rust (CWR) (*Puccinia horiana*) is a destructive disease of chrysanthemums and related plants. This disease has the potential to be extremely damaging to the commercial horticulture and florist industries if it becomes established in the United States. The disease is indigenous to China and Japan, but has since spread to Europe, Australia, South America and Africa, and has recently been found in Pennsylvania and Delaware. CWR has been accidentally introduced several times in the United States over the past several decades by chrysanthemum hobbyists, but aggressive eradication programs have successfully prevented establishment.

CWR has been surveyed for in Maine greenhouses and nurseries for the past three years, as part of routine nursery inspections. The Maine Dept. of Agriculture will continue to survey for this pest, as little additional effort is required.

- a. Survey Methodology (trapping protocol) – Visual inspections of chrysanthemums during routine fall nursery visits.
- b. Rationale underlying survey methodology – Select a group of greenhouses growing chrysanthemums from various out of state sources.
- c. Survey dates – August 2006 to October 2006.
- d. Taxonomic services – Samples screened by State Horticulturist and staff.
- e. Benefits and results of survey – By surveying a group of greenhouses across the state growing chrysanthemums we can determine if CWR is present in Maine. No CWR was observed during the inspections of chrysanthemums.
- f. Compare actual accomplishments to objectives established for the period - On schedule.
- g. If appropriate, explain why objectives were not met* - N/A
- h. Where appropriate, explain any cost overruns*- N/A

- i. NAPIS database submissions: Yes; all negative data.
4. Vegetable Pest Survey – MDAFRR

See B. 4.

5. Soybean Pest Survey – MDAFRR

In Maine, soybeans are an important rotation crop for potato growers and an important feed crop for dairy farm operations. Soybean pod borer, soybean aphid, and soybean rust have been shown to reduce crop yields significantly if given the opportunity to become established. Through the CAPS program in 2004, soybean aphid was detected for the first time in Maine. Continuous surveying will help determine presence and extent of these pests in Maine. Soybeans are also hosts for many polyphagous insect pests that can cause damage to nearby crops of value. The brown marmorated stink bug (BMSB), now a nuisance pest in Pennsylvania, can be expected to spread to crop hosts such as peach, tomato and soybean. The old world bollworm, ranked #7 on the National Pest List, is a severe economic pest in most places where it occurs. Risk assessments indicate that the old world bollworm poses a high risk of crop damage in Maine. Feeding studies have identified soybeans as an intermediately favored host for this pest.

- a. Survey Methodology - Four soybean farms in Aroostook County were surveyed between July 10 and September 20. Visual inspection of plants and sweep net sampling were used to detect presence of soybean pod borer, soybean aphid, soybean rust, and BMSB. Fields were inspected on two edges and in a Z-shaped pattern for signs of damage and presence of these pests. A sweep net sample was taken approximately every 20 feet and contents were inspected on the spot. Suspect diseased samples were put in Ziploc bags, and specimens were contained in vials of alcohol and brought back to MDAFRR for screening. One heliothis trap and one unitrap, each containing the *Helicoverpa armigera* lure from Otis (USDA, MA), were deployed at each site and checked every two weeks.
- b. Rationale Underlying Survey Methodology - Pheromone trapping is effective to detect presence of Old world bollworm if populations exist. Visual inspection of fields during the season when adult insects can be found (and more readily identifiable), as well as when plant damage or disease symptoms would be best expressed, should be effective in detecting the other pests if they are present.
- c. Survey Dates - Surveys for above soybean pests were conducted from July 10 to September 20.
- d. Taxonomic Services - No suspects found; no services used.
- e. Benefits and Results of Survey - Five exotic and potentially harmful soybean pests were surveyed for at 4 farms in Aroostook County. Staff learned how to identify key features of each pest. Farmers received information about each pest and a letter of results at the end of the season.
- f. Comparison of actual accomplishments to objectives established for the period - All objectives established for this survey were met:
 - Four soybean farms were surveyed at least twice for these exotic pests.

- Visual inspection methods were used to detect plant damage and presence of pest species. Sweep nets were employed to enhance visual surveys. Pheromone traps were used on applicable pests.
 - GPS coordinates were retrieved at each site.
 - Samples of suspect plant damage and pests were collected according to protocols, screened by the SSC. No material needed further confirmation.
 - Detection data for presence or absence of soybean pod borer, soybean aphid, soybean rust, and BMSB were generated for all counties and entered into the NAPIS database.
- g. If appropriate, explain why objectives were not met - Objectives were met.
 - h. Where appropriate, explain any cost overruns - There were no cost overruns
 - i. NAPIS database submissions - All data entered into NAPIS.

B. Additional Pest Detection Surveys (Part II):

1. *Ralstonia solanacearum* (UMCE)
2. National Exotic Bark Beetle/Woodborer (MDAFRR/MFS)
3. Siberian Silk Moth (MFS)
4. Vegetable Pest Survey (Swede midge, Exotic nematodes (Meloidogyne spp.)) (MDAFRR)

1. *Ralstonia solanacearum* – UMCE

- a. Survey Methodology (trapping protocol) – Possible *Ralstonia solanacearum* (R.s.) host plants that have entered the Plant Diagnostic Clinic were tested using Agdia Immunostrips for the presence of the bacterium. These samples included potatoes collected during the normal activities of the central Maine IPM scouting program as well as samples submitted by greenhouse growers, other growers, and homeowners.
- b. Rationale underlying survey methodology – The survey methodology is inexpensive to implement while still supplying a representative sample of suspect plants.
- c. Survey dates – The survey was in effect from January 1, 2006 through December 31, 2006.
- d. Taxonomic services - No taxonomic services were required because of a lack of R.s. positive samples. Any positive finds would have been forwarded to the National Plant Germplasm and Biotechnology Laboratory in Beltsville, MD.
- e. Benefits and results of survey – This survey has helped to guard against the consequences of accidental or intentional introduction of this select agent through early detection practices.
- f. Compare actual accomplishments to objectives established for the period - During the year, 127 possible R.s. host samples were tested for R.s. all with negative results.
- g. If appropriate, explain why objectives were not met* - Objectives have been met.

- h. Where appropriate, explain any cost overruns*- No cost overruns.
- i. NAPIS database submissions - Data is presently maintained at the Pest Management Office, Orono, ME, and has been entered into the NPDN and NAPIS databases. No R.s. positive samples were detected.

2. National Exotic Bark Beetle/Woodborer – MDAFRR/MFS

The 2006 program builds upon initial survey from 2004 and 2005, monitoring identified higher risk sites to detect artificial spread of exotic beetles at risk of entering the state in pallet wood. The work also is generating a reference collection of bark beetles and woodborers common around Maine sites (which will facilitate future detection of new species).

The specific achievements detailed in this final report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) – The 2006 trapping survey to detect exotic woodborers and bark beetles is being conducted using 3 12-funnel Lindgren traps. The MFS-conducted portion of this survey consisted of trapping at 11 sites around industrial parks in Aroostook, Cumberland, Sagadahoc, and York counties. The MDAFRR-conducted portion of the survey consisted of trapping at 9 sites around industrial parks in Androscoggin, Kennebec, Knox and Oxford counties.
 - Traps were placed near warehouses and company yards receiving and stock piling pallets.
 - Traps were visited biweekly, and any beetles collected.
 - Trapping period extended from April to October
 - Initial screening of trap material was conducted throughout the season and was completed by year-end.
 - Those specimens that could not be identified as native and that could not be diagnosed using available taxonomic keys were considered “suspect exotic”, and sent to a National Identifier.
 - All data was entered into the NAPIS database according to national protocols.
- b. Rationale underlying survey methodology – The CAPS program has identified the exotic bark beetles and woodborers as having a high risk of potential introduction and establishment, and has identified trapping with Lindgren traps as the appropriate survey tool. Specific pests targeted in the Maine survey for 2006 include:

<i>Agrilus biguttatus</i>	<i>Monochamus sutor</i>	<i>Platypus quercivorus</i>
<i>Tomicus piniperda</i>	<i>Agrilus planipennis</i>	<i>Anoplophora chinensis</i>
<i>A. glabripennis</i>	<i>Callidiellum rufipenne</i>	<i>Chlorophorus annularis</i>
<i>Hesperophanes campestris</i>	<i>Hylurgops palliatus</i>	<i>Hylurgus ligniperda</i>
<i>Ips sexdentatus</i>	<i>Ips typographus</i>	<i>Monochamus alternatus</i>
<i>Orthotomicus erosus</i>	<i>Pityogenes chalcographus</i>	<i>Scolytus shevyrewi</i>
<i>Sirex noctiolio</i>	<i>Tetropium castaneum</i>	<i>T. fuscum</i>
<i>Tomicus minor</i>	<i>Trypodendron domesticum</i>	<i>Urocerus gigas gigas</i>
<i>Xyleborus spp.</i>	<i>Xylotrechus spp.</i>	

- c. Survey dates – Trapping period: 3/29/06-10/4/06. Screening: 4/14/06-12/29/06.

- d. Taxonomic services – Taxonomic verification of screened samples provided by Dr. Robert Rabaglia (USFS) and Dr. E. Richard Hoebeke (USFS). Some species identifications still to be confirmed but none are anticipated to be any of the target exotics.
 - e. Benefits and results of survey –
 - A representative sample of high risk sites was surveyed during target period.
 - While none of the target exotic species were recovered, one native bark beetle, *Ips calligraphus* (Germar) was recovered for the first time in Maine. This recovery represents a range extension of this potential pest.
 - All target genera Scolytidea, Buprestidae, Cerambycidae and Siricidae identified to species. Approximately 8000 specimens identified, generating a list of 96 species in the 4 families.
 - Internal expertise was fostered: All prescreening and screening was done by MFS and MDAFRR employees.
 - f. Compare actual accomplishments to objectives established for the period –
 - 20 trap sites established by MFS/MDAFRR.
 - Traps serviced every 2 weeks. Overall, 360 trap samples were screened. These samples represent 240 trapsite-weeks of data.
 - All trap material processed by end of season.
 - g. If appropriate, explain why objectives were not met* - All targets activities met.
 - h. Where appropriate, explain any cost overruns*- No overruns. All costs covered by grant or were part of grant match activities.
 - i. NAPIS database submissions – No suspect finds of target organisms. All new records submitted to CAPS coordinator for entry onto NAPIS system.
3. Siberian Silk Moth –MFS

The 2006 program provided baseline detection to determine presence or absence of Siberian Silk Moth in Maine

The specific achievements detailed in this year end final report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) – The 2006 trapping survey to detect Siberian Silk Moth was conducted using the FHM Division’s existing network of 25 light traps located in forested locations across Maine. All catch from normally scheduled light traps (run from the end of June through the end of July) was screened for Siberian Silk Moth. In addition, 10 light traps in southern and coastal Maine had their season extended to mid August (an additional 2 weeks) to assure that the moth flight period was completely bracketed.
 - Light traps were run nightly, with catch preserved and sent to the MFS Lab periodically through the season. Screening of light trap material was conducted across the field season, and was completed by the end of November 2006.
 - The light trap survey was to be supplemented with pheromone trapping in 50 candidate locations in southern and coastal sections of the state (the area most likely to be exposed to artificial introduction on commodity shipments and containers) using

specific Siberian Silk Moth traps and lures provided by APHIS. This number was reduced in June 2006 to 30 traps to accommodate APHIS (who was unable to provide more than that amount of lure).

- Pheromone traps were placed by June 30, focusing on locations in southern/coastal Maine most likely to be exposed to artificial introduction. 20 of the traps were placed in hard pine settings (plantations and natural stands); the remaining 10 were in softwood stands. All traps were left out through September 1.
 - Twenty-nine of the 30 pheromone traps were collected at the end of the season (one trap missing). Traps were inspected and any catch was recorded.
 - Data on any Siberian Silk Moth recovered were to be entered into the NAPIS database according to national protocols.
- b. Rationale underlying survey methodology – The current National Pest Target List has Siberian Silk Moth ranked as the Number 3 priority for survey. Pheromone traps provide the most efficient tool for surveying high risk sites to detect what may be very low level populations. Where Maine has no known populations of this pest, the statewide light trap survey provides an efficient mechanism for more general detection.
- c. Survey dates –
- Light trapping survey conducted from 7/1/06 to 7/31/06 @ 15 sites
from 7/1/06 to 8/15/06 @ 10 sites.
 - Light trap catch collected daily. Screening – 7/15/06 to 11/30/06
 - Pheromone trapping survey conducted 7/1/06 to 9/1/06 @ 30 sites.
 - Pheromone trap catch collected @ end of season. Screening – 9/1/06 to 9/15/06.
- d. Taxonomic services – None used.
- e. Benefits and results of survey – Detection survey conducted at a representative sample of high risk sites. Internal expertise fostered.
- f. Compare actual accomplishments to objectives established for the period – All target activities accomplished.
- 25 Light traps were operated by MFS cooperators. Placement covered a representative sample of forest types across Maine (12 of the 16 counties). Those traps for which season was extended were confined to the southern half of the state. In total, 120 trap weeks of potential moth activity were sampled.
 - 30 Pheromone trapping sites were established by MFS results from 29). These were sites were focused on southwestern Maine (south and west of Somerset and Waldo Counties).
 - The combined light and pheromone trap survey provided a good sampling of Maine’s high-risk sites.
- g. If appropriate, explain why objectives were not met* - All targets met. Trapping conducted and all catch processed. No Siberian silk moth detected in any samples.
- h. Where appropriate, explain any cost overruns*- No cost overruns. All costs covered by grant or were part of grant match activities.
- i. NAPIS database submissions - No suspect finds. Negative data entered into NAPIS.

4. Vegetable Pest Survey – MDAFRR

- a. Survey Methodology (trapping protocol) – Eleven mixed vegetable farms in eight counties were selected for survey of a variety of pests. We surveyed weekly for six weeks beginning 17 July 2006 for Swede midge (*Contarinia nasturtii*), two exotic wireworm species (*Agriotes obscurus* and *A. lineatus*), leek moth (*Acrolepiopsis assectella*), brown marmorated stink bug (*Halyomorpha halys*) and Old World bollworm (*Helicoverpa armigera*). In addition, soil samples were collected once from each farm and were tested for the presence of two exotic plant parasitic nematodes, Columbia root-knot nematode (*Meloidogyne fallax*) and British root-knot nematode (*M. artiella*). A formally-trained entomologist (Marcia Siebenmann) who had assisted with the Vegetable Commodity pest survey in 2005 was hired again to assist with the 2006 insect and nematode surveys.
- Old World Bollworm: During the week of 17 July 06 a pheromone trap (Heliothis-type trap) baited with an Old World Bollworm pheromone was placed in host crops at one farm in each of six counties (Lincoln, Kennebec, Aroostook, Waldo, Penobscot, and Cumberland). A kill strip was placed in the top chamber and a clear plastic bag was secured over the top of each trap. Traps were checked weekly.
 - Leek Moth: during the week of 17 July 06, one or two leek moth pheromone traps were placed in or at the margin of onion, garlic, chives, or leeks at 7 farms in six counties (Cumberland, Lincoln, Penobscot, Sagadahoc, Waldo, and York). Traps were suspended from stakes approximately 0.3 m above the crop. Traps were raised as necessary as the crop grew. Traps were checked weekly and bottoms were replaced as needed.
 - Swede Midge: One or two Swede midge pheromone traps (Jackson traps supplied by USDA-APHIS-PPQ) were placed in or at the margin of cole crop fields (cabbage, broccoli, Brussels sprouts, kale, or cauliflower) at 9 of the farms located in eight counties (Aroostook, Lincoln, Kennebec, Sagadahoc, Waldo, Penobscot, Cumberland and York) during the week of 17 July 06. Traps were suspended about 0.6 m above the ground on stakes made of sections of ½” pvc pipe. Traps were checked weekly by removing the trap bottom and examining it carefully with the aid of a hand lens. When any suspected Swede midge specimens were found, the trap bottom was brought back to the lab for further screening by the State Survey Coordinator. Several specimens were sent to the Cornell Experiment Station in Geneva, NY for molecular taxonomic identification. Visual surveys were also conducted every week at each site scouting in a Z-shaped pattern in each field.
 - Wireworms: Two Vernon ® beetle traps (Phero-Tech), one baited with *A. lineatus* pheromone, the other with *A. obscurus* pheromone were inserted into the soil 1.5 meters apart in field edges of either corn or potato, according to protocol (Vernon, 2004, J. Entomol. Soc. Brit. Columbia, 101, p. 141-142) at 11 farms in eight counties. Traps were monitored weekly beginning the week of 17 July 06. All click beetle adults found in the traps were brought back to the lab, pinned and identified by Maine Department of Agriculture staff (Karen Coluzzi and Marcia Siebenmann).
 - Brown marmorated stink bug: At each of the eleven farms potential host crops including green beans and tomatoes were scouted by examining plants while traversing a z-shaped pattern in each field.
 - Nematodes: At each of ten of the farms in seven counties (Lincoln, Kennebec, Sagadahoc, Waldo, Penobscot, Cumberland and York), soil samples were collected from each of two appropriate host crops according to CAPS protocol for detection of the Columbia root knot nematode (*Meloidogyne fallax*) and the British root-knot nematode (*M. artiella*). Host crops were selected from the preferred hosts listed in the

Mini Risk Assessment (Davis and Venette, 2004). For each crop and farm sampled, 50 root-depth soil cores were collected with a soil probe, these 50 core samples were mixed together and 300 cc of the sample were sealed in a quart-sized plastic bag. Soil samples collected between 28 July 06 and 15 August 06 and were stored in a refrigerator until all samples were collected. All samples were shipped by overnight courier on 21 August 06 to the University of Nebraska at Lincoln (UNL) for nematode extraction and identification according to protocol established by UNL.

- b. Rationale underlying survey methodology – Farms were selected to represent good geographic distribution across the state. Other site selection criteria included: crops produced, acreage (medium to large acreage), and farmers’ willingness to participate. The methodologies for surveying these pests are in accordance with CAPS’ protocols.
- c. Survey dates – Trap deployment and visual inspections started July 17, 2006. The last site was set up July 21, 2006. All traps were removed by September 1, 2006.
- d. Taxonomic services - All screening and preliminary identifications done by MDAFRR staff. Molecular investigations of suspect Swede midge specimens were provided by Dr. Tony Shelton’s Laboratory at Cornell Experiment Station, Geneva, NY. Confirmation of suspect click beetle specimens were provided by Dr. Paul Johnson at South Dakota State University. Nematode extraction and identification were done at University of Nebraska. No taxonomic services were needed for leek moth.
- e. Benefits and results of survey – Eight exotic and potentially harmful vegetable pests were surveyed for at 11 farms in 8 counties. Staff are trained to identify key features of each pest. Staff created an information sheet about the survey and how to identify the exotic pests and/or damage/symptoms. This sheet has been distributed to the participating farmers to educate them about the exotic pest survey and to help them learn how to recognize the pests and their damage. (Appendix 1. Pg. 25)
- f. Compare actual accomplishments to objectives established for the period - All objectives established for this survey were met:
 - Eleven vegetable farms have been recruited and traps have been established at these farms. Nematode surveys were conducted in late July and early August. Target crops were visually inspected for signs of Leek moth and Swede midge damage.
 - Pheromone traps for each pest were deployed in appropriate crops at each farm and were monitored on a weekly basis at all but the most isolated farms which were monitored biweekly.
 - Suspect material was screened then sent to appropriate diagnostic centers for confirmation.
 - Detection data for presence or absence of these pests was generated for all counties surveyed and entered into the NAPIS database.
 - Informational sheets about each pest was created and distributed to growers participating in the survey. In addition, information about the pests and survey were shared with growers via grower newsletters (Appendix 2. Pg. 26), meetings and conferences.
- g. If appropriate, explain why objectives were not met* - Objectives have been met.
- h. Where appropriate, explain any cost overruns*- No cost overruns.

- i. NAPIS database submissions - All data have been entered into NAPIS.

C. Additional Pest Detection Surveys (Part III):

1. Pine Shoot Beetle (MFS)
2. Gypsy Moth (MFS)
3. European Larch Canker (MFS)
4. *Phytophthora ramorum* (Sudden Oak Death (SOD)) (MDAFRR/UMCE)

1. Pine Shoot Beetle (*Tomicus piniperda*) – MFS

The 2006 program expands upon earlier surveys, which yielded positive PSB catches and led to the regulation of Oxford and Franklin Counties, trapping in abutting counties plus the uninfested portions of those regulated counties. This survey monitors to detect both natural and artificial spread of PSB and serves to maintain current the regulated area of the state.

The specific achievements detailed in this year end final report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) - Original plan for the 2006 PSB survey was for the MFS to conduct a trapping survey 2 traps/site at 10 sites/county in each of the counties bordering the current regulated area in Maine (APHIS national standard protocols) in: York, Cumberland, Androscoggin, and Kennebec Counties. Additional traps were slated for placement in: Sagadahoc, Lincoln and Knox Counties (non-edge counties). A few traps were also to be placed in the southern portion of Oxford and Franklin Counties to monitor for spread of PSB in these partially infested counties. Total trapping: 100 each 8-funnel Lindgren Traps.

These plans were altered just before the start of the trapping season when it became apparent that all of Massachusetts, Connecticut and Rhode Island were to be included within the PSB regulated area (finalized May 1, 2006). This action prompted a similar decision for most of the remaining counties of Maine.

With the state decision to treat all of Maine except Aroostook and Washington Counties as presumptively regulated, the MFS refocused its PSB monitoring effort from the previous “edge” counties to a more general monitoring and comparison of PSB spread via natural vs. industrially-facilitated movement.

Initial screening of trap material was conducted during the field season.

Trapping period: April 1 to June 30

Suspect PSB specimens were to be sent to a National Identifier.

All data was to be entered into the NAPIS database according to national protocols.

- b. Rationale underlying survey methodology - APHIS has identified PSB as a serious pest, has established regulations to minimize potential for introduction and establishment outside the currently infested portion of the US, and has a standard survey protocol.

The survey protocols used in Maine reflect the approved national PSB survey protocol, altered (with APHIS preapproval) to enhance capacity to address specific northern New England concerns.

- c. Survey dates - Trapping period: 3/17/06-6/30/06. Screening: 4/01/06-8/25/06.
 - d. Taxonomic services – None used.
 - e. Benefits and results of survey -
 - Detection survey conducted at a representative sample of high risk sites.
 - Data collected will enhance analysis of risk associated with transport of PSB in regulated logs during the PSB flight period.
 - Internal expertise fostered.
 - f. Compare actual accomplishments to objectives established for the period – All target activities accomplished.
 - Traps were set out in mid- late March (one–two weeks earlier than specified in the project work plan) in response to concerns re potential early flight resulting from warm weather in March. With the extended trapping period and additional sampling entailed, the number of traps established was reduced to 84 so as to maintain workload within originally negotiated budget. This decision was facilitated by the decision to put most of Maine’s counties under regulation, thereby greatly reducing the number of presumptive unregulated counties to be monitored. This trapping intensity represents 98% of the originally negotiated number of samples.
 - This dedicated PSB trap network was augmented with species-specific screening for PSB in an independent trapping effort being conducted with the US Forest Service. These traps, although not part of the PSB trap network, provided analogous sampling at an additional 9 sites across the flight period.
 - Traps were serviced on a 2-week cycle. Overall, 280 batched PSB samples (all trap catch per site per period) and 189 independent trap samples were screened for PSB. These samples represent 686 trapsite-weeks of data.
 - All screening was done during the field season.
 - No PSB were encountered in any of the trap catches
 - Incidental by-catch was maintained for planned subsequent identification to augment EBB trapping.
 - g. If appropriate, explain why objectives were not met* - All targets met.
 - h. Where appropriate, explain any cost overruns*- No cost overruns. All costs covered by grant or were part of grant match activities.
 - i. NAPIS database submissions - No suspect PSB finds in 2006. All negative records entered into NAPIS by state CAPS survey coordinator.
2. European Gypsy Moth (*Lymantria dispar*) – MFS

The 2006 program primarily addressed survey and monitoring of European Gypsy Moth (GM) in and adjacent to the regulated portion of Maine. Ancillary efforts addressed monitoring and management activities associated with movement of GM host material, and supported the regulatory framework of the GM quarantine. The specific achievements detailed in this final year-end report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) -
 - i. Monitoring for Natural Spread @ Edge of Regulated Area/Transition

- Conduct pheromone trapping for GM in a band across the following counties: Aroostook, Penobscot, Piscataquis, Somerset, Franklin, and Oxford (2006 target: 240 traps).
 - Conduct on-ground scouting for life stages in areas outside the regulated zone where 2006 trap catches indicate probable gypsy moth populations.
 - Complete any remaining ground survey around 2005 pheromone trap sites with high catches before larval emergence.
- ii. Monitoring/Managing potential artificial spread: MFS focused considerable cooperative monitoring and management effort on restricting opportunities for artificial spread of GM.
- Visit and inspect all Maine sites receiving wood from the regulated area under gypsy moth compliance agreement.
 - Solicit additional processing facilities for regulated wood products.
 - Develop and provide targeted informational materials explaining forestry related quarantines in Maine for shippers and purchasers of wood products.
- b. Rationale underlying survey methodology -
- i. Current data suggests that GM is slowly expanded its range in Maine, with most expansion associated with natural spread at the edge of the current infested area in Maine or adjacent New Brunswick.
- ii. The lack of spot infestations at mills north of the regulated zone (several of which for years have had compliance agreements for processing regulated wood) suggests that the existing inter and intrastate GM quarantine regulations have been and continue to be effective in managing major pathways for artificial spread. Therefore, the MFS continues to monitor host movement associated with commerce and manage such movement to minimize the risk of spread of GM. The MFS works to maintain public awareness of, and support for, regulatory constraints on movement of potentially infested material.
- c. Survey dates –
- i. Pheromone survey period: 6/15/06-9/15/06
- Ground check 2005 sites: 1/1/06-4/15/06
 - Ground check 2006 sites: 9/15/06-12/30/06
- ii. Pheromone trapping @ mills conducted 6/15/06-9/15/06
- Mill visits/ inspections: Year round, on- going/ sporadic.
- d. Taxonomic services – None used.
- e. Benefits and results of survey -
- i. GM distribution tracked.
- Verification/adjustment of boundaries of Regulated Zone to incorporate those regions of the Transition Zone that are now harboring permanent GM populations; thereby minimizing the risk of inadvertent artificial spread by commerce of GM.
- ii. Safe, legal markets provided for regulated host material.
- Monitoring system in place to track movement of potentially infested host material.
 - Compliance Agreements in place allowing monitoring for potential establishment GM @ processing facilities outside regulated area.
- f. Compare actual accomplishments to objectives established for the period –

- i. Scouting of 2005 high catch trap sites completed before 4/15/06.
 - Pheromone trapping conducted: 289 traps (20% over negotiated target) were deployed in the transition zone, with a special focus in southern Aroostook County, before moth flight period. Traps were also placed at all mills, which had gypsy moth Compliance Agreements. All traps were collected in September and catch recorded.
 - MFS conducted follow-up site-specific detection survey for the presence/absence of gypsy moth life stages in/around sites where pheromone traps suggested potential established populations outside the currently regulated area. Populations were detected in 5 new townships.
 - All finds were sent to Me Dept of Ag for entry into NAPIS in accordance with national protocols.
 - MFS also provided Me Dept of Ag and USDA APHIS with maps and datasets defining the location and severity of pheromone trap catches.
 - MFS Cooperated with APHIS to evaluate and negotiate potential changes to the previous quarantine boundary. The regulated area was expanded include an additional 17 towns (final action: SPRO DA- 2007-04 February 16, 2007).
 - Administrative processes are currently underway to further expand the Regulated Zone to incorporate additional jurisdictions found infested during the fall 2006.

- ii. Currently 10 Compliance Agreements with 9 companies.
 - All sites were visited at least twice in 2006.
 - All were inspected:
 - No evidence that the companies were not abiding by the conditions of their Compliance Agreements.
 - Monitoring for potential GM on these 10 sites (pheromone traps and scouting) found no evidence of GM.
 - All shipments from commercial harvests in Maine accompanied by point of origin certificate.
 - No evidence of any certificate falsification at mills under Compliance Agreement
 - No evidence of receipt of regulated wood at mills without Compliance Agreement
 - Information on exotic, regulated pests and associated management regulations provided @ both the Portland and Bangor Flower/Garden shows.
 - MFS continued to provide:
 - A brochure for truckers and wood buyers that explains the various forestry quarantines that relate to wood movement in Maine.
 - Current MFS forestry quarantine-related materials to the Internet; this to be accessible via the MFS/FHM homepage.
 - A broad range of informational/educational material for use with the general public.

- g. If appropriate, explain why objectives were not met* - All targets met.

- h. Where appropriate, explain any cost overruns*- No cost overruns. All costs covered by grant or were part of grant match activities.

- i. NAPIS database submissions - All survey results provided to State CAPS coordinator for inclusion in NAPIS database.

3. European Larch Canker (*Lachnellula willkommii*) – MFS

The 2006 program is primarily addressing survey and monitoring of European larch canker (ELC) in and adjacent to the regulated portion of Maine. Ancillary efforts address support of the regulatory framework of the ELC quarantine. The specific achievements detailed in this mid year report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) -
 - i. Baseline monitoring population dynamics: Maine Forest Service (MFS) is collecting baseline measurements to assess evidence of possible intensification within or expansion from known infested stands, continuing specific investigations in and adjacent to selected existing known infestations.
 - ii. Baseline monitoring tree response/pest impact: The MFS is collecting ground data to assess 5-year changes in larch stocking and mortality across the regulated zone and adjacent area, conducting annualized remeasurement of a ground plot network on a 6000 acre equal area grid.
 - iii. Monitoring edge of regulated area: MFS plans to conduct ad hoc inspection activities in as-yet unregulated near-coastal areas where existing low-level infestations may have been overlooked.
 - iv. Monitoring/Managing potential artificial spread: MFS is focusing the majority of the cooperative monitoring and management effort on restricting opportunities for artificial spread of ELC.
- b. Rationale underlying survey methodology –
 - i. Although the Maine Forest Service (MFS) has seen little evidence in the past few years that ELC is expanding its range in Maine, we have seen evidence that infestation rates in individual stands is intensifying and expanding. This survey effort addresses that situation.
 - ii. There is very little pest risk/impact information for ELC in the eastern US. This monitoring effort is collecting a host response dataset to address this weakness.
 - iii. Although the MFS has seen little evidence in the past few years that ELC is expanding its range in Maine, this survey serves to recheck that premise and assure that no significant infestation of ELC has escaped the regulated area.
 - iv. The MFS believes that the primary threat of ELC spread is from human transport. These activities monitor host movement associated with commerce and manage such movement to minimize the risk of spread of ELC.
- c. Survey dates –
 - i. 4/28/06 to 5/5/06
 - ii. 4/17/06 to 11/16/06
 - iii. 9/5/06 to 9/29/06
 - iv. Year round, on- going
- d. Taxonomic services – None used.
- e. Benefits and results of survey –
 - i. Disease incidence intensifying on the two most coastal plots. Data from the plot network is beginning to quantify intertree/interstand spread rates.
 - ii. Preliminary cursory analysis of 2004 and 05 data showing no obvious trends. 2006 data augments sample size and tightens variance values. Data have been collected but no in-depth analysis yet done.

- iii. Verification of boundary of regulated area. Results to date show little indication of spread.
 - iv. Automatic system in place to contact all harvest operations within regulated area and notify of ELC regulations. This augmented by outreach to general public. Safe, legal market provided for potentially infested material. Monitoring system in place to track movement of potentially infested host material. Compliance Agreements in place allowing monitoring for potential establishment disease @ processing facilities outside regulated area.
- f. Comparison of actual accomplishments to objectives established for the period – All of target.
- i. All ELC monitoring plots measured: 6 plots resurveyed; 1 new plot established.
 - ii. Ground plots within and adjacent to the regulated zone, previously measured in 2001 were all remeasured to assess 5-year changes in larch stocking and mortality within and outside the regulated zone. As of Dec 12, 2006, sixty percent of the total plot network had been remeasured. The survey conducted in 2006 met negotiated objectives; the ground plot remeasurement data collection phase is on target for completion by Dec 2008.
 - iii. The new MFS forest pathologist conducted intensive site-specific survey for ELC at the industrial larch seed/scion orchard in Unity (no cultural activity reported from the Howland site in 2006). Beyond this specific intensive inspection, the only other checks consisted of casual observation of declining natural larch stands in Penobscot Bay area fairly late in the season. No evidence of ELC was detected.
 - iv. MFS staff reviewed quarantine regulations to assure that the currently designated regulated areas include and sufficiently buffer all known ELC infestations. In reviewing the various lists of regulated jurisdictions, it became apparent that there was a difference in the federal and state lists. MFS has been working with John Crowe, USDA APHIS PPQ in Bangor to develop a single up-to-date list and rectify the omissions. Although there was/is a difference in the current lists, the state-listed townships did fully capture all known ELC infestations in Maine (i.e. movement of potentially infected material from all infested townships was regulated, whether included on the federal list or not). 100% of commercial timber harvests from regulated area were sent an informational letter regarding ELC regulations and marketing options. A total of 397 such letters were sent in calendar year 2006.
 - Currently the MFS has Compliance Agreements with 8 companies outside the ELC Regulated Zone, allowing them to receive larch from within the regulated area. All sites were visited at least once in 2006. All were inspected:
 - No evidence that the companies were not abiding by the conditions of their Compliance Agreements.
 - Scouting while at these 8 sites found no evidence of ELC.
 - All shipments from commercial harvests in Maine accompanied by point of origin certificate:
 - No evidence of any certificate falsification at mills under Compliance Agreement
 - No evidence of receipt of regulated wood at mills without Compliance Agreement
 - Information on exotic, regulated pests (including ELC) and associated management regulations provided @ both the Portland and Bangor Flower/Garden shows.
- g. If appropriate, explain why objectives were not met – All targets met.

- h. Where appropriate, explain any cost overruns - No overruns. All costs covered by grant or were part of grant match
- i. NAPIS database submissions - All survey results provided to State CAPS coordinator for inclusion in NAPIS database.

4. Sudden Oak Death (*Phytophthora ramorum*) – MDAFRR/UMCE

Sudden Oak Death (SOD) (*Phytophthora ramorum*) is a quarantined plant disease that is established in parts of California and Oregon where it has killed many coastal oak trees. The disease impacts over 59 species of trees and shrubs, including oaks, rhododendrons and viburnum. Since 2004, SOD has been confirmed on nursery stock outside the quarantine area. These detections occurred after plants had already been shipped to many states, including Maine. Because this pest may now be widespread, a national survey has been implemented, in which Maine will participate for the third consecutive year.

- a. Survey Methodology –
 - i. MDAFRR - Surveyed according to the *P. ramorum* 2006 National Nursery Survey Manual. Following the manual protocol we had surveyed 25 of the proposed 20 sites. The 25 sites were comprised of 19 survey sites from 2004 and 6 trace forward sites from shipments received in 2006. Also followed the Confirmed Nursery Protocol after a positive sample was discovered.
 - ii. UMCE - Possible *Phytophthora ramorum* (Sudden Oak Death (SOD)) infected host plants were collected by staff from the Maine Department of Agriculture (MDA) and USDA/PPQ. These samples were collected during late spring/early summer. Samples were tested using Agdia Immunostrips, for the presence of *Phytophthora* spp.
- b. Rationale underlying survey methodology –
 - i. MDAFRR - Followed the manual to contribute data to the national survey.
 - ii. UMCE - Nurseries were chosen by MDAFRR and USDA/PPQ staff as were appropriate to fill in gaps left by previous SOD surveys.
- c. Survey dates –
 - i. MDAFRR - June 1, 2006 through July 10, 2006 surveyed 25 sites in 12 counties across the state.
 - ii. UMCE - The survey was in effect from June 1, 2006 through early August 2006.
- d. Taxonomic services –
 - i. MDAFRR - Samples were collected and sent to the University of Maine Lab (UMCE) and tested using Agdia's DAS ELISA test system for *Phytophthora*. Any ELISA + were sent to Cornell University for DNA extractions which will then be forwarded to USDA PPQ for PCR analysis.
 - ii. UMCE - *Phytophthora* positive samples were forwarded by overnight FedEx to the NPDP regional lab at Cornell. Cornell extracted DNA from these samples and either made PCR determination of the presence of the SOD pathogen or forwarded the DNA to the National Plant Germplasm and Biotechnology Laboratory in Beltsville, MD.
- e. Benefits and results of survey –
 - i. MDAFRR - By surveying host plants in nurseries, we were able to determine *P. ramorum*'s presence in Maine. 769 samples were taken from 133 different host

species. One sample of *Syringa vulgaris* from a trace forward notification was positive for *P. ramorum*.

- ii. UMCE - This survey has helped to guard against the consequences of accidental or intentional introduction of this agent through early detection practices. A total of 410 plants were tested from 25 nurseries. Of these samples, 43 tested positive for *Phytophthora* spp and one (from a trace forward survey) was determined as *P. ramorum* positive at Beltsville.

- f. Compare actual accomplishments to objectives established for the period –
 - i. MDAFRR - The survey was on schedule and objectives were met.
 - ii. UMCE - The accomplishments of this survey are in line with the stated objectives. A positive find of *P. ramorum* indicates that Maine may be at risk for this disease and that further survey work may be indicated.

- g. If appropriate, explain why objectives were not met* - Objectives have been met.

- h. Where appropriate, explain any cost overruns*- No cost overruns.

- i. NAPIS database submissions - All of the *P. ramorum* survey data have been entered into the NAPIS database.

D. Additional Pest Detection Surveys and News (CAPS related, though not CAPS funded):

- 1. Winter Moth (*Operophtera brumata*) (MFS/MDAFRR/PPQ)
- 2. Brown Marmorated Stink Bug (UMCE/MDAFRR)

1. Winter Moth (*Operophtera brumata*) – MFS/MDAFRR/PPQ

Staff from the Maine Forest Service (MFS), The Maine Department of Agriculture (MDAFRR), and USDA-APHIS-Plant Protection and Quarantine (PPQ) participated in a collaborative trapping program of the Northeast for the wintermoth, a devastating defoliator of many hardwood and ornamental plants. This is the second year in a row Maine has surveyed for this pest.

- a. Survey Methodology (trapping protocol) – Forty-four multi-pher traps each containing a wintermoth pheromone (Otis Lab, Cape Cod, MA), were placed at 44 wooded sites in 37 towns along 9 coastal counties. Traps were deployed mid-November 2006 and were checked every week until late-December 2006. Contents of traps were collected and counted every week.

- b. Rationale underlying survey methodology – Based on protocol established by Joe Elkinton at University of Massachusetts Amherst.

- c. Survey dates – mid-November to late-December 2006.

- d. Taxonomic services - University of Massachusetts Amherst.

- e. Benefits and results of survey – An infestation of wintermoth exists in Nova Scotia, Massachusetts, and Rhode Island. Surveying along Maine’s coastal communities and tourist destinations could help determine the pathway of this insect from Canada to Massachusetts. Results of suspect wintermoths sent to Umass have not been determined.
 - f. Compare actual accomplishments to objectives established for the period – N/A
 - g. If appropriate, explain why objectives were not met* - N/A
 - h. Where appropriate, explain any cost overruns*- N/A
 - i. NAPIS database submissions – No data to enter.
2. Brown Marmorated Stink Bug (BMSB) (*Halyomorpha halys*) – UMCE/MDAFRR

Staff from the University of Maine Cooperative Extension Pest Management Office (UMCE) were shown bugs collected from a recently purchased R/V trailer. These bugs were suspected to be BMSB and were sent to Cornell University for confirmation by Dr. E. Richard Hoebecke. Staff from UMCE visited the R/V dealership where the trailer was bought and found more BMSB in other trailers. All trailers came from the same manufacturer in Maryland and they were sent back. A trace forward yielded two more dealerships in Maine that receive trailers from the same manufacturer. One dealership was visited by staff from MDAFRR and the other was visited by staff from UMCE. Both dealerships were interviewed and trace-forward trailers were inspected. Two trailers from one of the dealerships had dead BMSB.

An article was written and published in the Maine Entomological Society newsletter (Appendix 3. Pg. 27) and situation updates were distributed to industry. (Appendix 4. Pg. 28)

Table 1. NAPIS Database submissions for 2006

COMMON NAME	SCIENTIFIC NAME	SURVEY METHOD	Counties	Sites* Plants	Traps	+	-
Leek Moth	<i>Acrolepiopsis assectella</i>	Trap;Wing Pheromone:Pherocon 1C	7		11	0	11
Metallic Beetle (Oak)	<i>Agrius biguttatus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Emerald Ash Borer	<i>Agrius planipennis</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Lined Click Beetle	<i>Agriotes lineatus</i>	Trap; Wire Worm Adult Beetle	8		11	0	11
Wireworm; A	<i>Agriotes obscurus</i>	Trap; Wire Worm Adult Beetle	8		11	0	11
Citrus Longhorned Beetle	<i>Anoplophora chinensis</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Asian Longhorned Beetle	<i>Anoplophora glabripennis</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Soybean Aphid	<i>Aphis glycines</i>	Sweep;50 Total;5 Sites	1	4		4	0
Soybean Aphid	<i>Aphis glycines</i>	Visual count; Unspecified number, Diagonal	1	4		4	0
Japanese Cedar Longhorn Beetle	<i>Callidiellum rufipenne</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Bamboo Borer Longhorned Beetle	<i>Chlorophorus annularis</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Swede Midge	<i>Contarinia nasturtii</i>	Trap;Delta Pheromone	8		16	0	16
Siberian Moth	<i>Dendrolimus superans</i>	Trap; Milk Carton Pheromone (Modified)	9		30	0	30
Siberian Moth	<i>Dendrolimus superans</i>	Trap; Blacklight 22 Watt	12		25	0	25
Brown Marmorated Stink Bug	<i>Halyomorpha halys</i>	Sweep;50 Total;5 Sites	1	4		0	4
Brown Marmorated Stink Bug	<i>Halyomorpha halys</i>	Visual count; Unspecified number, Diagonal	8	15		0	15
Old World Bollworm	<i>Helicoverpa armigera</i>	Trap;Internat.Pher.Ltd (lp Unitrap)	1		4	0	4
Old World Bollworm	<i>Helicoverpa armigera</i>	Trap;Heliothis Lure	1		4	0	4
Old World Bollworm	<i>Helicoverpa armigera</i>	Trap;Heliothis Lure	6		6	0	6
Longhorned Beetle; A	<i>Hesperophanes campestris</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Bark Beetle; A	<i>Hylurgops palliatus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Redhaired Pine Bark Beetle	<i>Hylurgus ligniperda</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Sixtoothed Bark Beetle	<i>Ips sexdentatus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60

Spruce Bark Beetle	<i>Ips typographus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Gypsy Moth (European)(Gm)	<i>Lymantria dispar</i>	Trap;Milk Carton Pheromone (Gyp Moth)	7		295	264	31
Gypsy Moth (European)(Gm)	<i>Lymantria dispar</i>	Trap;Delta Pheromone	1		30	26	4
Gypsy Moth (European)(Gm)	<i>Lymantria dispar</i>	General Pest Obs.; Lab Confirmed	3	4		4	0
Gypsy Moth (European)(Gm)	<i>Lymantria dispar</i>	Scientific Consensus/ General Agreement	10	10		10	0
Asian Gypsy Moth (Agm)	<i>Lymantria dispar spp.</i>	Trap;Milk Carton Pheromone (Gyp Moth)	1		5	0	5
Soybean Pod Borer	<i>Maruca vitrata</i>	Sweep;50 Total;5 Sites	1	4		0	4
Soybean Pod Borer	<i>Maruca vitrata</i>	Visual count; Unspecified number, Diagonal	1	4		0	4
Artiellia Root-Knot Nematode	<i>Meloidogyne artiellia</i>	Soil Sample;Pint;Var. Sites; 10/20+/50+	7	10		0	10
False Columbia Root-Knot Nema.	<i>Meloidogyne fallax</i>	Soil Sample;Pint;Var. Sites; 10/20+/50+	7	10		0	10
Sawyer Beetle; A	<i>Monochamus alternatus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Small White-Marmorated Beetle	<i>Monochamus sutor</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Mediterranean Pine Engraver	<i>Orthotomicus erosus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Cereal Leaf Beetle (Clb)	<i>Oulema melanopus</i>	Scientific Consensus/ General Agreement	1	1		1	0
New World Soybean Rust	<i>Phakopsora meibomiaie</i>	Visual;Count Unspecified Number;Diagonal	1	4		0	4
Australasian Soybean Rust	<i>Phakopsora pachyrhizi</i>	Visual;Count Unspecified Number;Diagonal	1	4		0	4
Sudden Oak Death; Ramorum Blgt	<i>Phytophthora ramorum</i>	P Ramorum National Nursery Survey	11	16582		0	16582
Sudden Oak Death; Ramorum Blgt	<i>Phytophthora ramorum</i>	P Ramorum USDA Trace (Forward/Back)	5	936		1	935
Sudden Oak Death; Ramorum Blgt	<i>Phytophthora ramorum</i>	P Ramorum Confirmed Nursery	1	120		0	120
Twotoothed Bark Beetle	<i>Pityogenes bidentatus</i>	Trap;Lindgren	1		3	1	2
Sixtoothed Spruce Bark Beetle	<i>Pityogenes chalcographus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Oak Ambrosia Beetle	<i>Platypus quercivorus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Japanese Beetle (Jb)	<i>Popillia japonica</i>	Trap;Japanese Beetle Floral Lure Strip	1		10	0	10
Chrysanthemum White Rust (Cwr)	<i>Puccinia horiana</i>	General Nursery Inspection	12	27		0	27
Geranium S. Bacterial Wilt	<i>Ralstonia solanacearum r3 b2</i>	General Pest Obs.; Lab Confirmed	14	127		0	127

Geranium S. Bacterial Wilt	<i>Ralstonia solanacearum</i> r3 b2	General Nursery Inspection	5	138500		0	138500
Bark Beetle; A	<i>Scolytus schevyrewi</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Steelblue Woodwasp [European]	<i>Sirex noctilio</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Steelblue Woodwasp [European]	<i>Sirex noctilio</i>	Trap;Lindgren	13		45	0	45
Longhorned Beetle; A	<i>Tetropium castaneum</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Brown Spruce Longhorned Beetle	<i>Tetropium fuscum</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Lesser Pine Shoot Beetle	<i>Tomicus minor</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Pine Shoot Beetle (Psb)	<i>Tomicus piniperda</i>	Trap;Lindgren	16		154	0	154
Pine Shoot Beetle (Psb)	<i>Tomicus piniperda</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Pine Shoot Beetle (Psb)	<i>Tomicus piniperda</i>	Scientific Consensus/ General Agreement	3	5		2	3
Exotic Bark Beetle; An	<i>Trypodendron domesticum</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Horntail (Wood Wasp)	<i>Urocerus gigas gigas</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Ambrosia Beetle; An	<i>Xyleborinus alni</i>	National Exotic Woodborer/Bark Beetle	8	60		49	11
Scolytid Beetle; A	<i>Xyleborus atratus</i>	Trap;Lindgren	1		6	2	4
Redbay Ambrosia Beetle	<i>Xyleborus glabratus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Bark Beetle; A	<i>Xyleborus intrusus</i>	Trap;Lindgren	1		3	1	2
Scolytid Beetle; A	<i>Xyleborus seriatus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Scolytid Beetle; A	<i>Xyleborus similis</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Longhorned Beetle; A	<i>Xylotrechus altaicus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Longhorned Beetle; A	<i>Xylotrechus hircus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60
Longhorned Beetle; A	<i>Xylotrechus rusticus</i>	National Exotic Woodborer/Bark Beetle	8	60		0	60

Appendix 1.

Maine Department of Agriculture, Food & Rural Resources 2006 Cooperative Agricultural Pest Survey (CAPS) Program Exotic Vegetable Pests

LEEK MOTH *Acrolepiopsis assectella*



The leek moth is native to Europe where it is a serious pest of onions and leeks. It was first discovered in North America in the Ottawa area of Ontario, Canada in 1993. It has not been detected in the continental United States, but it is an established pest in Hawaii.

The leek moth is known to attack *Allium spp.*, including onion, leek, garlic, shallot, and chive. Adult moths emerge in the spring and lay up to 100 eggs on the lower surfaces of leaves. Hatched larvae mine through the leaves as they progress inward toward the heart of the plant, occasionally attacking the bulb and the stem. Most plant damage is reported at the perimeter of a field. Symptoms of leek moth infestation include mining and pinhole damage on inner leaves. Plants may look unsightly and distorted because of this damage and rotting may occur.

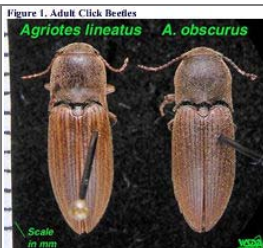
SWEDE MIDGE *Contarinia nasturtii*



The Swede midge is a tiny gall midge that is native to Europe and southwestern Asia. It was first discovered in North America in the summer of 2000 in Ontario, Canada. In 2004 it was detected for the first time in the United States in Niagara County, New York.

Swede midge attacks cruciferous crops such as broccoli, cabbage, cauliflower, Brussels sprouts, kale, and radishes. In Europe and Ontario, it has caused severe losses to these crops. Adult midges emerge from overwintering pupae in the spring, and lay clusters of eggs on young plants near the growth point. Larvae hatch within days and feed on the plant tissue. Depending on temperature, the Swede midge may have up to 4 overlapping generations. All stages of the Swede midge are very small and its presence may not be easily detected. Symptoms of Swede midge infestation look similar to other common problems of cruciferous crops. Some things to look for are swollen and distorted leaf stalks, blind heads, brown scarring in the growing tips, crumpled heartleaves, and multi-headed plants.

EXOTIC WIREWORMS *Agriotes lineatus*, *A. obscurus*

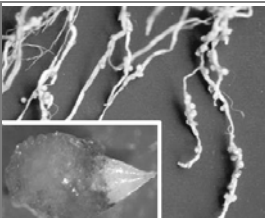


The larvae (wireworms) of two species of European click beetles, *Agriotes lineatus* and *A. obscurus*, are considered among Europe's most destructive insects of cultivated plants. They have been known to be present in British Columbia, Nova Scotia and other Maritime Provinces of Canada since 1950, and have more recently been discovered in Washington and Oregon.

Agriotes wireworms have a broad host range, attacking strawberries, legumes, ornamentals and most vegetables, including potatoes and cole crops. In the spring, wireworms bore into seeds or underground stems of seedlings and transplants, and later in the growing season, bore tunnels in developing roots, tubers or bulbs. Wireworms can live up to 6 years in the soil before pupating and emerging as adults.

Their favorite habitat is grassland or pasture, where they will feed on plant roots and other organic material while building up their populations. When a field is replaced with another crop, the wireworms from the soil will attack the crop.

ROOT KNOT NEMATODES *Meloidogyne fallax*, *M. artiellia*



The British root-knot (*Meloidogyne artiellia*) and the false Columbia root-knot (*M. fallax*) nematodes are important pests of many crops including cereals, legumes, crucifers, potatoes and other vegetables. Both nematodes occur in parts of Europe, Africa and Asia, and are not known to occur in the United States.

Root-knot nematodes are microscopic pathogens that live in the soil and underground plant parts where they penetrate host roots and extract the plant's nutrients with specialized mouthparts. This feeding results in gall formation on the roots. Above ground symptoms can include leaf chlorosis and plant stunting. In root vegetables, pimple-like galls may be evident on the tuber and deformation can occur rendering the vegetable unmarketable.

OLD WORLD BOLLWORM *Helicoverpa armigera*



Old world bollworm (*Helicoverpa armigera*) is an important pest of a variety of crops in Africa, Asia, Australia, and Europe. It has caused severe economic loss to corn, cotton, cowpeas, soybeans and tomatoes in these countries. It is closely related to the corn earworm (*Helicoverpa zea*), an important pest of corn in Maine. Old world bollworm is not known to be established in the United States.

Old world bollworm has a broad host range and has been reported on a variety of vegetables, cereals, fruits (strawberry), flowers (e.g. chrysanthemum), and forest trees. Adults emerge from the ground in the spring, feed on nectar, mate and lay eggs on host plants within 6 days of emergence. Larvae hatch within 2 weeks and bore into the fruiting structures of host plants where they will feed and complete development. Up to 3 generations are expected to be achieved annually in New England.

Appendix 2.

For the Maine Vegetable and Small Fruit Grower's Association (MVSFGA) newsletter:

Brown Marmorated Stink Bug and other Foreign Invaders. With the usual problems posed by insects, weeds, plant diseases, and vertebrate pests, who needs foreign invaders from 'away'? Unfortunately, global commerce and travel, plus natural pest movement (often aided by storms), often bring new invaders to our doorstep. Early pest detection is the key to preventing their establishment and spread. The Maine Department of Agriculture's Cooperative Agricultural Pest Survey (CAPS) is designed to look for high risk foreign pests with the aim of preventing their establishment and spread.

In 2006, we monitored for a variety of nematodes, insects and plant diseases at 10 vegetable farms throughout the state. The good news is that we did not find any of the target pests in the survey. Unfortunately, one new fruit and vegetable pest, the brown marmorated stink bug, was recently found hitchhiking in travel trailers purchased from MD by a Bangor dealer. All infested trailers were sent back to MD, hopefully taking all the bugs back with them but growers will want to keep a vigilant eye out for it next spring. This pest feeds on a variety of fruit crops (including peaches, apples, grapes, raspberries), vegetables (such as snap beans, soybeans, cucurbits and tomatoes) and ornamentals (crabapples, maples, Juneberry, holly) causing catfacing. Growers should be on the look out for this mottled brown stink bug (see <http://www.rce.rutgers.edu/stinkbug/> for photos and info). Bangor area next spring but not until were be scouting and setting up traps to detect the swede midge, a crucifer pest, and the leek moth, a pest of onions, leeks, and garlic. These two non-native pests pose a serious threat to Maine vegetable production. The leek moth (*Acropepiopsis assectella*) is serious European pest that attacks crops in the onion family, including leek, onion, green onion, and garlic. It has been found in Ontario and is frequently intercepted in the continental U.S. at points of entry from Canada. The Swede midge (*Contarinia nasturtii*) is also a significant pest of cole crops in Europe that has become established in Ontario. Research shows that the main contributor to swede midge infestation is lack of crop rotation.

The potential for entry of these two pests into the U.S. is considered to be high. A survey and outreach effort concerning the leek moth and Swede midge will be conducted at vegetable farms across the state to look for and to raise the level of awareness about these pests. The survey will be conducted on ten farms during the growing season in 2004. If you are interested in participating with this survey, contact Kathy Murray (287-7616) or Karen Coluzzi (287-7551). More information about swede midge is available on-line at: <http://www.gov.on.ca/OMAFRA/english/crops/facts/03-035.htm> and <http://ceris.purdue.edu/napis/pests/swmdg/>. On-line information about the leek moth can be found at: <http://www.gov.on.ca/OMAFRA/english/crops/facts/leekmoth.htm>.

A third non-native vegetable pest to be on the look out for is the brown marmorated stink bug. A native of Eastern Asia, this bug has been found infesting fruits and soybeans in Pennsylvania. The USDA is coordinating efforts to detect and prevent further spread of this insect. More information and photos of this insect can be found at: <http://www.dcnr.state.pa.us/forestry/leaflets/stinkbug.htm>

Appendix 3.

MES Article 12/15/06

The Brown Marmorated Stink Bug

Karen Coluzzi

You know that long-legged bug that languidly lingers across walls, windows and whatever else it will cling to - the one that magically appears inside your house at the first sign of summer's end? The one that everyone asks about, and is duly impressed when you exclaim – oh, that's the Western conifer seed bug? Well, it may have some competition, or a friend, depending on how things play out.

Another stinky Hemipteran has made its way into the United States and has been annoying homeowners in parts of Pennsylvania since 1996. Over the past ten years, it has increased its range, mostly around the mid-eastern seaboard (NJ, MD, DE, VA), but also has been reported out in Oregon. This new little stinker is the Brown Marmorated stink bug (BMSB), *Halyomorpha halys* (Hemiptera: Pentatomidae) and, although it flies well, likely spreads by hitchhiking on vehicles and through commerce. In fact, just last month, a woman living in Augusta, ME reported strange bugs emerging from her newly bought trailer. Clay Kirby and Jim Dill, our fearless extension entomologists, inspected other trailers at the dealership by looking under seat cushions and in storage compartments and found more bugs. They suspected these to be *Halyomorpha halys*, and suggested that the woman and the dealership return the trailers to its distributor. Coincidentally, the distributor is located in a BMSB-infested town in Maryland. Rick Hoebecke, insect taxonomist extraordinaire at Cornell University, later confirmed that these bugs were indeed *Halyomorpha halys*.

Like the Western conifer seed bug, BMSB overwinters as an adult, seeking warm, cozy, protected areas in which to hibernate. In spring, the adults emerge, mate and lay eggs on the undersides of leaves. There are five nymphal stages, and in Pennsylvania and presumably the northeast, not more than one generation is completed in a year. Young nymphs are yellowish with red and black markings, and the older nymphs look similar to adults. Adult BMSB are approximately 17 mm long and have a characteristic alternating dark and light banding on the last two antennal segments. They can also be distinguished from a look-alike native of the *Brochymena* genus by the smooth pronotal margin.

Should we be worried if BMSB becomes established in Maine? Is it merely just a nuisance pest like its distant cousin, the Western conifer seed bug? The good news is, like the seed bug, BMSB is not harmful to humans. Unfortunately, unlike the seed bug, BMSB is a significant fruit tree and legume pest in its home range of China, Japan, South Korea and Taiwan. In Pennsylvania and New Jersey, where BMSB presumably has resided the longest in the U.S., considerable plant damage has been reported. Fruit crops are especially vulnerable as the insect's sucking mouthparts cause pitting and discoloration of the flesh rendering the produce unmarketable. The host list in the United States is expanding as BMSB has been spotted feeding on leaves of butterfly-bush (*Buddleia spp.*), honeysuckle (*Lonicera spp.*), *Rosa rugosa*, and raspberry (*Rubus spp.*). Because the stink bug initially feeds on common landscape ornamentals, it is likely that homeowners will be the first detectors. No one really knows how much damage this stink bug would cause to our plant life, but do we really want another unwanted houseguest, especially a stinky one? If you suspect you've seen the Brown Marmorated stink bug, please contact the Department of Agriculture, 287-7551.

Appendix 4.

Update on the Brown Marmorated Stink Bug (*Halyomorpha halys*)

In mid-November, 2006, the brown marmorated stink bug was found in some trailers that were shipped to Maine (Bangor area) from Williamsport, MD. Entomologists at the University of Maine Pest Management Office confirmed the identification and encouraged the R/V dealership in Maine to return the trailers to Maryland. It is unknown whether any bugs escaped.

Adults become active in the spring when they will mate and lay eggs. The young nymphs will feed on undersides of leaves of many plants, especially ornamentals, fruit trees and soybeans. In the fall, adults will seek shelter in homes and buildings to overwinter. Recent research in Pennsylvania and New Jersey report significant plant damage and yield loss to fruit trees.

Please contact the Maine Department of Agriculture at (207) 287-3891 if you notice an unusual bug in your home or on your plants.

