
Cooperative Agricultural Pest Survey (CAPS)

Annual Reports Colorado FY2006

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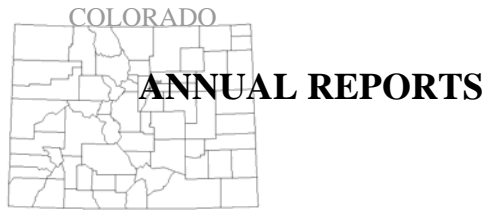




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Summary: This document contains annual reports for the 13 CAPS projects for FY2006. Three CAPS projects were coordinated by Colorado Department of Agriculture (CDA), two jointly by CDA and Colorado State University (CSU), seven by CSU, and one by the Colorado State Forest Service (CSFS). APHIS-PPQ conducted two additional trapping surveys, and contributed the resulting data to the NAPIS database.

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CORE Project

1. CAPS CORE Project

Colorado Department of Agriculture - Plant Industry Division
Project Coordinator: Kara Hempy-Mayer

Training. Training materials for the Exotic Wood Associated Pest, Exotic Fruit Pest, and *Phytophthora ramorum* surveys were prepared for state surveyors, which included a summer technician and state inspectors. These included pest descriptions and life cycles for the Wood and Fruit Pest surveys, while the *P. ramorum* materials included survey protocols and symptom descriptions. A one-hour training was conducted with the state inspectors for the *P. ramorum* survey. As the SSC I attended trainings for ISIS in Minnesota in March, but due to technical difficulties we were not able to incorporate ISIS into the data collection/entry portion of these projects this year. In August I attended a GIS training class in order to apply ArcGIS to our map-making activities, for both planning purposes and outreach, and have since entered some survey site locations into the map-making program to assist in site selection for next season. Along with the State Forest Entomologist and several PPQ representatives, I attended an emerald ash borer workshop in October of 2006 in Michigan, where we learned how to do destructive tree sampling, set tree traps, and plan for a potential emerald ash borer event. In January 2007, I attended the Invasive Species Research Forum in Annapolis, Maryland, along with the State Forest Entomologist. This provided valuable information on emerald ash borer and Sirex woodwasp updates, updates on other research pertaining to invasive pests, and opportunities to share information among foresters and other experts.

Coordination of Cooperators and Meetings. As the coordinator for the state's portion of the Exotic Wood and Fruit Pest Surveys, as well as for the *P. ramorum* National Nursery Survey, I hired a summer technician to conduct the Exotic Wood and Fruit Pest Surveys, helped conduct site selection, and prepared training materials. I also coordinated site selection with CSU and PPQ for the trap surveys, and with PPQ for the *Phytophthora ramorum* Trace Forward Surveys. For CSU and CSFS cooperators, I prepared spreadsheets to assist with data collection

for eventual submission to NAPIS, to ensure all the necessary information was gathered. As the potato cyst nematode survey developed over the course of the year, I helped prepare a financial plan and survey proposal for Colorado, and helped in the planning and coordination of this survey. It is now expected to take place in the spring and fall of 2007. The State CAPS Committee (SCC) has met three times over the year, for survey planning, pest assessment and proposal planning, and planning for the expansion of the committee into a State Pest Committee.

Fund Distribution. Funds have been distributed through CDA to CSU with no problems. CSFS has received funds directly from PPQ, as in previous years. Clarification of transfers between direct cost categories by the project coordinators was needed in the fall, for which I drafted a letter that was sent to CSU.

Cooperator and Public Outreach. During the winter, I attended a Forest Health Discussion at CSU organized by Dr. William Jacobi, and an Urban Foresters Pest Meeting at the same location. In February I attended an Emergency Pest Response meeting organized by Dr. Jacobi. From this latter meeting, a plan was made to develop a new State Pest Committee, with the purpose of sharing information on survey, detection, control, response, and outreach concerning all pests of concern to Colorado. Since that time, I've been compiling a list of potential committee members—including land management agencies, industries, and regulatory agencies—and held a meeting with the SCC in December to discuss the charter and other details for this new group. We'll be meeting in the spring of 2007 with the land management agency members to discuss firewood issues for the upcoming camping season, with a larger meeting potentially scheduled for fall of 2007. In April 2006, I attended a meeting of the Great Plains Tree Pest Council in Lincoln, Nebraska, and helped present the exotic pest/firewood poster we developed for Colorado. I gave a presentation on the role of the Colorado Department of Agriculture in both pest detection and response to the Colorado chapter of the International Society of Arboriculture in June of 2006. In October of 2007, I gave a presentation on biocontrol to a local Home Owners Association. In January of 2007, I attended the Denver ProGreen Expo, as well as the Colorado Farm Show, and manned the booth, arranged to show an emerald ash borer introductory video, answered questions, and handed out brochures and booklets.

Outreach materials we've developed for this year include the exotic pest/firewood poster which we've distributed with help from CSU and US Forest Service (USFS) cooperators to

USFS campgrounds in all National Forests along the Front Range, National Park Service (NPS) campgrounds, and State Park campgrounds, as well as offices of the various agencies. CSU extension agents and a local urban forester also requested posters to hand out, and we'll be including the poster as an insert in NPS mailings to visitors this spring. In addition, I developed Exotic Pests of Trees and Shrubs and Exotic Pests of Field Crop booklets, which are being mailed along with nursery license information to nursery dealers, nursery growers, sod growers, and landscape contractors. We are also handing these out at the various shows. I plan on developing an Exotic Pests of Fruit booklet in the upcoming months. These booklets highlight some of the exotic pests we are targeting in our state surveys, most of which are currently present in the United States, Colorado State Parks, and a local urban forester. I developed a flip-book of exotic pests of concern to Colorado for the CDA booth at the Colorado State Fair. We've added a CAPS page to the CDA website to provide background information and information on firewood pests, and hope to expand this soon to include reports, maps, and pest links. In cooperation with the Colorado Division of Wildlife (DOW), a notice to out of state hunters to buy firewood in Colorado was posted to the DOW website. We hope to do the same with State Parks in the upcoming season.

In December, we developed a newspaper announcement directed at Colorado citizens to raise awareness of the possible risks of transporting firewood and spreading harmful pests. It's appeared in the Colorado Springs, Grand Junction, Denver Post, Rocky Mountain News, and The Coloradoan in January and February. It's been well-received, and led to a news story on the issue for which I gave an interview by the KOAA news station—the NBC television affiliate for the Colorado Springs and Pueblo area. The newspaper announcement is also to be made into a poster, to be presented at the Colorado Ag Outlook Forum in February. These outreach efforts are increasing awareness of both the firewood and general exotic pest issues.

Rapid Response. A group from CDA and PPQ participated in an Emerald Ash Borer Full Scale Exercise in Broomfield, Colorado, to test our use of the Incident Command System. I acted as the Operations Chief for the exercise. Work has also been done on a Colorado Emergency Response Plan, which will hopefully be finalized in the coming year.

Data Management. To date, I have received all data from CAPS surveys and have entered it into NAPIS, with the assistance of one of our CSU cooperators. Additional data obtained from the CDA from a Japanese beetle survey has also been entered.

Priority Pest List, Pest Risk and Pathway Analysis. The SCC put together a State Priority Pest List for FY2006. We will be revising the list in the spring of 2007, and hope to get input from the members of the State Pest Committee for this revision and for planning survey projects for FY2008. Pest risk and pathway analysis will be important in the development of the pest list, and these will be strengthened this year by increased analysis of the available federal databases, such as the Interception, EAN, and Violation databases, with assistance from our Pest Survey Specialist.

Survey and Biocontrol Projects

The following projects have been successfully completed and all data has been entered into the NAPIS database. Official diagnostics for the majority of projects were carried out at the Department of BioAgricultural Sciences and Pest Management at Colorado State University. Boris Kondratieff, systematic ecologist with CSU, conducted insect identifications, and Tamla Blunt with the Identification and Diagnostic Service Clinic conducted pathogen diagnostics. Further pathogen diagnostics were carried out as needed by the USDA labs in Olney, TX (for diagnosis of Karnal bunt) and Beltsville, MD (for diagnosis of *P. ramorum* using PCR).

2. General Weed Survey and Biocontrol Program

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Eric Lane and Dan Bean

Objective:

The objective of this program are as follows: to survey, identify and map infestations of exotic, invasive weeds throughout Colorado; to produce biocontrol agents at the State Insectary or to locate and collect agents from the field for the purpose of redistribution to sites in Colorado and surrounding states; to provide biological control agents to the appropriate federal, state and local agencies; to cooperate with these agencies in biocontrol implementation programs; to assess the establishment and effectiveness of biocontrol agents against exotic noxious weeds and to make these results available to the appropriate federal, state and local agencies.

Methods and Results:

State distribution maps are currently being developed for two list B Colorado noxious weed species, houndstongue (*Cynoglossum officinale*) and perennial pepperweed (*Lepidium latifolium*), based on survey information received by Colorado Counties in the fall of 2006. These maps assist with the development of statewide management plans as well as determining statewide distribution and abundance for selected species. The selected list B species for 2006 mapping included: black henbane, diffuse knapweed, oxeye daisy, and yellow toadflax. List A species' distribution and abundance maps are continuously updated on a year to year basis.

Thirteen biological control (biocontrol) agents were released for twelve weed species during the 2006 field season (Table 1) (Figs. 1a-1b). Among the highest releases were *Aceria malherbae* mites and *Tyta luctuosa* moths for field bindweed, *Aphthona* beetles for leafy spurge, and *Larinus minutus* weevils for diffuse and spotted knapweed. Biocontrol agents for tamarisk, puncturevine, yellow and Dalmatian toadflax, purple loosestrife (released in Utah, Nevada and Oregon in collaboration with the Pyramid Lake Paiute Tribe and USDA APHIS) musk thistle, and Canada thistle were all released as well this year.

Table 1. Release numbers for biocontrol agents for 2006.

Target Weed	Biocontrol Agent	Number Released
Leafy spurge	<i>Aphthona spp.</i>	293,582
Field bindweed	<i>Aceria malherbae</i>	186,000
	<i>Tyta luctuosa</i>	30,346
Tamarisk	<i>Diorhabda elongata</i>	102,000
Diffuse & spotted knapweed	<i>Larinus minutus</i>	16,800
	<i>Cyphocleonus achates</i>	848
Puncturevine	<i>Microlarinus lareynii</i>	4,350
Canada thistle	<i>Urophora cardui</i>	1,935
Yellow & Dalmation toadflax	<i>Calophasia lunula</i>	1,833
Purple loosestrife	<i>Galerucella spp.</i>	315
	<i>Hylobius transversovittus</i>	100
Musk thistle	<i>Trichosirocalus horridus</i>	100

Recovery data has been summarized for *Aphthona* spp., of which approximately 20,582 beetles were recovered in surveys at 20 sites across four counties, indicating good establishment (Fig. 1a). Many more were recovered (as were *Larinus minutus* and other agents) for redistribution purposes. Sweep net surveys were made in Rio Blanco, Boulder, Adams, Larimer and Jefferson Counties in search of collectable populations of *Oberea erythrocephala*, a long horned beetle used for leafy spurge biocontrol. One site was located in Jefferson County that had collectable populations of the beetle. Beetles had been released at the site 12 years ago and the site had been periodically monitored by Debra Eberts, U S Bureau of Reclamation. It is anticipated that the site will be used in 2007 for a limited collection and redistribution program.

The Insectary collaborated with USDA APHIS in the collection and redistribution of *Diorhabda elongata* in the western US. *Diorhabda elongata* were collected from field sites in Mineral and Pershing Counties in western Nevada. Collections were made in mid May by personnel from USDA APHIS and the CDA (Palisade Insectary). Beetles were held at the Insectary and shipped to sites in 8 states, at the request of USDA collaborators in those states (Table 2).

Table 2. Totals of *D. elongata* shipments, by state, for 2006 (APHIS site releases only)

Colorado	14,000
Oregon	*14,000
Wyoming	20,000
South Dakota	22,000
Montana	8,000
Washington	9,000
Nebraska	7,000
Kansas	6,000

Total 100,000

*9,000 of these were taken to Oregon directly by Gary Brown, USDA APHIS

Beetles were also collected from a Bureau of Reclamation field site below Lake Pueblo (Pueblo County) Colorado. They were used to start a colony at the Insectary. This “Colorado adapted” population was used to establish a field population near Gateway, Colorado, on the Dolores River (Mesa County). The site was set up using the standard APHIS monitoring protocol.

Total number of tamarisk biocontrol monitoring sites established in 2006 (APHIS protocol)

Mesa County- 4

Montezuma County- 3

Monitoring other weed biocontrol projects

A monitoring protocol developed in collaboration with Sound Science LLC was implemented for leafy spurge biocontrol monitoring and is being tested for Dalmatian toadflax and Russian knapweed monitoring. The protocol was designed for perennial rangeland weeds.

Total number of leafy spurge monitoring sites established in 2006

Rio Blanco County- 19

Boulder County- 3

Total number of Russian knapweed sites established

Montezuma County- 1

Dalmatian toadflax monitoring sites established

Mesa County- 2

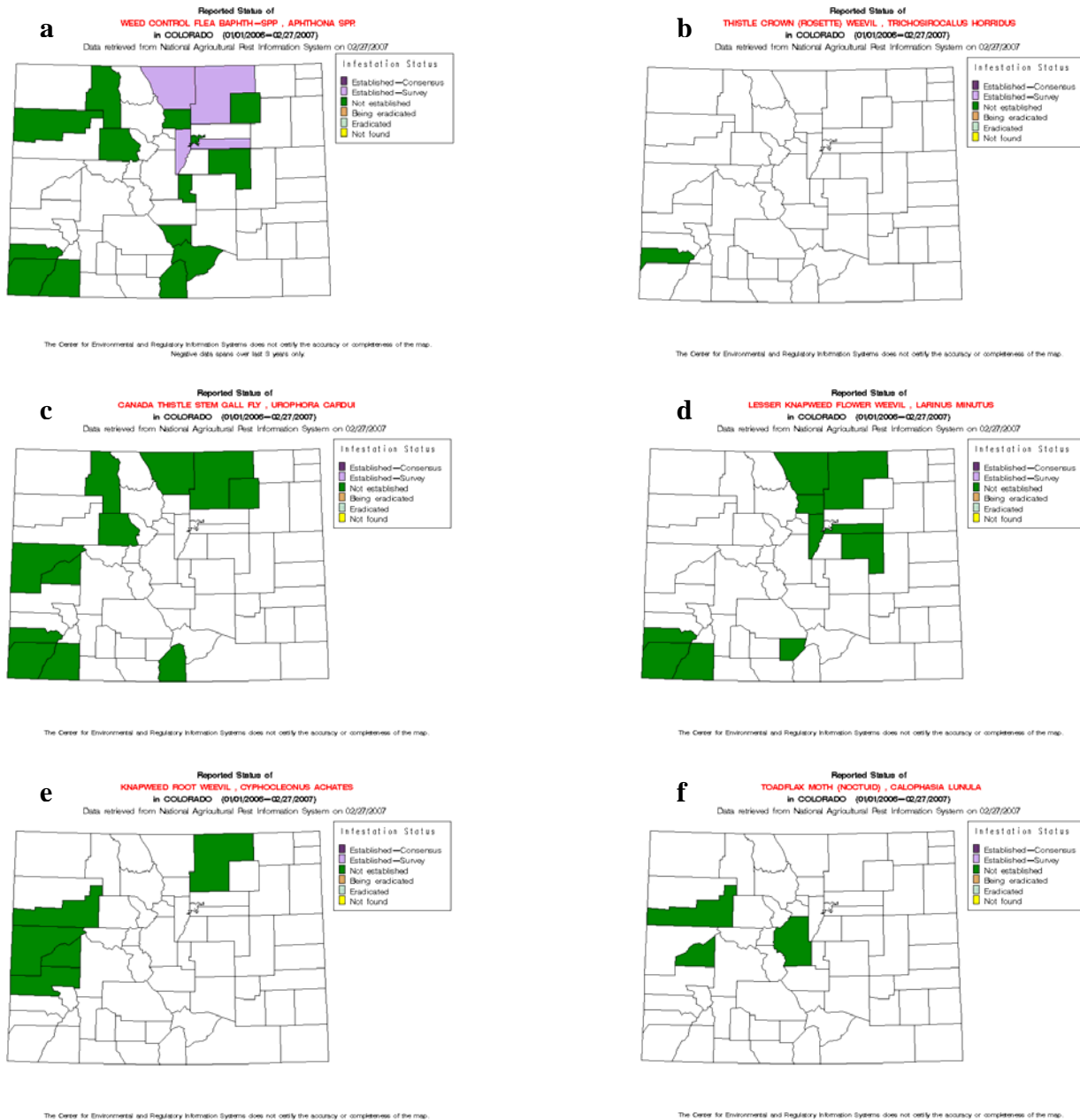
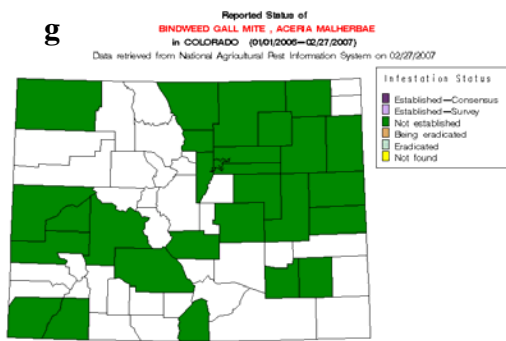
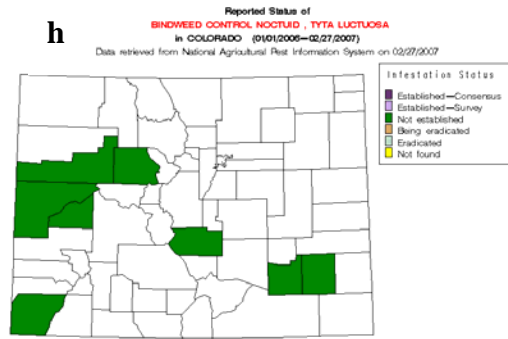


Figure 1a. Green and purple counties indicate those counties in which a) *Aphthona* spp., b) *Trichosirocalus horridus*, c) *Urophora carduii*, d) *Larinus minutus*, e) *Cyphocleonus achates*, and f) *Calophasia lunula* were released and recovered, respectively, in Colorado in 2006.



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.



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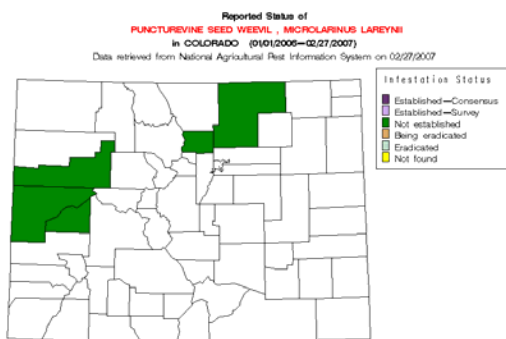


Figure 1b. Green and purple counties indicate those counties in which g) *Aceria malherbae* and h) *Tyta luctuosa*, i) *Microlarinus lareynii*, were released and recovered, respectively, in Colorado in 2006.

3. Cereal Leaf Beetle Biocontrol Program

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Eric Lane and Dan Bean

Objective:

The first objective of this project was to continue the production, processing and shipment of approximately 25,000 *Anaphes*-parasitized CLB eggs per season for use by collaborators in establishing *Anaphes flavipes* in the western US. The second objective is to supply CLB eggs to the Pullman, WA quarantine facility for rearing new egg parasitoids better suited to the western US and to assist in any way needed in the culturing and establishment of new agents. The third objective is to develop more efficient methods for mass rearing CLB egg parasitoids.

Methods and Results:

We began receiving adult cereal leaf beetles (CLB: *Oulema melanopus*) from our cooperators on 3/15/06. These were used to obtain eggs that were then parasitized by the wasp *Anaphes flavipes* that had been cultured during the winter on the eggs of the three lined potato beetle. The parasitoids made a smooth and rapid transition to cereal leaf beetle eggs, their natural host. We continued to receive adult CLB from cooperators in North Carolina, Oregon, Washington, and Utah and during the season we received a total of 28,261 adult CLB which were shipped to us from mid March until late June, 2006. These laid eggs that were used to culture the parasitoids and to produce and ship 21,096 parasitized eggs. Eggs were packaged into release cartons and shipped to cooperators in Oregon and Washington. Idaho did not receive parasitized eggs this year. In June, toward the end of the season, we received about 250 field collected and parasitized eggs from our cooperators in Wyoming. These were incorporated into our culture. We also received 1,660 adult CLB in July, 2006. These will be used for ongoing experiments in which we subject them to cold temperatures and break diapause.

4. Cereal Leaf Beetle Survey

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Cereal leaf beetle found: Yes, low levels

Objective:

The purpose of this project was to conduct a general trapping survey for *Oulema melanopus* (cereal leaf beetle) in Colorado. This pest is a threat to Colorado cereal commodities, chiefly wheat. Data obtained from a detection survey will be useful for purposes of eradication and planning of biocontrol efforts.

Methods and Results:

This survey was conducted by David James, Ron Meyer of Golden Plains Extension, and Bob Hammon of Mesa County Extension, who has notable knowledge and experience with cereal leaf beetle. Cereal leaf beetle was first detected by Bob Hammon in Colorado in 2001 in Routt County. The location of sites was adjusted from the work plan based on a risk assessment by Mr. Hammon. Visual and sweep surveys were conducted in 15 counties (Table 3) (Fig. 2). A minimum of 200 feet was walked in each field for the visual surveys, and at least 100 sweeps

were done in the same fields or 300 sweeps if feeding signs were present. All surveys were done in late May/early June when CLB is most likely to be present.

CLB larvae were found at low levels at one site in Routt County (Fig. 2). This is the first season since 2002 that CLB was found in Colorado. With the finding this year, it has been designated as established By Dr. Lou Bjostad and David James in Routt County.

Table 3. Summary of site numbers and results for Cereal Leaf Beetle Surveys.

<u>County</u>	<u># Sites</u>	<u>No. Positive Catches</u>
Larimer	1	0
Weld	1	0
Yuma	2	0
Kit Carson	2	0
Cheyenne	2	0
Washington	2	0
Delta	4	0
Dolores	4	0
La Plata	4	0
Mesa	5	0
Moffat	2	0
Montezuma	4	0
Montrose	4	0
Rio Blanco	4	0
Routt	4	1

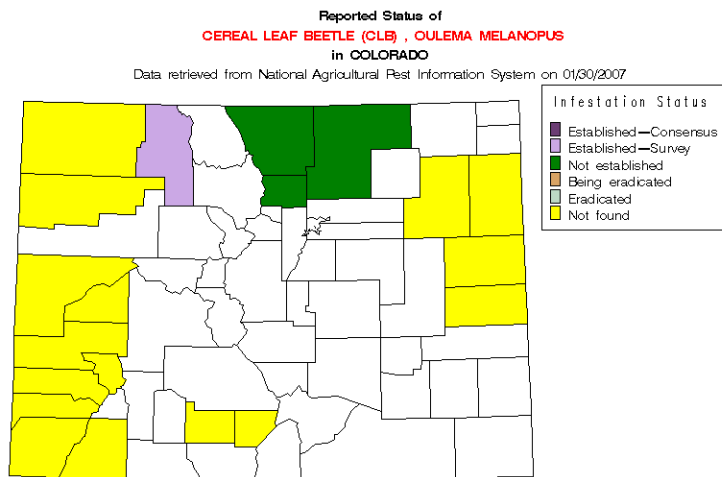


Figure 2. NAPIS map of counties surveyed in 2006 for cereal leaf beetle in Colorado.

5. Central Great Plains Regional Emerald Ash Borer Detection Survey

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management

Project Coordinators: Dr. William Jacobi

Emerald ash borer found: 0

Objective:

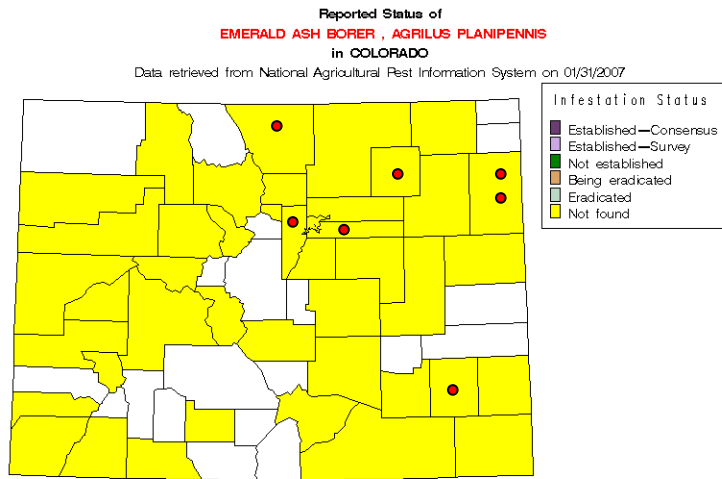
Emerald ash borer is currently causing severe mortality among all species of ash trees in the Midwest. If introduced to Colorado, it could cause the death of over 25% of landscape, windbreak trees. Green ash and white ash account for up to 70% of the trees in some communities. The value of these trees as wind breaks, natural areas along the Platte and Republican Rivers, urban communities throughout Colorado would be over 10 million \$ which is not counting removal and replacement costs of several million. The insect should have no problem establishing in many areas of Colorado. The main objective of this survey was to conduct an early warning system in the most likely locations that the insect would be introduced. A stressed ash trap tree emerald ash borer (*Agrilus planipennis*) detection survey was conducted in Colorado at seven locations by Dave Leatherman—retired Colorado State Forest Service entomologist. Trap trees were placed at campgrounds and near one distribution center, from June through August. Firewood posters and EAB information was distributed at all locations and six additional locations in Colorado.

Methods and Results:

Three donated green ash trees were placed at each location on June 12-19, 2006. The trees were 1.5-inch caliper in pots. Trees were visited and checked for borers on August 19 and 28, 2006. All trees were negative for emerald ash borer (Fig. 3). Trap-tree locations were at or near: (1) Distribution Center (Larimer County), (2&3) Two camp grounds at Bonny Lake State Park (Yuma County), (4) Jumbo Reservoir Campground (Morgan County), (5) John Martin Reservoir State Park (Bent County), (6) Chatfield State Park (Jefferson County), and (7) Cherry Creek State Park (Arapahoe County).

Publications Posted and Provided at:

1. Bonny Lake State Park
2. Jumbo Reservoir Campground
3. John Martin Reservoir Campground
4. Chatfield State Park Campground
5. Cherry Creek State Park- Campground
6. Trails West Campground- along I-70- Seibert
7. Buffalo Hill Campground- I-70 Sterling
8. Salida CO Forest Service Office
9. Fairplay, CO Forest Service Office
10. Salida, State DOW, Office
11. Fort Collins, DOW, Office



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
 Negative data spans over last 3 years only.

Figure 3. NAPIS map of Colorado counties surveyed for emerald ash borer in 2006. The • symbol represents the number of trap tree sites per county. Surveys in remaining counties were either Lindgren funnel trap or visual surveys, as described in the Exotic Wood Associated Insect Survey. Symbols do not represent actual site locations.

6. Exotic Fruit Pest Survey

Colorado Department of Agriculture - Plant Industry Division

Project Coordinators: Kara Hempy-Mayer

In cooperation with:

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management

Project Coordinators: Lou Bjostad and David James

Target exotic fruit pests found: 0

Objective:

The Colorado Department of Agriculture(CDA) and Colorado State University(CSU) cooperatively conducted an early detection trap survey for the following exotic fruit pests:

pear leaf blister moth - *Leucoptera malifoliella*,
apple ermine moth - *Herpestomus brunnicornis*,
summer fruit tortrix moth - *Adoxophyes orana*,
false codling moth - *Cryptophlebia leucotreta*,
European grape vine moth - *Lobesia botrana*, and
cherry bark tortrix – *Enarmonia formosana*.

Early detection will help to maintain a pest-free zone in Colorado from these pests, and to provide a means for early detection of insect pests which could pose restrictions for products exported from Colorado. Summer fruit tortrix, false codling moth, and pear leaf blister moth were highly ranked at #11, 28, and 31, respectively, on the 2006 National Pest List. Apple ermine moth and cherry bark tortrix were 2006 Emerging Plant Pests, and the rest pose specific restrictions to the export of Colorado products.

Methods and Results:

Surveys were performed with pheromone baited Pherocon 1C wing-style traps. Six traps were placed at each site. CDA sites included the Denver Botanical Gardens and five orchards around the Denver-metro area, Longmont, Colorado Springs, and Pueblo (Table 4). A vineyard was also trapped for European grapevine moth as a sixth site. Sites surveyed this year by CSU included orchards and nurseries in high fruit production areas on the western slope in Delta County and on the eastern slope in Larimer County. Trapping began in May or June and was performed until mid September or October. Traps were checked bimonthly. Trap captures were initially screened on site and suspect material then referred on by Rick Zimmerman and David

James. All suspect material for CSU and CDA was sent to Boris Kondratieff, systematic entomologist at Colorado State University. No targeted pests were found (Fig 4).

Table 4. Summary of trap- site numbers and results for exotic fruit pest surveys.

<u>Surveyor</u>	<u>County</u>	<u>No. Sites/Traps</u>	<u>No. Pos. Catches</u>
<u>CSU</u>			
Rick Zimmerman	Delta	5/60	0
David James	Larimer	3/18	0
<u>CDA</u>			
Mark Origer	Adams	2/12	0
Mark Origer	Boulder	1/6	0
Mark Origer	Denver	1/6	0
Mark Origer	El Paso	1/6	
Mark Origer	Fremont	1/6	0

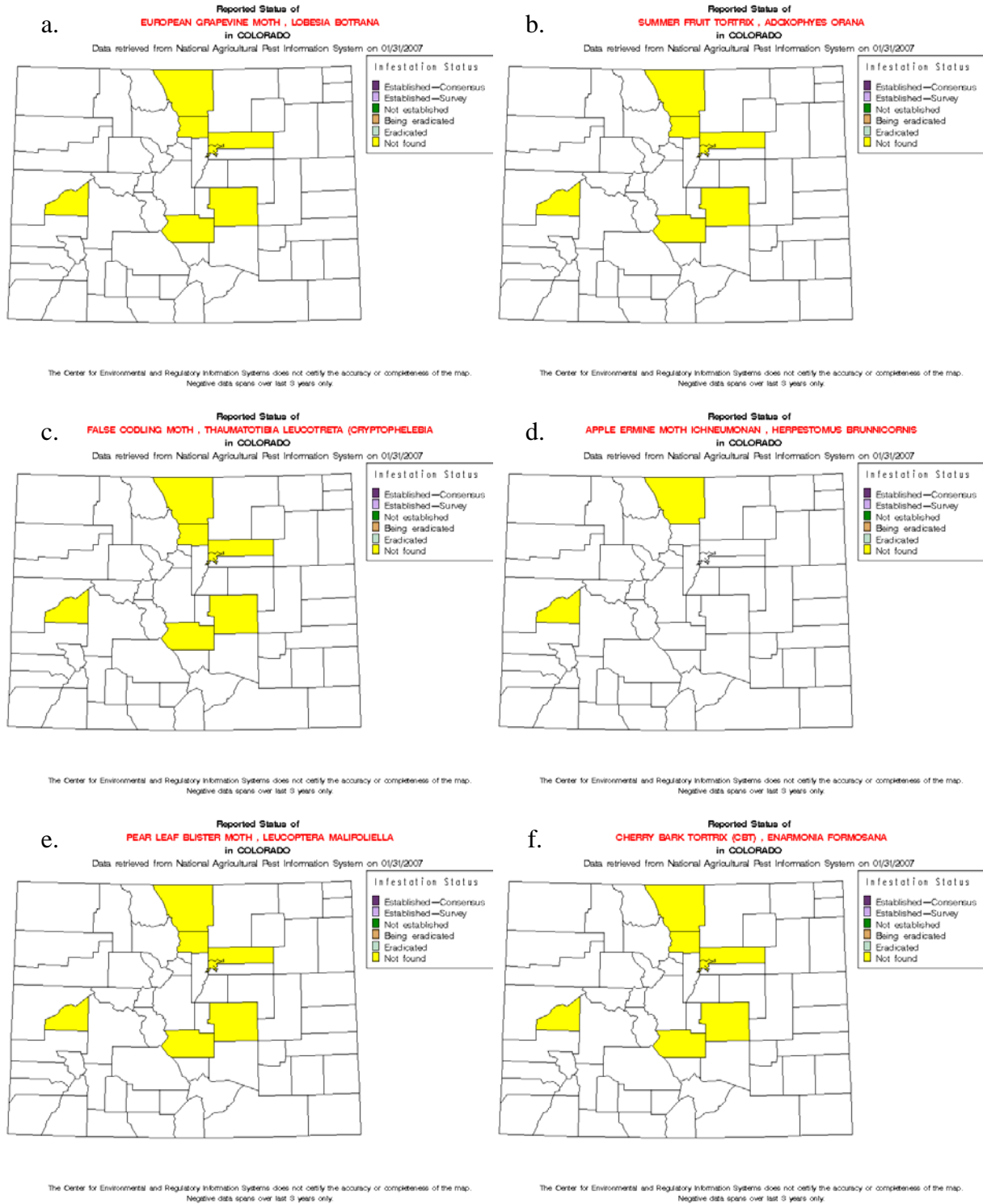


Figure 4. NAPIS maps of Colorado counties surveyed in 2006 for: a. European grapevine moth; b. summer fruit tortrix; c. false codling moth; d. apple ermine moth; e. pear leaf blister moth; and f. cherry bark tortrix.

7. Gypsy Moth Detection Survey

Colorado State Forest Service

Project Coordinator: Ingrid Aguayo

Gypsy moths found = No

Objective:

This project was a continuation of a long-term European and Asian gypsy moth detection survey in Colorado. Gypsy moth has not yet become established in Colorado. Its introduction could significantly damage the forests of Colorado, affecting the natural environment, the forest product industry, and tourism.

Methods and Results:

Gypsy Moth Survey program for FY06 was led by Ingrid Aguayo, forest entomologist for Colorado State Forest Service. Four hourly students were hired to deploy the traps, and were given appropriate background and training for this task. Traps were deployed from June 5 through July 25, 2006. A total of 1,598 traps were deployed throughout all counties of Colorado, except in San Juan County (Fig. 5). Summary of the number of traps deployed in each County is provided in Table 5. A map of the location of each trap is provided in Appendix B, while data including Lat/Long coordinates has been entered into NAPIS.

Traps were collected from September 9 through December 14, 2006. The slow collection of traps was due to the limited time hourly students had because of school commitments. From the total traps deployed, 235 traps were missing, and therefore we entered data for 1,363 of the traps into NAPIS. The 25 additional delimiting traps installed near the nursery site in Arapahoe County, area where APHIS had a positive detection in 2004, were labeled Ah A-AhY. From these only 2 were removed and checked, the rest of the traps were missing. The traps removed had no Gypsy moth.

From the total traps checked, no gypsy moths were found. A few Lepidoptera were found in some traps; these were confirmed by Ingrid Aguayo to be native species of the genus *Malacomosoma* and *Autographa*. One suspicious Lepidoptera was found, this was confirmed by Dr. Kondratieff to be from the genus *Dasichyra*. Some Diptera, Coleoptera, and Hymenoptera were also found in the traps but were not further identified.

Table 5: Summary traps per County Gypsy moth FY06

County	# Traps	County	# Traps
Adams	45	Kit Carson	9
Alamosa	10	La Plata	24
Arapahoe	153	Lake	5
Archuleta	4	Larimer	139
Baca	12	Las Animas	25
Bent	12	Lincoln	10
Boulder	96	Logan	16
Broomfield	4	Mesa	64
Chaffee	17	Mineral	1
Cheyenne	5	Moffat	11
Clear Creek	7	Montezuma	17
Conejos	8	Montrose	18
Costilla	4	Morgan	12
Crowley	6	Otero	20
Custer	3	Ouray	6
Douglas	38	Park	9
Dolores	3	Phillips	8
Delta	19	Pitkin	11
Denver	105	Prowers	17
Eagle	24	Pueblo	56
El Paso	127	Rio Blanco	4
Elbert	5	Rio Grande	10
Fremont	29	Routt	15
Garfield	16	Saguache	6
Gilpin	6	San Juan	0
Grand	25	San Miguel	8
Gunnison	14	Sedgwick	5
Hinsdale	2	Summit	12
Huerfano	15	Teller	9
Jackson	4	Washington	7
Jefferson	131	Weld	76
Kiowa	5	Yuma	14

Gypsy Moth Trap Location - Colorado 2006

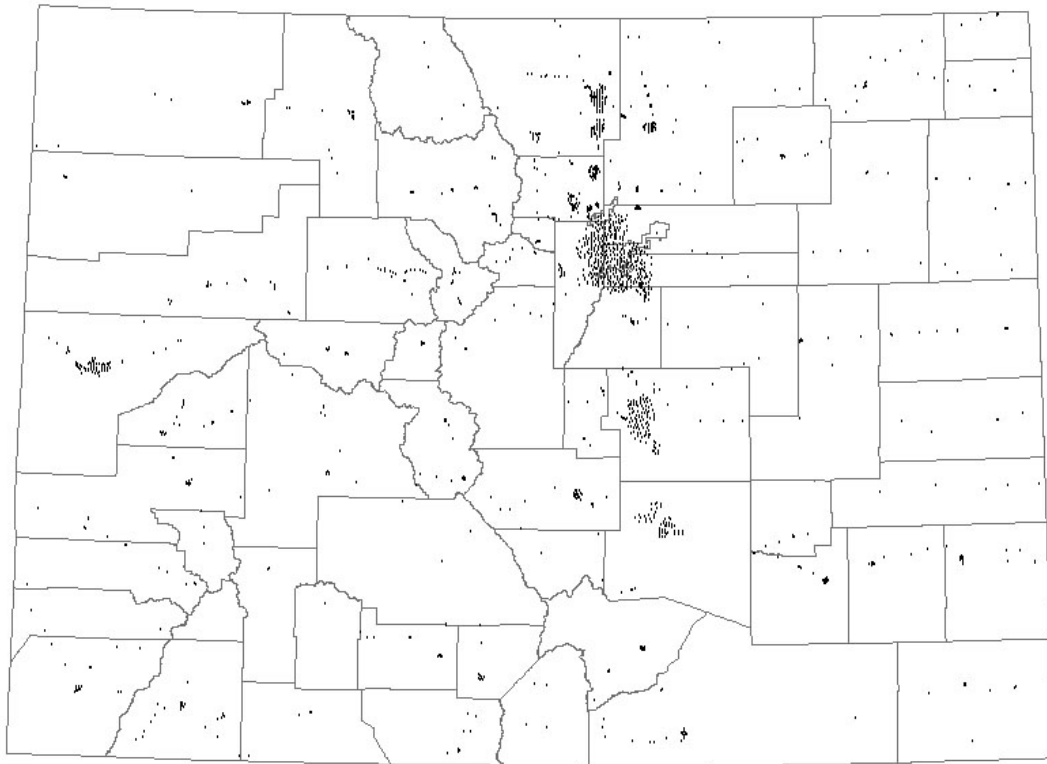


Figure 5. Map of trap locations in Colorado - Gypsy moth FY06;

8. *Kaphra Beetle*

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Khapra beetle found: 0

Objective:

The purpose of this project was to conduct early detection surveys for *Trogoderma granarium* (Khapra beetle) in Colorado. This pest has been identified as a high priority pest on the 2006 National Emerging Plant Pest List and Homeland Security Priority Pest List.

Additionally, *T. granarium* is listed as a restriction to exports of seeds and cereal grains to Mexico, Australia, and Columbia from Colorado. Surveys conducted during the 2006 growing season can be used to identify pest-free zones, which can help support PPQ efforts to negotiate export agreements with other countries.

Methods and Results:

Surveys were performed by Elisa Bernklau of Colorado State University, Department of Bioagricultural Sciences and Pest Management. Survey efforts for Khapra Beetle in 2006 mimicked those surveys conducted in 2005. Grain elevators, grain storage facilities, and small businesses selling grain were surveyed in eight counties by Colorado State University personnel (6). Trapping was conducted using wall-mounted vertical traps and pitfall traps and baited with *Trogoderma* pheromone. All suspect samples were screened and sent for analysis by David James.

No positive catches were reported (Fig. 6).

Table 6. Summary of trap-site numbers and results for Khapra Beetle Surveys.

<u>Surveyor</u>	<u>County</u>	<u>No. Sites/Traps</u>	<u>No. Pos. Catches</u>
Elisa Bernklau	Weld	1/3	0
Elisa Bernklau	Kit Carson	1/3	0
Elisa Bernklau	Lincoln	1/3	0
Elisa Bernklau	Adams	1/3	0
Elisa Bernklau	Washington	1/3	0
Elisa Bernklau	Yuma	1/3	0

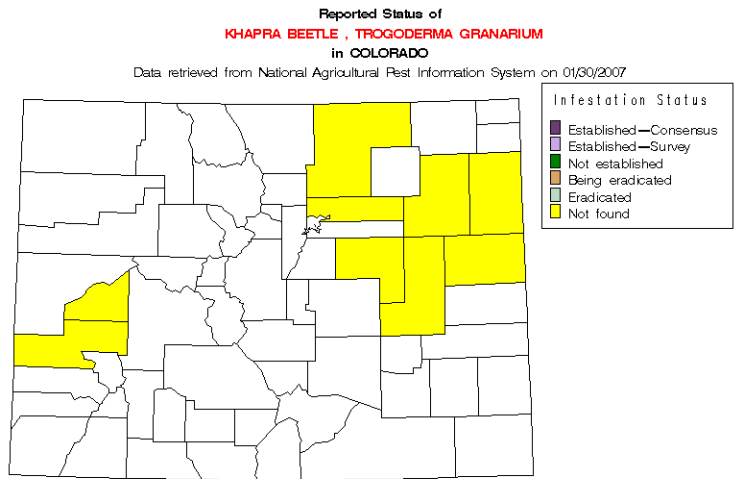


Figure 6. NAPIS map of counties surveyed for Khapra Beetle in Colorado in 2006.

9. Karnal Bunt

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Karnal bunt found: 0

Objective:

The purpose of this project was to continue the Karnal Bunt National Surveys in Colorado to help monitor the distribution and spread of Karnal Bunt in the United States and facilitate wheat exports by identifying areas free of disease.

Methods and Results:

Surveys were performed by Elisa Bernklau of Colorado State University, Department of Bioagricultural Sciences and Pest Management. Due to previous year's lackluster response from our cooperators, we decided to collect samples directly on site. This year 57 samples were collected from 11 counties (Table 7). Samples were sent to Olney, Texas for identification (many of these samples were composite samples—samples from numerous sites in one sample bag). Hold-back samples were taken and stored at Colorado State University. Counties targeted for this survey were those that had not been sampled in the last few years. All samples tested negative for Karnal Bunt (Fig. 7)

Table 7. Summary sample numbers and results for Karnal Bunt Surveys.

<u>County</u>	<u># Samples</u>	<u>No. Positive Samples</u>
Adams	3	0
Arapaho	3	0
Lincoln	8	0
Elbert	3	0
Washington	6	0
Kit Carson	7	0
Yuma	5	0
Weld	12	0
Logan	5	0
Morgan	5	0

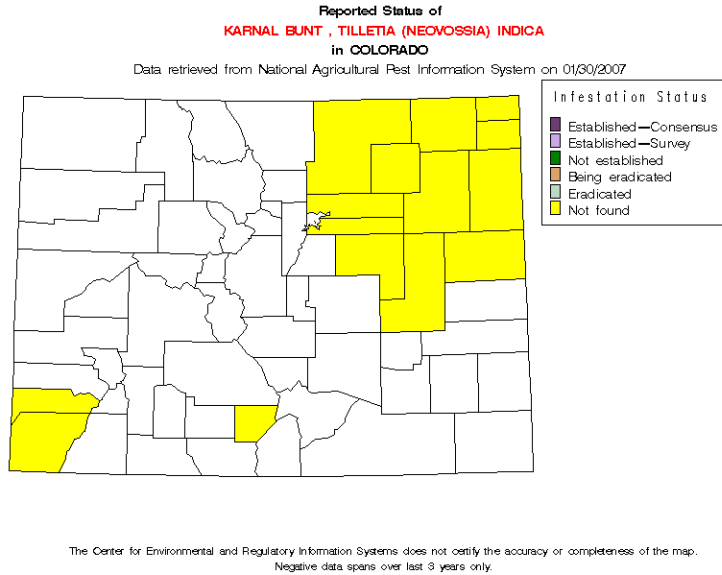


Figure 7. NAPIS map of counties surveyed in 2006 for Karnal Bunt in Colorado in 2006.

10. Old World Bollworm

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Old World bollworm found: 0

Objective:

The purpose of this project was to conduct early detection surveys for *Helicoverpa armigera* (Old World bollworm) in Colorado, and to help establish state or county level exemptions for Colorado in the export of agricultural commodities if negative data is found. This pest is ranked 6th on the CAPS FY06 National Pest Detection List, and is a pest of wheat, cotton, and tomato, all of which are products grown in Colorado. This survey for Old World bollworm was conducted in several counties for the first time in Colorado.

Methods and Results:

Surveys were performed by Bob Hammon of Mesa County Extension, David James, and Ron Meyer of Golden Plains Extension. Surveys were performed with pheromone baited pherocon 1C wing traps. Approximately 50 traps at 25 sites were placed in or near corn fields, and nurseries for detection of Old World Bollworm (Table 8). Traps were installed by mid-May and serviced bimonthly or monthly depending on location through mid-September. Servicing of

traps included collection of all contents and replacement of traps and attractants as directed. All trap contents were initially screened by David James and Bob Hammon. Suspect material was sent to Boris Kondratieff, systematic entomologist at Colorado State University.

All trap catches were negative (Fig. 8).

Table 8. Summary of trap-site numbers and results for Old World Bollworm Surveys.

Surveyor	County	Sites/Traps	# Positive traps
Bob Hammon	Delta	1/2	0
Bob Hammon	Montrose	3/6	0
Bob Hammon	Mesa	4/8	0
Ron Meyer	Kit Carson	4/8	0
Ron Meyer	Yuma	3/6	0
Ron Meyer	Cheyenne	3/6	0
David James	Weld	1/2	0
David James	Larimer	6/12	0

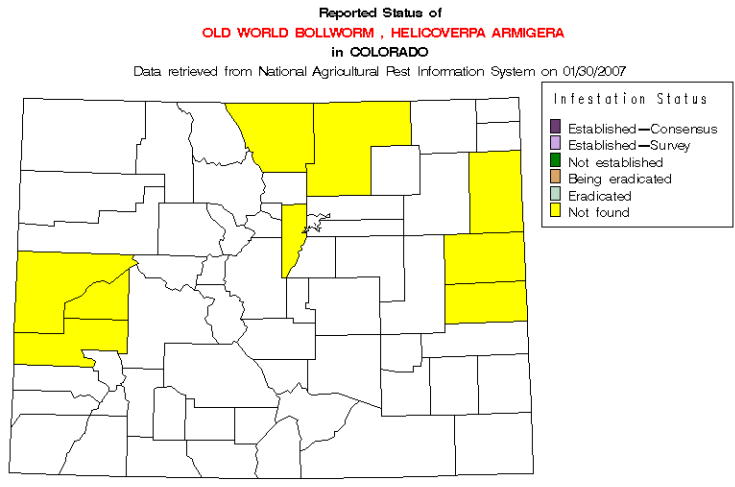


Figure 8. NAPIS map of counties surveyed in 2006 for Old World bollworm in Colorado.

11. Survey of Colorado Production areas for Exotic/Emerging Plant Pests

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Ned Tisserat

Target pests found: 0

Objective:

The purpose of this project was to conduct a state-wide survey of ornamental and tomato production areas for the presence of various plant pathogens and arthropods on the National Select Agent list, the CAPS pest detection list, and the western region pest list. The primary focus of the survey was to ascertain the presence/absence of the following pathogens and insects: *Ralstonia solanacearum* Race 3 Biovar 2 – National Select Agent list; *Phytophthora ramorum* – Emerging Plant Pest List; *Puccinia horiana* – Emerging Plant Pest List; Passionvine mealybug (*Planococcus minor*) – CAPS Pest Detection List; Pink hibiscus mealybug (*Maconellicoccus hirsutus*) – Emerging Plant Pest List; and *Anastrepha* sp.(exotic fruit flies) in tomato production – CO pest list. Host plants in Colorado include potatoes, tomatoes, chrysanthemums, and various other foliage and ornamental plants. Information on all insects and diseases was recorded during the survey.

Methods and Results:

A total of 27 production facilities throughout Colorado were surveyed for the various hosts listed above. Plants were visually surveyed. Suspicious plants were returned to the diagnostic lab and either viewed microscopically (chrysanthemum rust), cultured, had PCR tests run (geraniums), or forwarded to Dr. Boris Konratieff for insect identification. All samples were negative for the pests listed above (Fig. 9).

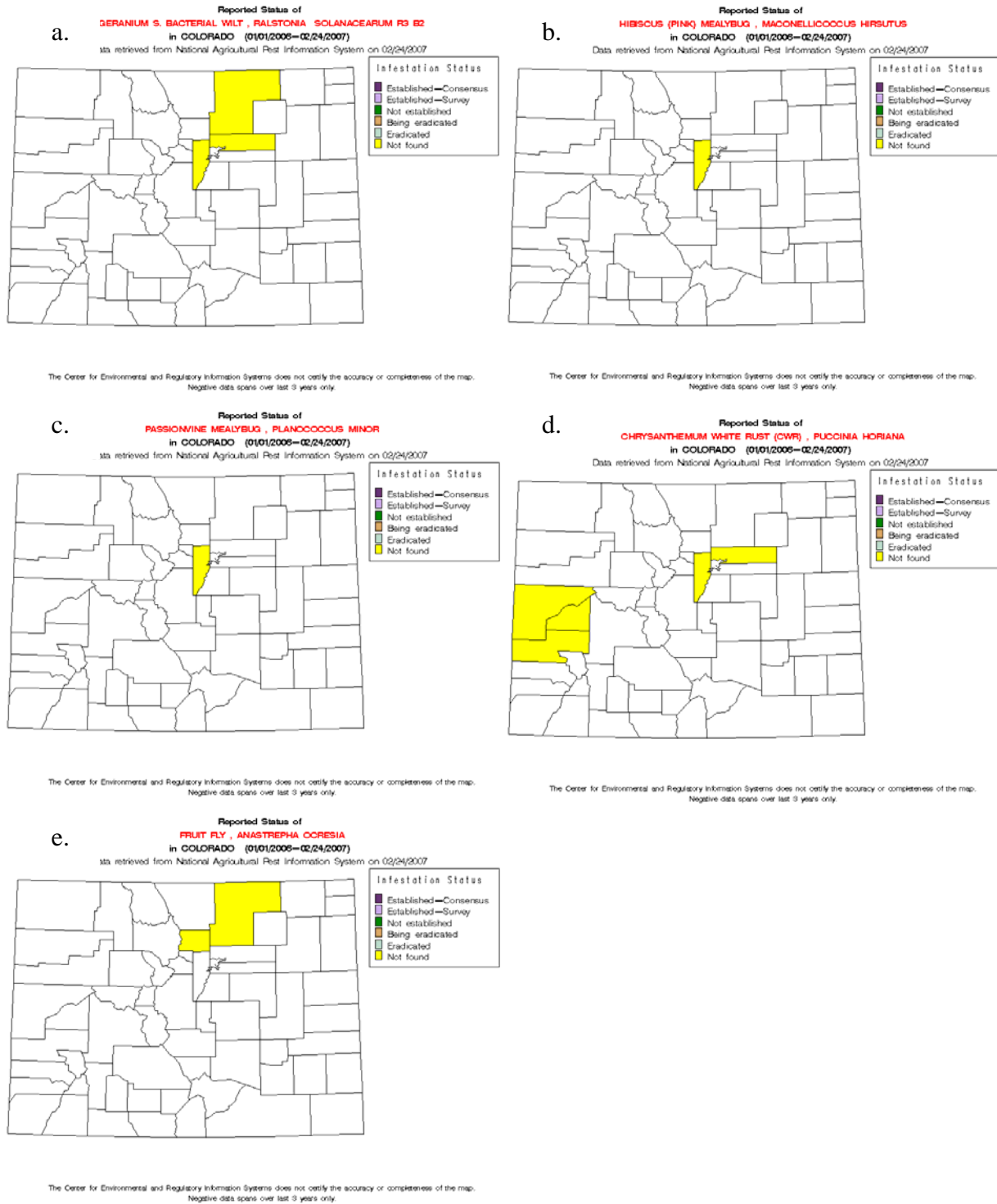


Figure 9. NAPIS map of Colorado counties surveyed in 2006 for: a. *Ralstonia solanacearum* Race 3 Biovar 2; b. hibiscus pink mealybug; c. passionvine mealybug; d. chrysanthemum white rust; and e. *Anastrepha* spp.

12. *Spodoptera littoralis*

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Spodoptera littoralis found: 0

Objective:

The purpose of this project was to conduct early detection surveys for *Spodoptera littoralis* in Colorado and to help establish state or county level exemptions for Colorado in the export of agricultural commodities if negative data is found. *S. littoralis* is ranked ninth on the 2006 National Plant Pest List. Major agricultural crops that are hosts for *Spodoptera littoralis* in Colorado include corn, alfalfa, dry beans, apples, and grapes. This survey was conducted in several counties in Colorado for the first time in 2006.

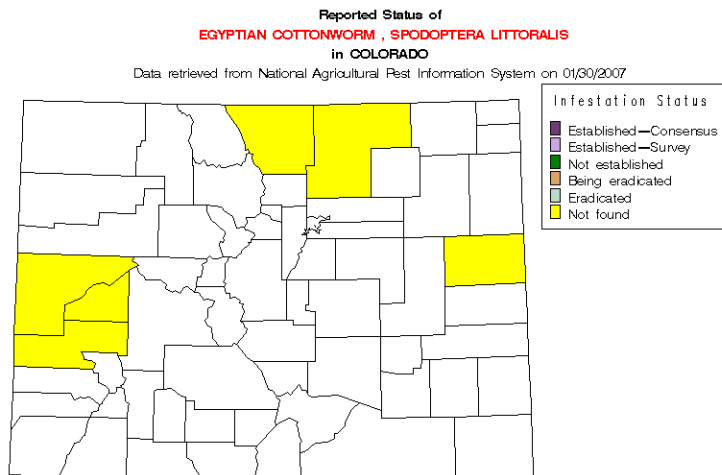
Methods and Results:

Surveys were performed by Bob Hammon of Mesa County Extension, David James, and Ron Meyer of Golden Plains Extension with pheromone baited pherocon 1C wing traps. 20 traps at 15 sites were placed in or near corn fields, and nurseries for detection of *Spodoptera littoralis* (Table 9). Traps were installed by mid-May and serviced bimonthly or monthly depending on location through mid-September. Servicing of traps included collection of all contents and replacement of traps and attractants as directed. All trap contents were initially screened by Bob Hammon and David James. Suspect material was sent to Boris Kondratieff, systematic entomologist at Colorado State University.

All trap catches were negative (Fig. 10), and all 2006 survey data are available.

Table 9. Summary of trap- site numbers and results for *Spodoptera littoralis* Surveys.

Surveyor	County	Sites/Traps	# Positive traps
Bob Hammon	Delta	3/3	0
Bob Hammon	Montrose	3/3	0
Bob Hammon	Mesa	3/3	0
Ron Meyer	Kit Carson	1/1	0
David James	Weld	2/4	0
David James	Larimer	3/6	0



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
 Negative data spans over last 3 years only.

Figure 10. NAPIS map of counties surveyed in 2006 for *Spodoptera littoralis* in Colorado.

13a. *Phytophthora ramorum* – National Trace Forward Survey

USDA-APHIS-PPQ Colorado

Project Coordinators: Lisa Peraino and Michael Winks

Phytophthora ramorum found: 0

Objective:

A National Trace Forward Survey for *Phytophthora ramorum* (sudden oak death) was carried out by the CDA and PPQ in response to the occurrence of *Phytophthora ramorum* in a *Syringa vulgaris* plant sample from a nursery in McMinnville, Oregon in June of 2004, as diagnosed by the USDA in Beltsville, MD in November of 2004. *P. ramorum* is listed on the 2006 National Emerging Plant Pest List.

Methods and Results:

Surveys were carried out by CDA State Inspectors and PPQ Plant Health Safeguarding Specialists following USDA APHIS PPQ National Trace Forward Survey protocols (2006). Thirteen nurseries were surveyed (three of which were also National Nursery Survey sites this year), with PPQ surveying 5 and CDA surveying 8 nurseries in the Denver-metro area. Approximately 63 samples were taken from host plants in nurseries receiving stock from an

infected nursery in Oregon. One hundred ninety-nine total plants were sampled, and of these, most of them were from *Viburnum*, *Syringa*, and *Taxus* species, with a few each from *Abies*, *Rhododendron*, *Magnolia*, *Fagus*, *Salix*, and *Arctostaphylos* (21 species total). All samples tested negative for *P. ramorum* (Fig. 11).

13b. *Phytophthora ramorum* National Nursery Survey

Colorado Department of Agriculture - Plant Industry Division

Project Coordinators: Kara Hempy-Mayer

Phytophthora ramorum found: 0

Objective:

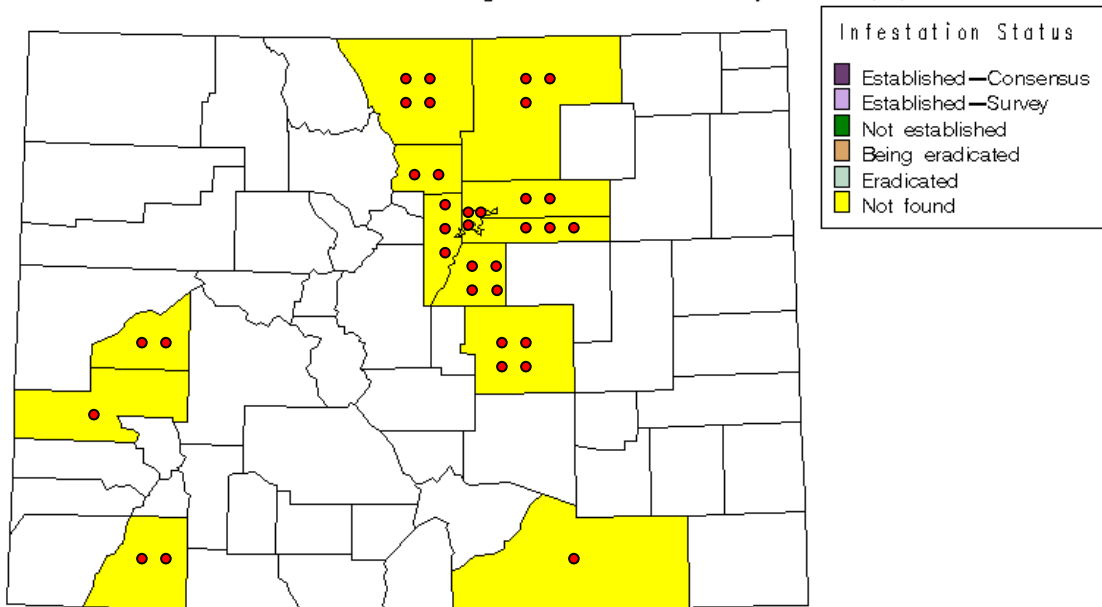
The purpose of this project was to conduct the 2006 National Nursery Survey for *Phytophthora ramorum* in Colorado as part of a larger effort by USDA APHIS PPQ to determine the distribution of *P. ramorum* in the nursery system of the United States by surveying nurseries at risk of harboring or distributing *P. ramorum* infected plants. This is the third year of survey work begun after finding *P. ramorum* in a Colorado nursery as part of a Trace-Forward Survey in 2003. The National survey will not be completed next year, as this satisfies the required follow-up survey, and as no *P. ramorum* has been found since. However, *P. ramorum* will be included in a production area survey in 2007.

Methods and Results:

Site selection and surveys were conducted according to the *P. ramorum* 2006 National Nursery Survey Manual. Twenty-four nurseries were selected based on their presence on the trace-forward list from 2005, any positive findings in previous years, and abundance of host material. Coincidentally, three of these nurseries also went through a trace-forward survey this year. Approximately an even number of nursery dealers and growers were surveyed, with 13 dealers and 11 growers. In all, 756 plants were surveyed, and 590 plants were sampled, with 132 total samples taken and submitted to the Plant Diagnostic Clinic at CSU for diagnosis. The most commonly sampled plants in Colorado were *Viburnum* and *Syringa* species. Approximately 30 plants each were sampled of *Taxus*, *Rosa*, and *Rhododendron* species, while less than 10 plants were sampled from each of another 13 species (38 species total). All samples tested negative for *P. ramorum* (Fig. 11).

**Reported Status of
SUDDEN OAK DEATH RAMORUM BLGT , PHYTOPHTHORA RAMORUM
in COLORADO (01/01/2006–02/24/2007)**

Data retrieved from National Agricultural Pest Information System on 02/24/2007



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
Negative data spans over last 3 years only.

Figure 11. NAPIS map of Colorado counties surveyed for *P. ramorum* in both National Nursery and Trace Forward Surveys. The ● symbol represents the number of survey sites per county. These symbols do not represent actual site locations.

14. Exotic Wood Boring Insect Survey

Colorado Department of Agriculture - Plant Industry Division

Project Coordinators: Kara Hempy-Mayer

In cooperation with:

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management

Project Coordinators: Lou Bjostad and David James

Target exotic pests found: 0

Objective:

The purpose of this project was to conduct an early detection visual survey along with non-specific trapping for the following exotic wood pests:

Deciduous Trees:

Asian longhorned beetle (*Anoplophora glabripennis*);
citrus longhorned beetle (*A. chinensis*),
emerald ash borer (*Agrilus planipennis*),
metallic beetle (*Agrilus biguttatus*),
small white-marmorated longhorned beetle (*Monochamus sutor*),

Coniferous Trees:

Sirex woodwasp (*Sirex noctilio*),
Siberian silk moth (*Dendrolimus superans sibiricus*), and
pine-tree lappet (*Dendrolimus pini*).

Surveys were done by following the Exotic Wood Borer Bark Beetle National Survey protocol. Exotic wood associated insects have emerged as significant pests to established landscape plantings as well as wood commodities. As these insects continue to spread and inflict economic injury it is prudent for Colorado to establish an effort to monitor for them. The above-mentioned exotic wood associated insects have recently been targeted by APHIS as posing a serious threat to wood commodities. Siberian silk moth, metallic beetle, pine-tree lappet, and small white-marmorated longhorned beetle are listed as #3, 6, 30, and 34, respectively, on the CAPS 2006 National Pest List; Asian longhorned beetle is listed on the National Emerging Plant Pest (EPP) List, and emerald ash borer and citrus longhorned beetle are listed on the Supplemental National EPP List with their own line item funding. Valuable wood resources in the state of Colorado are at risk to these types of exotics.

Methods and Results:

Twenty-eight sites were trapped this season. CDA deployed two 12-funnel Lindgren funnel traps at each of 13 high-risk sites, and CSU deployed one 12-funnel Lindgren funnel traps at each of 15 high-risk sites. Traps were baited with ethanol, alpha-pinene, and 3-part IPS lures. CDA survey sites included nine lumber and pallet suppliers, a firewood supplier, a state park campground, a nursery, and a wood disposal site. Locations included two sites in Adams County, two in Boulder County, three in Pueblo County, one in Denver County, one in Douglas County, three in El Paso County, and one in Gilpin County, which covers most of the large urban areas

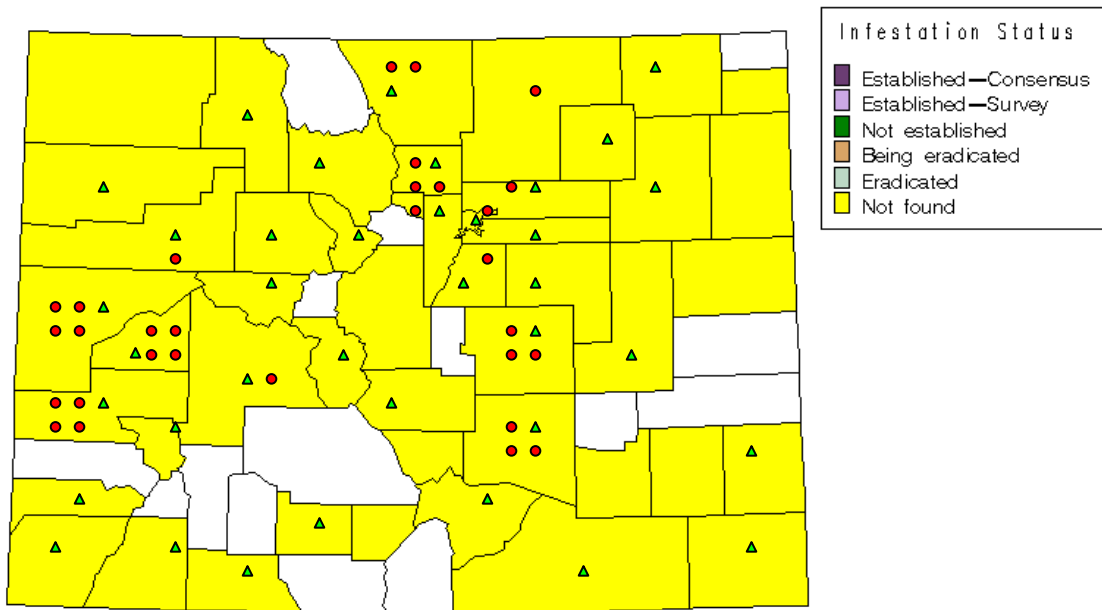
along the east slope south of Fort Collins. CSU survey sites included lumber and pallet suppliers, a wood pallet site at a community college, nurseries, landfills, and sawmills. Locations included four sites each in Delta, Montrose, and Mesa Counties (surveyed by Bob Hammon), and two and one site surveyed in Larimer and Weld Counties, respectively (surveyed by David James). Traps were deployed by mid-May and were removed by mid-October. Traps were checked bimonthly to monthly depending on location. Specimens were sent to Dr. Boris Kondratieff at CSU for identification.

During the growing season, 500, 286, and 557 nursery dealers or growers in about 39 counties that had host material for citrus longhorned beetle (for which both deciduous ornamentals and fruit trees were considered as hosts), the remaining deciduous tree pests, and the coniferous tree pests, respectively, were surveyed during annual state nursery inspections. Records from these inspections were used to provide evidence of the absence of these pests, as inspectors were directed to look for them, and none for found. Visual surveys were also completed at the trap survey sites, and visual surveys were conducted at 6 other sites in Adams and Larimer County (by David James). These visual survey sites include locations near a major distribution center, a major airport (DIA), a site that offered free mulched wood to the community, and a site that offered free wooden pallets to the community. Visual inspections were performed at these sites monthly from mid-May to mid-October.

In February of 2007, PPQ officers visually surveyed 80 ash trees for emerald ash borer in the town of Thornton in Adams County. Forty of these trees were further stripped (along the trunk). No signs of emerald ash borer were found.

No harmful exotic wood associated pests were found in any of these surveys (Figs. 12-14).

Reported Status of
CITRUS LONGHORNED BEETLE , ANOPLOPHORA CHINENSIS
 in COLORADO (01/01/2006—02/28/2007)
 Data retrieved from National Agricultural Pest Information System on 02/28/2007

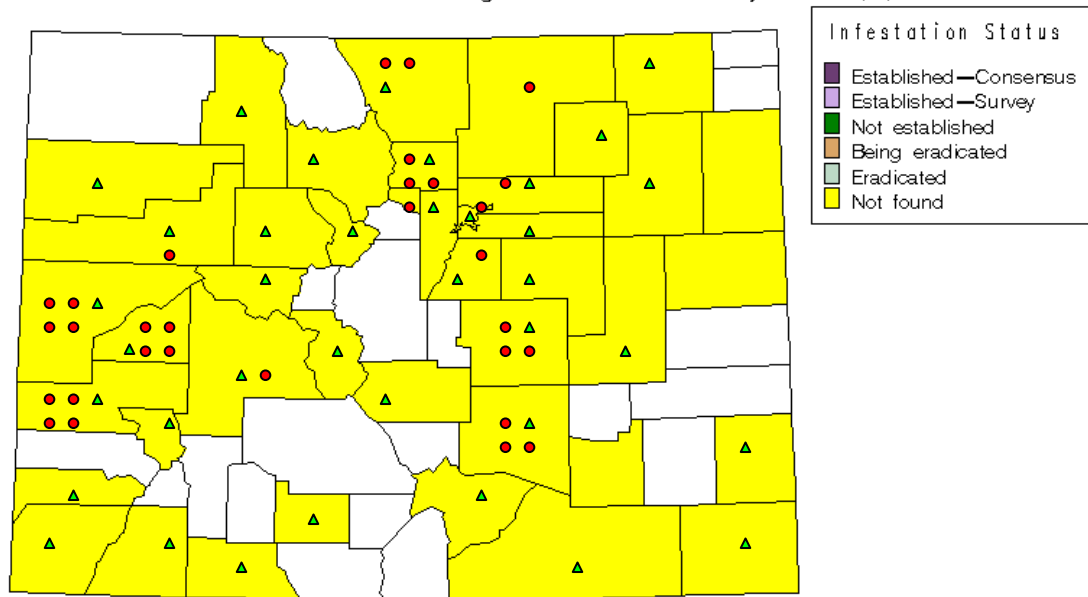


The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.

Figure 12. NAPIS map of **Colorado** counties surveyed for Citrus longhorned beetle, (deciduous and fruit tree pests). The • symbol represents the number of trap (with visual) survey sites per county, and the ▲ symbol represents counties in which visual survey only surveys were conducted (number of visual sites ranges from 1-28 sites/county). Symbol locations do not represent actual site locations on the map.

**Reported Status of
ASIAN CERAMBYCID (LH.) BEETLE , ANOPLOPHORA GLABRIPENNIS (LONGHORNED)
in COLORADO**

Data retrieved from National Agricultural Pest Information System on 01/31/2007

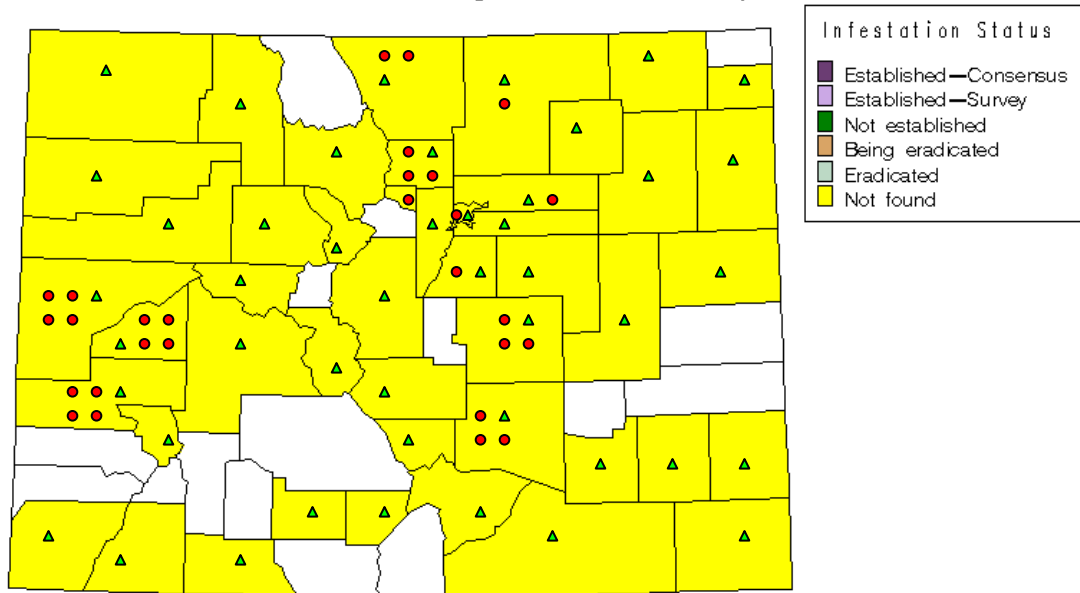


The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
Negative data spans over last 3 years only.

Figure 13. NAPIS map of **Colorado** counties surveyed for Asian longhorned beetle, as well as citrus longhorned beetle, emerald ash borer, and metallic beetle (deciduous tree pests). The symbol **•** represents the number of trap (with visual) survey sites per county, and the **▲** symbol represents counties in which visual survey only surveys were conducted (number of visual sites ranges from 1-28 sites/county). Symbol locations do not represent actual site locations on the map.

**Reported Status of
STEELBLUE WOODWASP [EUROPEAN] , SIREX NOCTILIO
in COLORADO (01/01/2006—02/26/2007)**

Data retrieved from National Agricultural Pest Information System on 02/26/2007



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
Negative data spans over last 3 years only.

Figure 14. NAPIS map of **Colorado** counties surveyed for *Sirex* wood wasp, as well as Siberian silk moth, and pine-tree lappett (coniferous tree pests). The symbol ● represents the number of trap (with visual) survey sites per county, and the ▲ symbol represents counties in which visual survey only surveys were conducted (number of visual sites ranges from 1-55 sites/county).

Related Projects

15. Japanese Beetle

Colorado Department of Agriculture

Project Coordinators: Jerry Cochran

Japanese beetle found: 17,426 beetles

Objective:

The purpose of this project was to conduct a delimiting trapping survey for Japanese beetle. Japanese beetle is listed on the 2006 National Emerging Plant Pest List, and has been recovered in Colorado in surveys dating back to 1995. No infestations, however, were identified

until 2002 when an established population was discovered in Palisade. That infestation has been under a cooperative eradication effort since 2004. The Palisade Japanese beetle infestation is especially worrisome with the presence of substantial peach orchards and vineyards surrounding Palisade. Peaches and grapes are both highly favored hosts. It has been determined that the population is confined to the town limits of Palisade. Another established population was identified in 2005 in the greater Denver-metro area. It was found on a golf course late in the trapping season of 2005.

Methods and Results:

Overview. Trapping surveys were conducted in El Paso, Denver, Boulder, Arapahoe, and Mesa Counties (Fig. 15). All five of the El Paso County traps were negative and all were placed on one golf course. Thirty-seven of 79 traps were positive in the Denver area and 32 of 248 were positive in the town of Palisade (Mesa County). The traps were funnel traps from Trece Inc. and were baited with a floral lure and a sex lure attractive to males only. The floral lure is attractive to males and females and is considered to be attractive out to a shorter distance than the sex lure. All of the 18 traps in the Boulder area were negative.

Golf Courses. Six golf courses were surveyed with a total of 30 traps. One golf course was in Colorado Springs, one was in Boulder and four were in the Denver area. The Boulder and Colorado Springs golf courses were both negative as was one golf course in the Denver area. One golf course caught one beetle out of a total of three traps at that course (Thornton area). One golf course in Denver City and County caught 24 beetles in five traps and one course in SE Suburban Denver (Arapahoe County) captured 17,142 beetles in 10 traps.

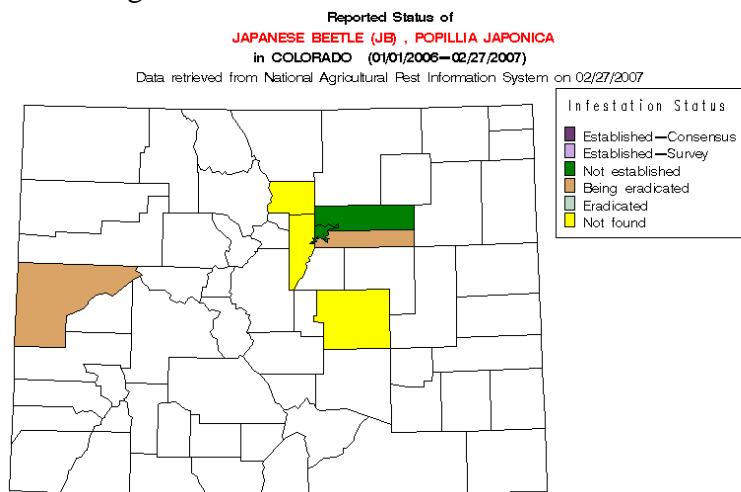
Residential Areas. Two traps were placed in residential areas of Jefferson County and were both negative. Ten traps in residential Adams County resulted in three of them being positive capturing four adults. Twenty-seven traps in residential Denver City and County resulted in three traps capturing five adults. All three of these traps were within one-mile buffer of the Denver City and County country club that was positive for JB adults (see above). The 17 traps in the one-mile buffer area around the Arapahoe County golf course captured 194 more beetles (predominately males).

Treatments. Two pesticides were used on the infestation in the town of Palisade. The core area and two surrounding areas near the core area were treated with a soil treatment in the

grassy areas in early July with Merit 0.5 G at 1.4 ounces per 1000 square feet. The city park area was treated with Merit 0.5 G also in early July by city officials. Three properties were considered the primary source of the infestation and feeding damage was noted on Virginia creeper and were treated with Tempo as a foliar treatment on July 24th. The Virginia creeper at the city park were also treated with Tempo as a foliar treatment and Merit as soil treatment on July 26th.

In Palisade, the 2006 trapping program caught 66 adults, which represents a 95% reduction from the high point in the population found during previous surveys. These results indicate that the eradication program is having a strong effect. Another cooperative eradication program is planned for 2007.

At the Denver-metro golf course, the survey program for 2006 resulted in the capture of 17,336 adults. Ninety-nine percent of the adults were captured on the golf course itself. The other one-percent of adults (187) consisted predominately of males apparently being lured off the golf course due to the sex-lure component of the traps. It is believed that the infestation is limited to the golf course proper due to winter-time irrigation practices at this high-end course. The surrounding areas are generally residential properties and do not receive much wintertime irrigation. An eradication effort (Marathon application in the summer of 2007 to the entire golf course) is planned for 2007, to be conducted by golf course personnel with assistance from the Colorado Department of Agriculture.



The Center for Environmental and Regulatory Information Systems does not certify the accuracy or completeness of the map.
 Negative data spans over last 3 years only.

Figure 15. NAPIS map of Colorado counties surveyed Japanese beetle in 2006.