Cooperative Agricultural Pest Survey (CAPS)

Annual Reports
Colorado
FY2005

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Plant Industry Division

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Summary: This document contains annual reports for the 13 CAPS projects and two other APHIS projects in Colorado for FY2005. Four CAPS projects were coordinated by the Colorado Department of Agriculture (CDA), three jointly by the CDA and Colorado State University (CSU), and six by CSU. The additional APHIS projects were conducted by the Colorado APHIS-PPQ office and Colorado State Forest Service.

Annual Reports

CORE Project

1. CAPS CORE Project

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Kara Hempy-Mayer and Jerry Cochran

For the first eight months of FY2005, Jerry Cochran was the acting CAPS State Survey Coordinator (SSC) for the Colorado CAPS CORE project under the Colorado Department of Agriculture (CDA). On November 9, Kara Hempy-Mayer was designated by the CDA Plant Industry Division as the new SSC to replace Jerry Cochran. The following highlight their respective activities fulfilling the responsibilities of this position in 2005.

Training

Ms. Hempy-Mayer participated in an ISIS beta-testing workshop from January 30-February 2, and received further training in Minneapolis from March 7-9. She plans on using and training a technician to use ISIS on a PDA or tablet for CDA surveys during the 2006 season. Colorado will be one of the few states to use a tablet for this purpose, and hope to share the advantages and disadvantages of using this system with other CAPS personnel and cooperators. In addition, Ms. Hempy-Mayer hopes to provide training in ISIS to other Colorado cooperators in the fall or winter of 2006 for survey work in 2007.

Coordination of Cooperators and Meetings

Mr. Cochran coordinated and facilitated two meetings with the State CAPS Committee on April 26 and September 27 of 2005. Ms. Hempy-Mayer attended the CAPS National Meeting in Nashville from December 5-9. The state meetings included representatives from the CDA-Biological Pest Control Program, Colorado State University (CSU), and the Colorado USDA-APHIS-PPQ office. During these meetings, proposals were generated for survey work in FY2006, and plans were formulated for carrying out 13 CAPS funded pest surveys for FY2005, as outlined in the Cooperative Agreement. Four projects were assigned to be coordinated by the CDA, six by CSU, and three to be coordinated jointly by the CDA and CSU.

For those seven projects coordinated by the CDA, Mr. Cochran, with the help of the CAPS committee, generated a list of sites to be surveyed in order to meet the goals of each project, which included identifying sites that would be most at risk for providing introduction and establishment pathways for targeted pests. Mr. Cochran arranged for CDA inspectors to carry out both visual and trap surveys under CAPS project funding, developed survey plans, ordered traps and assisted in their deployment, and generated survey data sheets. He then supervised the survey work throughout the season, collected the data at season's end, coordinated trap removals, and screened specimens taken from traps, sending suspect material for further analysis to the classification specialist for entomology at CSU.

Mr. Cochran also assisted in a National Trace Forward Survey for *Phytophthora ramorum*, arranging for surveys to be carried out by CDA inspectors at the appropriate nurseries and for samples to be sent to the Plant Disease Clinic at CSU. In addition, Mr. Cochran received and organized the data for the *P. ramorum* National Nursery Survey conducted by the Colorado PPQ office.

Mr. Cochran wrote and requested survey proposals for FY2006, and submitted these proposals in July of 2005. Ms. Hempy-Mayer has compiled and contributed to the CAPS semiannual and annual reports for FY2005. She has also compiled and submitted work and financial plans along with the Cooperative Agreement with the USDA for CAPS surveys for FY2006. These activities involved coordinating with the Plant Disease Clinic at CSU and the project coordinators for the survey projects under CSU, the PPQ, and the Colorado Forest Service.

Fund Distribution

Mr. Cochran and Ms. Hempy-Mayer have assisted in coordinating invoices for payment of work by cooperators, working both with CDA and CSU accounting personnel.

Cooperator and Public Outreach

Mr. Cochran has developed Emerald Ash Borer pamphlets and Pest Alerts specific to Colorado, and had them sent out with about 900 Colorado nursery registrations. Ms. Hempy-Mayer has met or spoken several times with existing and potential cooperators to discuss survey plans and future involvement, including CSU faculty, the Colorado Natural Heritage Program, the Colorado State Forest Service, and the Colorado Nursery and Greenhouse Association. Both she and Mr. Cochran are involved with a Forest Health Lunch forum organized by Dr. Bill

Jacobi of CSU. Ms. Hempy-Mayer and Mitch Yergert attended a meeting of stakeholders concerning emerald ash borer in Colorado. In addition, Ms. Hempy-Mayer attended the ProGreen Expo from January 23-27 and the Colorado Ag Forum on February 23, where she was able to make new contacts and gather information about various plant industries around Colorado.

Rapid Response

Ms. Hempy-Mayer and Mitch Yergert participated in a meeting concerning rapid response plans and options for pest infestations with various stakeholders in Colorado on February 24. Several key points to come out of the meeting include the joint federal/state response plan being developed by Mitch Yergert and Pat McPherren and based on a general plan developed by the USDA; the roles of the federal, state, and local governments in responding to a pest outbreak; changes needed in Colorado legislation concerning the ability of the state to respond; and the potential ability of the state CAPS committee to organize stakeholders and consider all pest threats to Colorado.

Data Management

Ms. Hempy-Mayer has entered all CAPS survey and biocontrol data and two other USDA-APHIS surveys from the 2005 field season into NAPIS, while Lou Bjostad and David James have continued to enter data from their surveys themselves. No first records occurred this year, and all surveys were negative for target species. No data were obtained from the CSREES network, although data surveys collected by Jerry Cochran through CDA on Japanese beetle has been compiled and will be entered into NAPIS.

Priority Pest List

Mr. Cochran worked with the SCC to develop a state priority pest list for Colorado for 2006.

Pest Risk and Pathway Analysis

Mr. Cochran has contributed to pest risk and pathway analysis by working with other CDA personnel to assess the status of and possible threat posed by the Japanese beetle by helping conduct supplementary surveys at high risk areas. He has also worked with the SCC to identify high risk sites for other surveys, and helped identify pest risks in order to write and request survey proposals for FY2006. Work is also ongoing to consider the risk posed to Colorado by emerald ash borer, and Ms. Hempy-Mayer—in cooperation with Dr. Bill Jacobi—

began a preliminary survey of bundled firewood suppliers to determine what, if any, firewood was coming from out of state.

Survey and Biocontrol Projects

The following projects have been successfully completed and all data has been entered into the NAPIS database. Please refer to the NAPIS-generated county level resolution maps and spreadsheets for those records entered into the 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. Chrysanthemum White Rust

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Jerry Cochran and Kara Hempy-Mayer

Objective:

The purpose of this project was to conduct an early detection survey for *Puccinia horiana* (chrysanthemum white rust) in Colorado greenhouses. Early detection of the fungus causing chrysanthemum white rust is critical in any attempt at control or containment. Early detection would be critical if we want to mitigate movement out of Colorado and thereby limit the risk of spreading the fungus to other states if it ever became present in Colorado greenhouses.

Methods and Results:

CDA inspectors surveyed for symptoms of *P. horiana* in host plants in conjunction with other survey work done during the months of August through October. Visual surveys were conducted at 28 locations including greenhouses, nurseries, and retail outlets that sold chrysanthemums, which together covered eight counties in northern Colorado (Table 1; Fig. 1).

No *P. horiana* was found as a result of these surveys.

Table 1. Numbers and results of chrysanthemum white rust surveys per county in Colorado.

County:	Number of Surveys:	No. Plants Infected
Adams	5	0
Arapahoe	2	0
Boulder	1	0
Denver	3	0
Douglas	2	0
Jefferson	6	0
Larimer	1	0
Weld	8	0

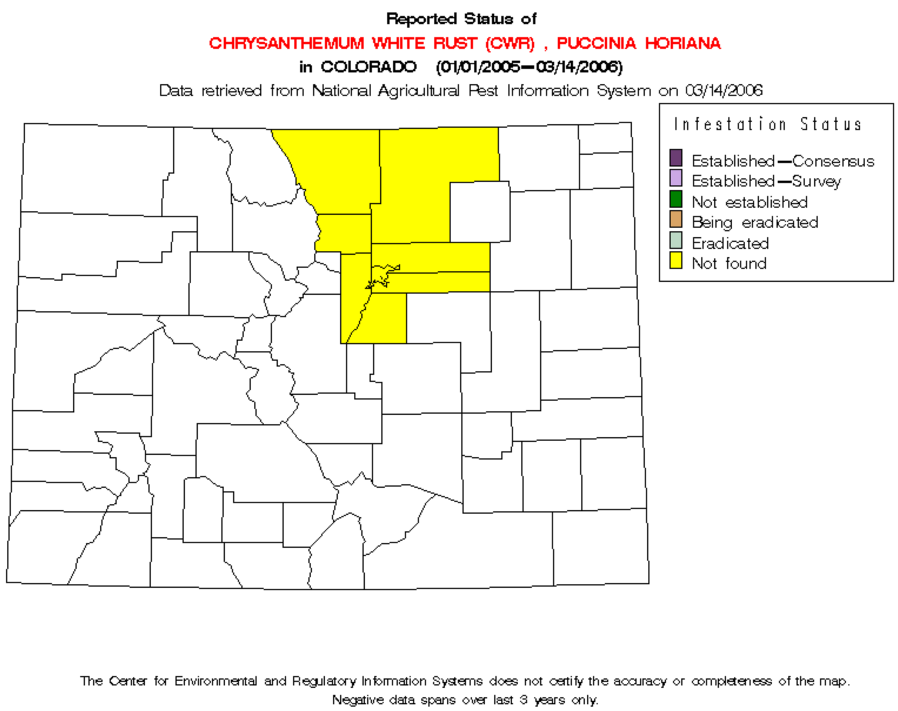


Figure 1. NAPIS map of **c**ounties surveyed for chrysanthemum white rust in Colorado.

3a. Sudden Oak Death – Early Detection

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Jerry Cochran and Kara Hempy-Mayer

Objective:

A general nursery survey was conducted for the purpose of early detection of *Phytopthora ramorum* in Colorado nurseries. Early detection of *Phytophthora ramorum* is critical in any attempt at control or containment.

Methods and Results:

CDA inspectors surveyed for *P. ramorum* in conjunction with other survey work done during the months of July through October, 2005. A total of forty-nine nurseries were surveyed in eight counties (Table 2; Fig. 2), and seven different host genera were surveyed, including *Fraxinus*, *Acer*, *Quercus*, *Rhododendron* (azaleas and rhododendrons), *Syringa*, and *Viburnum*. Visual surveys were conducted at the same sites as the Exotic Wood Boring Insect visual surveys carried out by CDA.

No symptomatic plant material was found as a result of these surveys.

3b. Sudden Oak Death – National Trace Forward/Back Survey

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Jerry Cochran

Objective:

A National Trace Forward Survey was carried out by the CDA in response to the occurrence of *Phytopthora 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.

Methods and Results:

Eleven nurseries in Colorado had received host stock from the Oregon nursery, and four of these (covering four counties) had host stock remaining when contacted in the winter of 2004 (Table 2; Fig. 2). In April of 2005, these nurseries were instructed to retain their remaining plants, and CDA inspectors sampled the plants in June of 2005 according to National Trace Forward/Back Survey protocols. Samples were taken from *Viburnum lantana*, *V. opulus*, *V.* x *Burkwoodii*, and another unknown *Viburnum* species for ELISA analysis.

All samples were negative for *P. ramorum*. Nine samples had tested positive with ELISA, but were sent on for PCR analysis and subsequently tested negative.

3c. Sudden Oak Death National Nursery Survey

USDA-APHIS-PPQ Colorado
Project Coordinators: Lisa Perainoand Patrick McPherren

Objective:

The purpose of this project was to conduct the 2005 National Nursery Survey for *Phytopthora 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.

Methods and Results:

The surveys were conducted by USDA APHIS PPQ personnel from July 12 through September 1. In ten counties throughout Colorado, fifteen nurseries were surveyed according to the National Nursery Survey protocol. Production and wholesale nurseries were targeted, with nursery selection based upon availability of host material. All host and associated host material was visually inspected. Over 46 species were inspected, covering 23 genera (see NAPIS database for a complete listing).

All samples tested negative for *P. ramorum*.

Table 2. Numbers and results of *P. ramorum* surveys per county in Colorado.

County:	3a. CDA Early Detection	3b. Trace Forward	3c. National Nursery Survey	Total Surveys per County	No. Infected Plants
Adams	10		1	11	0
Arapahoe	1	1	2	4	0
Boulder			2	2	0
Denver			2	2	0
Douglas	11		1	12	0
El Paso	4		2	6	0
Fremont	2		2	4	0
Montrose		1		1	0
Montezuma		1		1	0
Jefferson			1	1	0
Larimer	10	1		11	0
Logan			1	1	0
Pueblo	6			6	0
Weld	5		1	6	0

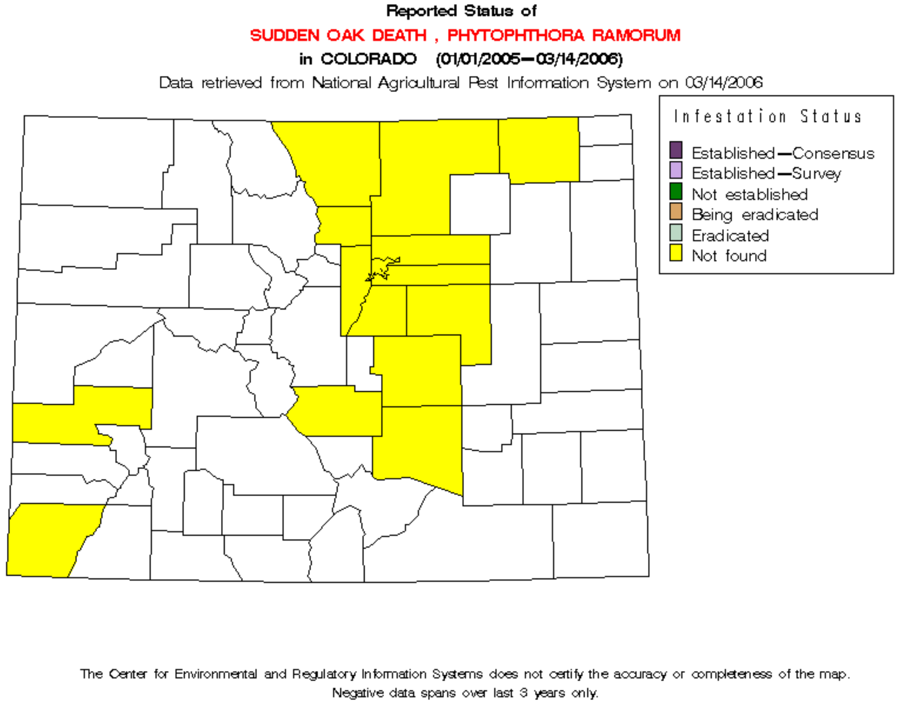


Figure 2. NAPIS map of Counties surveyed for *P. ramorum* in Colorado.

4. Weed Survey and Biocontrol Project

Colorado Department of Agriculture – Conservation Services Division
Project Coordinators: Eric Lane and Dan Bean

Objective:

The objectives of this project were to survey and map the exotic weed *Cardaria draba* (hoary cress) and to produce biological control agents to suppress the exotic weeds *Euphorbia esula* (leafy spurge), *Carduus nutans* (musk thistle), *Cirsium arvense* (Canada thistle), *Centaurea diffusa* (diffuse knapweed), *Centaurea stoebe* (spotted knapweed), Russian knapweed, *Linaria dalmatica* (Dalmatian toadflax), *Linaria vulgaris* (yellow toadflax), *Convolvulus arvensis* (field bindweed), and *Tamarix ramosissima* (saltcedar).

Methods and Results:

Weed survey

Hoary cress, or whitetop, is designated as a List B noxious weed species on the Colorado Noxious Weed list. Hoary cress was introduced to North America from Europe in the late 1800's in alfalfa seed and subsequently spread to the western United States by the early 1900's. In 2002, the Noxious Weeds Program of the Colorado Department of Agriculture requested survey data of 21 different species of concern, including hoary cress, from the County Weed Supervisors of Colorado. Surveys consisted of estimating infested acreages per 9,000-acre quarterquad. Typically, a County Weed Supervisor would gather together data from all knowledgeable weed managers—federal and private—within their county and estimate the number of infested acres for the targeted weed species within each 9000-acre quarterquad grid that overlaid the county. The acreage estimates were then compiled by the Colorado Department of Agriculture and entered into a 2002 quarterquad database file. This data was combined with data from other counties and georeferenced within a shapefile to produce the QQSurvey Noxious Weed Distribution and Abundance maps. In 2006, an additional Hoary cress quarterquad survey was administered to the County Weed Supervisors in order to review and update the distribution and abundance of Hoary cress in Colorado. The same survey process was repeated, with 32 of 39 counties responding thus far, resulting in an estimate of more than 38,000 acres currently infested with Hoary cress. These updated acreage estimates were used to produce the 2006 Distribution and Abundance map of Hoary cress in Colorado (Fig. 3).

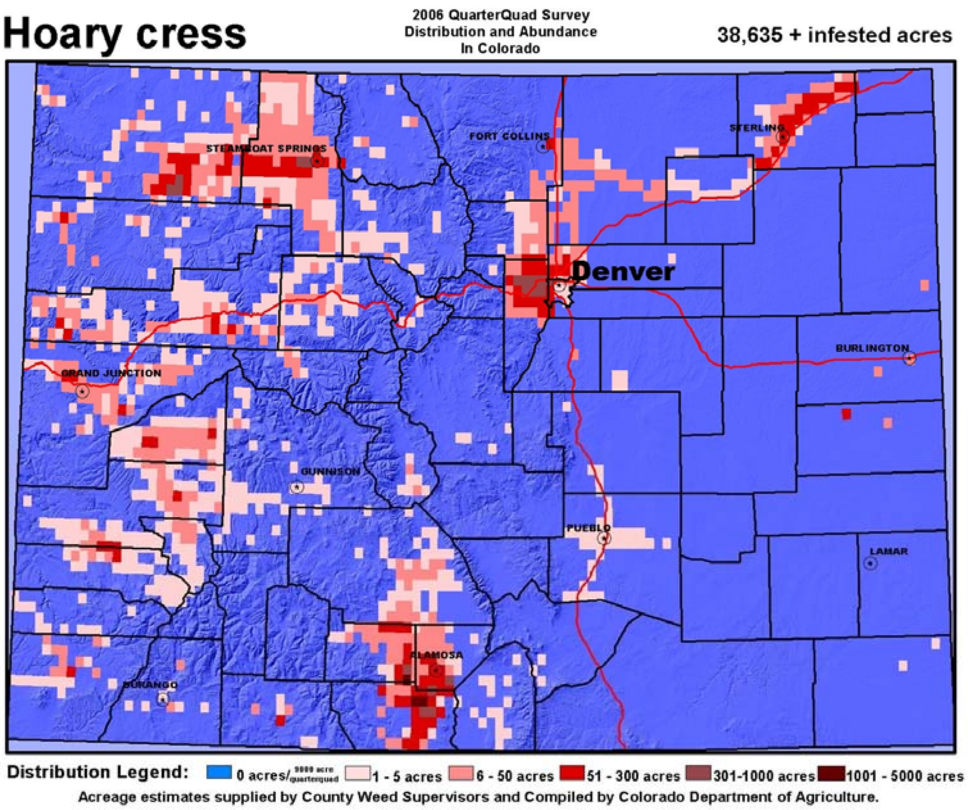


Figure 3. 2006 Distribution and abundance of hoary cress in Colorado. Each block of color represents an infested 9,000 acre area: lighter red blocks indicate the presence of relatively new or light infestations, while darker red blocks indicate the presence of a greater number of infested acres within the quarterquad.

Biocontrol

The Insectary provides biological control agents to the public and educates the public in their use. The Insectary also works with other governmental agencies and land managers to use biocontrol agents to suppress invasive weeds in a systematic and well-monitored fashion. Biocontrol agents are either reared at the Insectary or collected in the field. Of those collected in the field some were immediately released at other sites while some were brought into the Insectary and stored for future releases. We are currently experimenting with methods to better hold insects for future releases. We have trials in progress in which we vary the density of the tamarisk leaf beetle in plastic storage containers. We have purchased a controlled temperature freezer enabling us to hold diapause insects at sub freezing temperatures. By holding cold hardy insects at sub freezing temperatures we should be able to vastly improve survival rates and greatly increase the efficiency with which insects can be stored. Three species are being held at subfreezing temperatures: the tamarisk leaf beetle *Diorhabda elongata*, the toadflax stem borer *Mecinus janthinus* and the Canada thistle gall fly, *Urophora carduii*. They are being monitored for survival and the results will be used to develop more effective storage protocols.

Biocontrol agents were released for ten exotic weeds—six of which are listed on Colorado's Noxious Weed List B and one on List C. Releases occurred in various locations in Colorado, Wyoming, Nebraska, Utah, Idaho, and Washington. Field collections done for several biocontrol agents provided estimated numbers of established insects, which was recorded as recovery data. Release and recovery data have both been entered into NAPIS.

- **Leafy spurge** (*Euphorbia esula*) (B List)

Aphthona flea beetles, mixed species, were collected from several sites on the eastern slope (Fig. 4). Three hundred seventy-four releases of 1,000 adult beetles each were made, mostly on the eastern slope (Fig. 4). The presence of *Aphthona* adults at previous release sites was verified and it was also noted that a root feeding long horned beetle, *Oberea erythrocephala* was found at a number of east slope leafy spurge sites. The Insectary is currently planning a series of experimental releases of the long horned beetle in areas where *Aphthona* beetles have not become well established. Dr. Margot Becktell, lecturer at Mesa State College and recently affiliated with the Insectary as a Research Associate, has initiated a project to investigate the possibility that leafy spurge biocontrol in Colorado could be enhanced by supplementing naturally occurring soil borne pathogens, as has been shown by researchers with the USDA in Montana. Her approach is designed to provide a novel way to increase the efficiency of root boring insects in controlling leafy spurge.

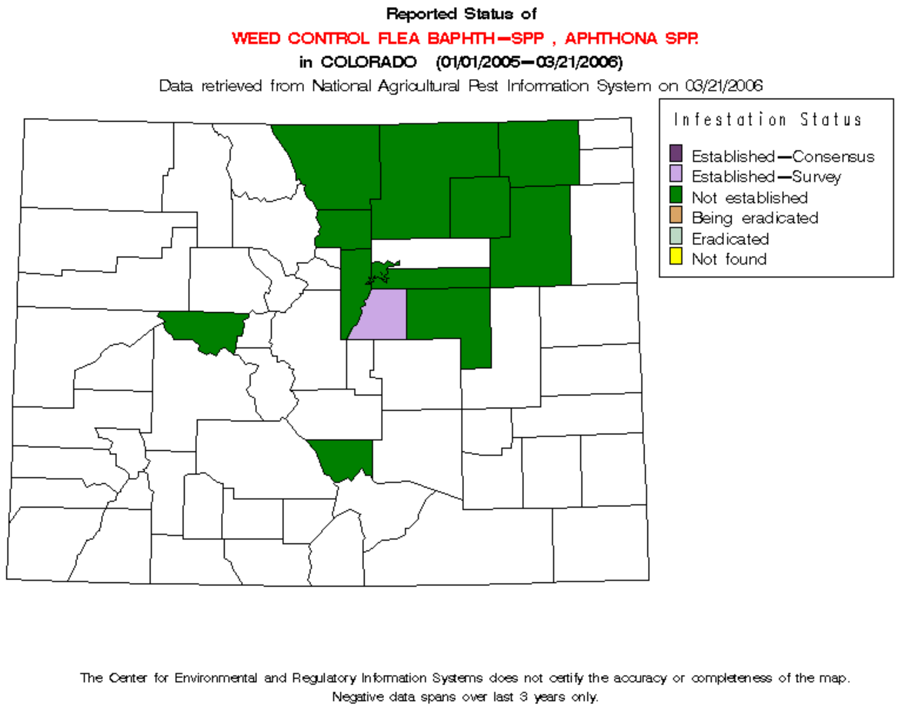


Figure 4. Green and purple counties indicate those counties in which *Apthona* spp. were released and recovered, respectively, in 2005.

Musk thistle (*Carduus nutans*) (B List)

The musk thistle rosette weevil *Trichosirocalus horridus* was released statewide. There were 18 releases on the eastern slope and 21 releases on the western slope as well as a single release in Nebraska, on the Colorado border (Fig. 5). Each release consisted of 100 adults and these were collected from sites on the eastern and western slopes. At one of the collection sites nearest to the Insectary, in Mesa Country, it was difficult to collect sufficient numbers of *T. horridus* due to the fact that most of the musk thistle was gone from what had been a very heavily infested site. *Rhinocyllus conicus* has been removed from our list of recommended species for musk thistle control due to concerns over non target impacts. This species is widespread in Colorado and readily colonizes musk thistle resulting in a synergistic negative impact when combined with *T. horridus*.

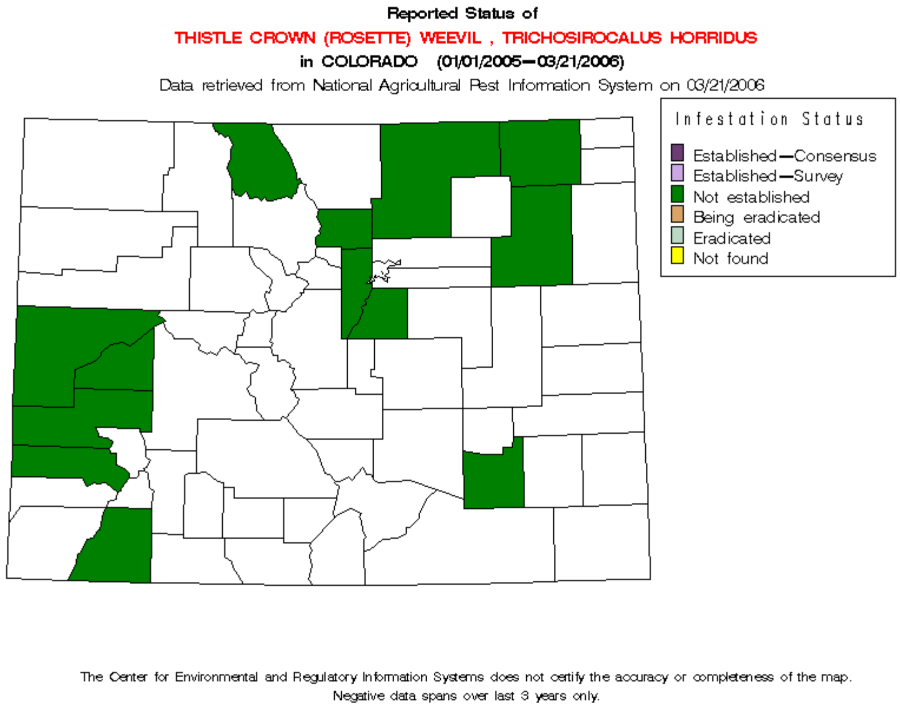


Figure 5. Green counties indicate those counties in which *Trichosirocalus horridus* was released in 2005.

• **Canada thistle** (*Cirsium arvense*) (B List)

Galls of the Canada thistle gall fly (*Urophora cardui*) were collected from a site on the east slope in the fall of 2004, although surveys done in several northern counties yielded no insects (Fig. 6). The galls were stored under refrigeration until late spring of 2005. The adult flies were allowed to emerge and were then collected and distributed in releases of approximately 200 adults. Seventeen releases were made, mostly on the east slope (Fig. 6). Galls were collected in 2005 and are being stored under refrigeration and at subfreezing temperatures for use in 2006.

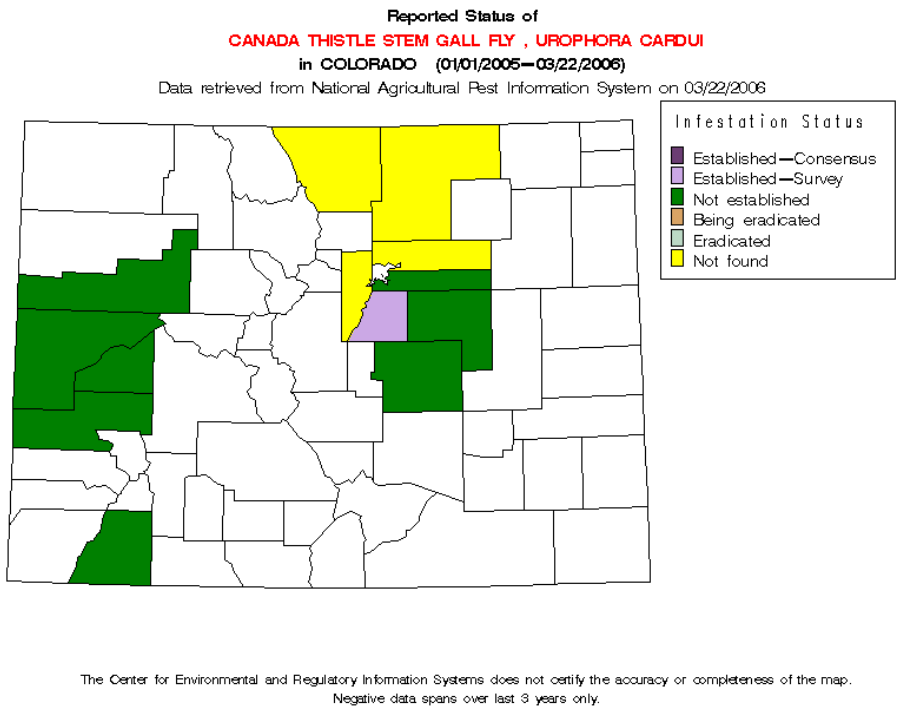


Figure 6. Green, yellow, and purple counties indicate those in which *Urophora cardui* was released, not found, and recovered, respectively, in 2005.

• **Diffuse and spotted knapweeds** (*Centaurea diffusa*, *Centaurea stoebe* ssp. *micranthos*) (B List)

There were two agents used against the knapweeds in 2005; the lesser knapweed flower beetle *Larinus minutus*, and the knapweed root weevil, *Cyphocleonus achates*. *L. minutus* was collected from several sites on the eastern slope (Fig. 7). There were 258 releases of 100 per release for a total of 23,800 *L. minutus* and there were nine releases of the root weevil, *C. achates* (Fig. 7 and 8). Most releases took place on the eastern slope. We are currently working on an artificial diet for *C. achates*, in collaboration with Dr. Nada Carruthers, USDA APHIS. Since root boring insects are notoriously difficult to rear under laboratory conditions it is thought that artificial diet will expedite their production. Thus far we are able to rear the purple loosestrife root boring weevil *Hylobius transversovittatus* on a diet developed by Dr. Carruthers but we have only been able to rear four *C. achates* to adulthood on that artificial diet.

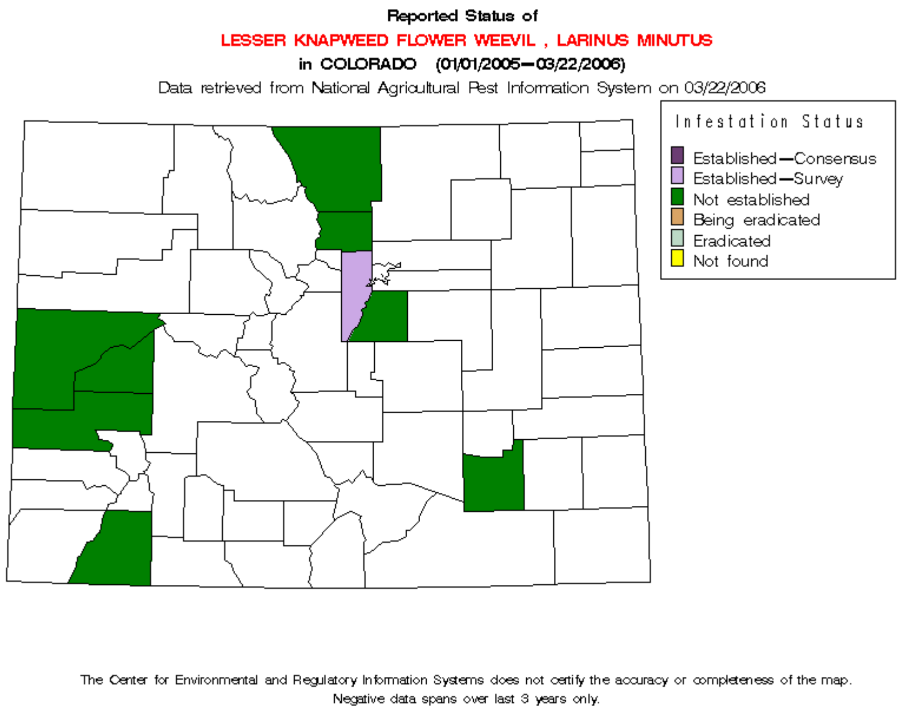


Figure 7. Green and purple counties indicate those counties in which *Larinus minutus* was released and recovered, respectively, in 2005.

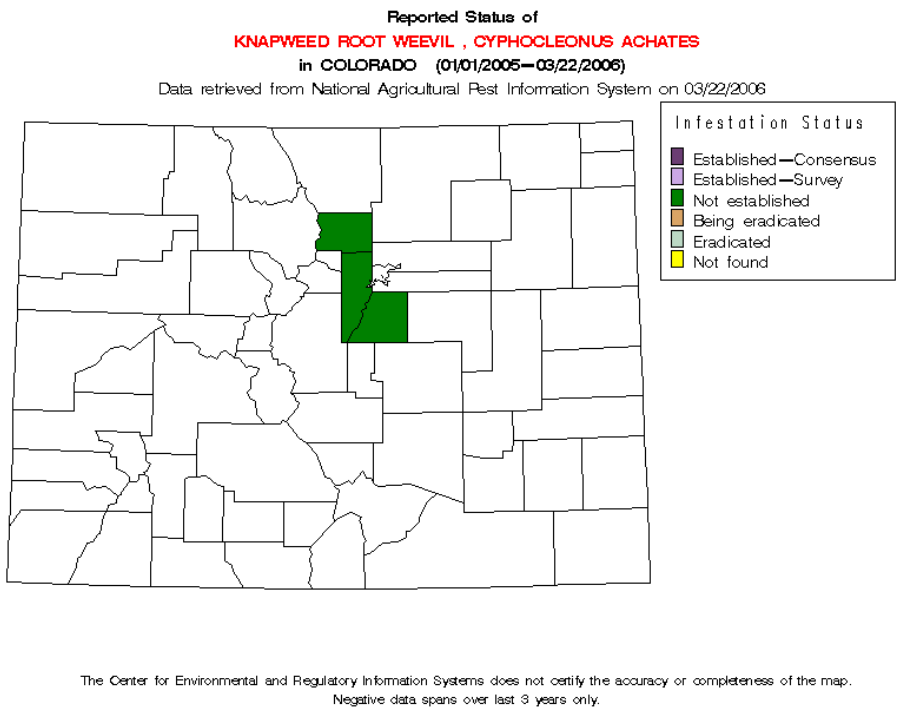


Figure 8. Green counties indicate those counties in which *Cyphocleonus achates* was released in 2005.

• **Russian knapweed** (*Acroptilon repens*) (B List)

Four potential biocontrol release sites have been scouted in Mesa County including the tamarisk leaf beetle release site on BLM land in Horsethief Canyon which has not only a heavy infestation of tamarisk but also of Russian knapweed. Should new agents come available it will be an ideal release site since it is gated and already a weed biocontrol study site. Unfortunately there were no agents available this year even though two *Urophora* flower gall flies have been approved by TAG. Dr. Margot Becktell sampled Russian knapweed infestations in Mesa County and has found a rust that could have biocontrol potential. Samples of *Puccinia acroptili* were sent to Dr. Bill Bruckart, USDA ARS, for identification. The collections by Dr. Becktell are the first from western Colorado and she was acknowledged on a poster presented by Dr. Bruckart. Dr. Bruckart has identified more virulent forms of the rust from overseas collections in Turkey and these may prove to be valuable as biocontrol agents. Collaborative efforts are scheduled to continue with Dr. Bruckart.

• **Dalmatian and yellow toadflaxes** (*Linaria genistifolia*, *Linaria vulgaris*) (B List)
The toadflax moth *Calophasia lunula* was released at 30 sites on both the east and west slopes (Fig. 9). Most of the releases were of larvae (6673 total) but some adults were also released (352). Released insects were reared in the Insectary. The releases were made on both species of toadflax. Our supply of the toadflax stem weevil, *Mecinus janthinus*, was very low this year due to an incubator malfunction that caused the temperature of the chamber to skyrocket and killed most of the weevils (stored as diapausing adults) last winter. New growth chambers, better failsafe systems and better monitoring of the chambers will prevent a repeat of the problem.

Two *M. janthinus* release sites were monitored this season and although no insects were found during surveys in Garfield County (Fig. 9), it was apparent that the stem boring weevils were having a significant impact on Dalmatian toadflax in Mesa County (recovery data were not available for Mesa County for this report). Plants near the release sites had large numbers of weevils. At the first release site a dense patch of toadflax had been reduced to low growing plants that were not flowering. Away from the release site plants were larger and continued to flower. Adult weevils were found in sweep samples nearly a kilometer from the release site but densities of insects declined away from the release site and plants greater than 100 meters from the release site showed no signs of negative impact. *Mecinus janthinus* was first released 7 years ago at the site. The population is now thriving there has probably become adapted to the high elevation site in eastern Mesa County. We plan to use the site as a field insectary for further releases at high altitude sites (>6,000 ft.) in western Colorado. We have two more release sites scheduled for next year, one on Bureau of Reclamation land and one on BLM land, both in Mesa County. In the long run we want to have a large and steady supply of the weevils that are adapted to environmental conditions in Colorado.

An interesting observation was made this year by Colleen Jandreau concerning the appearance of what seems to be a hybrid form of toadflax (Dalmatian x yellow). The hybrid form has leaves and stems that are intermediate between the two toadflax species and in most other aspects appears intermediate. Although there are reports of hybridization, many workers feel that perhaps a third species exists that appears to be intermediate between the two common species. Since Colleen found the intermediate form only in an area where both species of toadflax coexist it seems likely that they are truly hybrids. We now have the putative hybrid forms growing in the greenhouse and we plan to do more tests on them to determine if we are actually dealing with a hybrid and also how likely it is that such a hybrid form could act as a genetic conduit through backcrossing with the parental forms. The significance of this could be great, especially if hybrid traits lead to an increase in invasive potential. Colleen made another very intriguing observation concerning the hybrid form. Laboratory cultures of *C. lunula* can be reared on live plant material from either Dalmatian or yellow toadflax; the larvae do not distinguish between the two. On the hybrid toadflax *C. lunula* larvae cease feeding and enter a state of paralysis and arrested development. Of course this would give the hybrid form a tremendous advantage in the field once biocontrol agents have become established. We are currently testing to see if the stem boring weevil, which has so much promise as a control agent in Colorado for Dalmatian toadflax, is able to live on the hybrid form. If the hybrid form is also toxic to the weevil this could signal a major problem for toadflax biocontrol. Colleen has also observed that even the greenhouse aphids do not do well on the hybrid form. We have shared these observations with researchers from CSU (Drs Norton and Hufbauer) and we will collaborate with them to better understand this potentially important phenomenon.

At least three more yellow toadflax sites have been identified and we will set up monitoring transects to test the efficacy of both *M. janthinus and C. lunula* on yellow.

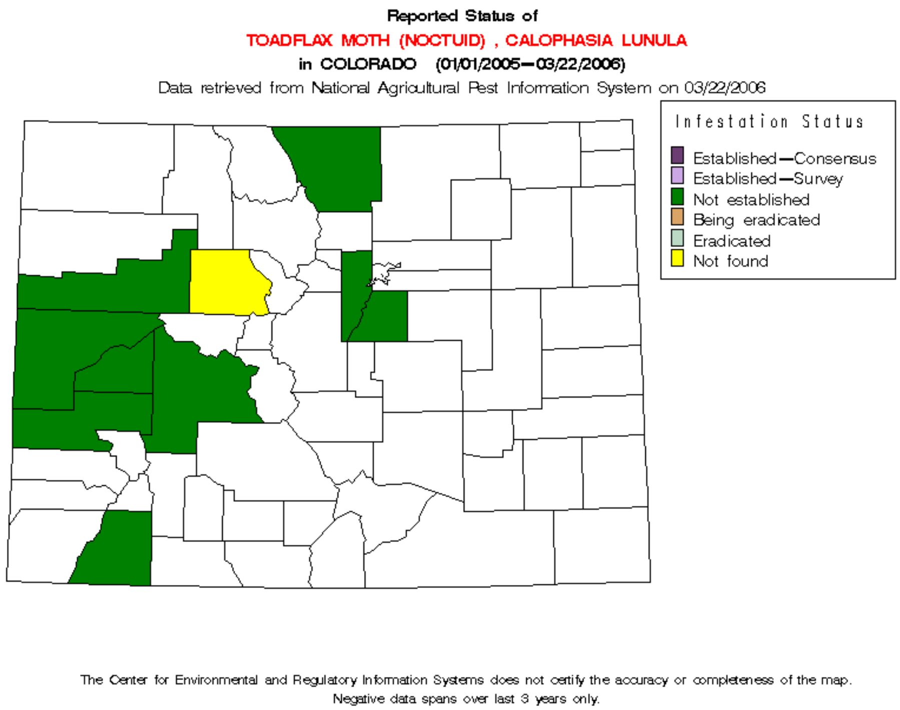


Figure 9. Green and yellow indicate those counties in which *Urophora cardui* was released and not found, respectively, in 2005.

• **Field bindweed** (*Convolvulus arvensis*) (C List)

Two agents were released for control of field bindweed; a gall forming mite *Aceria malherbae* and a moth *Tyta luctuosa*. The mite was released in a very widespread fashion around Colorado (Fig. 10). The release program involved CSU Cooperative Extension (Bob Hammon), the Insectary (Terri Locke) and significant public participation. Mite-infested plant material was collected, packaged and was made available to the public. This season alone the CDA shipped material for nearly 600 releases throughout Colorado and CSU Coop Extension provided another 2,500 releases for the public. Surveys done by CSU and CSU Extension, in collaboration with CDA, show that the mites have become established in almost every county in Colorado where bindweed is a pest (Fig. 11). In some areas, such as the Grand Valley in Mesa County, mites have started to have a significant impact on bindweed populations. Because the mites overwinter on the root crowns they can continue to hit plants every time they begin to leaf out. The mite appears to be a very dramatic emerging success story.

The bindweed moth has not been as dramatic as the mite in controlling field bindweed. However, the moth has become established in Mesa County (recovery data was not available for this report) and it appears to have an impact on bindweed when it is present at high densities. Twenty-nine thousand *T. luctuosa* larvae were release across Colorado (approximately 70 releases) during 2005 (Figure 12).

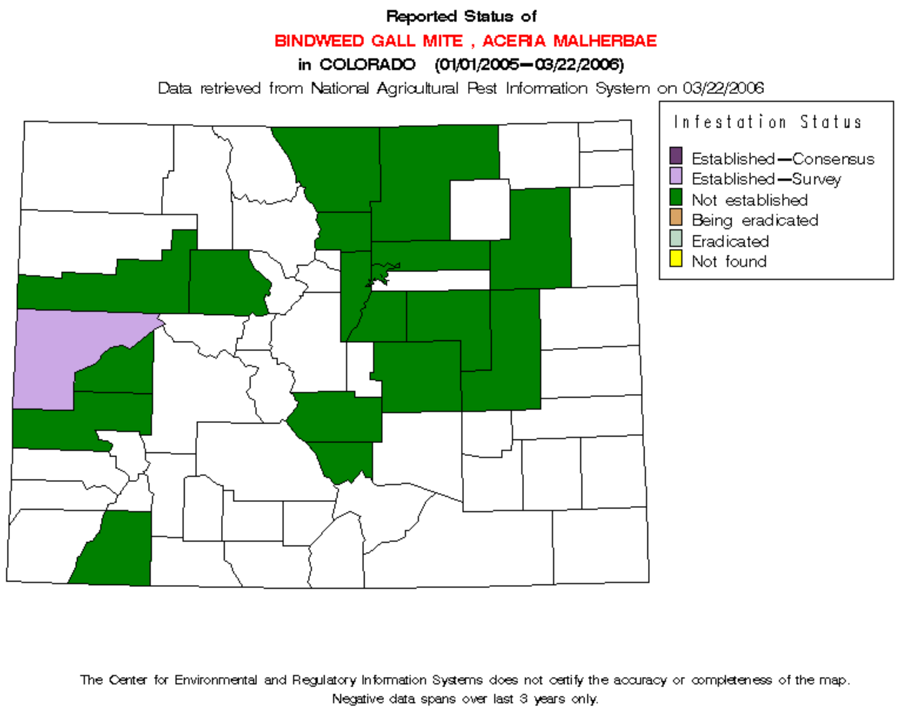


Figure 10. Green and purple counties indicate those in which *Aceria malherbae* was released and recovered (by Insectory personnel), respectively, in 2005.

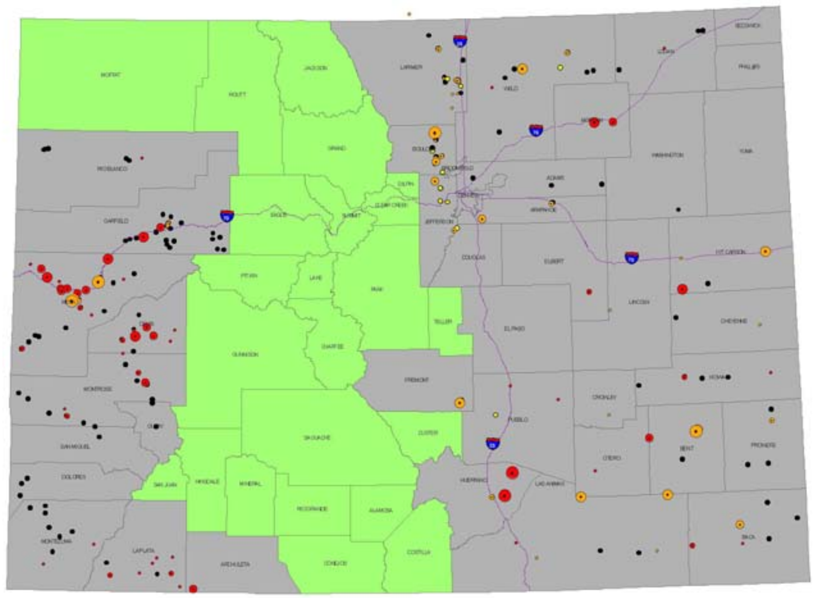


Figure 11. Bindweed mite establishment in Colorado - Surveys done by Andrew Norton (CSU), Bob Hammon (CSU Cooperative Extension) and CDA staff reveal establishment of *Aceria malherbae* statewide. Red circles are survey results from 2005, orange are from 2004. The degree of plant damage is proportional to circle size and black dots are survey locations where no mites were found.

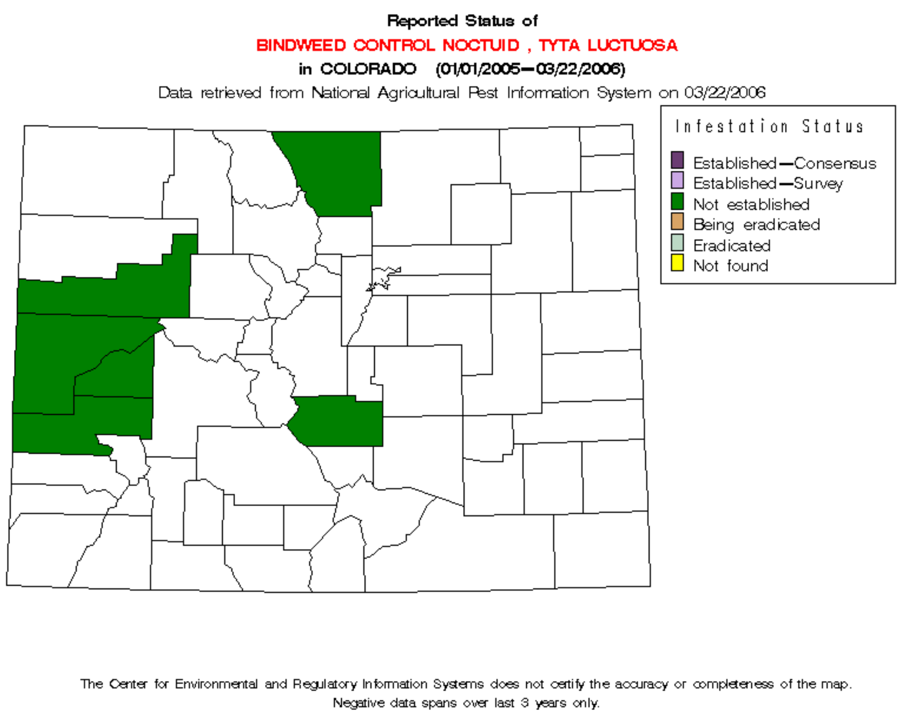


Figure 12. Green counties indicate those counties in which *Tyta luctuosa* was released in 2005.

• **Saltcedar** (*Tamarix ramosissima*)

A major regional biocontrol implementation project began in 2005 under the supervision of USDA APHIS. The CDA Palisade Insectary played a major role in the collection, storage and shipment of the biocontrol agent *Diorhabda elongata* (Chrysomelidae) to 24 field sites in the western US. Insectary personnel collected 60,000 adult beetles from field insectaries in western Nevada, brought them back to the Insectary where they were kept under controlled temperature (25°C) and photoperiod (16L:8D) for about two weeks. Under these conditions adults remain reproductive indefinitely. Beetles were provided with a constant supply of cut fresh saltcedar foliage and they fed and laid eggs for the duration of their stay at the Insectary. They were then packaged into lots of 2,000 beetles and shipped to cooperators at 24 field release sites. Shipments occurred during the first and second weeks of August and represented the first true implementation of biological control for saltcedar. The Insectary was also responsible for releasing beetles at a field site in Mesa County (release data were not available for this report). Approximately 6,000 adult beetles and over 20,000 larvae were released along the Colorado River, on BLM land in Horsethief Canyon. Defoliation was noted on the release tree three weeks after the releases. Larvae fed and developed on the plants and adults were observed to mate and lay eggs for the first two weeks of August. By mid September beetles were no longer found on the tamarisk plants.

Monitoring protocols were established and the Insectary assisted in setting up permanently marked tamarisk plants and taking basic measurements for use after the beetles become established at the Mesa County release site.

In September Insectary personnel, in collaboration with Rich Hansen of USDA APHIS, collected *D. elongata* destined for overwintering in western Nevada. It was very difficult to locate large numbers of beetles so collecting was quite painstaking and the numbers were smaller than collected in 2004. In spite of the difficulties locating large aggregations of adults approximately 25,000 adults were collected. These were brought back to the Insectary and fed fresh cuttings to allow full accumulation of fat body reserves for overwinter survival. This “feeding out” occurred at 20°C and 12L:12D photoperiod. These conditions promote diapause in this species. After insects had accumulated full metabolic reserves they were counted and stored in plastic trays at 4°C. They are currently being monitored for survival and will provide material for release next spring. Thus far approximately 95% of the adults remain alive nearly five months into the storage period. We anticipate being able to supply the first round of implementation releases planned for the western region next spring. After that we are planning to travel to western Nevada and collect another batch of adults that have emerged from overwintering diapause.

5. Exotic Wood Boring Insect Survey

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Kara Hempy-Mayer and Jerry Cochran
In cooperation with:
Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Objective:

The purpose of this project was to conduct an early detection visual survey along with non-specific trapping for *Agrilis planipennis* (emerald ash borer), *Anoplophora glabripennis* (Asian longhorned beetle), and *A. chinensis* (citrus longhorned beetle) in conjunction with Pat McPherren of APHIS-PPQ in Colorado, and following the Exotic Wood Borer Bark Beetle National Survey protocol. Exotic wood boring beetles 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. Wood boring beetles have recently been targeted by APHIS as posing a serious threat to wood commodities. Valuable wood resources in the state of Colorado are at risk to these types of exotics.

Methods and Results:

Twelve-funnel Lindgren funnel traps were installed with E/AP and 3-part IPS lures at sites such as lumber and pallet companies where host material was present and where there was a high potential for infestation. Visual surveys were conducted by CDA inspectors at nurseries handling host plants.

CSU Surveys were performed by Bob Hammon of Mesa County Extension and Jeff Owens of Colorado State University, Department of Bioagricultural Sciences and Pest Management. Trapping was conducted in seven counties (Table 3). All traps were in place by mid-June and checked monthly through September. Suspect material was sorted and sent for analysis by David James.

CDA Surveys were conducted by state inspectors, with visual surveys being done at 82 nurseries at various times from May to October in 12 counties, and trapping surveys being done at eight sites in two counties (Table 3). Traps were installed by early June, checked monthly, and removed in early October. Suspect material was sorted and sent for analysis by Jerry Cochran.

No targeted species were detected (Fig. 13-15).

Table 3. Summary of trap- site numbers and results for Exotic Wood Boring Beetle surveys.

Surveyor	County	Traps/ Sites	# Positive traps
CSU			
Bob Hammon	Montrose	5/5	0
Bob Hammon	Ouray	1/1	0
Bob Hammon	Delta	6/6	0
Bob Hammon	Mesa	6/6	0
Jeff Owens	Weld	3/3	0
Jeff Owens	Larimer	2/2	0
Jeff Owens	Jefferson	1/1	0
CDA			
Inspector	Pueblo	4/2	0
Inspector	El Paso	12/6	0
Inspector	Larimer	visual	0
Inspector	Weld	visual	0
Inspector	Prowers	visual	0
Inspector	Douglas	visual	0
Inspector	Arapahoe	visual	0
Inspector	Adams	visual	0
Inspector	El Paso	visual	0
Inspector	Fremont	visual	0
Inspector	Huerfano	visual	0
Inspector	Jefferson	visual	0
Inspector	Boulder	visual	0
Inspector	Pueblo	visual	0

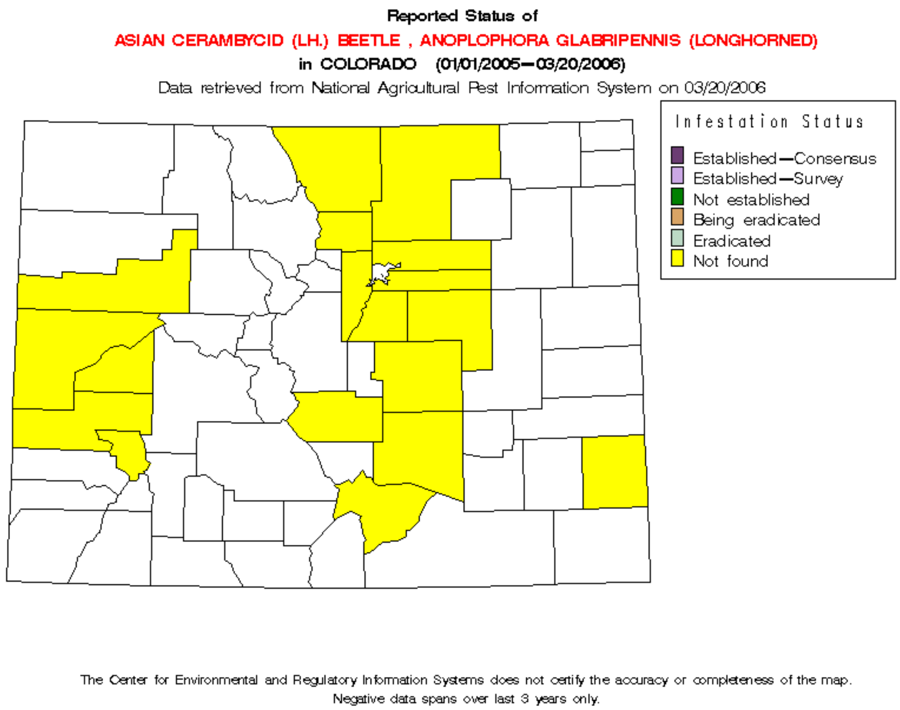


Figure 13. NAPIS map of counties surveyed for Asian longhorned beetle in Colorado.

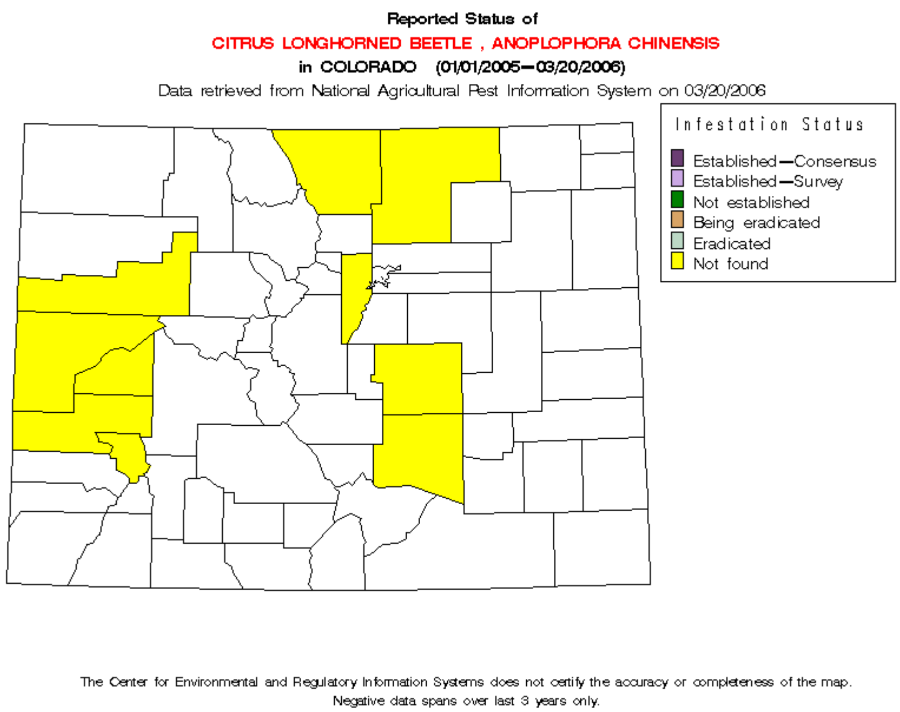


Figure 14. NAPIS map of counties surveyed for citrus longhorned beetle in Colorado.

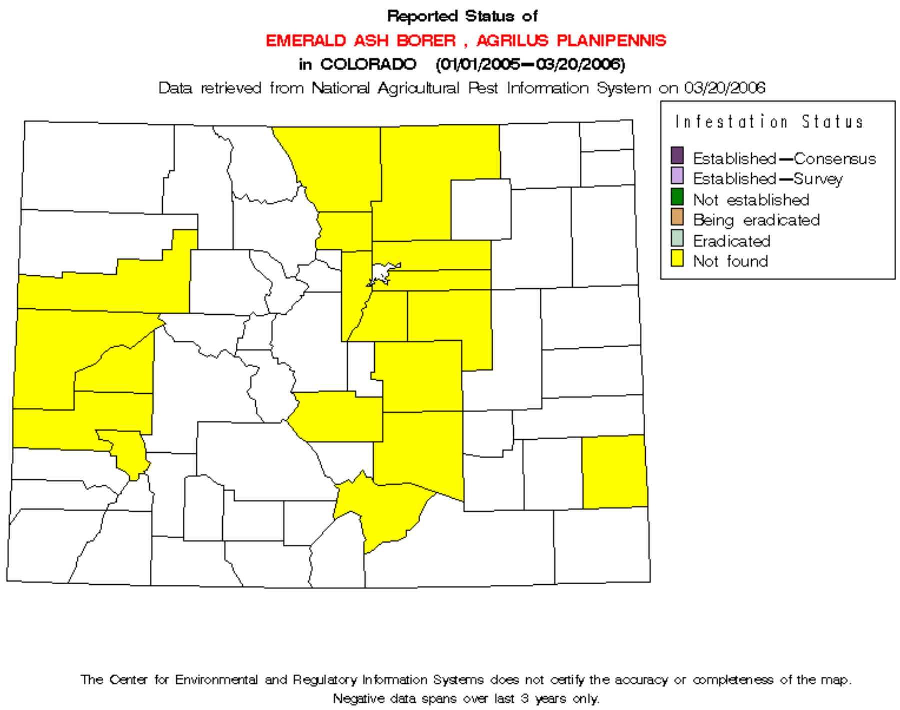


Figure 15. NAPIS map of counties surveyed for emerald ash borer in Colorado.

6. Exotic Fruit Pest Survey

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Kara Hempy-Mayer and Jerry Cochran
In cooperation with:
Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Objective:

The purpose of this project was to continue a trapping survey for early detection of *Enarmonia formosana* (cherry bark tortrix), *Yponomeuta malinellus* (apple ermine moth), *Cryptophlebia leucotreta* (false codling moth), *Epiphyas postvittana* (light brown apple moth), *Lobesia botrana* (European grape vine moth), and *Cydia funebrana* (plum fruit moth), to help 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. False codling moth is ranked ninth on the CAPS FY05 Pest Detection Pest List, and cherry bark tortrix and apple ermine moth are on the Emerging Plant Pest List, while the rest pose specific restrictions to the export of Colorado products.

Methods and Results:

Pheromone-baited Pherocon 1C wing-style traps were installed at sites such as orchards, vineyards, botanical gardens, and nurseries where host plants occur. According to survey protocol, most traps were checked every other week and lures replaced as needed.

CSU Surveys were conducted by Rick Zimmerman of Rogers Mesa Extension and David James. Traps for the exotic fruit moth survey took place in Larimer County on the east slope and Delta County on the west slope (Table 4). Trapping began in June and was performed until mid September. Trap captures were initially screened on site and suspect material then referred on by Rick Zimmerman and David James.

CDA Surveys were conducted by CDA inspectors. Pheromone traps were installed in early June and removed in early October at four sites in four counties (Table 4). Trap captures were initially screened and then referred on by Jerry Cochran.

No targeted pests were found (Fig 16).

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

Surveyor	County	No. Sites/Traps	No. Pos. Catches
CSU			
Rick Zimmerman	Delta	5/60	0
David James	Larimer	3/18	0
CDA			
Inspector	Adams	1/5	0
Inspector	Boulder	1/5	0
Inspector	Denver	1/5	0
Inspector	Fremont	1/5	0

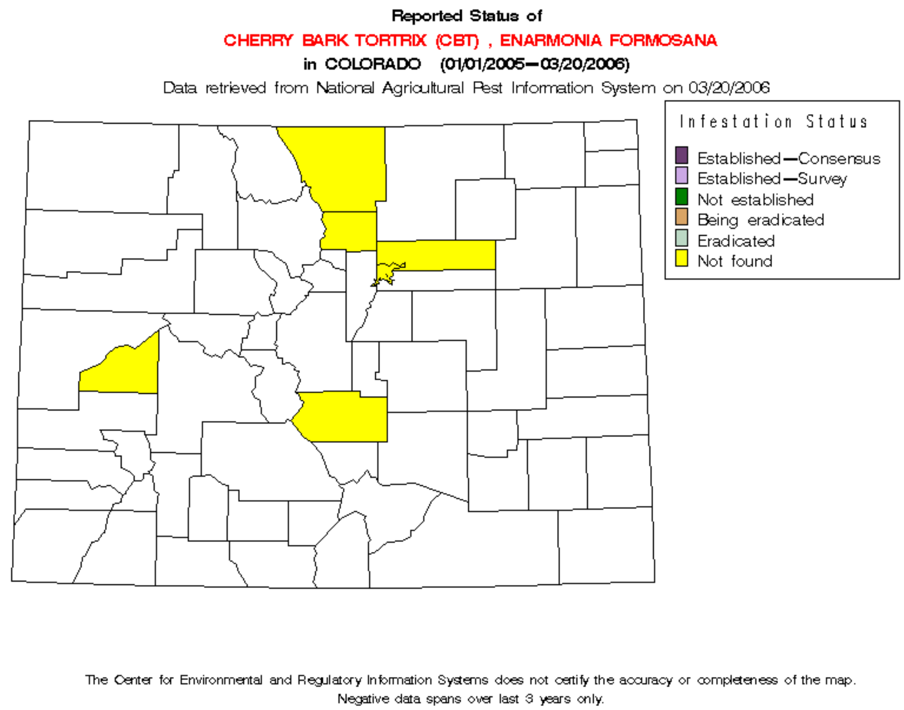


Figure 16. NAPIS map of counties surveyed for exotic fruit pests in Colorado.

7. Pine Shoot Beetle

Colorado Department of Agriculture - Plant Industry Division
Project Coordinators: Kara Hempy-Mayer and Jerry Cochran
In cooperation with:
Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Lou Bjostad and David James

Objective:

The purpose of this project was to conduct an early detection trapping survey for *Tomicus piniperda* (pine shoot beetle) in Colorado. The pine shoot beetle is an insect that poses a significant threat to Colorado forest and forestry products. The pest has been found in several northeastern states from which Colorado obtains nursery stock or Christmas trees for resale. A survey is needed to determine the presence or absence of this insect in the state.

Methods and Results:

CSU Surveys were performed by Bob Hammon of Mesa County Extension and Jeff Owens of Colorado State University, Department of Bioagricultural Sciences and Pest Management. Trapping was conducted in seven counties using Lindgren funnels baited with alpha-pinene lures (Table 5). All traps were in place by mid-June and checked monthly through early December. All suspect material was sorted and sent for identification by David James.

CDA surveys took place in four counties (Table 5). Lindgren funnel traps with tomicus lures were used and installed in early June, checked monthly, and removed in early October.

All samples were negative for pine shoot beetle (Fig. 17).

Table 5. Summary of trap- site numbers and results for Pine Shoot Beetle Surveys.

Surveyor	County	No. Sites/Traps	No. Pos Traps
CSU			
Bob Hammon	Montrose	5/5	0
Bob Hammon	Ouray	1/1	0
Bob Hammon	Delta	6/6	0
Bob Hammon	Mesa	6/6	0
Jeff Owens	Weld	3/3	0
Jeff Owens	Larimer	2/2	0
Jeff Owens	Jefferson	1/1	0
CDA			
Inspector	El Paso	1/1	0
Inspector	Denver	1/1	0
Inspector	Adams	1/1	0
Inspector	Boulder	1/1	0

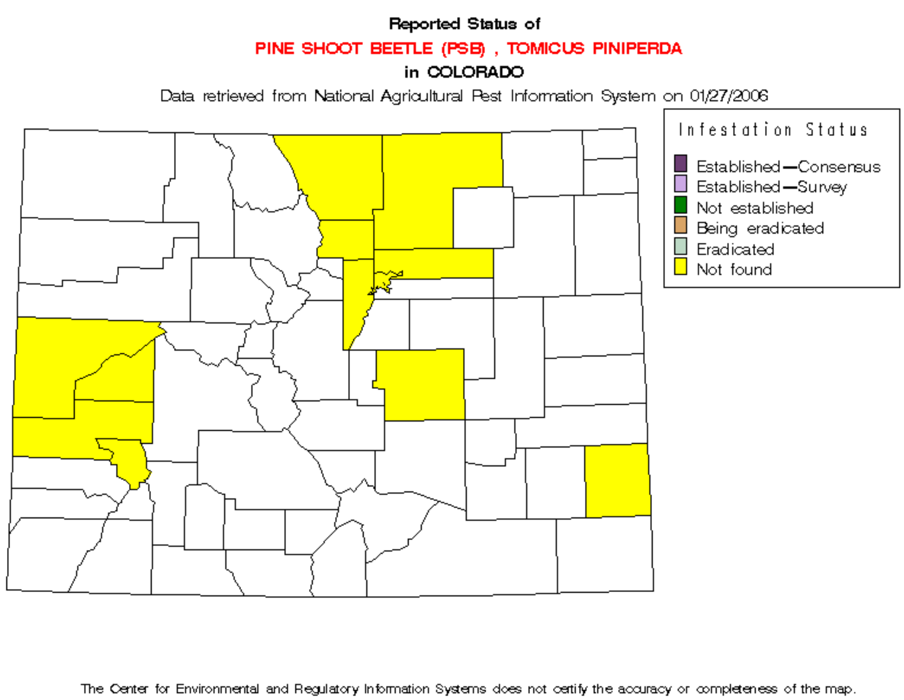


Figure 17. NAPIS map of counties surveyed for pine shoot beetle in Colorado.

8. Kaphra Beetle

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

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 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 2005 growing season can be used to identify pest-free zones, which can help support PPQ efforts to negotiate export agreements with other countries.

Methods:

Surveys were performed by Elisa Bernklau of Colorado State University, Department of Bioagricultural Sciences and Pest Management, and Rick Zimmerman of Rogers Mesa Extension. Survey efforts for Khapra Beetle in 2005 mimicked those surveys conducted in 2004. Grain elevators, grain storage facilities, and small businesses selling grain were surveyed in eight counties by Colorado State University personnel (Table 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. 18).

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

Surveyor	County	No. Sites/Traps	No. Pos. Catches
Elisa Bernklau	Weld	2/6	0
Elisa Bernklau	Kit Carson	1/3	0
Elisa Bernklau	Elbert	1/3	0
Elisa Bernklau	Adams	1/3	0
Elisa Bernklau	Washington	1/3	0
Elisa Bernklau	Yuma	1/3	0
Rick Zimmerman	Delta	1/3	0
Rick Zimmerman	Montrose	1/3	0

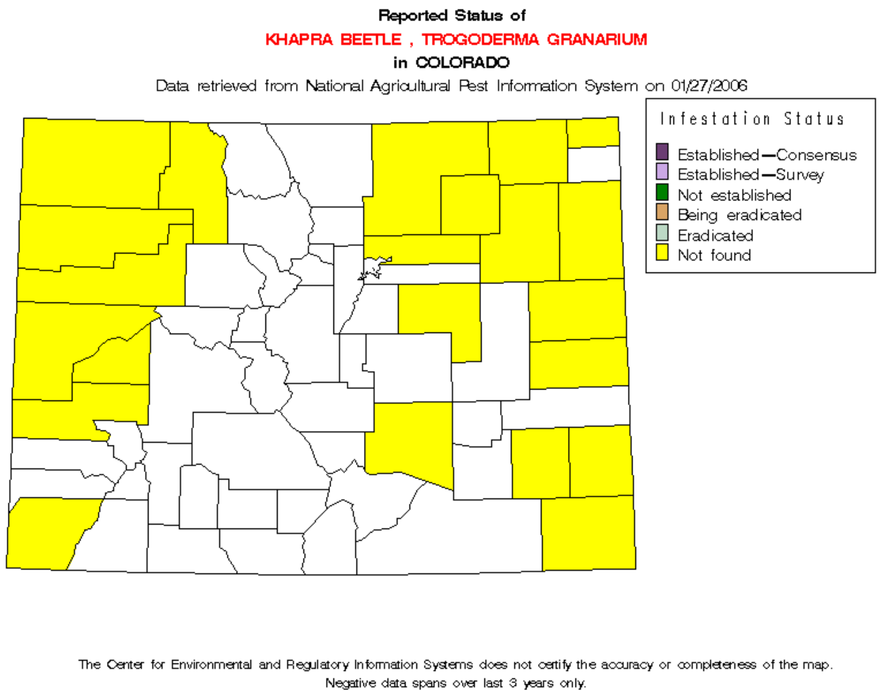


Figure 18. NAPIS map of counties surveyed for Khapra Beetle in Colorado.

9. Cereal Leaf Beetle

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

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 would be useful for purposes of eradication and planning of biocontrol efforts.

Methods and Results:

This survey was conducted by David James 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 nine counties (Table 7). 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.

No cereal leaf beetle was found (Fig. 19).

Table 7. Summary of site numbers and results for Cereal Leaf Beetle Surveys.

County	# Sites	No. Positive Catches
Montrose	4	0
Dolores	4	0
Montezuma	4	0
Delta	5	0
La Plata	4	0
Moffat	4	0
Mesa	3	0
Larimer	1	0
Weld	1	0

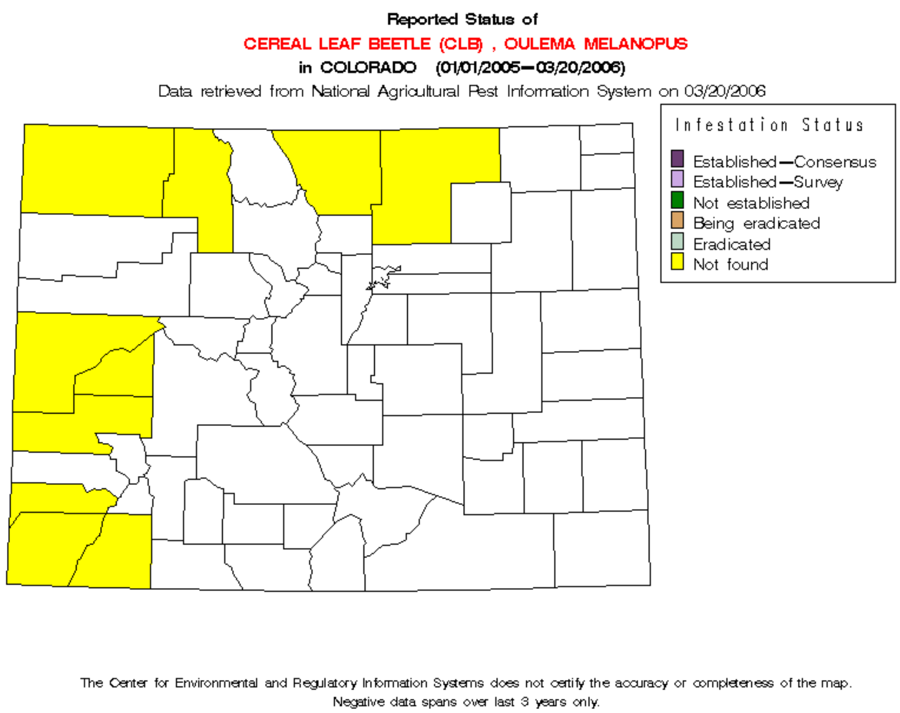


Figure 19. NAPIS map of counties surveyed in 2005 for cereal leaf beetle in Colorado.

10. Dry Bean Pests

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

Objective:

The purpose of this study was to conduct a survey of soybean and dry edible bean production regions in eastern Colorado for early detection of the dry bean pests *Aphis glycines* (soybean aphid) and *Maruca vitrata* (soybean pod borer). Soybean aphid is on the Emerging Plant Pest List, and the soybean pod borer is 19th on the WR FY05 Pest Detection Pest List. There is significant dry bean production in Colorado and soybean plantings are increasing. Extension workers in Colorado have expressed concern about dry bean pests, including soybean aphid, which can be a vector for alfalfa mosaic virus, cucumber mosaic virus, and bean common mosaic virus, serotype A (Larsen, USDA virologist, Prosser, Washington).

Methods and Results:

Surveys were performed by Ron Meyer of Golden Plains Extension, Rick Zimmerman of Rogers Mesa Extension, and David James. The soybean pests survey was conducted at a soybean and drybean field locations at the ARDEC research facility in Larimer County and in four northeast Colorado bean producing counties (Table 8). Surveys were also conducted in counties that had a substantial amount of bean production located on the western slope based on recommendations from a western slope cooperator. Visual surveys were conducted by making 10-ft transects of each field, and sweeps were conducted at 20 different locations. In addition to the survey, we consulted regularly with CSU drybean Cooperative Extension personnel (Barry Ogg and Howard Schwartz) to alert us concerning any possible aphid infestations throughout Colorado. No pests were found from these surveys (Fig. 20-21).

Table 8. Summary of site numbers and results for Dry Bean Pest Surveys.

Surveyor	County	# Sites	No. Positive
Ron Meyer	Kit Carson	2	0
Ron Meyer	Washington	1	0
Rick Zimmerman	Delta	4	0
Rick Zimmerman	Montrose	2	0
David James	Larimer	1	0

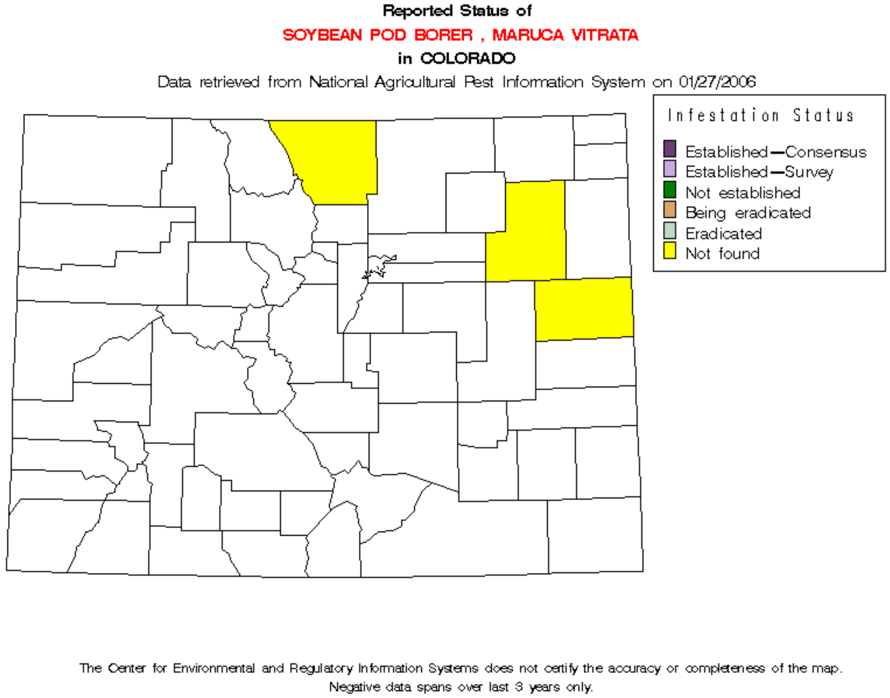


Figure 20. NAPIS map of counties surveyed in 2005 for soybean pod borer in Colorado.

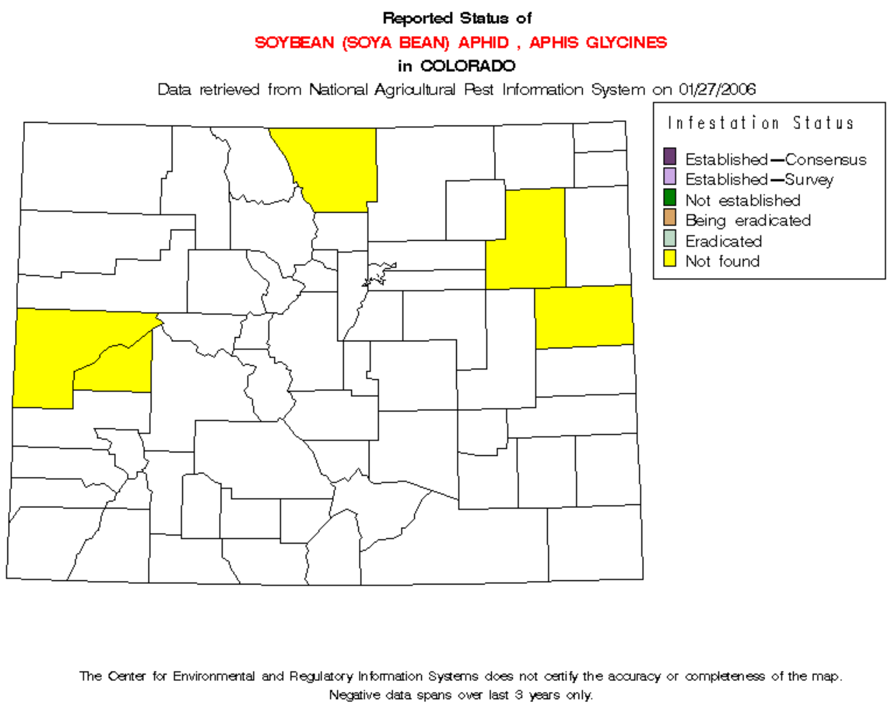


Figure 21. NAPIS map of counties surveyed in 2005 for soybean aphid in Colorado.

11. Karnal Bunt

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

Project Coordinators: Lou Bjostad and David James

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 and Rick Zimmerman of Rogers Mesa Extension. Due to last year's lackluster response from our cooperators, we decided to collect samples directly on site. This year 62 samples were collected from 11 counties (Table 9). Samples were sent in thirty-three bags (labeled CO400-CO434) 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. We had expected even more samples from the western slope; however, our cooperator in the area, Rick Zimmerman, found that wheat production in this area has been greatly reduced.

All samples tested negative for Karnal Bunt (Fig. 22)

.

Table 9. . Summary sample numbers and results for Karnal Bunt Surveys.

County	# Samples	No. Positive Samples
Adams	5	0
Arapaho	5	0
Lincoln	6	0
Elbert	5	0
Washington	13	0
Kit Carson	7	0
Cheyenne	7	0
Delta	1	0
Yuma	5	0
Weld	7	0
Montrose	1	0

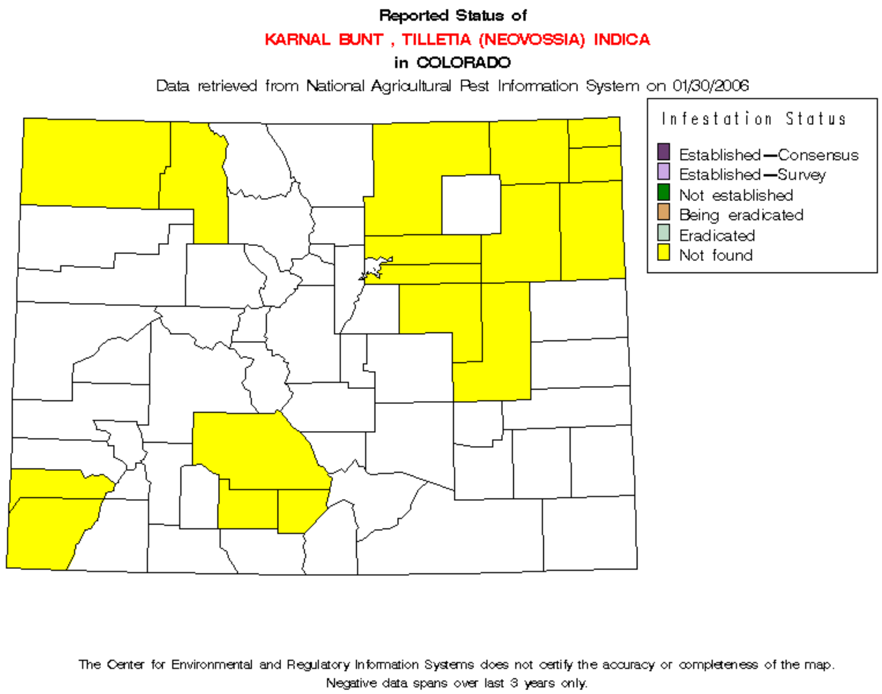


Figure 22. NAPIS map of counties surveyed in 2005 for Karnal Bunt in Colorado.

12. Old World Bollworm

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

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 at the top of the CAPS FY05 Pest Detection Pest List, and is a pest of wheat cotton, and tomato, all of which are products grown in Colorado. This survey represents the first time for which Old World bollworm has been surveyed in Colorado.

Methods and Results:

Surveys were performed by Bob Hammon of Mesa County Extension, Jeff Owens of Colorado State University, Department of Bioagricultural Sciences and Pest Management, and David James. Survey trapping was done in six counties and used pheromone-baited Pherocon 1C wing-style traps (Table 11). Most traps were checked every other week and lures replaced as directed. Trapping began in June and was performed until mid-September. Trap captures were initially screened on site by Bob Hammon, Jeff Owens, and David James.

All trap catches were negative (Fig. 23).

Table 11. Summary of trap-site numbers and results for Old World Bollworm Surveys.

Surveyor	County	Traps/ Sites	# Positive traps
Bob Hammon	Delta	3/3	0
Bob Hammon	Montrose	6/6	0
Bob Hammon	Mesa	5/5	0
Jeff Owens	Jefferson	1/1	0
David James	Larimer	5/5	0
David James	Weld	1/1	0

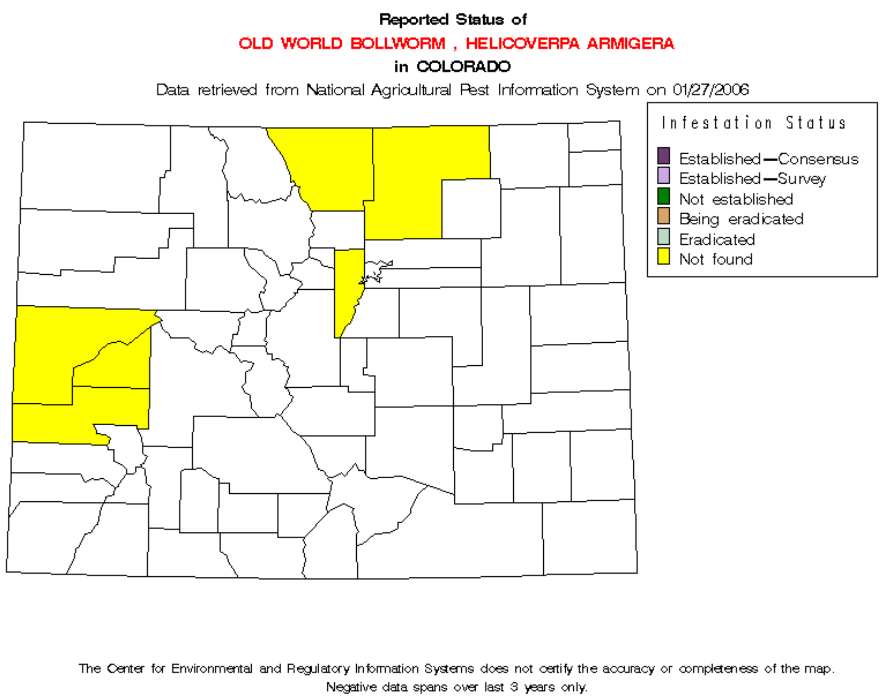


Figure 23. NAPIS map of counties surveyed in 2005 for Old World bollworm in Colorado.

13. Spodoptera littoralis

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

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. It is ranked 22nd on the CAPS FY05 Pest Detection Pest List, and is a pest of tomatoes and cotton, both of which are products grown in Colorado. This survey represents the first time for which *S. littoralis* has been surveyed in Colorado.

Methods and Results:

Surveys were performed by Bob Hammon of Mesa County Extension in three countries on the western slope (Table 12). Survey trapping used pheromone-baited Pherocon 1C wing-style traps. Most traps were checked every other week and lures replaced as directed. Trapping began in June and was performed until mid-September. Trap captures were initially screened on site by Bob Hammon.

All trap catches were negative (Fig. 24), and all 2005 survey data are available. Please refer to the NAPIS-generated county level resolution map and Excel spreadsheets for those records entered into the database.

Table 12. Summary of trap- site numbers and results for *Spodoptera littoralis* Surveys.

Surveyor	County	Traps/ Sites	# Positive traps
Bob Hammon	Delta	2/2	0
Bob Hammon	Montrose	2/2	0
Bob Hammon	Mesa	3/3	0

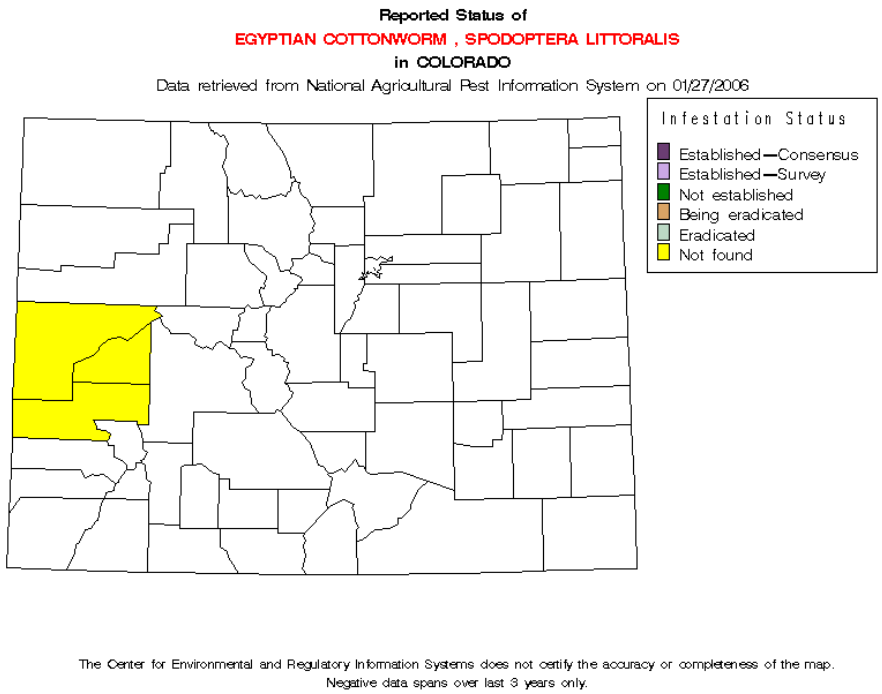


Figure 24. NAPIS map of counties surveyed in 2005 for *Spodoptera littoralis* in Colorado.

14. Insect Pests and Pathogens of Soybeans

Colorado State University - Dept. of BioAgricultural Sciences & Pest Management
Project Coordinators: Howard Schwartz

Objective:

The purpose of this project during 2005 was to monitor Sentinel Plots of dry beans for the natural occurrence of *Phakopsora pachyrhizi* (soybean rust) spread from southeastern states into eastern, southern, and western Colorado during the 2005 growing season. In recent years, this emerging disease has threatened soybean production throughout the southern hemisphere. Spread to soybean production regions in the southern United States has been an ongoing concern of USDA APHIS, the soybean industry, and pest management personnel. During October and November of 2004, the pathogen and disease were confirmed from multiple sites in Louisiana, Mississippi, and Florida; and sightings have expanded to these and additional states and counties during 2005. This inoculum and the wide host range of the pathogen (kudzu, dry edible bean, alfalfa, leguminous weed species) in combination with wind currents (and projections from climatological models) pose a real and definite threat to spore movement from contiguous soybean states (i.e., infested southern states to hosts in Texas, Oklahoma, Kansas, Nebraska, and eastern and southern Colorado).

Methods:

The CSU Vegetable Pathology Program, Pest Management Team, and Plant Disease Diagnostic Laboratory (GPDN) provided technical support for enhanced plant health and crop production in Colorado. CSU Vegetable Pathology and GPDN personnel identified and trained Agricultural Experiment Station scientists and extension agents from our Cooperative Extension Pest Management Work Team in critical areas of Colorado where soybean, dry edible bean, and/or alfalfa are grown with irrigation (furrow, flood, sprinkler). Each team conducted weekly visits to Sentinel Plots of dry beans for symptomatic plants. Sentinel Plot monitoring was conducted in fields in northeastern (Howard Schwartz), eastern (Ron Meyer), southern (Mike Bartolo), southwestern (Mark Stack), and western (Wayne Cooley) counties of Colorado (Table 13).

Each plot was located in five counties (Fig. 25) as near as possible (preferably a few kilometers) to a COAGMET weather station to monitor daily patterns of temperature and rainfall (Fig. 26). Suspicious samples (rust lesions) were to be processed according to standard NPDN protocols, in which digital images and plant samples would be sent electronically and in sealed containers to the GPDN clinic and personnel at Colorado State University in Fort Collins. If confirmed as a potential sample of Soybean Rust, the specimen would be forwarded to the regional GPDN clinic at Kansas State University and in turn to the national program in Beltsville. If Soybean Rust was confirmed from one or more Colorado Sentinel Sites, then further outbreaks would not have required implementation of the NPDN diagnostic protocols. However, the climate and disease monitoring (incidence, severity, and secondary spread into and from other susceptible hosts) would continue until crop maturity (more than 50% chlorosis and defoliation).

Table 13. Site locations and collaborators for Insect Pests and Pathogens of Soybeans Surveys

Dry Bean Sentinel Sites – collaborators*, **:

05CO01	Montezuma/Dolores County	Mark Stack/Dan Fernandez
05CO02	Mesa/Delta/Montrose County	Wayne Cooley
05CO03	Otero County	Mike Bartolo
05CO04	Kit Carson/Yuma County	Ron Meyer

05CO05 Larimer/Weld/Logan County Howard Schwartz

*Campus Personnel: Ned Tisserat/Tamla Blunt (GPDN/CSU Plant Disease Clinic), Howard Schwartz/Mark McMillan (Dry Bean Pathology)
**State Liaisons: Mitch Yergert/Jerry Cochran (Colorado Dept. of Agriculture) and Pat McPherren (USDA/APHIS)

The 50 x 50-ft^2 plots were planted in or near commercial fields of pinto dry beans during mid to late May. Weekly scouting recorded stage of plant growth and monitored plants for initial signs of Soybean Rust infection; training and diagnostic resources were provided by Schwartz. Weekly reports and status were conveyed by the CSU Sentinel Site members to Schwartz.

Results:

Weekly surveys of the Sentinel Plots at the five locations in Colorado by the team members were negative as no suspicious samples were detected. Weekly reports from the five Colorado teams were collated by Project Director Schwartz and reports submitted to the USDA APHIS National Soybean Rust secured website: http://aphis.zedxinc.com/login.html
and the public-access website: http://www.usda.gov/soybeanrust/.

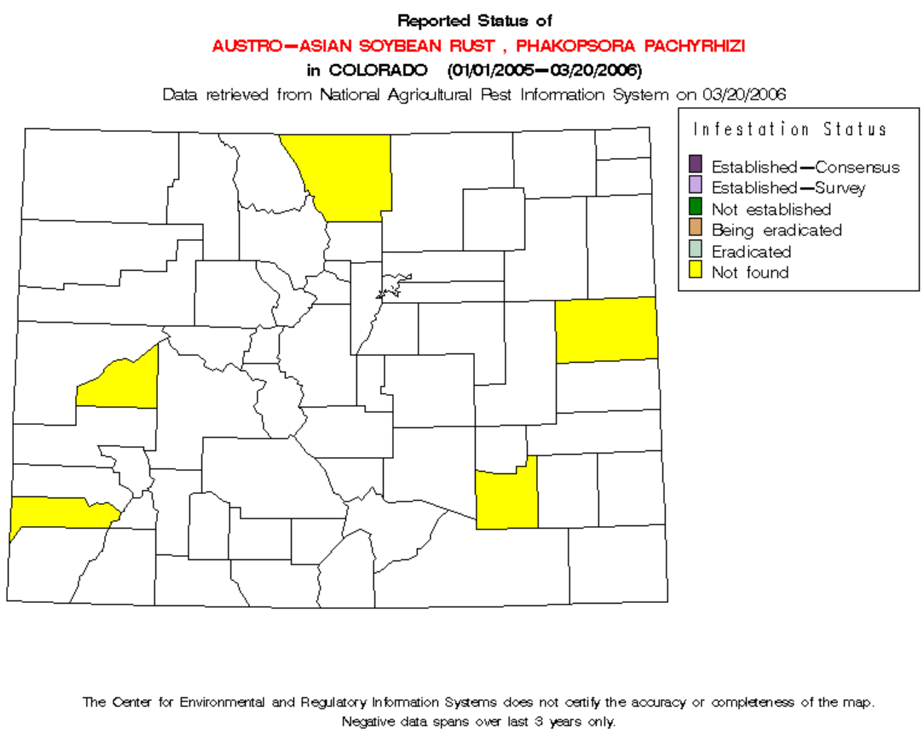
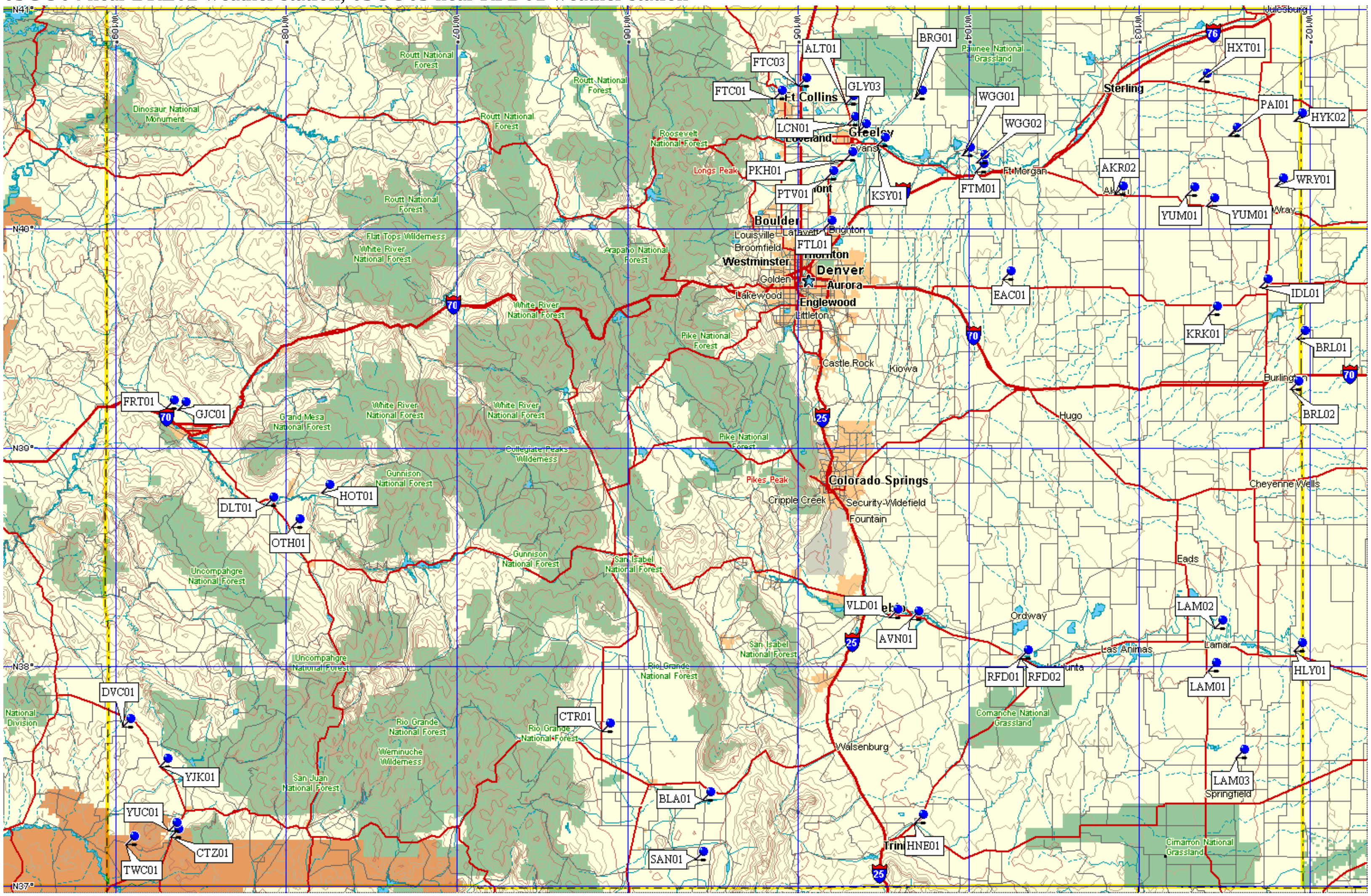


Figure 25. NAPIS map of counties surveyed in 2005 for Soybean rust in Colorado.

Figure 26. MAP of COAGMET Stations in Colorado

05CO01 near DVC01weather station, **05CO02** near DLT01 weather station, **05CO03** near FTC03 weather station
05CO04 near BRL02 weather station, **05CO05** near RFD01 weather station



Additional surveys of legumes and weeds by Schwartz and others throughout the state of Colorado were also negative for soybean rust in 2005. The 2005 Soybean Rust monitoring and survey project was successfully implemented in Colorado, and Colorado State University personnel provided timely and thorough expertise in support of efforts by USDA-APHIS and the Colorado Department of Agriculture personnel.

15. European Gypsy Moth Detection Survey

Colorado State Forest Service
Project Coordinator: Dave Leatherman

Objective:

This project was a continuation of a long-term gypsy moth detection survey in Colorado.

Methods and Results:

Trapping was carried out by Dave Leatherman, Jake Maksimowicz, and Dave Harnke of the Colorado State Forest Service, with assistance from Grant Leatherman. A total of 1568 detection traps were deployed statewide by the Colorado State Forest Service (CSFS). Two counties did not receive traps this year: Lake and Rio Blanco. Increased efforts were devoted to Denver Metro, Colorado Springs, Boulder, and Pueblo.

No European or Asian gypsy moths were caught in this year's traps.

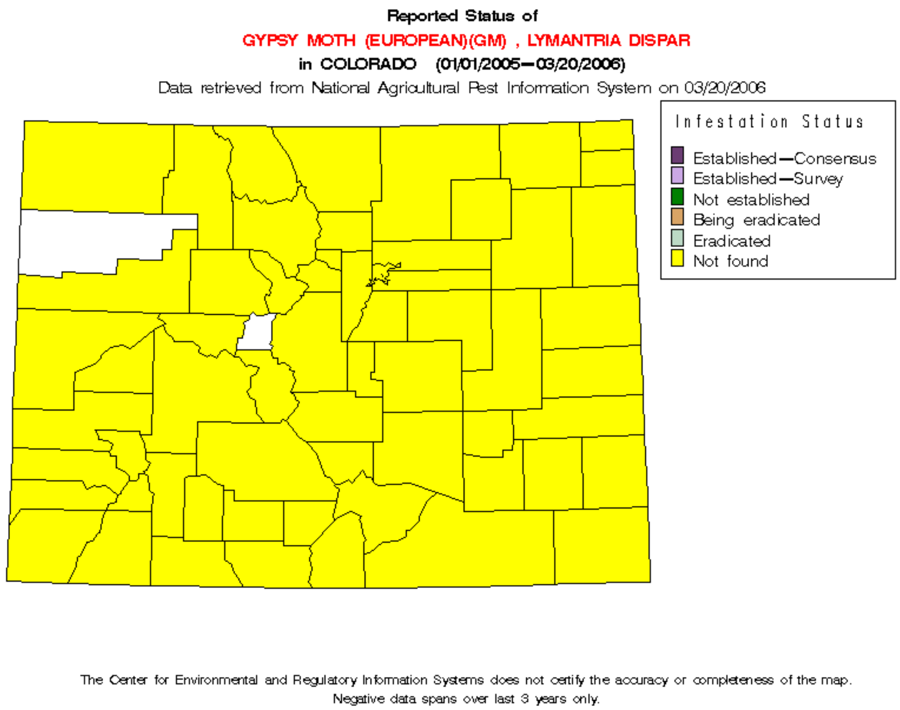


Figure 27. NAPIS map of counties surveyed in 2005 for European and Asian gypsy moth in Colorado.