Interstate Pest Control Compact

2002 Annual Report

Arizona
Arkansas
California
Colorado
Delaware
Florida
Georgia
Illinois
Kansas
Maine
Maryland
Michigan
Minnesota
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Puerto Rico
Rhode Island
South Carolina
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wyoming

Chairman:
Robert Spear
Commissioner
Maine Department of Agriculture, Food & Rural Resources
Commissioner's Office
28 State House Station
Augusta, ME 04333-0028
Phone: (207) 287-3419
Fax: (207) 287-7548

Executive Director:
Robert J. Balaam
Interstate Pest Control Compact
61 Britton Road
Stockton, NJ 08559-1007
Phone: (908) 788-8707
Fax: (908) 788-4113
E-mail: rbalaam@earthlink.net

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In Memorium - William W. Metterhouse

Executive Director, Interstate Pest Control Compact (1992-2002)

For many years Bill Metterhouse proudly served the American agricultural industries and plant protection agencies and organizations until his passing on June 1, 2002. Bill was 78 years young.

Born in Jersey City, New Jersey, he lived in Upper Freehold Township for 50 years. He was a Navy veteran of World War II. Mr. Metterhouse was a 1950 graduate of Ohio State University. He was an entomologist for 40 years with the New Jersey Department of Agriculture, retiring in 1992 as Director of the Division of Plant Industry. He was chairman of the Upper Freehold Township Environmental Commission; and a member of the Association of New Jersey Environmental Commission, Monmouth County Planning Board and Allentown (NJ) United Methodist Church. He also taught for the Allentown, NJ school system. He is survived by his wife of 53 years, Bonnie Dillon Metterhouse; a son and daughter-in-law, Mark and Carolyn of Maineville, Ohio; a daughter, Lori L. Metterhouse of Cream Ridge; three grandchildren, Jessica C. Magowan, Dillon W. Metterhouse and Angela Adams; three sisters-in-law and a brother-in-law, Norma Markley, Gwenda Warix and Shirley and David Harper; and nieces and nephews.

Bill was nationally recognized in the area of plant health and pest management. As a State Plant Regulatory official with the New Jersey Department of Agriculture he served the States as Chairman of both the Eastern Plant Board and the National Plant Board (NPB). As a long time supporter and champion of biological control of plant pests, Bill served on numerous USDA biological control committees. He was the recipient of numerous awards for his devotion and service to agriculture, including the NASDA Honor Award for Regulation in 1981, the USDA Award for Superior Service in 1982, the ESA Distinguished Service Achievement Award in Regulatory Entomology in 1991, and the USDA APHIS Administrator's Award in 1999.

Following his retirement from state service in 1992, Bill served as the Executive Director of the Interstate Pest Control Compact insurance fund and promoted its use in controlling plant pest problems in several states that did not have the resources to effectively deal with pests that could easily become regional or national problems. In his post-retirement role as the NASDA – NPB – USDA APHIS PPQ liaison on plant regulatory issues, Bill was an intermediary for all three organizations and helped to ensure that the concerns of all the organizations were equally addressed. Bill volunteered his time to serve as Chairman of the Permits Committee on the NPB sponsored Safeguarding Review; he provided insightful recommendations towards improvement of APHIS' safeguarding ability and responsibility.

The Interstate Pest Control Compact Governing Board and all that it serves will deeply miss Bill Metterhouse.

Introduction

Each year billion of dollars of damage is caused by plant pests - insects, weeds, plant diseases, and other organisms that attack U.S. crops and forest resources. Many of the same pests also attack lawns, gardens, and the general environment, causing still more damage in dollars and esthetics. These pests don't recognize political boundaries. They can easily move across state lines on the wind or in soil or water, or hitchhike to new areas with goods, vehicles, or people. Tremendous losses occur even though farmers, industry, and local, state, and federal governments spend billions each year on control.

At one time, only coastal and border states had to fear infestations of new foreign plant pests, but today heartland states are also at risk. International containerized cargo with the potential for carrying foreign pests can travel through ports of entry and reach interior states before it can be opened and inspected.

Federal and state agencies have ongoing control and regulatory programs against a number of plant pests, and many have recently stepped up their pest detection and monitoring efforts. In most cases, however, appropriations are earmarked for specific pests - a mere handful of the 10,000-odd species that cause damage in this country. In general, too, state funds may be spent only on in-state control, even though pests just across the border may be equal threats. If a single state undertakes necessary pest control activities, on its own or with federal assistance, it cannot be certain that companion measures will be taken in other states.

Often the budget process does not allow governments to move quickly against newly introduced pests or take on challenges outside already approved program plans, a particular problem in times of decreasing resources. Technology is available to control or eliminate many pests, but its effectiveness often depends on speedy action.

The Interstate Pest Control Compact was instituted in 1968 under the Council of State Governments to bridge economic and jurisdictional gaps among state and federal governments, to enable agencies to respond to plant pest infestations. The Compact, through the Insurance Fund it administers, provides financial assistance to address:

- New and economically significant destructive plant pest outbreaks;
- Plant pest infestations outside the control or means of a single jurisdiction; or
- Destructive single-state outbreaks which could affect other states if allows to spread.

Funding

The basis for determining the amount of funds to be appropriated from each of the participating states is as follows: 1/10th of the total budget of $1 million in equal shares (i.e. $100,000), and the remainder in proportion to the value of agricultural and forest crops and products, excluding animals and animal products produced in each party state. This is not an annual appropriation, but has been a one-time contribution to the Insurance Fund. It is conceivable that, if Compact funds were appreciably depleted in carrying out a containment or eradication program, a state

could be assessed its proportional share to return Compact funds to the $1 million Insurance Fund level. However, with investment income, this does not appear likely.

How the Fund Operates

The Compact provides that any party state can apply to the Insurance Fund for financial support of pest control or eradication activities which it wishes to have undertaken or intensified in one or more other party or, in limited circumstances, in nonparty states. When a pest is found in another state that constitutes a threat to valuable agricultural or forest crops or products within the applying state, the Insurance Fund can provide financial support for control or eradication measures. State parties to the Compact are expected to maintain their existing pest control programs at normal levels aside from any assistance from the Insurance Fund. This safeguards the soundness of the Fund and assures that it will be used to apply the additional thrust necessary to combat outbreaks, which otherwise would not be controlled.

The Insurance Fund is under the control of a Governing Board, consisting of an official representative of each party state chosen by that state in accordance with its own laws. An Executive committee, consisting of the chairman and a representative from each of the four regions, is authorized to exercise certain responsibilities for the Governing Board when the Board itself does not meet.

A Technical Advisory Committee has been established to assist the Governing Board with the technical information necessary to make a decision on whether or not the Compact should be invoked on any particular requests.

The Technical Advisory Committee is composed of two state plant control officials from each of the four regions of the Plant Boards, together with a representative of the U.S. Animal and Plant Health Inspection Service and a representative of the U.S. Forest Service.

When a request is filed for invoking the Compact, the request is referred to the ten-member Technical Advisory Committee, which makes a study of the request and a recommendation on the feasibility of the project to the Governing Board. In an emergency, the Committee could make this recommendation within 72 hours or less after receiving the initial request for Compact assistance

Annual Report from the Executive Director

Note: On June 1, 2002, William W. Metterhouse, Executive Director of the Interstate Pest Control Compact passed away after a brief illness. The Compact did not fill the vacant Executive Director position until mid-October of 2002. At that time Robert J. Balaam, retired Director of the Division of Plant Industry, New Jersey Department of Agriculture, and Past President of the National Plant Board was asked and agreed to assume the position of Executive Director. This report has been compiled by Bob Balaam from records and reports available at the time of this writing.

Membership

In January of 2002, the State of New York joined the Interstate Pest Control Compact. The Compact is now composed of 34 party states. As of July 1, 2002, three states continue to pay membership dues over a six year amortization, Arkansas, Colorado, and Rhode Island. The 17 non-member states include the following: Alabama, Alaska, Connecticut, Hawaii, Idaho, Indiana, Iowa, Kentucky, Louisiana, Massachusetts, Mississippi, Missouri, Montana, Nebraska, Nevada, South Dakota, and Wisconsin. The former Executive Director reported in February that a number of states continue to submit legislative requests for membership, but due to declining budgets, legislative approval has become difficult.

Claims

Two requests for plant pest control assistance from the Compact were received during FY 2002.

The Washington Department of Agriculture requested $50,000 in December 2002 for survey and quarantine activities directed against the citrus longhorned beetle, *Anoplophora chinensis*. In August 2001, imported maple trees at two Washington nurseries in Tukwila and Lacey, were found to be infested with citrus longhorned beetle. The infested trees were immediately destroyed. This tree-killing pest, currently found widespread in China, and also in Myanamar and Vietnam, was not known to occur in the United States. A close relative of the Asian longhorned beetle currently being eradicated in New York and Illinois, this wood boring beetle attacks citrus, apple and pear. Washington pome fruit production is a billion dollar industry that could be significantly impacted by this pest if not controlled. Maple, poplar, alder, and other hardwood trees are also at risk. The Technical Advisory Committee evaluated and recommended approval of the request. The Executive Committee approved the full claim request for detection survey and quarantine activities. The $50,000 claim check was issued to the Washington Department of Agriculture on February 4, 2002.

The Minnesota Department of Agriculture requested $79,973 in March of 2002 for gypsy moth eradication. The planned eradication program was budgeted for $163,646. Male moth trap counts in 2002 and subsequent egg mass surveys in the Twin Cities metro area indicated a heavy population of gypsy moth. The claim application requested money to conduct aerial treatment of over 2,000 acres using two applications of the biological insecticide, *Bacillus thuringiensis (BT).* Subsequent to the insecticide applications, additional male moth trapping would be conducted using high trap densities in the area to trap off any surviving population in the treatment areas. The Technical Advisory Committee reviewed the application and recommended that the claim

request be granted at a $50,000 level. The committee recommended that Compact funds only cover one-third of the total eradication cost; the remaining 2/3 of the total cost should be supplied through Federal and State funds. The Executive Committee approved the claim at the recommended level. A claim check for $50,000 was issued to the Minnesota Department of Agriculture on May 15, 2002.

Progress and/or final reports on Compact funded projects were received from States which had recently received Compact funds. Those reports are shown later in this report under the *Claims Reports* section.

Other Issues

The Federal Office of Management and Budget continues to pressure USDA APHIS PPQ to require more State funding as a prerequisite for federally funded emergency plant protection programs. The cost-share requirement as requested by OMB is not attainable by most States. This requirement could cause many States to invoke the Compact in future years. Neither the impacted States, nor the Compact will be able to meet these OMB requirements.

Many States continue to work cooperatively with the USDA APHIS PPQ in attempting to eradicate serious exotic plant pests that have entered the U.S. and formed economically damaging populations. The current pests of concern include Asian longhorned beetle, a wood boring insect pest of forest and shade trees, in New York and Illinois, citrus canker, a bacterial disease of citrus trees and fruit, in Florida, and plum pox, a virus disease of peaches and other stone fruit, in Pennsylvania. Eradication efforts by the affected States continue in cooperation with the USDA and detection surveys are being conducted in other States where these pests might also be found. Federal and State officials are soon expected to declare eradication efforts a success for Asian longhorned beetle in Illinois and for plum pox virus in Pennsylvania. Court battles over destruction and removal of non-infected host trees in the vicinity of infected trees in Florida have hampered eradication efforts there.

A new wood boring insect pest, emerald ash borer, was detected in southeastern Michigan in the summer of 2002. Currently the State of Michigan and the USDA are cooperating in a program of detection, containment and eradication of this pest. A core area of 2,000 square miles in size has been isolated by suppression and “firebreak” areas. Insect controls are only being applied outside the core area. Ash trees inside the core area are dying at a rapid rate due to the ash monoculture present. The borer populations are being allowed to exhaust their food source in that area since control of those populations is not possible at this time. Control and containment efforts are being applied outside of the core area.

2001 Annual Meeting Minutes – September 2001

September 23, 2001
Burlington, Vermont

Member States Present (18):

Arizona	Georgia	New York	Virginia
Arkansas	Illinois	North Carolina	Washington
California	Maine	North Dakota	West Virginia
Delaware	Maryland	Ohio	
Florida	New Jersey	Rhode Island	

Call to order:
Meeting was called to order at 7:45 by Vice Chairman Robert Spear. Eighteen states were reported present as indicated above.

Chairman's Report:
No Report

Treasurer's Report:
Carlton Courter reported that the total asses available on June 30, 2001 were $1,064,382. Income on investments totaled $59, 697. There were no investment fees or expenses. The average yield for the year was 5.91%, that compares favorably with the Institutional Money Funds reported by IBC/Donoghue (5.45%) and 91-Day Treasury Bills (5.91%). Membership dues totaling $27,253 were received from the States of Arkansas, Florida, Oklahoma, Rhode Island and the Territory of Puerto Rico. One insurance claim of $20,000 was paid to Oregon for research into Small Broomrape, a noxious weed. Operating expenses were $14,000 which was $2,880 under budget.

Election of Officers:

Chairman:	Robert Spear, Maine
Vice Chairman:	Phil Ward, Oregon
Executive Committee Member for the Northeast:	Michael Scuse, Delaware

Executive Director's Report:
Presently there are 33 states that are members of the Compact. Recruitment continues in an effort to enroll additional states. The New York Legislature passed the legislation to enable the state to join the Compact. The legislation awaits the Governor's signature. The Executive Director, after negotiating with USDA APHIS PPQ, has received an agreement that $66,000 will be reimbursed to the Compact as part of cost sharing monies that were disbursed to New York and Illinois for control of the Asian longhorned beetle. Soliciting gifts from agricultural organizations will continue.

Old Business:
There was no old business discussed.

New Business:
NASDA has made the request that IPCC increase their contribution for facility use to $1,700 from $1,000. The Board of Directors agreed after some discussion to increase the funding by $1,000 to a total of $2,000 per year.

The meeting was adjourned at 8:10 am.

Financial Statement - Final (July 1, 2001 – June 30, 2002)

Highlights from Fiscal Year 2002:

Total assets available at June 30, 2002 were $1,005,398. A decrease of $58,984 over the June 30, 2001, balance of $1,064,382. This decrease was due to the funding of two claims / projects totaling $100,000 during the year.

Income on investments totaled $27,827. There were no investment fees or expenses. The Average Yield for the year was 2.66. As you all well know, returns on investment are down significantly everywhere.

Investment Risk: Recent news about accounting discrepancies at various corporations have severely depressed the stock market and resulted in significant losses for investors holding stock in applicable corporations. The Virginia Local Government Investment Pool, in which IPCC funds are invested, follows guidelines that permit only high quality corporate investments. The LGIP portfolio does not contain any securities that have recently experienced credit concerns or downgrades. The IPCC investment is diversified in the following way:

U.S. Treasury / Agency.....22%
Repurchase Agreements.....31%
Negotiable CDs & BAs.....16%
Commercial Paper*.....0%
Non-Negotiable CDs.....23%
Commercial Paper*.....8%
Corporate & Bank Notes*.....100%
Total: 16%

* Commercial Paper is restricted to a maximum of 35% and Corporate & Bank Notes to a maximum of 25% of the entire investment pool by law. This minimizes the risk to the IPCC while attempting to maximize gains.

Membership dues totaling $24,446 were received from the states of Arkansas, Florida, Kansas, Rhode Island, Colorado, and New York.

Two insurance claims / projects were paid out during the year. The State of Washington received $50,000 for the Citrus Long-Horned Beetle and Minnesota received $50,000 to combat their Gypsy Moth infestation.

Operating expenses were $11,491, which was $5,409 under budget.

We were all saddened by the death of Bill Metterhouse, Executive Director of the IPCC. Our deepest sympathies and prayers go out to his family and all who knew him.

INTERSTATE PEST CONTOL COMPACT
OPERATING BUDGET
July 1, 2001 to June 30, 2002

Description	Budget 2001-2002	Actual 2001-2002	Budget 2000-2001	Actual 2000-2001
NASDA Contracts				
Administration	$2,000.00	$2,000.00	$2,000.00	$1,000.00
Metterhouse	10,000.00	6,335.00	10,000.00	9,720.00
Travel & Misc.	3,500.00	2,692.26	3,500.00	2,778.94
Printing	500.00	234.77	500.00	348.00
Bond for Treasurer	100.00	0.00	100.00	0.00
Audit	150.00	0.00	150.00	0.00
Postage & Miscellaneous- Secretary's Office	150.00	25.11	150.00	0.00
Bank Charges	0.00	203.88	0.00	172.91
Technical Committee	0.00	0.00	0.00	0.00
Special Committee	500.00	0.00	500.00	0.00
TOTALS	**$16,900.00**	**$11,491.02**	**$16,900.00**	**$14,019.85**

INTERSTATE PEST CONTROL COMPACT
BALANCE SHEET
June 30, 2002

Assets

Operating Account	$9,877.22	
Investments	995,520.69 [1]	
TOTAL ASSETS		**$1,005,397.91**

Liabilities & Equity

Liabilities	$0.00	
Equity	1,005,397.91	
TOTAL LIABILITIES & EQUITY		**$1,005,397.91**

[1] Funds are invested in the Local Government Investment Pool (LGIP) through the Commonwealth of Virginia's Treasurer's Office. The average yield for the fiscal year ended June 30, 2002 was 2.66%.

INTERSTATE PEST CONTOL COMPACT
STATEMENT OF CASH FLOWS
For the Year Ended June 30, 2002

Balance on July 1, 2001			**$ 1,064,382.12**
Add - Inflows			
Investment Income:			
LGIP	27,826.58		
		27,826.58	
Dues Income:			
Arkansas	3,954.00		
Colorado	4,000.00		
Kansas	4,786.00		
New York	11,362.00		
Rhode Island	344.00		
		24,446.00	
Operating Account Interest		234.23	
			52,506.81
Deduct-Outflows			
Operating Expenses:			
Executive Director	6,335.00		
Travel	1,867.26		
NASDA Management Fee	2,000.00		
Bank Service Charges	203.88		
Conference Registrations	825.00		
Printing	234.77		
Misc. Administration	25.11	11,491.02	
Insurance Claims			
Washington - Citrus Long-Horned Beetle		50,000.00	
Minnesota - Gypsy Moth		50,000.00	
			111,491.02
Balance on June 30, 2002			**$ 1,005,397.91**

INTERSTATE PEST CONTOL COMPACT
STATEMENT OF REVENUES, EXPENDITURES, & CHANGES IN FUND BALANCES/EQUITY
For the Year-Ended Ended June 30, 2002

Revenues		
Investment Income	$27,826.58	
Dues Income	24,446.00	
Operating Account Interest	234.23	
Total revenues		**$52,506.81**
Expenditures		
Operating Expenses	$11,491.02	
Insurance Claims	100,000.00	
Total expenses		**111,491.02**
Excess of revenue over expenditures		**($58,984.21)**
Fund balances/equity July 1, 2001		**1,064,382.12**
Fund balances/equity June 30, 2002		**$1,005,397.91**

Claims History

Fiscal Year	Project	Claim Amount ($)	Recipient State
1969	Golden nematode eradication	6,000	Delaware
1972	Tourist vehicle check for gypsy moth	10,000	Pennsylvania
1972	Tourist vehicle check for gypsy moth	5,000	Delaware
1972	Tourist vehicle check for gypsy moth	5,000	Virginia
1974	Gypsy moth disparlure trial	1,500	North Carolina
1977	Scleroderris canker control	900	Vermont and New Hampshire
1979	White fringed beetle control	5,400[1]	Maryland
1980	Gypsy moth control	3,000	Illinois
1980	Gypsy moth control	20,000	Washington
1980	Winter moth control	2,000	Oregon
1981	Apple maggot control	20,000	Oregon
1983	Grape nematode control (Polar nematode)	45,000	Michigan
1983	Corn cyst nematode	93,000	Maryland
1992	Gypsy moth control	23,000	Georgia
1992	Africanized honey bee management	44,500	Texas
1996	Apple Ermine moth regulatory control research	8,000	Oregon
1995	Tropical soda apple management	95,355	Florida
1997	Corn cyst nematode survey	19,170	Virginia
1997	Tropical soda apple biological control	70,000	Florida
1997	Asian longhorned beetle eradication	100,000	New York
1998	Grecian foxglove control	12,093	Kansas
1999	Asian longhorned beetle eradication	100,000	Illinois
1999	Tomato yellow leaf curl virus	75,167	Florida
2001	Clover broom rape survey	20,000	Oregon
2002	Citrus longhorned beetle establishment prevention	50,000	Washington
2002	Gypsy moth eradication	50,000	Minnesota
Total	**25 claims**	**$884,085**	

[1] $10,000 was initially requested and approved, but only $5,400 was finally disbursed.

Claim Reports

Grecian Foxglove Control (Final Report)

Recipient Party:	**Kansas**
Claim Year:	**1998**
Claim Amount:	**$12,093**

Kansas Department of Agriculture

In the spring of 1994 Mr. John Cole, Wilson County Kansas, submitted a plant specimen to the County Extension Office for identification. He noticed the plant expanding across his land and began mechanical efforts to control the plant. Kansas State University in cooperation with the Biological Survey at Kansas University identified the plant as Grecian foxglove (*Digitalis lanata* Erth.). Dr. Ron McGregor, herbarium director at KU, visited the site to determine the extent of the infestation. He also contacted the Kansas Department of Agriculture, Plant Protection and Weed Control Program, to provide assistance to the landowner on control methods. Bill Scott, KDA Weed Specialist, visited the site in 1994 and established a series of plots to determine the most effective means of control. Herbicides and cultural methods were evaluated. KDA staff assisted in a delimiting survey in 1995 and estimated a total of 22 acres of Grecian foxglove spread across approximately 250 acres of land. Although the majority of the infestation is on the Cole property, eight other landowners adjoining the Cole property have some degree of infestation. Plots were continued in 1996 with plant densities in severely infested areas as high as 65 plants per square meter. Mr. Cole hired two workers to assist him in pulling plants on his land and on adjoining properties. He purchased an ATV with a sprayer and treated plants with various herbicides. In 1998 the Kansas Department of Agriculture applied for and received $12,093 from the Interstate Pest Control Compact to help pay the cost of controlling this pest.

The budget allocated funds for survey, control and education. $5,569.95 was budgeted as reimbursement to Mr. Cole for expenses incurred in controlling Grecian foxglove. Funds were also used to pay travel expenses for KDA staff who met at the site in early June to survey and treat blooming plants. A hand-held GPS unit was purchased to aid in locating small patches of foxglove in the dense forest and hilly terrain. A brochure was developed and printed in 1999. The brochure, featuring identification and reporting information, was distributed to adjoining landowners, federal, state and local offices in the county and to the county noxious weed departments in Kansas. The initial printing cost $1,018.25 for 750 brochures. An additional 1,000 were printed with state funds in 2001. The Kansas Department of Agriculture enacted a quarantine on May 10, 2001 prohibiting the entry or movement of Grecian foxglove into or within Kansas.

With a combination of research plots and experience, the control program has been refined to spring treatment with herbicides beginning in mid April and ending with the cleanup survey in early June. Most of the treatment is accomplished early when the plants are in the rosette stage

and are rapidly growing. The cleanup survey catches the blooming plants missed by earlier application and expands the survey area to look for any new infestations. When the project began in 1997 approximately 20 acres were being treated with herbicides each year. In 2001 a total of 1.2 acres were treated and in 2002, 1.1 acres were treated. Treated acres are based upon the total volume of herbicides applied for the year. The Kansas Department of Agriculture has cooperated with the Minnesota Department of Transportation on an infestation of Grecian foxglove found on their right of way and adjoining property. Numerous presentations about Grecian foxglove have been given to groups ranging from local landowners to the North Central Weed Science Society. The Cooperative Extension Service in Wilson County and the Wilson County Noxious Weed Department has provided assistance through out the project. The Kansas Department of Agriculture will continue to treat and monitor the area.

Claim Report

Tomato Yellow Leaf Curl Virus Regulatory Research (Final Report)

Recipient Party: **Florida**
Claim Year: **1999**
Claim Amount: **$75,167**

"Evaluation And Development Of Tactics To Reduce or Eliminate Infection of Transplants By *Tomato Yellow Leaf Curl Virus* And Other Whitefly-Transmitted Geminiviruses"

J. E. Polston and D. J. Schuster
University of Florida, Gulf Coast Research and Educ. Ctr.

Funding Period: November 1999 to May 2001

Executive Summary
We found several new possibilities for the protection of transplants from transmission of TYLCV. We demonstrated that a Novartis product, Fulfill, provided very good protection against virus-carrying whiteflies. A single application gave 4 to 7 days of protection from large numbers of whiteflies reared on TYLCV infected plants. We developed a method for measuring the ability of a compound to repel whiteflies, and have used it to evaluate 30 compounds. Several were found to have repellency in the bioassay. Several of the products that tested as repellent in the bioassay were tested in the greenhouse and found to reduce whitefly oviposition and to interfere with begomovirus transmission. Some of these show promise as possible new approaches to protecting transplants from virus transmission. We have tested several other products for their ability to increase plant resistance to infection, or for their ability to kill whiteflies before transmission can occur. Actara, a Novartis product, was found to interfere with virus transmission but many other products that we tested did not. We established a technique to measure transmitted and reflected UV light and used it to measure UV light in transplant houses. This work demonstrated that most of the plastics that growers are using filter out some of the UV light, and that UV light which enters from the sides of open-sided planthouses only penetrates about 4 feet into planthouses. Due to the harmful effect of the absence of UV light on transplants, this approach might be best pursued in planthouses in which fruit is produced. We have found several new plant hosts of TYLCV that are produced as transplants in Florida. In summary, this project has identified at least one new management approach (Fulfill) that can be used immediately to reduce the number of virus-infected transplants, and several other approaches that need further study for development into future management practices.

INTRODUCTION

Whiteflies transmit an ever increasing number of plant viruses, one of which, tomato yellow leaf curl virus, is a known pathogen of several important crops in Florida and the southern U.S. In

the 1990's TYLCV appeared in the Western Hemisphere and spread to new countries both in the Caribbean and in the Mediterranean, at least in part through the distribution of infected transplants. Beyond a few insecticides transplant producers have few means by which to manage whiteflies before they can transmit viruses to the developing transplants.

The goal of these studies is to discover new methods by which whiteflies can be discouraged from transmitting TYLCV to susceptible transplants. In order to be implemented these methods will have to be cost effective and consistent with current practices. In addition some of these approaches may be useful for management of TYLCV in the field thereby reducing the number of virus-carrying whiteflies that pass through greenhouses and screenhouses. We expect that a combination of several of these tactics may prove to be the most effective in reducing or essentially eliminating the incidence of TYLCV in transplants.

We began work on the objectives in November 1999. We hired three people to work on this project, one full time and two half-time employees. A visiting scholar (Dr. L. Ortega) participated in the repellency studies described in Objective 1 from January through March 2000. The following is a summary of the results obtained.

We invited a second scholar, Dr. Moshe Lapidot, to Florida to talk on his work with UV-absorbing plastics. He presented a seminar in Gainesville on 6 November entitled "UV-absorbing Plastics for Use in Whitefly Management". He also presented a paper on the same topic at the 17th National Tomato Disease Workshop in W. Palm Beach, FL on 9 November.

Objective 1. Identify approaches that interfere with whitefly feeding behavior and reduce transmission of TYLCV.

AND

Objective 2. Evaluate new approaches for reducing whitefly movement into production houses.

A. UV ABSORBING SCREENS AND PLASTICS

Evaluation of Florida Planthouses for Presence of UV light. UV light between the wavelengths of 350 and 425 nm has been found recently to be critical to whitefly movement and feeding behavior. In order to study this in more depth and use this in whitefly/virus management, we used a UV/VIS portable spectrophotometer and computer to measure the amount of UV that passes through or is reflected by various agricultural plastics and screens. We evaluated the presence of UV in a research planthouse to determine how UV light between the wavelengths of 350 and 425 nm is distributed in various types of greenhouses. We used this information to develop a sampling design that was used to measure the amount of UV light that exists in commercial planthouses.

Our survey of commercial planthouses revealed that UV light from the outside penetrated only about 4 ft. into open-sided planthouses. Polycarbonate/fiberglass reduced UV light 75-85% (compared to outside conditions). Polyethylene plastic reduced UV light by 55- 60%. Age of either material did not have any significant impact on how much UV light was transmitted. Both

materials did not reduce UV light sufficiently to impair whitefly movement. We learned from Dr. Moshe Lapidot that UV-absorbing plastics cannot be used with transplant production because the absence of UV light causes the transplants to become etiolated. However, these plastics would be very helpful to the tomato fruit producers in Florida who are having a very difficult time managing incidences of TYLCV-infected plants. These plastics would not interfere with the growth of tomato plants for fruit production.

B. CHEMICAL REPELLENTS

Development of a Laboratory Bioassay to Measure Repellency to Whiteflies. A laboratory bioassay method was developed to evaluate and compare various commercial products and chemical compounds for repellency to silverleaf whitefly adults. Bioassay chambers were constructed from plexiglass cylinders with organdy-covered bottoms for ventilation. Starved whitefly adults were released into the chambers where they had access to either treated or non-treated tomato leaf disks supported on the tops of the chambers. After 24 hrs, the number of adults on the leaf disks were counted. At least four concentrations (%, v/v) of each test product or compound were evaluated along with a water check and were replicated at least four times. The data were converted to the number of adults not on the leaf disks and the data were subjected to probit analyses using SAS. The concentrations required to repel 50% of the whitefly adults (RC_{50}) were calculated for each product and compound and were compared with the RC_{50} of Sunspray Ultrafine Oil, a commercial product that has been reported to have repellent activity against whitefly adults.

Use of Laboratory Bioassay to Screen Compounds for Repellency. Thirty products or compounds were evaluated using the bioassay (Table 1). The commercial products Bio Crack® (garlic extract), Organocide® (sesame and fish oils) and Pepper Wax® (capsacin), that are sold as having repellent properties for agricultural insect pests, were not as repellent to the silverleaf whitefly as the standard Sunspray Ultrafine Oil. Other commercial products including Dawn® detergent, Neemix®(azadirachtin), Prime Oil® and Trilogy®(neem oil) that were thought to have some repellent activity were no more repellent to the whitefly than Sunspray Ultrafine Oil. There was little or no rate response to Envirepel (garlic juice), which is also sold as a repellent. Of the other products evaluated, only citronellal, geranium oil, ginger oil, hamlin oil (citrus oil), olive oil and winter green oil had higher repellent properties than did Sunspray; however, the RC_{50} values were not greatly lower than Sunspray. Combinations of certain products were 15-30 times more repellent than Sunspray alone. All of the non-commercial components were formulated with 1% Tween 20 in order to make water preparations. Better formulations of these components might improve their repellent properties.

Greenhouse Bioassay. In the first greenhouse bioassay, limonene, ginger oil, olive oil and Sunspray Ultrafine Oil were compared with water for impact on oviposition and virus transmission by the silverleaf whitefly on tomato. Trays of 32 tomato seedlings each were sprayed to run-off with 0.25% (v/v) concentrations each of the test materials and, after drying, were placed in organdy-covered cages in the greenhouse. Whitefly adults collected from a colony maintained in the laboratory on tomato plants infected with tomato mottle geminivirus (ToMoV) were released into the cages at the rate of 10/plant. Three days later the plants were treated with imidacloprid to kill the whitefly adults. After three more days the number of

whitefly eggs were counted on 10 randomly selected plants from each tray. The plants were then examined weekly for three weeks for the presence of symptoms of ToMoV. The treatments were replicated three times.

Significantly fewer eggs were deposited on all chemically treated plants relative to water treated plants (**Table 2**). No differences among chemical treatments were observed. The Sunspray Ultrafine Oil and olive oil treatments resulted in significantly lower proportions of plants with symptoms of ToMoV compared to the water treatment.

A similar study was conducted with TYLCV (**Table 3**).

The results of these studies suggest that the repellency of different products and compounds can be ascertained quickly in the laboratory and that the repellency of at least some of the materials is strong enough to reduce oviposition and virus transmission by the silverleaf whitefly, even under severe whitefly adult density. Additional studies are needed to evaluate other potential repellents in the laboratory, particularly different combinations and concentrations of products and compounds indicating repellency. These studies need to be followed by additional greenhouse evaluations, both in an experimental setting and in a commercial setting.

C. OTHER PRODUCTS.

Actara (from Syngenta, with a chemistry similar to imidacloprid, the chemical that provides the best chemical control of whiteflies), and **Fulfill** (developed as an aphid anti-feedant) were evaluated for their ability to interfere with whitefly transmission of TYLCV. **Actara** worked well, as expected, and performed in a similar manner to imidacloprid. However, Actara will have limited usefulness because of its chemical similarity to imidacloprid and the concern of whitefly resistance to imidacloprid.

Fulfill was demonstrated to have a significant impact on whiteflies and the transmission of TYLCV-Is. We found that at the label rate (0.291g/L Fulfill 50WG plus 2.5 ml/L NIS), Fulfill provided protection for 4 days. However, Fulfill provided protection from virus transmission for 7 days at a higher rate (0.582g/L Fulfill 50WG plus 2.5 ml/L NIS). Fulfill has a different chemistry than other insecticides in current use and could be very helpful in management of whiteflies and geminiviruses in transplants. We worked successfully with Syngenta to alter the label from exclusion from use in planthouses to permitted use in planthouses.

Objective 3. Evaluate plant growth promoting rhizobacteria (PGPRs) and other biologically based products for protection of plants from infection by TYLCV.

Plant Growth Promoting Rhizobacteria (PGPRs). Thirty isolates of PGPRs were obtained from J. Kloepper. All were evaluated in replicated experiments for their ability to stimulate resistance to TYLCV. Though all the isolates stimulated growth of tomato transplants, none had any effect on the infection rate of TYLCV in tomato transplants.

Commercial Products. We evaluated **Messenger** (Eden Bioscience), which is reported to stimulate resistance to numerous pathogens. Messenger was tested at three rates as a foliar spray. Neither rate of Messenger had any effect on the infection rate of TYLCV in tomato transplants.

We also tested **Actigard** (Syngenta). This was applied as a soil drench and was evaluated for its ability to protect plants from infection in two experiments. At the initial rates tested (0.07 and 0.04 g ai/L of a 50WP formulation) Actigard was observed in both experiments to increase TYLCV-Is infection rates. We have also evaluated Actigard at 3 rates (0.0262 g/L, 0.0092 g/L, and 0.0046 g/L) in a foliar application and it was found to have no effect on transmission rates. We also test 6 rates of Actigard in a soil drench application and the two highest rates caused a slight decrease in the number of TYLCV infected transplants. However these rates are not economical for transplant growers to use.

Objective 4. Identify which plant species commercially produced in Florida are susceptible to infection by TYLCV.

Tomato yellow leaf curl virus (TYLCV), is a concern for tomato growers, transplant producers, and producers of ornamental plants in the Caribbean and southeastern U.S. This study was conducted to identify primarily ornamental plants that can be infected by TYLCV. Adult whiteflies, reared on TYLCV-infected tomato plants, were placed on 94 species within 29 plant families and allowed to feed. The plants were then tested by PCR and dot spot hybridization to determine if they were susceptible to TYLCV. Knowledge of the plant hosts of TYLCV is important for the development of effective disease management strategies.

Eight new host species are reported (*Arabidopsis thaliana*, *Browallia speciosa*, *Limonium sinuatum*, *Nicotiana langsdorfii*, *Petunia* x *hybrida*, *Physalis ixocarpa*, *Physalis pruinosa*, *Solanum capsicoides*) and we confirmed the ability of this isolate of TYLCV to infect six hosts previously reported from other locations in the world: (*Datura stramonium*, *Eustoma grandiflorum*, *Lycopersicum pimpinellifolium*, *Nicotiana benthamiana*, *Nicotiana tabacum*, *Phaseolus vulgaris*) were confirmed as hosts of this isolate of TYLCV.

Of the new hosts, browallia (*Browallia speciosa*), statice (*Limonium sinuatum),* ground cherry (*Physalis pruinosa*), and flowering tobacco (*Nicotiana langsdorfii*) and are produced in Florida but to a limited extent. Petunia (*Petunia* x *hybrida*) is a major annual plant species produced in Florida and is grown throughout the state in landscapes and containers. Tomatillo (*Physalis ixocarpa*) is a field crop grown to a limited extent in transplant houses and fields. Red tropical soda apple (*Solanum capsicoides*) is a weed that occurs primarily in cattle-grazed land.

Almost as important as knowing the hosts, is knowing which plants are immune. The following plants were inoculated and were not able to be infected: **Anacardiaceae;** *Schnius terebinthifolius* Raddi (Brazilian pepper), **Apocynaceae;** *Catharanthus roseus* (L.) G. Don (Vinca), **Araceae;** *Caladium x hortulanum* 'White Christmas' and 'Frieda Hemple' (Caladium), **Asclepiadaceae;** *Asclepias sp.* L. (Milkweed), **Asteraceae;** *Ageratum houstonianum* Mill. 'Royal Hawaii' (Blue mink), *Calendula officinalis* L. 'Calypso' (Pot marigold), *Centaurea cineraria* L. (Dusty Miller), *Centaurea cyanus* L. (Bachelor's-button), *Chrysanthemum morifolium* L. 'Ponoma' (Chrysanthemum), *Emilia fosbergii* Nicolson (Florida Tassel-flower), *Helianthus annuus* L.

'Mammoth' (Sunflower), *Melampodium paludosum* L. 'Derby' (Yellow Jaune), *Rudbeckia hirta* L. (Blackeye Susan), *Sonchus oleraceus* L. (Sow thistle), *Tagetes erecta* L. 'Little Yellow Hero' (American marigold), *Tagetes patula* L. 'Bonanza Bee' (French marigold), *Tithonia rotundifolia* (Hemsl.) A. Gray 'Fiesta del Sol' (Mexican sunflower), **Balsaminaceae;** *Impatiens wallerana* Hook. F. "Impact White' (Impatiens), **Begoniaceae;** *Begonia semperflorens* Link & Otto (Wax Begonia), **Brassicaceae;** *Brassica oleracea* L. var. *acephala* DC 'Vates' (collard), *Brassica oleracea* L. var. *capitata* 'Earliana' (cabbage), *Brassica rapa* L. var. *rapa* (DC) Metzg. (turnip), *Capsella bursa-pastoris* L. (Sheperd's purse), **Caryophyllaceae;** *Diathus chinensis* L. 'Baby Doll' (Chinese pink), *Gypsophila elegans* L. (Baby's breath), **Chenopodiaceae;** *Chenopodium ambrosioides* L. (Mexican tea), **Cucurbitaceae;** *Citrullus lanatus* (Thurb.) Matsum & Nakai 'Charleston Grey' (watermelon), *Cucumis melo* L. var. *cantaloupensis* 'Top Mark' (cantaloupe), *Cucumis sativus* L. 'Dasher II' (cucumber), *Cucurbita pepo* L. 'Spineless Beauty' (zucchini squash), *Momordica charantia* L. (Bitter gourd), **Euphorbiaceae;** *Euphorbia hypericifolia* L. (Graceful sandmat), *Euphorbia marginata* Pursh (Snow-on the-Mountain), *Euphorbia pulcherrima* Willd. ex Klotzsch 'Freedom' (Poinsettia), F**abaceae;** *Crotalaria rotundifolia* J.F. Gmel (Rabbitbells), *Pachyrhizus erosus* (L.) Urb. (Jicama), *Phaseolus limensis* L. Macfady (Lima bean), *Phaseolus vulgaris* L. 'Top Crop' (Common bean), *Vicia faba* 'Broad Windsor Long Pod' (Fava bean), *Vinga sesquipedalis* 'Yard Long' (Asparagus bean), *Vigna unguiculata* (L.) Walp. 'California Blackeye' (Cowpea), **Gentianaceae;** *Eustoma grandiflorum* 'Echo Blue' (Lisianthus), **Geraniaceae;** *Pelargonium x hortorum* 'Ringo Red' (Geranium), **Lamiaceae;** *Coleus blumei* Lour. (Coleus), *Lavendula sp.* 'Midcole Blue' (Lavender), *Salvia splendens* 'Vista Red and White' (Salvia), **Lythraceae;** *Cuphea hyssopifolia* (False Heather), **Malvaceae;** *Abelmoschus moschatos* (Pacific orange scarlet), *Abutilon theophrasti* Medik. (Velvetleaf), *Alcea rosea* L. (Hollyhock), *Goppypium hirsutum* L. 'Delta Pina Acala 90' (Upland cotton), **Myrtaceae;** *Eugenia uniflora* (Surinam cherry), **Onagraceae;** *Ludwigia erecta* (L.) H. Hara (Yerba de Jicotea), *Ludwigia leptocarpa* (Nutt.) H. Hara (Primrose willow), *Oenothera glazioviana* (Scented evening primrose), **Polemoniaceae;** *Ipomopsis sp.* Michx. 'Hummingbird Mix' (Ipomopsis), **Portulacaceae;** *Portulaca sp.* L. (Purslane), **Rosaceae;** *Fragaria virginiana* Duchesne 'Sweet Charlie' (strawberry), **Rubiaceae;** *Pentas lanceolata* 'New Look Rose' (Pentas), **Scrophulariaceae;** *Antirrhinum majus* (Snapdragon), *Angelonia angustifolia* (Narrowleaf Angelon), **Solanaceae;** *Brugmansia x candida, Capsicum annuum* 'Red Rooster Spur' (Red pepper), *Cestrum nocturnum* L. (Night-flowering Jessamine), *Nicotiana alata* 'Hummingbird Rose' (Winged tobacco), *Physalis alkekengi* (Chinese lantern), *Physalis angustifolia* Nutt. (Coastal groundcherry), *Physalis floridana* (Husk tomato), *Solandra maxima, Solanum americanum* (American black nightshade), *Solanum capsicoides* (Red tropical soda apple), *Solanum diphyllum* L. (Twoleaf nightshade), *Solanum eleagnifolium* (Silverleaf nightshade), *Solanum melongena* 'Thai Long Green' and 'Thai Round Green' (Oriental eggplant), *Solanum seaforthianum* (Brazilian nightshade), *Solanum torvum* (Turkeyberry), *Solanum viarum* (Yellow tropical soda apple), **Verbenaceae;** *Verbena hortensis* 'Obsession' (Garden Verbena), *Lantana camara* (Lantana), **Violaceae;** *Viola splendid* 'Blue & Yellow', *Viola x wittrockiana* (Pansy).

Outputs of this Project:

Presentations:

Polston, J. E. 2001. "Management of Tomato Yellow Leaf Curl Virus in Florida". Third International Geminivirus Symposium, 24-28 July 2001, Norwich, England. (Invited)

Polston, J. E. and R. J. McGovern. 2001. "New and emerging disease problems: *Tomato yellow leaf curl virus*". 17th Conf. On Insect and Disease Management on Ornamentals. 25-27 Feb. 2001, Orlando, FL.

Polston, J.E. and D.J. Schuster, New Tools for Management of Whitefly-transmitted Geminiviruses . pp. 17-19 In: 2000 Florida Tomato Institute Proceedings, PRO-516, C.S. Vavrina, ed., Univ. of Florida and Citrus and Vegetable Magazine. 5 Sept. 2001 Naples, FL.

J. E. Polston, T. Sherwood, and D. J. Schuster. 2002. Effect of Pymetrozine on Transmission of *Tomato Yellow Leaf Curl Virus* by the Whitefly, *Bemisia tabaci*. Proc. 17th National Tomato Disease Workshop. 7-9 Nov. 2001, W. Palm Beach, FL (invited).

Conference Proceedings:

Polston, J.E. and R.J. McGovern. 2001. New and emerging disease problems: *Tomato yellow leaf curl virus.* pp. 7-10 In: Proc. 17th Conf. On Insect and Disease Management on Ornamentals. 25-27 February 2001, Orlando, FL.

Polston, J.E. and D.J. Schuster, New Tools for Management of Whitefly-transmitted Geminiviruses . pp. 17-19 In: 2000 Florida Tomato Institute Proceedings, PRO-516, C.S. Vavrina, ed., Univ. of Florida and Citrus and Vegetable Magazine. 5 Sept. 2001 Naples, FL.

J. E. Polston, T. Sherwood, and D. J. Schuster. 2002. Effect of Pymetrozine on Transmission of *Tomato Yellow Leaf Curl Virus* by the Whitefly, *Bemisia tabaci*. Proc. 17th National Tomato Disease Workshop. (In press).

Manuscripts:

J. E. Polston and T. Sherwood. 2002. Pymetrozine Interferes with Transmission of *Tomato Yellow Leaf Curl Virus* by the Whitefly, *Bemisia tabaci* (*Hemiptera: Aleyrodidae*). Florida Entomologist (submitted).
J. E. Polston, T. Sherwood, and R. J. M^{C}Govern. 2002. Experimental Host Range of a Florida Isolate of *Tomato Yellow Leaf Curl Virus*. HortScience (in preparation).

Popular Press/Extension Publications:

Polston, J.E. 2000. Cultural Control of TYLCV. Manatee Vegetable Newsletter May/June issue. 1 pg.

Polston, J.E., P.D. Roberts, and K. Pernezny. 2000. Evaluation of Chemicals for the Control of Whiteflies and Transmission of *Tomato yellow leaf curl virus* in Planthouses. Vegetable IPM Newsletter No. 4. 1 pg.

Polston, J.E. and D.J. Schuster. 2000. Tools for Management of Whitefly-transmitted Geminiviruses. Manatee Vegetable Newsletter Sept./Oct issue. 1 pg.

Polston, J.E., A. Post, and T.A. Sherwood. Evaluation of Actara for Protection of Tomato Transplants from Infection by *Tomato yellow leaf curl virus*. GCREC Research Report BRA 2000-7. Sept. 2000. Bradenton, FL. 6 pg.

Post, A., and J.E. Polston. Evaluation of Actigard for Protection of Tomato Transplants from Infection by *Tomato yellow leaf curl virus*. GCREC Research Report BRA 2000-8. Sept. 2000. Bradenton, FL. 6 pg.

Polston, J.E., A. Post, and T.A. Sherwood. 2000. The Effect of Fulfill on the Transmission of *Tomato yellow leaf curl virus* by the Whitefly, *Bemisia tabaci*, to Tomato Transplants. GCREC Research Report BRA 2000-15. Oct. 2000. Bradenton, FL. 8 pg.

Application of These Results by the Florida Agricultural Industry:

Many transplant producers have told me that they are now using Fulfill routinely and are getting good results. Many stated that after using Fulfill they had no to few complaints from their customers regarding virus-infected transplants. Although hard to confirm, the use of Fulfill by Florida transplant producers should reduce or slow down the introduction of TYLCV into other states (or countries).

I have talked to several greenhouse tomato growers about using UV-absorbing plastics to minimize the incidence of virus-infected plants in their houses. I do not know how many greenhouses are now using this new approach, although several are considering testing the plastic next time they need to replace their plastic.

Table 1. Comparison of various compounds and products for repellency to silverleaf whitefly adults in the laboratory.

Material	Intercept	Slope	RC_{50}[1]	RR_{50}[2]	P
Sunspray Ultrafine Oil®	1.39	1.77	0.15	-----	<0.01
Bio Crack®	-3.03	1.68	63.67	424.5	0.50
Capsacin		>0.1[3]			
Castor Oil	0.41	1.28	0.48	3.2	<0.01
Cedar Oil	0.44	0.56	0.16	1.1	<0.00001
Cineole	0.32	0.95	0.46	3.1	0.02
Citronellal	**2.79**	**2.67**	**0.09**	**0.6**	**0.33**
Dawn® detergent	0.63	1.14	0.28	1.9	0.10
Envirepel®	-1.73	-0.08	3.63E-21	—	0.01
Geranium Oil	**1.60**	**1.76**	**0.12**	**0.8**	**0.01**
Ginger Oil	**3.92**	**3.26**	**0.06**	**0.4**	**0.05**
Hamlin Oil	**0.80**	**0.64**	**0.06**	**0.4**	**0.04**
Hyssop	0.09	0.44	0.61	4.1	0.57
Jasmonic Acid	0.13	0.78	0.69	4.6	0.02
Lavender	0.21	1.10	0.65	4.3	<0.00001
Limonene	2.36	3.59	0.22	1.5	<0.01
Neemix®	-1.73	1.79	9.36	62.4	0.43
Olive Oil	**2.38**	**1.49**	**0.025**	**0.2**	**0.0002**
Organocide® (New)	-0.78	3.83	1.60	10.7	0.07
Organocide® (Old)	-0.29	2.07	1.39	9.3	0.12
Pepper Wax®	-9.29	7.01	21.13	140.7	0.001
Prime Oil®	-0.14	0.66	1.61	10.7	0.27
Rosemary	-0.46	1.20	2.43	16.2	0.0005
Sage	0.06	-0.12	1.39	9.3	0.09
Sesame Oil	0.42	0.82	0.30	2.0	0.14
Tagetes	0.32	0.69	0.53	3.5	0.0002
Tansy	-0.98	2.25	2.73	18.2	0.13
Trilogy®	-0.78	2.31	2.17	14.5	0.19
Tween 20®	-1.73	1.53	13.45	89.7	0.36
Winter Green Oil	**3.08**	**2.77**	**0.08**	**0.5**	**<0.01**
Combination No. 1	**3.92**	**1.71**	**0.005**	**0.03**	**0.88**
Combination No. 2	**2.44**	**1.22**	**0.01**	**0.07**	**0.002**

[1]Estimated concentration of test compound (% v/v) required to repel 50% of an adult whitefly population.
[2]Repellency rates based upon RC_{50} values relative to Sunspray Ultrafine Oil as the standard.
[3]Higher concentrations were too innocuous to handle.

Table 2. Effect of various compounds and a commercial product on oviposition and *Tomato mottle virus* transmission by silverleaf whitefly adults on tomato transplants in the greenhouse.

Material	No. Eggs/Plant	% Plants with Virus Symptoms
Ginger oil	137 a	46.0 bc
Limonene	166 a	39.2 bc
Sunspray Ultrafine Oil®	191 a	24.0 ab
Olive oil	218 a	18.0 a
Water	379 b	58.6 c

Table 3. Effect of various compounds and a commercial product on oviposition and *Tomato yellow leaf curl virus* transmission by silverleaf whitefly adults on tomato transplants in the greenhouse.

Material	No. Eggs/Plant	% Plants with Virus Symptoms
Ginger oil	137a	46.0bc
Limonene	166a	39.2bc
Sunspray Ultrafine Oil®	191a	24.0ab
Olive oil	218a	18.0a
Water	379b	58.6c

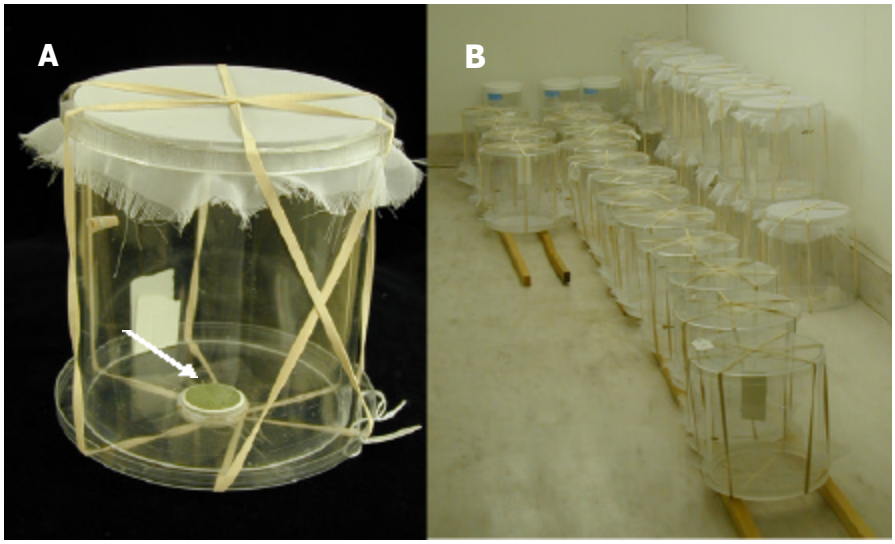


Figure 1. A laboratory bioassay to measure the ability of a compound to repel adult whiteflies. **A.** Cage (shown upside down) designed to confine whitefly with leaf disk that has been treated with test compound. Leaf disk indicated by arrow. **B.** Experiment in progress showing cages in correct orientation with whiteflies.

Claim Report

Asian Longhorned Beetle Eradication (Final Report)

Recipient Party:	**Illinois**
Claim Year:	**1999**
Claim Amount:	**$100,000**

Illinois Department of Agriculture

In July of 1998 the USDA was alerted to an infestation of the Asian longhorned beetle (ALB) in Chicago. A suburban park district employee discovered an adult beetle in a load of cut wood (firewood) that he had transported in the bed of his pick-up truck from Chicago's northeast Ravenswood neighborhood to his home in Morton Grove, a northwest suburb. By performing a web search the employee discovered the beetle to be the exotic Asian longhorned beetle (*Anoplophora glabripennis*), heretofore only found, outside of warehouses, in New York City. He immediately notified the USDA. This beetle poses a threat to a majority of street trees in the City of Chicago and other municipalities.

The identity of the beetle was verified by Federal entomologists, and State entomologist Norm Seaborg. Stan Smith, Nursery Manager for the State of Illinois established the initial quarantine area with the input of Federal and City representatives. Smith also appointed State inspector Roy Winbigler to be the State's ALB point person.

Before the end of 1998, three more zones were quarantined for the Asian longhorned, including Kilbourne Park, just west of Ravenswood and 2 suburban locations, Summit and Addison. Summit is southwest of Chicago and the source was believed to be palletized material from a nearby industrial park. Addison is west of Chicago and the source was also believed to originate from pallets behind a plumbing and kitchen remodeling company. As a result of ALB all pallets from China are now required to be heat-treated.

In 1998 and 1999 the State of Illinois ALB hotline was the initial contact for any probable positive sightings. The hotline was established and coordinated by the State of Illinois to take phone calls from homeowners and others identifying potentially infested trees. Door to door flyers were distributed in local neighborhoods and public meetings were held. Tremendous media interest kept the beetle in the public eye. The State responded to requests for information by telephone and through mailings to local municipalities, departments of parks and recreation, tree companies, lawn care companies and waste management facilities as well as homeowners submitting survey requests.

As the designated liaison between the USDA, City of Chicago, State of Illinois and other municipalities, Roy Winbigler participated in detection and control of ALB infested trees. Nursery Manager, Stan Smith dedicated much of his time on the job to the ALB project.

Stan Smith instructed state employees including Bob Lubben, Don Orton, Norm Seaborg, John Walt, Jim Senechalle, Mark Cinnamon and Melissa Cotton to respond to Hot Line calls coming in from throughout the State of Illinois. State inspectors responded with 195 site visits to 1999 survey requests.

In the city of Chicago a team composed of State, Federal and City employees was assembled to locate and destroy infested trees. State inspectors participated with Federal and City employees in the removal of ALB infested trees. From January through September 1999, most of the 17 state inspectors rotated in one-week work shifts in teams of two, working on detection and control. Four hundred and seventy-two (472) infested trees were removed, chipped and replaced in 1999.

In 1998 and 1999 ALB regulatory guidelines were established in accordance with the "The Insect Pest and Plant Disease Act" (State of Illinois Compiled Statutes, Chapter 505, Paragraph 90/1). A host tree list was established that included maple (Acer), elm (Ulmus), horsechestnut (Aesculus), willow (Salix), birch (Betula), and ash (Fraxinus). The list was later expanded to include hackberry (Celtis) and European mountain ash (Sorbus). A 'compliance agreement' was instituted in order to inform and monitor tree companies and landscapers on their responsibilities when operating in ALB quarantine zones. The guidelines required that host tree wood be chipped to ½ inch and the stump ground to 8 inches below the soil prior to transporting it out of quarantine zone[2]. Disposal of yard waste that might contain host tree material was addressed through the major waste management companies. Mailings were made to local municipalities, tree companies, lawn care companies and waste management facilities as well as people submitting survey requests.

After the initial round of tree removals in 1998 (837 trees) potential treatment options were discussed and preliminary actions related to the control of ALB through insecticide treatment were carried out. These control actions included measuring the diameters at breast height (dbh) of host trees to be treated in the various quarantine zones to determine the volume of insecticide needed per site.

In the fall of 1999 ALB infested trees were discovered in the City of Park Ridge on property belonging to the Forest Preserve District of Cook County (FPDCC). A tree company had alerted the State to the possibility of ALB presence on the site because they had worked in Chicago's Ravenswood neighborhood using trucks that they parked overnight in Park Ridge. Nearby trees were surveyed resulting in the discovery seven infested trees. On November 24th, 1999 the State of Illinois established the Park Ridge quarantine. Control actions were immediately taken and after the initial 1999 sweep of seven trees, no more ALB infested trees have been found in the Park Ridge quarantine.

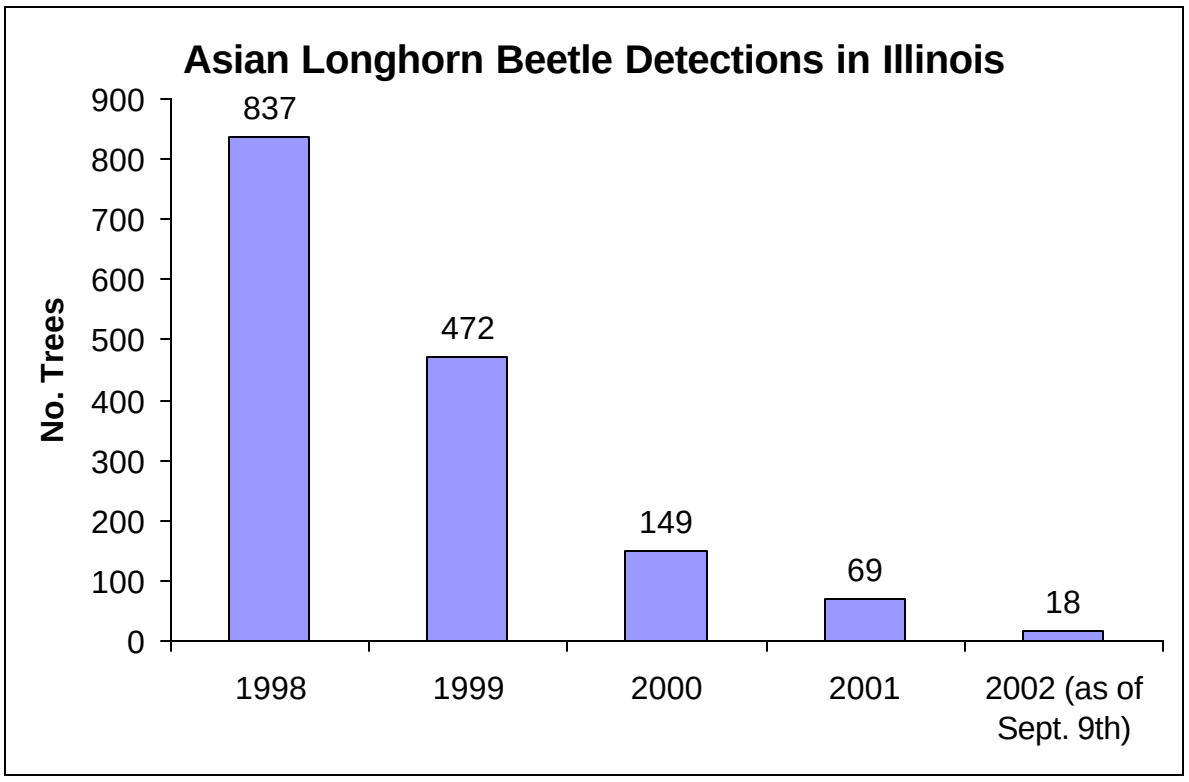
Only one additional find of infested trees was made, near O'Hare Airport (designated the Bensenville quarantine zone) that was definitively traced to movement of infested wood from the initial Ravenswood zone. Since the initial removal of 23 infested trees, and over 200 proximal host trees, no further trees have been found in Bensenville. The current six quarantine zones have

[2] This is still the most effective measure to deal with an infested tree, although the use of insecticides in non-infested trees shows promise for control.

a total area of approximately 25 sq. miles. Of those six, three have had no ALB finds in 2001 and 2002 and may be eligible for removal from quarantine after 2003.

Since its detection in 1998 there has been a downward trend in detections of Asian Longhorn beetle infested trees (Chart 1). Programs in Control, Regulatory Compliance, Survey Training and Public Outreach all contributed to this downward trend; however, the primary reason for the continuing success of this program is the high level of cooperation and communication between Federal, State, City of Chicago, other agencies and municipalities, the media and the general public.

CHART NO. 1



Membership and Committees

Interstate Pest Control Compact Officers
2001-2002

Chair	**Robert Spear, Maine**
Vice Chair	Phil Ward, Oregon
Secretary	William Lyons, California
Treasurer	Carlton Courter, Virginia

Executive Committee
2001-2002

Chair	**Robert Spear, Maine**
Midwestern Region	Fred Dailey, Ohio
Northeastern Region	Michael Scuse, Delaware
Southern Region	Gus Douglas, West Virginia
Western Region	William Lyons, California

Technical Advisory Committee - 2002

Central Plant Board **Geir Friisoe, Minnesota** **Thomas Harrison, Ohio**	Eastern Plant Board **Charles Coffman, West Virginia** **Randy Ciurlino, Delaware**
Western Plant Board John Caravetta, Arizona Richard Wilson, Utah	**Southern Plant Board** Benny Graves, Mississippi Mike Evans, Georgia
USDA APHIS PPQ Jerry Fowler	**USDA Forest Service** Thomas Hofacker

Governing Board
(34 Member States as of July 1, 2002)

Member	Administrator	Year Joined
Arizona	S. Jones	1994
Arkansas	D. Alexander	1999
California	W. Lyons	1969
Colorado	D. Ament	2001
Delaware	M. Scuse	1969
Florida	C. Bronson	1995
Georgia	T. Irvin	1984
Illinois	J. Hampton	1968
Kansas	J. Clover Adams	1996
Maine	R. Spear	1986
Maryland	H. Mister	1976
Michigan	D. Wyant	1968
Minnesota	G. Hugoson	1969
New Hampshire	S. Taylor	1968
New Jersey	C. Kuperus	1970
New Mexico	F. DuBois	1981
New York	N. Rudgers	2002
North Carolina	M. Scott	1975
	Phipps	
North Dakota	R. Johnson	1973
Ohio	F. Dailey	1974
Oklahoma	D. Howard	1999
Oregon	P. Ward	1981
Pennsylvania	S. Hayes	1968
Puerto Rico	L. Rivero Cubano	1994
Rhode Island	K. Ayars	1999
South Carolina	L. Tindal	1972
Tennessee	D. Wheeler	1969
Texas	S. Combs	1994
Utah	C. Peterson	1985
Vermont	L. Graves	1978
Virginia	C. Courter	1974
Washington	V. Loveland	1999
West Virginia	G. Douglass	1968
Wyoming	R. Micheli	1996

Officers History

Term of Office	Date of Election	Chairman	Vice Chairman	Secretary	Treasurer
1968-69	1968 (a)	California Lyng	Michigan Ballo	Illinois Larkin	Illinois
1969-70	Feb 1969	Michigan Ball	N. Hampshire Buckley	California Fielder	Illinois Lewis
1970-71	Mar 1970	N. Hampshire Buckley	Tennessee Moss	California Fielder	Illinois Lewis
1971-72	Mar 1971	W. Virginia Douglass	Delaware Caulk	California Fielder	Illinois Ropp

Officers History					
Term of Office	**Date of Election**	**Chairman**	**Vice Chairman**	**Secretary**	**Treasurer**
1972	Jan 1972	Delaware Caulk	California Fielder	Minnesota Dennistoun	Illinois Ropp
1972-73	Nov 1972	California Christensen	New Jersey Alampi	Minnesota Dennistoun	Illinois Ropp
1973-74	Sep 1973	New Jersey Alampi	Ohio Abercrombie	Minnesota Dennistoun	Illinois Williams
1974-75	Sep 1974	Ohio Abercrombie	S. Carolina Harrelson	Minnesota Dennistoun	Illinois Williams
1975-76	Oct 1975	S. Carolina Harrelson	Ohio Stackhouse	Minnesota Dennistoun	Illinois Williams
1976-77	Nov 1976	Ohio Stackhouse	Virginia Carbaugh	Minnesota Dennistoun	Illinois Block
1977-78	Sep 1977	Virginia Carbaugh	N. Carolina Graham	Minnesota Dennistoun	Illinois Block
1978-79	Sep 1978	Virginia Carbaugh	N. Carolina Graham	Minnesota Dennistoun	Illinois Block
1979-80	Sep 1979	Virginia Carbaugh	N. Carolina Graham	Minnesota Dennistoun	Illinois Block
1980-81	Nov 1980	N. Carolina Graham	California Rominger	Minnesota Dennistoun	Illinois Block
1981-82	Sep 1981	California Rominger	Vermont Dunsmore	Minnesota Dennistoun	Illinois Block
1982-83	Sep 1982	Vermont Dunsmore	Michigan Pridgeon	Minnesota Dennistoun	Illinois Werries
1983-84	Sep 1983	Tennessee Walker	Ohio Locker	Minnesota Dennistoun	Illinois Werries
1984-85	Sep 1984	Ohio Locker	California Berryhill	Minnesota Dennistoun	Illinois Werries
1985-86	Oct 1985	Oregon Kunzman	Delaware Chandler	Minnesota Dennistoun	Illinois Werries
1986-87	Sep 1986	Delaware Chandler	Georgia Irvin	Minnesota Dennistoun	Illinois Werries
1987-88	Oct 1987	Delaware Chandler	Georgia Irvin	Minnesota Dennistoun	Illinois Werries
1988-89	Sep 1988	Georgia Irvin	Ohio Maurer	Michigan Cardwell	Illinois Werries
1989-90	Sep 1989	Ohio Maurer	Utah Ferry	Michigan Cardwell	Illinois Rundquist

Officers History					
Term of Office	**Date of Election**	**Chairman**	**Vice Chairman**	**Secretary**	**Treasurer**
1990-91	Oct 1990	Utah Ferry	Pennsylvania Wolff	Michigan Cardwell	Illinois Rundquist
1991-92	Sep 1991	Pennsylvania Wolff	South Carolina Tindal	Michigan Cardwell	Illinois Doyle
1992-93	Sep 1992	South Carolina Tindal	West Virginia Douglass	Michigan Cardwell	Illinois Doyle
1993-94	Sep 1993	Ohio Dailey	West Virginia Douglass	Michigan Cardwell	Illinois Doyle
1994-95	Sep 1994	West Virginia Douglass	New Jersey Brown	South Carolina Tompkins	Illinois Doyle
1995-96	Sep 1995	New Jersey Brown	Arizona Kelly	South Carolina Tompkins	Illinois Doyle
1996-97	Sep 1996	Arizona Kelly	Virginia Courter	South Carolina Tompkins	Illinois Doyle
1997-98	Sep 1997	Virginia Courter	Maine McLaughlin	South Carolina Tompkins	Illinois Doyle
1998-99	Sep 1998	Arizona Jones	Maryland Virts	South Carolina Tompkins	Virginia Courter
1999-00	Sep 1999	Maryland Virts	Minnesota Masso	California Lyons	Virginia Courter
2000-01	Sep 2000	Minnesota Masso	Maine Spear	California Lyons	Virginia Courter
2001-02	Sep 2001	Maine Spear	Oregon Ward	California Lyons	Virginia Courter
(a) First meeting of the Compact was January 1969. Records indicate that officers had been elected or selected prior to this meeting, as meeting was chaired by Lyng of California.					