Frontiers of Plant Science

A REPORT FROM THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN

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Jilo being grown as a new crop for Connecticut

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THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, founded in 1875, is the first experiment station in America. It is chartered by the General Assembly as an independent State agency governed by a Board of Control. Station scientists make inquiries and experiments regarding plants and their pests, insects, soil and water quality, food safety, and perform analyses for State agencies. Factual information relating to the environment and agriculture is provided freely and objectively to all. The laboratories of the Station are in New Haven and Windsor; its Lockwood Farm is in Hamden. Copies of this and other publications are available upon request to Publications; Box 1106; New Haven, Connecticut 06504

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Station has been developing new crops for Connecticut growers for 20 years

By David E. Hill

The year 2002 marks the 20th anniversary of the new crops program at The Connecticut Agricultural Experiment Station. In 1982, the dairy industry was sharply declining due to a buy-out program by the federal government to reduce dairy herds. Also the tobacco industry, once the greatest agricultural enterprise in the state, was declining rapidly. Tobacco land was being diverted to nursery stock and vegetables or lost to urban development. Some growers who wanted to remain in agriculture sought to diversify their operations with profitable vegetable crops. The new crops program provided information about the cultural details of many new and unusual crops. Crop selection was based on two criteria, a high market value for the product and high consumer demand. Many of the crops selected were those being grown elsewhere and imported into Connecticut.

For example, Connecticut sits astride of one of the largest consumer markets for globe artichokes in the country. Forty percent of California artichokes are sold in markets between New York and Boston. We learned how to grow them in Connecticut by modifying their growth habit to shorten their life cycle from 2 years to 4 months and produce an annual crop. Commercial growers in Easton and Branford can attest to the popularity of locally grown artichokes whose flavor is superior to that of 10-day-old artichokes shipped from California.

We also learned how to grow Belgian endive to provide winter income for Connecticut growers. Roots grown in summer fields were harvested in fall and forced to re-grow in winter in darkened unheated barns and home basements to produce an edible crop in three short weeks.

As the program evolved, several standard crops received our attention. Broccoli, with its anti-cancer compounds, became popular in the mid-1980's as per capita consumption increased from 0.9 lb to 3.5 lb in the preceding decade. With the explosion of fast-food outlets, the demand for Spanish onions provided opportunity for profit. Many cultivars were tested to find those that produced a high percentage of colossal (+4 inch) and jumbo (+3 inch) sizes that would fill or exceed the circumference of a hamburger bun. Specialty melons (honey dew, galia, charentais, canary, and Christmas) were grown successfully using black plastic mulch to warm the soil and Reemay row covers to create a greenhouse effect to speed early vine growth and enhance productivity.

Belgian endive, yellow at the rear and red in the foreground, being forced from roots grown at Lockwood Farm.

The past 20 years has seen a marked change in the selling of produce. Gradually, the emphasis has shifted to direct sales to consumers. It has become less profitable for vegetable growers to sell the produce at wholesale prices. Direct marketing is now accomplished by several methods. A survey by the Connecticut Department of Agriculture identified about 560 growers who market their produce through farm showrooms and roadside stands. About 30% of Connecticut vegetable and fruit growers have pick-your-own programs that offer produce at reduced prices. Finally, the Department of Agriculture developed a network of 65 farmer's markets in cities and densely populated suburbs. These markets are served by about 120 growers who attend the markets 1-5 days each week. Their annual sales in 2000 were estimated to reach 1.2 million dollars. These farmer's markets reach a highly diversified clientele who have immigrated from many foreign lands. For example, the 2000 Census enumerated 370,000 inhabitants of Hispanic heritage (fully 1 in 10 of Connecticut's population), an increase of 120,000 in the last 10 years. There are also 4,500 persons of Brazilian heritage residing in the Danbury-Waterbury area. Because these consumers avidly seek vegetables native to their foreign lands, demand has increased for ethnic vegetables. How best to serve their needs?

Consumers and growers who attend farmers markets were surveyed to determine the kinds of fruit, vegetables, and herbs they would buy, if available. Leading the list of some 45 items were okra, leeks, sweet potatoes, jilo (a South American eggplant), and calabaza winter squash (tropical pumpkin). In 1998, the new crops program began a study to evaluate the potential of these crops to be included in the array of vegetables offered at farmers markets. Okra, leeks, sweet potatoes, and jilo were found to grow well in Connecticut, utilizing cultivars that were developed for more northerly climates, and cultural modifications to accommodate a shorter growing season. We are currently evaluating calabaza, highly prized for its use in vegetable dishes, soups, and baked goods. I will describe our progress in growing this ethnic vegetable in Connecticut's climate.

Calabaza has a vegetative habit, akin to pumpkin, with vines that attain 30 feet or more in length and requires an inordinate amount of space to grow. It also has a long growing season, approaching 120 days. Breeding programs in Puerto Rico and Florida have developed new cultivars with shorter vines (12-18 feet) and earlier maturity which increase the potential for profitable production. In 2000, we obtained seed of short-vined cultivars from the University of Florida. We direct seeded these cultivars about June 1, similar to pumpkin, and found that they germinated poorly in the field (15-20%). The plants that developed grew a crop of 6-8 pound fruit, but harvest after the first frost in early October revealed that the fruit were immature. Palatability was increased but not the nutritional value by using liberal applications of sugar, salt, and butter. In 2001, we started the plants in a greenhouse in mid-May and transplanted the seedlings in mid-June. This tactic provided not only a greater population of plants in the field, but also plants that were already 30 days on their path to maturity. By the time they were harvested in early October, most fruit were fully mature and had suitable texture and taste for the table. The average weight of fruit was 11.0 lbs., with a projected yield of nearly 30 tons/acre. At these yields, profit for the grower is assured, and Hispanic consumers can enjoy a favorite vegetable.

At times, the new crops program responded to changes in the marketplace. One example is the appearance of grape tomatoes. Grape tomatoes, as the name implies, are oval in shape, similar to grapes. Their small size, sweetness, thin skin, and firmness have been credited to their success. Produce industry publications have speculated that they are taking over the cherry tomato niche.

The sudden emergence of grape tomatoes is largely due to an unusual legal debate. Chu Farms in Florida coined the term "grape tomatoes" for their product. They sought and received a federal trademark registration. Under trademark laws, the term could not be used for other varieties that resembled Chu's. The trademark also restricted the use of the term in seed catalogue descriptions for fruit of similar size and shape. Procacci Bros. Sales Corp. challenged the exclusive right for use of the term, declaring it a generic name and not a cultivar name. After a lengthy court battle, Chu Farms relinquished the exclusive rights to the term, thus opening the door for the produce industry and seedsmen to describe similar fruit as "grape tomatoes."

In 2001, free of restriction for the use of the term "grape tomatoes", four seed companies offered five cultivars of grape tomatoes, which we obtained for evaluation. Among them was the Santa variety, commonly seen in produce aisles

Artichokes growing in Connecticut.

in the supermarkets of Connecticut. Its seed, however, was unavailable from seedsmen due to an exclusive agreement between Procacci Bros. Sales Corp. and the developer of the seed in Taiwan. We obtained seed, however, from the United Kingdom and used it as a standard with which to compare to other cultivars. We grew indeterminate varieties Santa, Summer Sweet, and Tami-G, and determinate varieties Sweet Olive and Chiquita. Harvest began July 23 and concluded October 9, a 12-week span. Yield was related to plant habit. Cumulative yield of indeterminate Santa and Summer Sweet was 15.5 lb/plant. Cumulative yield of determinate variety Sweet Olive was only 6.7 lb/plant, largely due to the termination of harvest after only 8 weeks. In 2002, five more grape tomato cultivars became available as seedsmen scrambled to capture a part of the action.

The culture of grape tomatoes is labor intensive. Staking, tying, and harvest are time-consuming, but similar to the effort required to grow cherry tomatoes. At current wholesale prices, however, grape tomatoes ($0.66/lb) enjoy a 33% greater monetary return than cherry tomatoes ($0.50/lb). At a projected potential yield exceeding 47,000 lb/acre for Santa and Summer Sweet, profitability is assured for the grower. For the home grower, a few grape tomato plants will provide ample harvest from mid-summer to early fall.

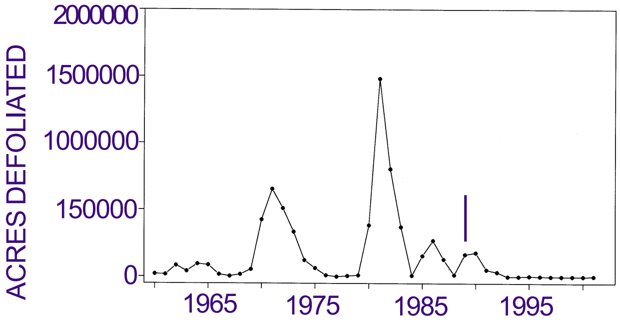
The new crops program has provided vegetable growers with information on preferred cultivars that grow well in Connecticut and cultural details on many crops that are not normally grown here. Along the way, we have also encouraged home growers to include some of these vegetables in their gardens to enhance their tables and neighborhood bragging rights.

The fungus and the gypsy moth: A tale of two foes and the happy outcome from their deadly battles

By Ronald M. Weseloh

A few years ago, I unfortunately fell off my bicycle and broke a leg. While it was being set, the attending physician asked me what I did for a living. When I told him I worked on the gypsy moth, his immediate comment was, "what's that?" Granted, he was young and new to New England. Still, his lack of knowledge about this pest illustrates how things have changed in less than 20 years.

Indeed, in 1981, 1.5 million acres were defoliated in



Graph of acres defoliated by the gypsy moth in Connecticut from 1960 to 2001. The blue vertical line is at 1989, the year the fungus was discovered in North America.

Connecticut. Pest numbers subsequently declined, but by 1989, gypsy moths were increasing again in Fairfield County. Then something odd happened—caterpillars began dying on tree trunks for no apparent reason. Symptoms were similar to a disease caused by the gypsy moth nuclear polyhedrosis virus. However, the virus seemed an unlikely cause because it almost never occurs in the early stages of an outbreak. Station inspectors brought dead specimens to Theodore Andreadis, now head of our Department of Soil and Water. He found that the dead caterpillars were filled with resting spores of a fungus from the genus *Entomophaga*. This was exciting news because gypsy moths in North America had never before been shown to harbor such disease-causing fungi. The fungus, *Entomophaga maimagia*, occurs in Japan and attacks the Asian gypsy moth there. We do not know how or when it arrived in the northeastern United States before its sudden appearance in 1989.

Because of *E. maimaiga*, defoliation by the gypsy moth after 1990 was much less than it was before. This pathogen is environmentally safe because it is specific to the gypsy moth. Moreover, such specialist natural enemies are more effective than those with general eating habits. *E. maimaiga* resting spores are located in the soil, and Dr. Andreadis and I have found that they are able to survive for up to 10 years. This means the fungus can endure periods when gypsy moth populations are low. Under moist conditions in spring, some of the resting spores germinate and produce long tubes that develop primary conidia at the tips. The pear-shaped conidia are released into the air, and if one contacts a gypsy moth larva, it germinates through the body wall to initiate infection. After about 10 days, the fungus completes its development and, if the relative humidity is high, grows filaments back through the body wall to produce thousands of pear-shaped secondary conidia that are released into the air to infect other larvae. The multiple cycles of infections caused by such secondary conidia are responsible for the increases in disease rates that occur as caterpillars get larger. When gypsy moth larvae are near pupation, the production of conidia decreases, and infected caterpillars become filled with resting spores that are eventually released into the soil to begin the cycle over again.

Despite the presence of *E. maimaiga*, there have been some recent gypsy moth outbreaks in Connecticut. For instance, over 150 acres were defoliated in Mansfield Hollow State Park in Windham County in 2000 and 2001. Thus, it is important to determine and monitor the impact of *E. maimaiga* on the gypsy moth. To accomplish this, one needs to know how to measure the important environmental and biological conditions that affect both the pathogen and host. I have developed a simple method for determining the number of resting spores in the soil. My associates and I collect forest soil and incubate damp soil samples for a week. After a 24 hour exposure to a sample, gypsy moth larvae are reared to see if they develop the fungus disease. The percentage of larvae that become infected is a measure of the resting spore load in the soil.

The abundance of gypsy moth larvae is important because the more caterpillars that become infected, the more secondary conidia are produced. We count the number of gypsy moth caterpillars seen on leaves of oaks. To estimate how effective the fungus is, we collect 100 larvae weekly from specific areas and rear them in the laboratory. The number diseased is an indication of the percentage infected in the forest. We also monitor rainfall, temperature, and relative humidity.

Relating these environmental and biological data to fungal incidence in the forest has allowed me to develop a computer model that simulates fungus infection. In the model, gypsy moth larvae are hatched at the appropriate time of the season and develop in a temperature-dependent manner—faster development at high temperatures. The chance of being infected with germinating resting spores depends on how many resting spores are in the soil and on how moist the soil is. Once infected, the fungus develops at a rate depending on temperature. This rate can be used to

Gypsy moth larvae killed by *E. maimaiga* and filled with fungal resting spores.

determine when an infected larva will die. If the relative humidity is high after death, the pathogen will produce secondary conidia. These conidia have a chance of infecting healthy larvae depending on their numbers and humidity.

With a model in hand, we can ask how fungus activity will be affected by resting spore loads and weather conditions. I ran the model with inputs of low or high resting spore levels (bioassay result = 0.1% or 20.0% infection) and weather conditions measured during 1989 (a very wet year) and 1999 (a very dry year). For 1989 conditions, most of the caterpillars were infected no matter what the resting spore load was. Evidently, favorable weather is enough to cause a great deal of mortality even with few resting spores, probably because conidia infection cycles can proceed efficiently. In 1999 the fungus was able to do well when resting spore load was high, but if few resting spores were present, not enough larvae become infected to produce enough secondary conidia to lead to substantial mortality.

The ability of the fungus to do well in a dry year, so long as there are abundant resting spores available, could explain the incidence of *E. maimaiga* after 1989. Weather conditions before and after 1989 were similar, yet the fungus was only prominent during and after that year. The reason is probably because previous to 1989, resting spore loads in soils were much lower than 0.1%. Thus, not enough larvae would have become infected initially to result in much mortality. However, after 1989, large numbers of resting spores were present that could drive infections to high levels.

The observed impact of resting spore abundance can be used for future prediction of fungus activity. When resting spores are abundant, the pathogen should be favored even if weather conditions are unfavorable. Conversely, low resting spore loads may not be a deterrent if favorable weather occurs. A problem might arise if resting spore loads are low, the spring is predicted to be dry, and gypsy moth numbers are increasing. At present, many areas of the state are likely to have low resting spore numbers because spores were last deposited in the early 1990's and have not been substantially replenished since. Gypsy moth numbers are currently low, but populations are increasing slightly in some parts of southern Connecticut. Thus, there may be isolated outbreaks if May and June are dry. But even if this occurs, the fungus disperses so efficiently that conidia from other areas should quickly infect caterpillars in a defoliated area. I am looking forward to seeing what happens.

The gypsy moth has had a 133 year-long run in North America. However, from what we now know about *E. maimaiga*, I feel it is unlikely that the pest will cause the kinds of widespread damage that we experienced in the past. *E. maimaiga* dramatically shows how effective and safe a natural enemy can be. I am proud to have been a witness to a most impressive case of successful biological control.

Managing an exotic forest insect: the Asian longhorned beetle

By Dennis J. Souto
USDA-Forest Service, Durham, NH

Talk given at Imported Pests and Pathogens: Biology, Dispersal, and Control, A Conference Commemorating the 125th Anniversary of The Connecticut Agricultural Experiment Station, October 12, 2000

Asian longhorned beetle was discovered in New York City in August 1996 by a resident who noticed exit holes and large beetles on a street tree in front of his house. This location, in the Green Point section of Brooklyn, is close to shipping piers along the East River. We believe that Asian longhorned beetle arrived here via infested solid wood packing material from China in the 1980's, and the beetles began to infest living trees in Green Point. This was the first time the Asian longhorned beetle was reported established outside its native range.

The following month (September 1996) a second infestation was reported in Amityville, NY about 30 miles east of Green Point. An arborist from Amityville who had been doing tree work in Brooklyn apparently transported infested material unknowingly from Brooklyn to Amityville to begin this second, and probably more recent, infestation. Additional infestations have since been found in Manhattan, Queens, and Islip, NY. When surveys began in Bayside (Queens) in 1999 to delineate the boundaries of a newly-discovered infestation there, a resident produced a 1992 photograph of her house deck that showed an Asian longhorned beetle adult. As a result, this infestation was considered about 10 years old at the time of its discovery.

In July 1998, a resident of the Ravenswood section of Chicago collected beetles emerging from a local tree branch. They turned out to be Asian longhorned beetles that probably arrived in infested solid wood packing material protecting imports to local businesses. The extensive media coverage resulted in two smaller infestations being discovered in the Addison and Summit areas of Chicago. Each infestation probably began in the 1990's.

Although it is difficult to estimate how old infestations are when they are discovered, the best guess is that the New York infestations were about 10-15 years old when found. The Chicago infestations were younger. Two variables that help to estimate age of infestations are number of attacked trees (the larger the number of infested trees found, the older the infestation is thought to be) and intensity of attacks on individual trees (trees with many oviposition sites and exit

Adult Asian longhorned beetle. Actual size is 3/4 to 1-1/4 inches, excluding antennae, which are longer than the body.

holes from the crown to exposed roots are thought to be older infestations than trees with few signs of attack, only in the upper crown).

Since discovery of these two Asian longhorned beetle infestations, the USDA Animal and Plant Health Inspection Service (APHIS) has found specimens at many American ports. But, as far as we know, New York and Chicago are the only locations in the United States where Asian longhorned beetle successfully left infested solid wood packing material and began attacking and reproducing in live trees.

The beetle is a major pest in China where it occurs from the latitudes of 21-43 degrees, a range similar to most of the United States. In China, maples (*Acer*), poplar (*Populus*), willow (*Salix*), and elm (*Ulmus*) are the most common host tree species. It causes the greatest problem in northern areas where millions of acres have been converted into exotic species plantations to meet industrial wood demand.

In the United States, Asian longhorned beetle has attacked mostly maple species, which account for 80% of the infested trees. This tendency is probably due to its preference for maple species as well as the dominance of maples in the infested areas. Unfortunately, maples are dominant in many of our uninfested urban forests as well. Other host tree species include horsechestnut (*Aesculus*), birch (*Betula*), ash (*Fraxinus*), Rose-of-Sharon (*Hibiscus*), poplar, willow, and elm.

Asian longhorned beetle attacks all sizes of trees and recently cut logs. Chinese references indicate that both healthy and stressed trees are attacked. In newly-infested trees, oviposition and damage generally begin on the smooth bark of the upper stem and large branches. Emerging beetles readily attack the same tree. As the infestation proceeds, activity moves down the stem and eventually includes the exposed roots.

Both New York and Chicago implemented eradication programs soon after discovery. Both programs include intensive surveys and aggressive media coverage to detect infested trees and quick removal and destruction of these trees. Both jurisdictions will consider Asian longhorned beetle successfully eradicated when no new infested trees are detected after 5 years of annual surveys.

Chicago added bucket trucks and tree climbers to their surveys within a year of the discovery of Asian longhorned beetles there. This followed a test that detected an additional 300 infested trees in an area that yielded 425 infested trees in the initial survey using only visual inspections from the ground with binoculars. In contrast, New York relied only on visual surveys from the ground for over 3 years after initial discovery. Within the last year, New York added both tree climbers and bucket trucks to their survey protocols.

The numbers of infested trees detected in both cities as of September 2000 are illustrated in the table.

Although both New York and Chicago have instituted trials with Merit insecticide, Chicago has also incorporated systemic insecticide treatment as a component of their eradication program. This year, Chicago treated more than 11,000 trees in hopes of limiting beetle spread and protecting large numbers of urban trees that might otherwise come under attack.

A number of key decision points still exist for the eradication programs, particularly in New York:

- What happens if Asian longhorned beetle (already found at two separate Manhattan locations) is found infesting trees in an extremely high value area such as Central Park? Will trees still be removed and destroyed or will insecticidal control be attempted?
- Will New York follow Chicago's lead and incorporate systemic chemical insecticides as a major component of their eradication program?
- Will cutting apparently uninfested trees adjacent to infested trees be incorporated into the programs to improve the chances of successful eradication.

Asian longhorned beetle is a major concern that requires an immediate and drastic response because its host is so common in our rural and urban forests. Clearly we have little control over the abundance of maples in our rural forests, but we can control the species composition of our urban forests. The fact that many of our eastern urban forests are predominately maple is a major concern—just like the predominance of elms in our eastern urban forests was a major concern after arrival of Dutch elm disease.

It will be difficult to predict the next exotic forest insect pest and which host tree species will be threatened. But we are guaranteed to minimize its impact—without knowing its

Number of trees found infested with Asian longhorned beetles in New York and Chicago.

Year	New York	Chicago
96-97	1220	
97-98	784	
98-99	954	886
99-00	1640	509
00-01	360	29
Total:	4958	1424

identity ahead of time—by simply diversifying the species composition of our forests. For example, if no tree species comprised more than 10% of an urban forest and those 10% were interspersed among other tree species, we would minimize all future impacts.

Clearly, the logistics of growing and planting nursery stock favors the establishment of monocultures. But, the long-term preventative benefit of doing just the opposite and establishing diverse urban forests is compelling. But can we diversify rural forests? It is a much more difficult—but not impossible—proposition. For example, we know that large areas of mature spruce and balsam fir forests are prerequisites for spruce budworm outbreaks in our northern coniferous forest.

Management recommendations have been to balance the age class distribution of these forests to minimize the budworm's impact to a manageable proportion of the forest where harvesting can recoup values at risk. Despite this easily understood concept, we have never reached the kind of age class balance needed. Why? I believe that traditionally our management has been reactive rather than proactive. We are much more accomplished at suppressing fires and impacts caused by insect defoliator outbreaks than preventing them. If we can shift the allocation of the limited resources available to minimize forest insect impacts (regardless whether they are exotic, naturalized, or native) from reactive to proactive actions we would get the greatest returns on our investment. Diversifying our forests would be such an activity.

The USDA Forest Service has conducted five Pest Risk Assessments (PRA) for logs imported into the United States from various countries. The goal of a PRA is to identify if there is a need for action because of insects and pathogens that may be present in such products, which are not already here and could be catastrophic if they did arrive and spread. If the answer is yes, then a Plant Pest Reduction Assessment (PPRRA) is needed. A PPRRA determines the benefits of proposed regulations including the reduction or prevention of risk. An example is the current PPRRA concerning the Importation of Unmanufactured Wood Articles (solid wood packing material) from anywhere in the world. The regulations being considered require heat (kiln drying), wood preservation, methyl bromide, and other fumigants. These activities are proactive ways to identify exotic insects and pathogens that would be serious problems if they got here and determine practical, effective ways to minimize the probability of that event occurring.

Does it work? In the aftermath of the arrival of the Asian longhorned beetle in the United States, the Department of Agriculture established an interim rule in December 1998 on regulations for treating solid wood packing material from China. The number of Asian longhorned beetles intercepted at American ports before this interim rule went into effect was 28 in 1997 and 1998. In 1999 (after the rule went into effect), none was intercepted, illustrating what can be accomplished when effective regulations exist, inspectors are vigilant, and exporters excel at compliance. The unmanufactured wood articles PPRRA will be a major tool in

Shipments from many parts of the world carry risk of introducing new pest insects in packing and other materials.

limiting the next Asian longhorned beetle from entering our country.

In the 1990's, APHIS and the Forest Service funded a project known as the Russian Far East Lymantrid Monitoring Project. Its goal was to develop an early warning system to alert ports in the United States, New Zealand, Canada, Australia, and Chile of increasing forest pest populations around Russia's Far East shipping ports. They focused on three defoliators that are serious problems in Asia (Asian gypsy moth, nun moth, and rosy gypsy moth) and don't exist in the countries receiving goods from these ports. They strived to develop efficient survey tools (pheromones) for each insect; support suppression projects around the ports during outbreaks; determine critical months when egg masses might be laid on ships, containers, and goods; and develop mitigation practices that would minimize the chances of spread.

In one outstanding piece of applied research, they determined that a visible light wavelength was unattractive to adult female moths. Both port and ship lights that used this wavelength would have their light requirements met and, at the same time, would not attract ovipositing adult females to them like beacons in the night. The project and all its activities clearly illustrate how to move the battlegrounds away from our ports and to the shipping ports. Unfortunately funding for this project ran out several years ago. Why? One reason may be the enormous level of cooperation needed between countries to carry out an international program. Such programs may be difficult to attain, and maybe even more importantly, sustain. Regardless, it's a shining example of the kind of proactive approach that would be very productive in managing exotic insects and their impacts.

Chestnut blight and Dutch elm disease taught us the power of exotic forest pests in our forests. In the case of chestnut blight, it changed the species composition of our eastern forests. Although chestnuts still vigorously sprout from root systems, oaks and other tree species have taken their place in the canopies of our forests. In the case of Dutch elm disease, our urban forests have experienced an equally fundamental species composition change. Both diseases are native to Asia, and they found suitable host trees in this country that dominated our rural and urban forests. If we look at exotic forest insects, gypsy moth emerges as their equal. However, the tree species most favored by gypsy moth have not disappeared from our forests. It is ironic that the tree species that benefited most from the loss of chestnut—oaks—are then subjected to the impact of another exotic forest pest—the gypsy moth. A similar irony exists in the loss of elms as a dominant component of our urban forests, only to be replaced by maple species that are now at risk to another forest insect invader, the Asian longhorned beetle.

We know as greater quantities of goods move between more trading partners that accidental movement of exotic plants, microorganisms, insects, and animals will increase. We can expect this trend that began to greatly accelerate in the last century to continue in the future. Our goal must be to minimize both spread and impacts in our forest ecosystems despite the meager resources available compared to the monumental size and importance of the task.

Victory Garden host to speak at Plant Science Day

Roger B. Swain, the host of the PBS televison show Victory Garden, will be the main speaker on Plant Science Day, Wednesday, August 7, at 11:30 a.m.

Swain graduated from Harvard College and went on to earn a Ph.D, studying the behavior of ants in tropical forests, before becoming science editor of Horticulture magazine. Since 1978 he has written articles and essays in that magazine, as well as five books.

The Plant Science Day open house, at Lockwood Farm at Evergreen and Kenwood Avenues in the Mt. Carmel section of Hamden, from 10 a.m.-4 p.m., will feature short talks by Station staff, exhibits, and about 60 field plots.

For directions and more information, go to the Experiment Station’s web site:
www.caes.state.ct.us

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