# Frontiers of Plant Science

A REPORT FROM THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN

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## Blending land conservation with economic development: Compost for a healthy community!

#### By Terry H. Jones

Jones Family Farms, Shelton Samuel W. Johnson Lecture delivered on Plant Science Day, August 1, 2001

What a privilege to address you on *Plant Science Day* at the start of this new century! As a prologue to my subject I must speak in praise of The Connecticut Agricultural Experiment Station, the oldest agricultural research station in America. Indeed, it occupies a special place in our state and is part of the rich fabric that clothes Connecticut in success. The men and women scientists here are dedicated to defining knowledge and unraveling mysteries in nature, which improves the lives of every citizen of Connecticut!

I am a fan of this Station and have been fascinated by its work all my lifetime of over 50 years. Discovery of vitamins and creating the first hybrid corn—who can deny that the work done on this little patch of God's earth by Connecticut scientists has radiated outwards to improve life on our entire planet!

As a child I was exposed early to the Station's work. Our farm in Shelton sometimes served as a research area. I remember with intrigue, mysterious grapefruit-sized bundles around branches of blue spruce growing on our hillside where a Station scientist sought to clone the perfect tree by air layering. In the early 1950's I remember John Schread and another young scientist visiting our farm. That young scientist was Paul Waggoner—he is here with us today, still serving this Station after 50 years, including many years as director.

Coming to Lockwood Farm each August was a ritual seldom missed. To see the progress made in plant science and the beauty of this farm overlooking the Sleeping Giant continues to be memorable.

The achievements of this Connecticut Agricultural Experiment Station read like a litany of the progress and betterment of life in Connecticut and beyond. Whether it's overcoming crises in our plants, such as blue mold or black vine weevil, or reducing a threat to people such as West Nile virus and Lyme disease, the scientists are here today as they have been for over 125 years making Connecticut and our Nation a better place. Let us never forget *all* this beloved institution has done!

*Have you ever made a compost heap*? The key to composting is combining a variety of plant materials in proper ratios to facilitate their decomposition into soil-enriching fertilizer. The Station scientists who have worked on composting projects can attest to the value of blending the raw ingredients to yield compost that gives health to a soil. It's good stuff and has the magical ability to improve any soil.

Today I want to share ideas and plant seeds to sprout changes in the way we are growing our Connecticut commu-

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nities. I want to talk with you about how land conservation can be blended with economic development to form a compost that can enrich our communities.

Charles Lindbergh wrote in his book "Spirit of St. Louis": Ideas are like seeds, apparently insignificant when first held in the hand. If a wind or a new current of thought drifts them away, nothing is lost. But once firmly planted, they can grow and flower into almost anything at all, a cornstalk or a giant redwood—or a flight across the ocean.

We cannot be the first human to fly solo across the Atlantic, and we may not toil in our laboratories and field plots as did station scientist Donald Jones to bring the world hybrid corn, but each one of us can leave this place—the beautiful Lockwood Farm—and bring back to our communities this idea:

Simply stated, as we grow our cities and towns, we have the ability to blend land conservation with economic development! We can blend and mix the two and it will make a fertile compost for growing a healthy community!

As we grow our towns and cities in Connecticut, some view land conservation and economic development as different goals. All too often public policy decisions are made regarding land use, which would seem to put these goals at competitive odds with each other. Bit by bit, many towns have lost precious farm and forest land to sprawling development that ultimately becomes a liability to the community.

My City of Shelton and some other Connecticut communities are exploring ways to achieve both economic development and conservation of lands for farming, recreation, and natural resource protection.

Whether we are cultivating plants or growing a community, balance is the secret to a healthy result. If the natural resources of the beautiful spaces of our towns are threatened, we should not stand idly by, any more than a farmer would if his crops or livestock are threatened or parents do if their child is in danger.

As you would expect from a farmer interested in land conservation in his town, I have with me today family and friends of the farm and fellow Shelton Conservation Commission members including co-chair Harriet Wilber and Land Trust president Marybeth Banks. Also here are Bob and Marcella Stockmal who recently preserved their beautiful forest through a combination of charitable giving and sale of development rights.

Who you might not expect in addition, are Shelton's Mayor Mark Lauretti, Planning and Zoning Chairman Joe Pagliarro, our economic development commissioner, City Attorney Tom Welch, and our State Representative Dick Belden. Also here is the press, including our local newspaper editor.

I did not invite these men and women out of fear no one else would be here to listen—although that crossed my mind! I invited them because they are a team. They are a team that is in some form potentially present in each of our 169 Connecticut towns and cities. And they are a team that must play together to grow a balanced and successful community.

This team must work together like seasoned athletes. They must break out their spading forks and take their appropriate positions at turning the compost heap until it yields the wonderful, rich humus that symbolizes the texture and diversity of a successful community!

One great shortfall is that in many communities the farm and conservation folks are not a working part of the economic development team. And the consequence is simply that groups work at odds, especially without the common goal of achieving a balanced combination of conserving farms, forests, and special green spaces along with vibrant economic development. When all members of this team do not play together, we have sprawl and accidental cities instead of a balanced successful community.

Remember back to childhood and those wonderful wooden puzzles, where pieces were inset onto a recessed wooden base. We would dump the pieces in a scrambled heap on a table or floor then eagerly shuffle them into position, achieving at last a perfect placement into the wooden frame. *Voilà*!—a completed picture.

Well, think of your town as a puzzle. What picture do your citizens want to create as the pieces are placed together?

For most communities the desired pieces will create a picture of prosperity and economic development. Yet we all want to maintain our quality of life as the framework that holds the pieces together. The old thinking was that the pieces of our puzzle represented the development of business, industry, commercial, and residential with the necessary garnish of schools, ball fields, and parks.

We now realize a balanced community benefits from additional pieces to complete the puzzle. They represent open spaces—ideally a fabric of working farms, forests, wildlife corridor, and natural areas for passive recreation. And for those communities with a worn-out downtown or riverfront, their renewal is also an important piece of the puzzle.

Let us recall the words and vision of John F. Kennedy, spoken 3 weeks before his death 38 years ago: I look forward to an America which will not be afraid of grace and beauty, which will protect the beauty of our natural environment, which will preserve the great old American houses and squares and parks of our national past, and which will build handsome and balanced cities for our future.

The possibilities of a balanced community are unlimited, for any town that can keep intact these pieces of their land

use puzzle. Remember, diversity is the key. No two towns are exactly alike. If larger working farms are no longer left, encourage the preservation of smaller green spaces for community gardens and pocket parks. Part-time farming of fruits, vegetables, plants, and flowers, may be successful on only a couple of acres. Several such enterprises can sustain a local farmers' market. In Shelton, some small neighborhood growers make a great contribution to our downtown market each Saturday. And farmers' markets can make a great difference in reviving a downtown! Farms preserve the richness of the surrounding land while the gathering of people at the weekly markets can provide opportunities for townspeople to reconnect with each other. Call it "face time." It helps create a sense of place and that's good for the human spirit.

Our picture puzzle is now completed and set within the framework of a good quality of life. This picture of balanced growth applies on a larger scale to our State of Connecticut. The environmental benefits of land conservation—the working landscapes of healthy farms, forests, and waterways, and the restful interlude of roadways not sprawled along—these are the elements that will continue to insure Connecticut remains an attractive place for business, industry, and commerce.

Nor should we forget tourism, a leading part of Connecticut's economy. Be assured, if tourism is to remain strong in Connecticut we must maintain a working landscape of farmland, forests, clean rivers, lakes, and streams, and preserved places of historic interest. This natural beauty makes our state attractive to tourists!

In short, whether at the local level or statewide, land conservation should be viewed as a vital partner to economic development. What a pitch!—saving a working landscape that nourishes agriculture and tourism—multibillion-dollar industries in Connecticut. Receiving the fringe benefits of a healthier environment and sustainable quality of life are wonderful as well. And economic development is sure to follow.

In Shelton, the economic development leaders have found that it's good business to preserve land for farms, forests, wildlife corridors, and greenways. The corporate scouts scoping our town to locate their business like the diversity and working landscape of the farms, forests, and waterways. It is part of the tour our economic development people provide to tempt prospective businesses to our town. They check out the new school, and then visit the farms. The corporate CEOs know their employees will like a balanced community with ample green spaces.

A decade ago the City of Shelton actually decommissioned a corridor zoned for industry. This down zoning was a remarkable decision given the demand for businesses to locate to our City. Corporate development along our Route 8/Consitution Boulevard corridor has steadily progressed. Shelton's grand list exceeds \$2.5 billion and the daily influx of the workforce nearly doubles our population to over 60,000.

Removing this land along State Route 110 from potential corporate or industrial development helped insure that Shelton will grow in balance with its natural environment.

Over a mile long and nearly as wide, this corridor has become a working lands greenway. Our farm is a part of this greenway, as well as parcels belonging to a water company, land trust, and city open space. Parts of our farm have been permanently protected with conservation easements. Other land-owning families located within this corridor have caught the preservation spirit, and have given birth to new farm businesses. The younger generation is sensing new opportunities. The land, under the stewardship of young entrepreneurs, is sprouting new orchard, grape, vegetable, Christmas tree, and livestock ventures.

Kids come by school bus from New Haven, Bridgeport, and Waterbury to learn about farming and see where food really begins. Scouts camp in the pristine forest of the land trust property. Water quality and flood protection are ensured for several downstream communities. Future food security for the region is provided by protecting the prime agricultural soils. All this in a working lands greenway once slated for industrial development!

This can happen in your town. Even on a smaller scale, you can "grow the green." Be persistent. Distinguished anthropologist Margaret Mead once said: "*Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has.*" I challenge each of you to be one of those "thoughtful, committed citizens"!

We need to leave this place-this beautiful, historic,

working research farm beside the pastoral profile of the Sleeping Giant—and go back to our communities and reflect on what special places remain in our hometowns. We need to focus our reflections into a sharp vision of how we want our environment and our working green landscape to look and how we want to leave these as a legacy to our children and our children's children. We need to pass along a conservation ethic and show future generations love and respect for the land. And we must take care to leave them land to love.

We need to gather not only the conservationists, but also the landowners, the town leaders, the economic development people, the educators, concerned citizens, and the media to create a team and to unify that team to pursue a common vision of a beautiful community. Go forth and encourage local dialogue that will provide your team with a healthy compost of ideas that will fertilize a strategy to save the beauty of green places to nurture future generations. The task is daunting, but many tools and techniques are available to help, from both public and private sources. We must be persistent and we must work together. If our compost heap does not heat up to generate good results, find out what is missing, then mix it in!

We need to complete the puzzle of growth into a successful picture for the future of our towns and our state. The people of Connecticut have within them a longing to protect the beauty of their natural environment. That sentiment is, I think, a Sleeping Giant lying at the heart and soul of each of our communities. Waken that giant to action! Breathe life into it with your vision of a balanced community. Nourish it with a compost of ideas to blend successful land conservation with economic growth. Embrace the soul of our beautiful Connecticut lands and be their good stewards so future generations can enjoy and protect their rich bounty.

# Plant quarantine on the front line at Kennedy Airport: The size of the problem

#### By Michael Kenney

Plant Pathologist/Identifier, USDA-APHIS-PPQ

Talk given at Imported Pests and Pathogens: Biology, Dispersal, and Control, A Conference Commemorating the 125th Anniversary of The Connecticut Agricultural Experiment Station, October 10, 2000

I probably have one of the most interesting jobs in the country. I inspect for and identify plant diseases coming in on plant products from the four corners of the world. My job is to keep new ones from getting here. My discussion is based on almost 14 years with the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) at J.F. Kennedy International Airport (JFK) in New York City, first as a plant quarantine officer in the passenger terminals, and then as a plant pathologist/ identifier at the Plant Inspection Station.

I deal mostly with fungal diseases, but all other

Once in a while we encounter pests or diseases about which little is known, or which may even be new to science!

pathogens are also studied, i.e., bacteria, viruses, nematodes, and even parasitic seed plants. It's rare, but once in a while we encounter pests or diseases about which little is known, or which may even be new to science! We found two *Puccinia*'s (rusts), one on a *Uncaria* sp. (an herbal medicine



Contraband items seized from foreign mail parcels.

from the Dominican Republic) and the other on a native tree seedling from New Zealand, although no rust had been previously reported on either of these hosts.

Our jobs can be stressful because we have to make a timely identification and take decisive action on thousands of dollars worth of material. Occasionally even a bit of diplomacy enters in. We had to (delicately) seize bonsai plants from China, which were gifts for a President and a former Secretary of Agriculture, because the plants had scale insects and were in soil (which is prohibited).

There are many inspection stations in the United States, most at or near major ports-of-entry; i.e., New York, NY; Linden, NJ; Miami and Orlando, FL; Houston and Brownsville, TX; Los Angeles, Otay Mesa (near San Diego), and San Francisco, CA; Seattle, WA; Honolulu HI; and San Juan, PR. One special inspection station, in Beltsville MD, is for entry of foreign germplasm material. Other ports (Chicago, IL; Boston, MA, and Atlanta, GA) also have "identifiers" who are specialists (entomologists, plant pathologists, botanists, or experts responsible for checking materials against the endangered or threatened plant species list). One of the busiest stations is at Miami International Airport, where an estimated 85% of propagative plant material enters the country. Most of this is from Latin America and is not as diverse as the material that comes into places like Kennedy Airport.

At JFK we get shipments from Latin America, Europe, Africa, Asia, Australia, and New Zealand. We deal with volume, diversity, and complexity of plant shipments, and that's what makes our jobs so interesting. Just when you think you've seen it all, something new and different appears!

Passenger clearance is the most visible (and most hectic) aspect of the quarantine unit to the general public. During 2000, 9.1 million international passengers came into JFK. Of these, 3.1 million were American citizens and 6 million were foreign citizens. They arrived in the Federal Inspection Services Area (Immigration, Customs, and USDA) of six terminals (International Arrivals Terminal, Delta, TWA, British Airways, American Airlines, and Terminal One).

Seventy-eight international carriers serve JFK from all points of the globe. On a typical day, there will be about

One flight from Bangladesh produced eight garbage cans full of prohibited (contraband) fruits and vegetables, etc. Some had the dread citrus canker bacterium.

65 plant quarantine (PQ) officers, seven supervisors, 16 technicians, and six K-9 ("Beagle Brigade") officers with their dogs working. There are two to three shifts per terminal. The hours at terminals vary based on when most scheduled flights arrive. On one Sunday during 2000, ten flights with a total of about 4,000 passengers reached the International Arrivals Terminal between 3 and 4 p.m. One flight from Bangladesh produced eight garbage cans full of prohibited (contraband) fruits and vegetables, etc. Some had the dread citrus canker bacterium.

The typical PQ officer may have a college degree in agriculture or biology, but in recent years only a few college credits have been required. We have officers who are natives of the Dominican Republic, Egypt, Colombia, Ecuador, the Czech Republic, Nigeria, the Philippines, China, Greece, Guyana, Puerto Rico, and Hawaii (Japanese-Americans). Since we deal with so many foreign passengers, the diversity of our work force is useful.

We have many manuals upon which we base inspection decisions. For example, there are manuals listing prohibited propagative and non-propagative plant parts and plant material/products. Another contains listings of prohibited meat and animal products. The entry status of a commodity depends on its country of origin, how it was processed (if at all), the use to which it is to be put (propagative or consumptive), the state/region of destination, and whether the proper paperwork accompanies it. The entry status of an agricultural item may change when new problems are discovered (such as the recent prohibition of animal products from countries with "mad cow disease"). All of our many agricultural regulations (both foreign and domestic) can be found in the Code of Federal Regulations and updates in the Federal Register.



Plants of foreign origin being inspected for pests and diseases at the Plant Inspection Station at JFK Airport.

The cut-flower tulips from the Netherlands that appear at your market before noon were probably inspected and released by our officers at 1:30 a.m. that morning.

Our Beagles have gotten good publicity for our goals of trying to keep out dangerous agricultural products. Since the dogs' sense of smell is probably several thousand times better than ours, they make very good "detectors." Sometimes they find an apple or sandwich that a passenger has forgotten about, but occasionally they find smuggled items such as sausage or fruit.

We hear a lot of excuses when passengers are caught: "My mother packed my suitcase," "I didn't know THAT was in there." They are fined and admonished, regardless of the excuse. Some people are remorseful, but many don't seem to realize the significance of their act. They just want to pay the fine and be on their way. Violator's names and passport information are put in the Immigration Service computer system, so the passenger may be flagged when coming in again. In American passports are words of caution about bringing in foreign agricultural items!

If we find prohibited, undeclared agricultural items in a passenger's baggage, handbag, or on their person they are fined \$50; if the material is concealed or misrepresented, the fine is \$100. Smuggling live songbirds incurs a \$250 fine. Live birds can be carrying virus diseases that endanger our poultry industry, or the birds may be on the U.S. Fish and Wildlife Service list of threatened or endangered species. Many of these birds are "wild collected." Individuals may bring in pet birds with the proper permits, but we should be contacted before travel to ensure smooth processing of the entry.

Some of the agricultural seizures that I have made were: fresh mangoes stuffed in a toy teddy bear (the passenger "didn't know" they were there); fresh tropical fruit and dried meat in a large cardboard box with a false bottom (the



Passenger baggage being x-rayed to check for contraband plant and animal materials.

passenger said her father did it); fresh tropical fruit inside large, unlabeled cans of "cookies"; an elderly woman coming from Brazil, carrying her coat over her arm, had pinned to the coat lining a live fern plant in a plastic bag with soil (she was fined \$100 and received a lecture); a sausage in a diaper bag (no one knew how it got there).

Probably one of the most bizarre specimens to come through the Plant Inspection Station was a foot-long basrelief of an Easter bunny made by a famous German artist. It was hand-carried by an art dealer from Manhattan's Upper East Side arriving from Germany. We determined it was made of cow manure. Although we found no evidence of pathogen propagules or noxious weed seeds, we were concerned about the possibility of livestock disease agents being in the manure. After much discussion and calls for official guidance from Veterinary Services Headquarters in Riverdale, MD, the agency decided after several hours that there was no risk, since the art work would be displayed inside the art dealer's shop. The specimen was subsequently put on (indoor) display and was written up in a column in New York Magazine.

International cargo (of many different kinds) is "cleared" at various scattered facilities (there are almost 80 foreign airlines at JFK). Normal hours are 8:30 a.m. to 5:00 p.m., but agricultural freight is examined around the clock by appointment, especially perishable plant or animal materials. The cut-flower tulips from the Netherlands that appear at your market before noon were probably inspected and released by our officers at 1:30 a.m. that morning.

The cargo operation has a director, two supervisors, 22 PQ officers, and four to six technicians. The most important job is inspecting freight. This includes fresh fruit and vegetables, fresh culinary materials, certain seeds, cut flowers, fresh and/or dried herbal medicines, animal trophies, and other agricultural products. If importers smuggle or misrepresent declared agricultural cargo, they may be fined \$1000. Sometimes importers feign innocence, but patterns of deception are often discovered.

One of the most interesting cases that I was involved with were "blank, white disks" (1 inch in diameter) imported from Ecuador. A colleague in cargo thought these might be made from bone or horn (which are prohibited because of animal diseases). Microscopic study showed the disks were actually "vegetable ivory" from a tropical palm nut and were permitted entry (after we checked the endangered/threatened plant species list). Another interesting interception was an antique doll house from China. Although the doll house itself was of no concern, the package was fumigated at the importers' expense because the wood packing material surrounding it contained live, wood-boring beetle larvae.

Even noxious weed seeds are intercepted in cargo. *Cuscuta* sp. (dodder) seeds are sometimes imported as Chinese herbal medicine ("tu si zi"). These seeds remain viable for years and could be dangerous to agriculture if planted because dodder is a serious plant parasite.

Some items are prohibited outright because there is a high risk of them having important plant diseases or associated insects. For example, all members of the citrus family (Rutaceae) are restricted because many members can carry the citrus canker bacterium or organisms that cause other diseases. Included are several species of the genus Zanthoxylum, such as "prickly ash" used as a spice/ condiment in Asia as "san-sho", and "Chinese pepper." Chemicals of unknown origin are checked in the Merck Index to see if they contain products of animal origin which might be a pathway for livestock disease entry.

An officer attached to the cargo operation inspects mailed packages full time at the huge international post office adjacent to Kennedy Airport. Many types of prohibited agricultural items are seized, such as meats, fruits, vegetables, plants, seeds, handicrafts made from rice or wheat straw, dried or fresh herbal medicine, and bamboo containers capable of propagation or infected with a disease. One or two technicians may help, especially during the busy Christmasmailing season. X-ray machines and Beagle Brigade dogs may also be employed to find contraband. In March 2000, 1,473 mailed packages were inspected at JFK. Of these, 20 contained illegal plant materials and 191 had illegal meat or poultry materials weighing a total of 208 kg.

"International garbage" surveillance is another task. All foreign garbage, uneaten food, even cut flower bouquets, must be removed from the airplanes by the foreign carriers and incinerated. The garbage is just another pathway for exotic pests and diseases to enter our country.

Key to the Inspection Station (and the Cargo Work Unit, Baggage Operations, and Post Office Unit) are the specialists who can identify pests and diseases found ("intercepted"). These people are commonly called "identifiers" because their primary job is the identification of pests, diseases, and plant materials. My staff includes three entomologists (who identify slugs and snails in addition to arthropods), one botanist, one plant pathologist, an endangered/threatened plant specialist, and back-ups in entomology and pathology. Our staff has two Ph.D.'s, two officers with Master's degrees, and the other officers have B.S. degrees. Of all the



A botanist checking imported tropical plants for correct identification and proper paperwork.

Some items are prohibited outright because there is a high risk of them having important plant diseases or associated insects.

APHIS/PQ Operations at the various ports-of-entry, this staff is the most technically and scientifically oriented.

At JFK, we have a number of dissecting and compound microscopes and an x-ray machine for examining seeds. Many seeds can contain larvae of insects with no visible, external clue to their infestation. We have reference collections of insects and mites and of mollusks, a higherplant herbarium, a seed collection (one of the best in the East), a mycological herbarium, and an economic plant collection. Essential to our work is the reference library, which is especially strong in publications on foreign pests and diseases. We have an autoclave for sterilizing prohibited soil and materials containing pests and diseases. Large amounts of foreign plant material that must be destroyed because of pests, etc., are put into a locked quarantine dumpster and incinerated commercially. A hot water bath is used for heating small volumes of plants infested with certain root knots to kill the nematodes (Meloidogyne sp.). We have a few fungicides and other pesticides for treating, when possible, small lots of infested/ infected material. Large, commercial shipments of commodities are fumigated at a nearby commercial facility. This includes mandatory treatment of Jamaican yams (Disocorea sp.) for scale and cut flowers infested with insects (if a treatment is available).

If after inspection no violations are found, the material is released. If a pest, disease, noxious weed, or unidentified plant material (which may be prohibited), etc. is found, the material is held and can't be moved. It is marked with black and yellow USDA quarantine warning tape, and P.Q. form 309 is attached with information on host material, country of origin, and destination. Interceptions of perishable materials are called "urgents" because timely disposition is necessary. We strive for a resolution within 24 hours. Often thousands of dollars of freight is involved.

Such material is hand-carried to the appropriate specialist (botanist, entomologist, etc.). Identification may take from a few minutes to several hours. If the pathogen or pest already occurs widely in the United States or is not what was originally feared, the product will be released. If an identification cannot be made, or if confirmation is required, the specimen is forwarded by overnight express, or sent as a digital image, to national specialists (all but one are in the Beltsville, MD area).

The following shows the inspections at Kennedy Airport during a typical 3-month period during April, May, and June 2000:

	Quarantined		
Interceptions	Yes	No	Total
Insects, mites, snails	353	712	1,065
Plant diseases	82	46	128
Noxious weeds	17	295	312

In addition, a total 65 endangered species import shipments were cleared. These included a total of 79,006 endangered species plants; a total of 29 endangered species export shipments cleared which included 861 plants, and 2,524 lbs. of American ginseng, 2,548 lbs of golden seal (*Hydrastis canadensis*), and 47 guitars made of rosewood (*Dalbergia nigra*); a total of 4,113,158 plants of nonendangered species were cleared; a total of 21 pest interceptions were made from propagative materials; and a total of eight Biotechnology shipments were cleared. As you can see, JFK is a busy and interesting place. Thousands of international travelers are processed, and thousands of kilograms of produce, cut flowers, and plants for propagation are inspected daily. Some shipments are refused, others are treated, some are destroyed, and some are returned to their country of origin...all to protect America's agriculture and our environment.

For more information, see the APHIS website: www.aphis.usda.gov.

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