

**2005 International Institute of Tropical Forestry
USDA Forest Service**

PROJECT TITLE

**SURVEY OF FOREST PESTS AND EARLY DETECTION
OF EXOTIC PESTS IN PUERTO RICO**

Abstract:

Native pests as well as exotic pests can threaten ecosystem health and viability. It is mandatory to develop and implement an early detection and rapid response effort for forest pests and non-native invasive species in Puerto Rico. Identifying potential native organism threats to forest ecosystems allows us to design effective surveys for early outbreak detection. In Puerto Rico, forest personnel need resources to help with the screening and rapid identification of key pests and diseases. The use of GPS time and position reference systems will enable us to collect useful information about existent organisms' threats to forest ecosystems and to detect new exotic pests. The development of pest maps and educational materials will assist personnel related to forest management in the rapid identification of forest pests and development of a sustainable management plan for the protection of forest trees. This proposal requests \$30,000 in federal funds to: 1) develop a survey of pests in state and urban forests using GPS/ISIS mapping, and 2) develop an educational program through the use of pest advisory newsletters, seminars and field days to educate personnel of the Department of Natural Resources and Extension Agents in the correct identification of forest pests and implementation of effective management strategies. The outcomes of this project will lead to reduce the potential for pest problems on trees in state and urban forests in Puerto Rico.

PROJECT DURATION: 2007-2009

PROJECT DIRECTOR:

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Justification

The Forest Health Protection Program provides technical assistance on forest health-related matters, particularly those related to disturbance agents such as native and non-native insects, pathogens, and plants. They offer specialized assistance to incorporate disturbance considerations into forest plans and decisions. (USDA Forest Service, Forest Health Protection). In Puerto Rico we have developed educational information about identification and management of pests in forest trees. (Almodóvar, W. 2005, O’Farrill, H., 2007). *Apate monacha*, the black borer, *Hypsipyla grandella*, the mahogany shoot borer, *Eulepte concordalis*, the robble leaf webber and *Maconellicoccus hirsutus*, the pink mealybug are some of the most important pests causing damage to forest trees in Puerto Rico. (O’Farrill, H.2007, Martorell, Luis F. 1945).

Early detection and rapid response to new introductions of exotic forest and tree insects and pathogens is a significant component of a Forest Health Management Program. Public interest and professional concern about the adverse effects caused by recently introduced exotic tree pests, like *Holopothrips* sp., in trumpet tree, *Tabebuia heterophylla* (Almodóvar, W. 2007) stresses the importance of the need for early detection and rapid response in order to contain and eradicate these pests before they become established and adversely affect our forests and trees across our urban landscapes. The impact of potential pests often differs in different regions. Indigenous pests may appear in sporadic outbreaks, Newly introduced exotic pests, on the other hand, will often occur as an initial massive outbreak, but may become less damaging over time as the most susceptible trees die. However, most alien pest species are likely to remain damaging at some level. (Cock, M.J.W. 2003).

The introduction of high technology tools into the forest community that are more accurate, cost effective and user friendly allows us to obtain very useful information about pest occurrence. Many of the innovations rely on the integration of on-board computers, data collection sensors, and GPS time and position reference systems. Through the use of GPS, GIS, and remote sensing, useful information can be collected. GPS surveying is the ideal way to survey positions in a short period of time. (USDA Forest Service: Global Positioning System). The visual presentation from GPS/GIS mapping may enable locating "hot spots" or frequent occurrences of pests. This information will help in the early detection of outbreaks of native and exotic pests.

We plan to make an archive of pest maps that will serve as a useful tool for predicting where and when destructive pest populations are more likely to occur in forests in Puerto Rico. When the identity of the causal agent is uncertain or unknown, samples will be sent for taxonomic verification to specialists from APHIS, USFS Forests Products Laboratory and the National Plant Diagnostic Network (NPDN). Taxonomic verification will help us to determine whether a detected pest is a new introduction. (APHIS Plant Protection and Quarantine, USFS Forest Products Laboratory, National Plant Diagnostic Network).

The adoption of more sustainable management strategies for forest pests is related to changes in the perception of the role of the forest, which is increasingly valued not just for economic reasons, but also for its ecological and social functions. Large monocultures are disappearing from many forests and are being replaced by smaller, mixed stands, which reduce pest risks. There is an urgent need for surveys and identification of the pests and diseases associated with

many important tropical timber trees, in both natural and plantation situations (Cock, M.J.W. 2003).

Goals and Objectives

The main goals of the project are: early detection and rapid response to native or exotic insects and pathogens in Puerto Rico by a survey in state and urban forests, development of pest distribution maps using GPS/ISIS mapping and, adoption of more sustainable management strategies of forest pests through education of the forest community with pest advisory newsletters, seminars and field days.

The objectives of this proposal are the following:

1. To make a pest survey of state and urban forests in Puerto Rico using GPS/ISIS mapping.
2. To develop pest advisory newsletters to disseminate pest distribution maps and other information about forest pests.
3. To offer seminars and field days to Extension Agents and personnel of the Department of Natural and Environmental Resources about existent and recently introduced exotic pests.

Methodology/Timeline

To make a pest survey, the director and collaborators of this project will visit the state and urban forests and use GPS/ISIS mapping to help in the detection of tree pests in Puerto Rico. Exact location of pests will be established using a pocket PC based handheld device that have an integrated Global Positioning System (GPS) unit. The survey will be done in collaboration with APHIS personnel and the collected information will be transferred to an Integrated Survey Information System (ISIS) where it will be link to the locations where the pests are detected. Personnel of APHIS will train personnel participating in the project in the use of GPS and ISIS. The entomologist of the Agricultural Experiment Station will help in the identification of insects and the Plant Pathology Specialist in identification of pathogens in the Diagnostic Clinic of the Extension Service. When the identity of the causal agent is uncertain or unknown, we will use the expertise of taxonomic specialists from APHIS and from the National Plant Diagnostic Network (NPDN) and USFS Forest Products Laboratory (FPL) to identify the pest. Taxonomic verification determines whether a detected pest is a new introduction.

Pest advisory newsletters will be prepared bi-monthly to disseminate pest distribution maps and other information about forest pests. The newsletters will contain pest distribution maps and other information about existent or exotic pests that can threaten the Island's forests. The newsletters will include general information, insect activity, disease activity and pest maps. The purpose of the newsletter is to provide an informational document for personnel related to forest management and the public and provide easy access to current information available. This will facilitate awareness detection, prevention and management of forest pests and allows us to deliver timely information on new or reoccurring pest problems. The project director and the research assistant will prepare six newsletters. The publication will be available by the internet

and in print form. Printed copies will be distributed by the Extension Service, Natural and Environmental Resources Department and local and federal Agricultural Offices.

Seminars and field days are part of the educational program that will be delivered to Extension Agents and personnel of the Department of Natural and Environmental Resources about existent and recently introduced exotic pests. A very important component of an educational program is to educate and involve personnel related to forest management in scouting practices, pest recognition and pro-active treatment of potential problems with acceptable practices. Seminars will be conducted in facilities of the University of Puerto Rico in Mayaguez, Isabela and Río Piedras. The field days will take place in state forests and the emphasis is correct identification of key pests and implementation of effective strategies to reduce the potential for insect and disease problems on trees in forests.

Key Personnel

Wanda Almodóvar, M.S., Extension Plant Pathologist and Project Director, UPR Agricultural Extension Service, College of Agricultural Sciences, Mayagüez, Puerto Rico

Edwin Abreu, M.S., Researcher and Entomologist, UPR Agricultural Experimental Station, College of Agricultural Sciences, Isabela, Puerto Rico

Ada Alvarado, M.S. Extension IPM Specialist, UPR Agricultural Extension Service, College of Agricultural Sciences, Mayagüez, Puerto Rico

Jan Paul Zegarra, Research Assistant

Major Collaborators

Hipólito O’Farrill, PhD., Extension Entomology Specialist, UPR Agricultural Extension Service, College of Agricultural Sciences, Mayagüez, Puerto Rico

Norberto Gabriel, Domestic Program Coordinator, APHIS, USDA.

Workplan:

The key personnel and major collaborators have expertise in all the areas needed for project development and implementation. The Extension IPM Specialist and the Extension Entomology Specialist will help in the revision of the educational materials. The APHIS Coordinator will train the project personnel in GPS/ISIS use and data analysis.

The APHIS Domestic Program Coordinator and other personnel of APHIS, USDA will train personnel participating in the project in the use of GPS and ISIS at the beginning of the project. The director and collaborators of this project will visit the state and urban forests in collaboration with personnel of APHIS, USDA and personnel of the Department of Natural and Environmental Resources to make an initial survey using GPS/ISIS mapping. Before the survey, we will make a meeting with the project personnel, collaborators and other personnel of APHIS and the

Department of Natural and Environmental Resources to plan how to do the survey, develop a form to take the information and define the responsibility of each person in the development and data analysis of the survey. The survey will enable us to produce a national overview and provide a perspective of how insect and diseases conditions are affecting or are likely to affect our state and urban forests and as an aid to improve forest management and assist other state and federal agencies.

Insect samples will be collected and verified by the entomologist of the AES. Diseased samples will be collected and verified by the Plant Pathologist of the Extension Diagnostic Clinic. APHIS personnel will assist us in the survey and identification of unknown or exotic pests. After we finished visiting the surveyed areas we will begin to analyze the information obtained in the survey to generate maps of different pests detected by GPS in conjunction with the ISIS Program. This review process and generation of maps will be executed in close collaboration with the APHIS, USDA Domestic Program Coordinator and personnel of the forestry division of the Department of Natural and Environmental Resources. The maps will be in the Forest Health Management Website. During the survey, we will develop regional maps and post them in the website. At the end of the project, we will generate a national map with all the information of the regional maps.

The project director and the research assistant in collaboration with the project collaborators will develop advisory newsletters that will contain pest maps and other information about insects and diseases found affecting forests in the survey. The Extension Entomology and IPM Specialists will revise the newsletters and help in the development of the educational program activities, like seminars and field days. The educational materials will be prepared in the Mayaguez Campus Press and in the facilities of the Extension Crop Protection section. We will use a color laser printer and a CD duplicator to produce educational materials for seminars.

Before the survey and the educational program are over, we will create a Forest Health Advisory Committee composed of personnel of different state and federal agencies to work cooperatively to find and respond to new insect and disease plant pests.

Literature Cited:

Almodóvar, W. 2007. *Holopothrips* sp.: Nueva plaga de los robles en Puerto Rico. Fact Sheet. Agricultural Extension Service, College of Agricultural Sciences, University of Puerto Rico, Mayagüez Campus.

Almodóvar, W. 2005. Manejo Integrado de Enfermedades en viveros de árboles en Puerto Rico. Manual. Agricultural Extension Service, College of Agricultural Sciences, University of Puerto Rico, Mayagüez Campus.

Cock, M.J.W. 2003. *Biosecurity and Forests: An Introduction - with particular emphasis on forest pests*. FAO Forest Health and Biosecurity Working Paper FBS/2E, 2003.

Martorell, Luis F. 1945. A Survey of the Forest Insects of Puerto Rico. Part II. The Journal of Agriculture of the University of Puerto Rico. Agricultural Experiment Station, Rio Piedras, P.R. Page 355-608.

O’Farrill, H. 2007. Las plagas comunes de los árboles urbanos de Puerto Rico. Manual. Agricultural Extension Service, Collage of Agricultural Sciences, University of Puerto Rico, Mayagüez Campus.

APHIS - <http://www.aphis.usda.gov/lpa/about/welcome.html>

DHS - <http://www.dhs.gov/dhspublic/index.jsp>

Regional Centers of the National Plant Diagnostic Network (NPDN):
<http://npdn.ppath.cornell.edu/default.htm>

USDA Forest Service, Forest Health Protection: <http://www.fs.fed.us/foresthealth/>

USDA Forest Service, Forest Health Program, Insect and Disease Risk Map
http://www.fs.fed.us/foresthealth/risk_maps/risk_maps.html

USDA Forest Service, Forest Products Laboratory (FPL) - <http://www.fpl.fs.fed.us/>

USDA Forest Service: Global Positioning System: <http://www.fs.fed.us/database/gps>