

IPM PROGRAM

Plan of Work

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Program Overview

Narrative Overview: University Plan of Action

In Banana and Plantain, the development of an IPM manual and eight electronic presentations in Black Sigatoka IPM will assist Extension agents and other educators related to the plantain and banana commodity in training plantain and banana growers to understand Black Sigatoka management using the IPM approach. After delivering the educational materials to educators, demonstrations will be carry out in farms of interested farmers to show the benefits of IPM.

In forest IPM we will develop a manual and a series of electronic presentations for Extension Agents and personnel of the Department of Natural and Environmental Resources about management of key pests in nurseries and urban forests. The objective is to promote the adoption of IPM by nursery managers and personnel related to forest management, responding to their specific needs. The manual and electronic presentations will be posted in the Forest Health Management (FHM) web page. In the next three years we will continue updating the Forest Health Management web page and information on destructive key pests and pests of possible introduction, to make it easier to document benefits derived from IPM and guide future research and education efforts.

The educational effort in herb production will emphasize the identification of key pests of culantro (*Eryngium foetidum*) and cilantro (*Coriandrum sativum*) and the development of educational materials. A field guide and an electronic presentation about management of key pests of culantro and cilantro will be develop to assist agricultural educators in training farmers to understand and implement IPM practices. A survey will be delivered to producers before the educational program is started to acquire data about patterns of pesticide use and knowledge of IPM.

In the citrus commodity emphasis will be made in evaluating IPM practices in nurseries to control the citrus leafminer and developing the Citrus Crop Profile. The Crop profile will be developed by the IPM Specialist in coordination with the citrus commodity leader and the Fruit Specialist. The evaluation of citrus leaf miner IPM

practices in nurseries will be made by an entomologist, researcher of the Crop Protection Department.

The IPM program relates to other IPM Extension efforts in forest IPM and banana and plantain IPM. Since 1998 we are funded by the Forest Service to assist forest nurseries and personnel of state agencies related to forest management, in IPM. In banana and plantain we were funded by the North Carolina IPM Center to develop educational materials about Black Sigatoka IPM.

IPM Annual Report - 2006

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IPM Program Overview

This section provides an overview of major accomplishments and outcomes. It lists how the program benefits clients and explains any adjustments that had to be made to the University Plan of Action.

In Puerto Rico the emphasis of the IPM Program for fiscal year 2006 was concentrated in the following commodities: herbs and spices (Coriander and culantro), tropical fruits (plantain and banana), ornamentals and turf and; Forest, trees and forest products. For Bananas and Plantains we developed educational materials, IPM manual and electronic presentations, to assist Extension agents and other educators related to this commodity in training farmers on Black Sigatoka management. The availability of a Black Sigatoka IPM Manual and power point presentations are useful tools for Extension Agents. They are better educated about the disease and its control and can help growers in an efficient way. The educational materials will be delivered to Extension Agents and growers in workshops from may to June 2007. The IPM program works in cooperation with a project funded in 2005 by the Southern Region IPM Center, Integrated Management of Black Sigatoka in Puerto Rico. Ornamentals and Turf - Through a project funded by the Pesticide Environmental Stewardship Program an educational program in landscape management is in progress since 2006. This program promotes adoption and implementation of effective strategies to reduce the potential for pest problems on ornamentals, turf and urban landscapes. The objective was to respond to specific needs of the professional personnel working with landscape management by creating educational materials in spanish with colorful photos that help them in the fast and accurate identification of pests. One manual and eight electronic presentations about IPM in ornamentals in urban landscapes and Turf were developed. The IPM effort in Coriander and Culantro was achieved by the preparation of two fact sheets, one about Common Diseases of Coriander and one about Common Diseases of Culantro. These publications are Clinic fact sheets that provide general information about diseases and their management and are disseminated to growers and Extension Agents in seminars and annexed to Clinic Reports. A proposal entitled Development of an IPM Educational Program for Coriander (*Coriandrum sativum*) and Culantro

(*Eryngium foetidum*) in Puerto Rico was submitted to SRIPMC in December 2006 to complement the effort of the IPM Program in developing educational materials and field demonstrations of IPM practices in coriander and culantro. In the forest IPM initiative, one manual about Integrated Disease Management was produced and disseminated to tree nurseries and other private nurseries through conferences to personnel of the Natural Resources Department and to nursery managers. A CD about common diseases and arthropods in trees was produced for Extension Agents and other personnel related to forest management. The CD is provided to the clientele during educational activities. Field trips to State Forests managed by the Puerto Rico Department of Natural and Environmental Resources were celebrated to train participants in key pests of trees. The IPM Program collaborates with a project funded by the US Forest Service - International Institute of Tropical Agriculture for the development of educational materials about forest health.

Areas of Emphasis Reports

Area of Emphasis Tropical/Subtropical Fruit

Introduction:

In Puerto Rico the emphasis in tropical crops was placed on plantains and bananas through an educational program for Black Sigatoka (BS) management. BS was detected in Puerto Rico in June 2004. Trainings for Extension agents were accomplished through seminars about identification and management of the disease, whenever detected. Afterwards, an educational program was developed in cooperation with the Department of Agriculture to develop an efficient IPM program. Plantain production occupies around 26,582 acres in 6,340 farms and bananas around 11,071 in 3,958 farms. Actually, the major threat that affects production in this commodity in Puerto Rico is the BS disease. As a result, educational materials were developed and will be disseminated among Extension agents and growers in workshops in 2007.

Status of Activities:

In Bananas and Plantains we developed an IPM manual and electronic presentations to assist Extension agents and other educators related to the plantain and banana commodity in training growers in Black Sigatoka management. The availability of a Black Sigatoka IPM Manual and power point presentations are useful tools for Extension Agents. They are trained about the disease and its control and help growers in a more efficient way. The educational materials will be delivered to Extension Agents and growers in workshops from May to June 2007. A fact sheet with photos help growers identify the disease and implement management practices on time. Following the workshops, field days will be celebrated on the farms where the disease was diagnosed, in order to demonstrate different management practices and train farmers on pesticides application and equipment calibration.

Status of planned cooperation and any new partnerships:

The IPM program will coordinate all educational efforts with the Department of Agriculture and the Puerto Rico Farmers Association to ensure participation of affected farmers and personnel related to bananas and plantains production in a more efficient way. The College of Agriculture, through the Starchy Crops Commodity meetings will facilitate discussions, address research priorities and evaluate the

impact of Extension activities. These meetings are attended by farmers, researchers, Extension personnel, and representatives from pesticides dealers and the Puerto Rico the Department of Agriculture.

Progress toward planned changes in pest management behavior:

Educational materials and field days will help to increase awareness among growers about the need for different integrated practices to manage the disease and reduce pesticides use.

Changes in desired impacts:
None

Challenges to achievement of desired impacts:

Black Sigatoka is controlled with frequent applications of fungicides and cultural practices, such as the removal of affected leaves, and adequate spacing of plants and efficient drainage within plantation. In the final analysis, these are very expensive practices. Fungicide application has the high recurring expense of the spray materials themselves. Their great expense makes them essentially unavailable to small-holder farmers, who are the majority of growers in Puerto Rico. As a result, many growers are changing to other crops and the growers that stays have to face the problem of resistance of the fungus to fungicides.

Area of Emphasis Ornamentals and Turf

Introduction:

Puerto Rico is experiencing unprecedented rates of urban and industrial development and we have to be proactive in educating personnel related to the landscape industry. Accelerated development triggered a boom of the landscape maintenance industry. This sector includes approximately 1,500 pest control operators (PCO's), and 1,000 landscapers. Around 80% of landscapers and their employees do not know how to monitor and diagnose key pest problems in urban trees. In Puerto Rico, urban landscape management is mainly achieved by the use of large amounts of pesticides. This contributes to pollution of water, threat to human health and other organisms, and disruptions of ecological balances. In order to achieve success we have to reach landscape personnel through a train the trainer program. Through a project funded by the Pesticide Environmental Stewardship Program an educational program in landscape management is in progress since 2006. The program promotes adoption and implementation of effective strategies to reduce the potential for pest problems on ornamentals, turf and in the urban landscape. Objective was to respond to specific needs of the professional personnel working with landscape management by creating educational materials in spanish and with colorful photos that help them in the fast and accurate identification of pests.

Status of Activities:

One manual and eight electronic presentations about IPM in ornamentals in the urban landscape and Turf were developed. These include reference materials and educational activities to assist agricultural educators in training arborists,

landscapers, PCO's, and homeowners to understand and implement IPM. A train the trainer program to Extension agents started on February 2007 and ends on April 2007. Afterwards, landscapers and PCO's will be trained as part of the educational approach started with the Extension personnel.

Status of planned cooperation and any new partnerships:

All educational activities will be conducted in coordination with different agencies whose personnel will participate in the trainings; like the US Forest Service, Arborist Association, Department of Natural Resources and the PR Pest Control Association. The College of Agricultural Sciences, through the Ornamental Commodity meeting will facilitate to discuss and address research priorities and evaluate the impact of Extension activities. These meetings are attended by farmers, researchers, Extension personnel, and representatives from pesticides dealers and the Puerto Rico the Department of Agriculture.

Progress toward planned changes in pest management behavior:

Outcomes of this project will lead to minimize impacts of the landscape maintenance on the urban environment, and reduce the potential for disease problems on trees and ornamentals in the urban landscape. The availability of an IPM manual about common pests of trees and ornamentals in the landscape, and the participation of trainees in the evaluation of the manual and electronic presentations will encourage landscapers, and other professionals to adopt IPM strategies and make better decisions when handling pest problems.

Changes in desired impacts:

None

Challenges to achievement of desired impacts:

The unprecedented rates of urban and industrial development in Puerto Rico triggered a boom of the landscape maintenance industry. This makes mandatory an educational effort to train personnel related to the landscape industry. Around 80% of landscapers and their employees do not know how to monitor and diagnose key pest problems in urban trees. In Puerto Rico, urban landscape management is mainly achieved by the use of large amounts of pesticides. This contributes to pollution of water, threat to human health and other organisms, and disruptions of ecological balances. In order to achieve success we have to reach landscape personnel through a train the trainer program.

Area of Emphasis Miscellaneous and New Crops

Introduction:

In Puerto Rico the emphasis in herbs and spices, was accomplished through the development of an efficient IPM program in culantro and cilantro in hydroponics. These crops account for having the greatest increase in gross income value during 2005-2006 among vegetable crops. The increment in production was \$1.2 million for coriander and \$1.4 millions for cilantro, compared to 2004. In 2006 we identify the major diseases that affect cilantro and culantro production in Puerto Rico, as

detected in samples diagnosed in the Extension Diagnostic Clinic and visits to hydroponic and field projects of these herbs. The common diseases in cilantro are *Alternaria* Leaf Blight and *Pythium* root rot. *Alternaria* sp. causes blight and damping off of seedlings. The diseases that are common to culantro are Black rot caused by *Xanthomonas campestris* and damage by the root-knot nematode, *Meloidogyne incognita*. Actually we are engage in some ways with the identification of pests in cilantro and coriander and with the education of growers in integrated management.

Status of Activities:

The plan of action in herb production of the Puerto Rico IPM Program emphasizes the identification of key pests of culantro and coriander, developing educational materials and identifying key pests and diseases. From January to May 2007 power point presentations about Coriander and Culantro IPM will be developed for Extension Agents. Also, we will be visiting hydroponics to take samples and identify the pathogens and other pests and give the educational materials developed to growers. A proposal titled Development of an IPM Educational Program for Coriander (*Coriandrum sativum*) and Culantro (*Eryngium foetidum*) in Puerto Rico was submitted to SRIPMC in December 2006 to complement the effort of the IPM Program in developing educational materials and field demonstrations of IPM practices in coriander and culantro. In accordance with the Plan of Action we prepared two fact sheets, one about Common Diseases of Coriander and one about Common Diseases of Culantro. These publications are Clinic fact sheets that give general information about diseases and their management and are disseminated to growers and Extension Agents in seminars and annexed to Clinic Reports. The dissemination of information about identification and management of diseases in coriander for the current year was accomplished through the preparation of a CD that was reproduced and given to Extension agents in the Vegetable Commodity Meeting. A survey was prepared and will be administered to growers in 2007 to gather island wide information about key pests of coriander and culantro, current patterns of pesticide use, and Integrated Pest Management (IPM) knowledge of growers.

Status of planned cooperation and any new partnerships:

The IPM program will coordinate all educational activities with the Department of Agriculture and the Growers Association to ensure the participation of affected growers and personnel related to herb production in a more efficient way. The College of Agricultural Sciences, through the Vegetable Commodity meeting will facilitate to discuss and address research priorities and evaluate the impact of Extension activities. These meetings are attended by farmers, researchers, Extension personnel, and representatives from pesticides dealers and the Puerto Rico the Department of Agriculture.

Progress toward planned changes in pest management behavior:

The availability of existent educational materials (clinic fact sheets) is encouraging growers to make better decisions when handling diseases and other pests as detected in an increase in the submission of herb samples to the clinic in 2006. The fact sheets and the CD will help to increase awareness among growers about the need to use different integrated practices to manage pests and to reduce pesticide use. An understanding of current pest management strategies in herb production will help us to plan future educational efforts.

Changes in desired impacts:
None

Challenges to achievement of desired impacts:

The great variety of pests and diseases that our tropical environment sustains makes necessary a new vision in keeping growers informed and updated in identification and pest management strategies to avoid that they rely in the use of a few available pesticides and sometimes apply pesticides that are not registered for use on culantro or coriander, which poses a threat to human health and beneficial organisms.

Area of Emphasis Trees, Forests, and Forest Products (excluding edible tree nut crops)

Introduction:

Through a project funded by IITF - Forest Service in cooperation with the IPM Program, an educational program was implemented in tree management in state and private nurseries and in State Forests to promote the adoption and implementation of effective strategies to reduce the potential for pest problems and to respond to specific needs of the personnel working with trees in nurseries and in the urban forest.

Status of Activities:

One manual about Integrated Disease Management was produced and disseminated to tree nurseries and other private nurseries through conferences to personnel of the Natural Resources Department and to nursery managers. A CD about common diseases and arthropods in trees was produced for Extension Agents and other personnel related to forest management. The CD is given to the clientele in conferences. Field trips to State Forests administered by the Natural Resources Department were celebrated to train participants in key pests of trees. The participants were Extension agents, personnel of the Department of Natural Resources, personnel of the Forest Service and nursery managers. In 2007 we will prepare two field guides, one about integrated disease management on shrubs and trees and one about integrated disease management of ornamentals in nurseries. There will be a CD for each field guide and electronic presentations for the topics covered in the field guides.

Status of planned cooperation and any new partnerships:

Planned cooperation for the forest initiative will be coordinated with the US Forest Service, IITF and the Department of Natural and Environmental Resources. The College of Agricultural Sciences, through the Ornamental Commodity meeting will help to discuss and address research priorities and evaluate the impact of Extension activities. These meetings are attended by farmers, researchers, Extension personnel, and representatives from pesticides dealers and the Puerto Rico the Department of Agriculture.

Progress toward planned changes in pest management behavior:

The availability of a manual about Integrated Management of Trees in Nurseries, a CD about Management of pests of trees and the field trips to identify forests key pests will encourage personnel related to forest management to adopt IPM strategies and make more appropriate decisions when handling pest problems.

Changes in desired impacts:

None

Challenges to achievement of desired impacts:

Our tropical environment promotes the presence of multiple pests. Also, the threat of new introduced pests makes difficult to implement an IPM program successfully in urban forests in Puerto Rico.