IMPACTS

LIVESTOCK PRODUCTION IN HAWAII

The Korean concept using indigenous micro-organisms (IMO) and natural ventilation provides much-needed options to swine and poultry producers in addressing waste management and environmental protection issues.

While the current implementation is for backyard and small-scale production, at least two commercial farms are in the process of adapting the plans for large-scale operations, which will support efforts for increasing food sustainability for the state, without further contributing to waste disposal and nutrient runoff liabilities.

IPM Implementation for Animal Agriculture

The "Natural Farming" waste management concept incorporates indigenous micro-organisms (IMO), use of natural ventilation and solar positioning for cooling and drying within livestock housing. A maintenance-free green waste bedding system, mitigating generation of nuisance flies and odors, eliminates the need for manure handling. Within a year, five piggeries implementing these concepts have been constructed in Hawaiiʻ. The natural farming concepts have also been adapted to poultry production. Twenty-one stand-alone poultry housing structures ("Hubbell (pictured below) have been constructed in East Hawai'i Island, five of which are being monitored as part of a demonstration project. Nuisance fly and odor levels and egg and chick predation by mongoose and rodents have been significantly reduced in backyard and small scale commercial poultry operations.

Three workshops were held (50 participants) at the demonstration farms and covered construction, microbe collection, waste management, and mongoose control. More workshops are planned later in the year.

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IPM REPORT

HAWAIʻI IPM

IMPACTS

MACADAMIA NUT PRODUCTION IN HAWAIII

Identification of the primary organism causing macadamia quick decline and an effective injected fungicide finally provides a solution to a problem that has plagued the industry for 25 years.

Management of disease and insect pests during harvest and post-harvest handling, and availability of more effective pesticides and application methods has reduced crop losses and increased delivery of higher quality nuts to processors.

Adoption of these IPM practices allows producers to better predict production estimates and optimize their business decisions and profitability.

Macadamia quick decline (top) photo credit: *Scot Nelson, Jan McEwen, Wayne Borth, Wayne Nishijima J. B. Friday, James Brewbaker, Angela Kay Kepler, Frank Rust*

In this issue

IPM for Specialty Crops

MACADAMIA NUT IPM

Macadamia nut producers were trained through workshops and published materials to recognize damage caused by the tropical nut borer (TNB) (*Hypothenemus obscurus*) and three of the most common nutrient deficiency symptoms encountered in macadamia nut trees (nitrogen, magnesium and iron). Once the cause of damage symptoms was determined, producers were able to implement effective management strategies.

The primary causal agent of macadamia quick decline (MQD) responsible for the death of a large number of mature trees in Hawai'i was identified as *Phytophthora tropicalis* through collaborative research between Dr Mike Nagao (UH CTAHR horticultural specialist) and Dr. Lisa Keith (USDA-PBARC plant pathologist). A pressurized injection system (Arborjet) was developed to deliver phosphorous acid fungicide into the tree trunk at or near Infection sites and prolong the life of trees with MQD.

Use of spirotetramat (Movento) was found to provide better control of the macadamia felted coccid (MFC) (*Eriococcus ironsidei*) than spray oil emulsions. Long-term control is attributable to spirotetramat's systemic activity (phloem and xylem movement).

Macadamia nuts with MFC
HI Dept of Agriculture

Minor adjustments to harvesting protocol can greatly preserve nut and kernel quality. Clearing the orchard floor prior to the start of the harvest season eliminates old and poor quality nuts. Harvesting intervals of four weeks or less during high infestations of TNB can decrease kernel damage; likewise, 4-week or shorter harvesting intervals during wet weather reduces damage by mold and seed germination, which accelerate with increased rain and humidity.

Adjustments to post-harvest handling can also maximize nut quality. De-husking and delivery of nuts to the processor for drying should be done immediately after harvesting to maintain their highest quality. If de-husked nuts need to be held for any length of time (up to 2-3 weeks) before delivery to the processor for drying, in-shell nuts should be placed on open air wire racks no more than 2 or 3 nuts deep in a shaded area (not in direct sun) with good air circulation.

Orchard nutrient management decisions based upon leaf tissue and soil sample analysis continues to minimize over-application of fertilizers, reducing nutrient runoff and leaching.

UNIVERSITY of HAWAIʻI® MĀNOA

IMPACTS

SAPINDACEOUS FRUIT PRODUCTION IN HAWAIʻI

Growers of longan cv 'Biew Kiew' have nutrient management recommendations based on nutrients removed in harvested fruit, which minimizes over-application of fertilizers and risk to the environment through run-off and leaching.

Production of higher quality fruits is possible through monitoring rainfall and providing irrigation when necessary to ensure optimum fruit size at maturity.

The University of Hawaiʻi Extension IPM program provides education and resources during a time of transition among our stakeholders.

Nearly 30 years ago, sugarcane and pineapple production phase-out began, being replaced as Hawaiʻi's economic mainstays by specialty crops and renewed emphasis on tourism, greatly affecting our self-sufficiency.

SAPINDACEOUS FRUIT IPM

Nutrient requirements of longan production were determined for a commercial cultivar 'Biew Kiew' based on tissue analysis during fruit development.


Longan fruit *Forest & Kim Starr*

For every 100 pounds of fresh fruit harvested, 0.89 pounds of nutrients removed by the crop must be replaced at minimum. Application of fertilizer with an approximate ratio of 2-1-4 (N-P-K, 0.74 lb per 100 lb of harvested fruit) is recommended during fruit development. Calcium and magnesium (0.10 lb and 0.05 lb per 100 lb of harvested fruit, respectively) can be supplied as dolomite if soil pH is low, or provided in the form of calcium sulfate (gypsum) and magnesium sulfate.

For both longan and rambutan, adequate moisture is critical during fruit set: longan trees must receive adequate irrigation and/or rainfall between 12 and 24 weeks after flowering to ensure optimum fruit size at maturity. Rambutan trees should be irrigated at 80 to 85% of pan evaporation rate (equivalent to 1.09-1.16 inches of rainfall/week) under Hawaiʻi growing conditions from fruit set to harvest.

Growers were encouraged to monitor fruit development. Longan cultivar 'Biew Kiew' fruit should be harvested between 23 - 24 weeks after flowering at peak maturity when weight and soluble solids content are at their highest; thereafter, sugar content progressively drops and the seeds begin to germinate, negatively impacting fruit quality.

ORNAMENTAL CROPS IPM

An **Integrated Crop and Livestock Management Workshop**, co-sponsored by the University of Hawaiʻi Extension IPM program and the Western Region, Sustainable Agriculture Research and Education Professional Development Program, was held on June 7-8, 2010 at the Komohana Extension and Research Center in Hilo (42 participants) for University of Hawaiʻi extension faculty and staff and personnel from Hawaiʻi Soil and Water Conservation Districts, USDA Natural Districts Resources Conservation Service, USDA Resource Conservation and Development Council, and USDA Hawaii Association of Conservation Districts. Seventeen IPM practices were covered by presentations, demonstrations and field tours, and participants were surveyed after the workshop on whether they would encourage appropriate adoption of each practice by their respective clientele. Survey results indicated that 89% of the state and federal agents were convinced of the efficacy and economic and environmental viability of the IPM practices presented to encourage their adoption, including heat treatment of potted plants for quarantine pests, steam sterilization of potting media and use of cover crops for nematode control, "Natural Farming "for livestock (see page 4), varroa mite management in honey bee production, optimizing insecticide spray coverage with nozzle technology, use of compost extracts and teas in organic farming, and methods that optimize herbicide applications.

We contributed to the **Pest Management Strategic Plan (PMSP) for Potted Orchid Production in Hawaiʻi** at a work session held on September 30, 2010 in Hilo, Hawaiʻi. Pest management strategies for blossom midge, mealybugs, scale insects, false spider mites, snails, and coqui frogs were provided for inclusion in a decision support system document authored by Mike Kawate, Kelvin Sewake and Cathy Tarutani (Univ. of Hawaiʻi at Mānoa, College of Tropical Agriculture and Human Resources).


***Eudocima fullonia* larva** *S. Cabral*

A poster was designed and published to assist agricultural producers, state and federal inspectors, extension faculty and staff, personnel at facilities involved with plant shipments, landscape workers, and the general public with identification of the 16 **"Most Unwanted Pests in the United States"**, as designated by the USDA APHIS Cooperative Agricultural Pest Survey (CAPS) project. Six of the 16 featured insects (including the fruit-piercing moth (left) are already present in one or more states but diligence and early detection can impede their spread and damage. In Hawaiʻi, new discovery of these insects can be reported to the Hawaiʻi Department of Agriculture Pest Hotline at 643-PEST (7378) for all islands.

A **commercial-scale hot water shower system to treat potted plants** for quarantine pests prior to transport is in constant use by six plant exporter nurseries. UH Extension IPM advised one grower in the construction of a permanent (versus portable) onsite facility in East Hawaiʻi County. Volcanic cinder potting media used by plant nurseries continues to be steam-sterilized for reniform nematodes (160-200 °F for 30 minutes).

IMPACTS

ORNAMENTAL PRODUCTION IN HAWAIʻI

Approximately 63,223 potted plants were treated on the island of Hawaiʻduring the past nine months, resulting in elimination of over 1,200 potential causes of rejection, including 1,171 coqui frogs. Rejections of potted ornamental plants exported from Hawai'i to California has been reduced since export nurseries adopted heat as a quarantine treatment. A hot water shower (pictured here) (103 to 120 °F for 5 to 15 minutes, depending on target pest) is effective against all life stages of the coqui frog as well as many arthropods. Steam (160-200 °F for 30 minutes) effectively sterilizes volcanic cinder media and eliminates reniform nematodes (see photo at top of page, right).

HONORS

GOVERNOR'S AWARD

Dr. Arnold H. Hara, IPM Coordinator, and his support team, received the 2010 Governor's Award for Team Excellence, Award of Merit. The team was selected from among 52 exceptional group and individual nominees from the state's executive branch departments who exemplify the highest caliber of public service and dedication to serving the people of Hawaiʻi. The nomination stated, "Through [Dr. Hara's team's] innovative and effective solutions, Hawaiʻi growers can continue to ship their nursery products interisland and export their plants to California, Guam and Japan."

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