The "Natural Farming" waste management concept incorporates indigenous microorganisms (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 Hawaii. 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 Hawaii 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 particpants) at the demonstration farms and covered construction, microbe collection, waste management, and mongoose control. More workshops are planned later in the year.

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 application 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 (bo) photo credit: Scott Nelson, Jim McEvgen, Wayne Smith, Wayne Ohnibuma & B. Friday; James Bialek, Angela Kay Keyser, Frank Ives

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. 

IMPACTS

LIVESTOCK PRODUCTION IN HAWAII

The Korean concept using indigenous microorganisms (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 for Specialty Crops

Macadamia nut producers were trained through workshops and published materials to recognize damage caused by the tropical nut borer (TNB) (Hypothenemus obcurus) 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 Hawaii 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 spirotremat-m (Movento) was found to provide better control of the macadamia felled coccid (MFC) (Ericeoccus irioside) than spray oil emulsions. Long-term control is attributable to spirotremat-m’s systemic activity (phloem and xylem movement).
The University of Hawai‘i Extension IPM program provides education and resources during a time of transition among our stakeholders.

SAPINDACEOUS FRUIT IPM

Nutrient requirements of longan production were determined for a commercial cultivar ‘Blew Kiew’ based on tissue analysis during fruit development. For every 100 pounds of fresh fruit harvested, 0.89 pounds of nutrients were removed in harvested fruit, which minimizes over-application of fertilizers and risk to the environment 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.

IMPACTS

ORNAMENTAL CROPS IPM

An Integrated Crop and Livestock Management Workshop, co-sponsored by the University of Hawai‘i Extension IPM program and the Western Region, Sustainable Agriculture Research and Education Professional Development Program, was held on June 7-8, 2010 at the Komo-Hana Extension and Research Center in Hilo (42 participants) for University of Hawai‘i extension faculty and staff and personnel from Hawai‘i 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 work-shop on whether they would encourage 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 environmental and economic 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 (PMS) for Potted Orchid Production in Hawai‘i at a work session held on September 30, 2010 in Hilo, Hawai‘i. 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 Kewake and Cathy Tarutani (Univ. of Hawai‘i at Mānoa, College of Tropical Agriculture and Human Resources).

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 Hawai‘i, a new discovery of these insects can be reported to the Hawai‘i 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 export nurseries. UH Extension IPM advised one grower in the construction of a permanent (versus portable) on-site facility in East Hawai‘i 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 HAWAI‘I

Approximately 65,223 potted plants were treated on the island of Hawai‘i during 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).

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 Hawai‘i. The nomination stated, “Through the Hara team’s innovative and effective solutions, Hawai‘i growers can continue to ship their nursery products internationally and export their plants to California, Guam and Japan.”

PUBLICATIONS


EXTENSION


TRADE