



SUCCESS STORY

IPM CRSP Helps Identify and Contain Papaya Mealybug

By Miriam Rich

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--Muni Muniappan, Director, IPM CRSP



A papaya field in Indonesia is devastated by the papaya mealybug. Papaya is a key component of the daily diet in many tropical countries.



An infestation of the papaya mealybug shows the moldy growth it leaves behind on the fruit.

Thanks to efforts by IPM CRSP scientists, the papaya mealybug—an emerging threat from India to Indonesia and the Caribbean—is being identified and contained.

In May, 2008, an IPM CRSP team identified papaya mealybug at the Bogor Botanical Gardens in Bogor, Indonesia, collected samples, and sent them for identification to a specialist in mealybug taxonomy at the California Department of Agriculture. The taxonomist, Gillian Watson, confirmed the identification as papaya mealybug—an unarmored scale insect found in moist, warm climates. It was the first reported occurrence of papaya mealybug in Indonesia and Southeast Asia.

Two months later, on a trip to Tamil Nadu Agricultural University in Coimbatore, India, Dr. Muni Muniappan, Director of the IPM CRSP, recognized the telltale sticky residue on papayas he saw there as papaya mealybug.

In each case, IPM scientists alerted government authorities and advised them on appropriate actions to take. These discoveries are critical; the sooner authorities can arrest the spread of the papaya mealybug, the better their chances of saving this lucrative tropical crop.

While papaya is an exotic fruit for us in the northern hemisphere, it is one that many of us use unknowingly in a variety of ways every day. Papain, a product of papaya, is used in the production of chewing gum and shampoo, toothpaste and tooth whiteners, as a meat tenderizer, and in the brewing and textile industries. In many tropical countries, papaya is an important commercial crop and a key component of the daily diet.

For this reason, attacks by the papaya mealybug are a serious threat. In Indonesia, India, countries in the Caribbean and South America, the Hawaiian Islands, and Florida, papaya means millions of dollars for farmers, middlemen and processors. In Java, the scourge has wiped out most of the papaya plantations.

The papaya mealybug originated in Mexico, where it developed alongside natural enemies and was first identified in 1992. It wasn't until it jumped countries and started proliferating in places where it had no natural enemies that

that it began to pose problems. In 1995, it was discovered on the Caribbean island of St. Martin. By the year 2000, it had spread to 13 countries in the Caribbean, to Florida in the United States, and to three countries each in Central and South America.

The papaya mealybug is a particularly devastating pest because it is polyphagous—it feeds on many things. The insect’s host range includes over 60 species of plants: cassava, papaya, beans, eggplant, melons, hibiscus, plumeria, pepper, sweet potato, tomato, citrus, mango and sour sop. On papaya plants, the mealybug infests all parts of the young leaves and fruits, mostly along the veins and midrib of the older leaves. Young leaves become crinkly, and older leaves turn yellow and dry up. Terminal shoots become bunched and distorted. Affected trees drop flowers and fruits. To add insult to injury, the mealybug secretes a honeydew-like substance that turns into a thick sooty mold growth, making the fruit inedible and unusable for the production of papain. The good news is that the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (APHIS) has developed a biological control program to tackle the pest. It has identified three parasitoids—all of them parasitic wasps—that are highly effective at containing the mealybug. These natural enemies are being cultured in a laboratory in Puerto Rico and are offered free to countries that request them.

In addition to advising control agents on which parasitoid to use and how to release them, IPM CRSP can assist in determining the spread of the mealybug, how to conduct an environmental assessment, how to conduct surveys, and how to assess the efficacy of the parasitoid.

The IPM CRSP team that traveled to Indonesia included Robert Hedlund, USAID’s Cognizant Technical Officer for the USAID-funded program, Muniappan, Clemson University professors of entomology Merle Shepard and Gerry Carner, Clemson professor of economics Mike Hammig, Yulu Xia, Assistant Director of the NSF Center for IPM at North Carolina State, and Aunu Rauf, professor of entomology at Bogor Agricultural University in Indonesia.

While the challenge of reclaiming the papaya plantations from the papaya mealybug seems daunting, Muniappan is optimistic. “The use of parasitoids has been very effective in Caribbean countries, in Latin American countries and in Florida, Guam and Palau,” he says. “But we need to be vigilant.”

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