BIOLOGICAL CONTROL OF MITES AFFECTING *Carica papaya* IN FLORIDA, MEXICO AND BELIZE

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Until recently the most limiting factor in papaya production was the papaya ring spot virus PRSV transmitted by several species of aphids. For years growers relied in the use of insecticides to control PRSV vectors which induced mite outbreaks. Mites were considered secondary but their natural controls and predators were destroyed and now are a major concern for papaya producers. The development of PRSV resistant cultivars has reduced the dependence on chemical insecticides and opened an opportunity to use biological control to control pest mites. Ongoing research in Florida, Belize and Mexico aims to demonstrate that naturally occurring predators can suppress mite populations after pesticides are removed from the system. This presentation summarizes efforts in Florida, Mexico and Belize to introduce and augment natural enemies, and encourage growers to use biological control to manage pest mites. Mites are probably the most persistent arthropod pests of papaya. The pest mite complex in Florida includes Tetranychid (*Eutetranychus banksi*, *Tetranychus urticae*, *Eotetranychus* sp.) and tarsonemid (*Polyphagotarsonemus latus*) mites. Several natural enemies are found associated with these mites, including phytoseiid mites (*Amblyseius largoensis*), coccinellid beetles *Stethorus utilis*, lace wings *Ceraeochrysa claveri* and an unidentified Cecidomyiidae. In addition, commercially available natural enemies, *Amblysieus swirski* and *Stethorus punctillum*, have been released for pest mite suppression. Here we summarize efforts to quantify effect of native natural enemies and releases of commercially available predators on pest mite populations affecting papaya crops in Florida. In Mexico the phytophagous mite complex associated with

papaya includes *Tetranychus merganser* and *Eutetranychus banksi* (Tetranychiidae), *Calacarus citrifolii* (Eriophyidae) and *Daidalotarsonemus* sp. (Tarsonemidae).The natural enemies most of ten associated with these mites include several Phytoseiidae species and a predatory nitidulid beetle, *Cybocephalus* sp. Surveys in papaya groves with different pest management practices in Texoclo, Mexico, indicated that populations of Tetranychid mites and damage to papaya plants were high inthe grove with conventional chemical control practices no ground cover, and no natural enemies were detected. By contrast, populations of phytophagous mites and leaf damage were considerably lower in unsprayed groves that manage ground covers to promote the establishment of natural enemies. Phytoseiid and *Cybochephalus* predators were detected in the unsprayed grove. Efforts by Mexican producers looking at alternatives to chemical control are discussed here. More emphasis is needed on identification of natural enemies, sampling techniques, and commercial production of these agents. In Belize large plantings with heavy chemical input were suffering significant damage by *Tetranychus turkestani* and other *Tetranychus* spp. (Acari: Tetranychidae). Mites became resistant to chemical control practices and grove managers decided to use of biological control. Natural enemies were scarce in papaya plantings and commercial natural enemies were not available in Belize. High numbers of the predacious Staphylinid beetle *Holobus* sp. were observed in near by banana plantations associated with mites. Beetles were collected and released in areas in papaya plantings infested with mites in 2012. The beetles established and dispersed to new areas in the papaya plantings. The number of phytophagous mites has reduced significantly after biological control was reestablished. If tactics to delay PRSV are used and insecticide pressure is reduced it is feasible to re-build the mite natural enemy fauna and/or to introduce commercially produced biological control agents (Florida). For those places where biological control producers is not practiced, it is still feasible to develop techniques to encourage the presence of natural enemies of tetranychid mites (Belize).