

Insect and Disease Management in Organic Apples in the US and New Zealand

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Abstract

*In the US, in 2005, there were 97,277 acres of organic fruits, with the majority in the drier climates of Colorado and eastern Washington. Significant production of organic fruits occurs in the Midwestern US, however, because of a long history of producing tree fruits. In Midwestern organic markets, the scab-resistant cultivars, Enterprise, Liberty, Redfree, and Gold Rush, have gained increased acceptance, with the use of codling moth granulosus virus (CMGV), kaolin clay, and spinosad-based insecticides, resulting in codling moth damage levels below seven percent in these cultivars. Cedar apple rust continues to require sulfur applications for management, especially for 'Gold Rush.' Killing frosts in Iowa destroyed up to 80% of certain cultivars in 2007, where codling moth and plum curculio resurged under a no-spray program, emphasizing the need to manage pests even in low crop years. In Michigan, plum curculio, *Conotrachelus nenuphar* (Herbst), is managed with a combination of kaolin clay and Whalon PC traps lured with plum essence and benzaldehyde lures (Great Lakes IPM, Vestaburg, MI). Up to 12 sprays of kaolin are needed annually to "push" curculios to the margins of the orchard where they are trapped out of the system with the Whalon PC traps. Kaolin also helps manage other pests, including apple maggot, using yellow sticky traps to monitor for early emergence of maggots as a means to synchronize spraying with emergence. Companion plantings are used to bolster natural enemies and pollination in the system. Similar pest management systems have been developed by apple exporting countries like New Zealand in order to comply with export standards and quarantines where CMCV and a spinosad-based insecticide have led to an increase in organic exports with a 41% premium price over conventional apples. Non-target effects from spinosad, however, have been suggested through experimental evidence in the case of beneficial insects and secondary pests, such as woolly apple aphid, *Eriosoma lanigerum* (Hausmann). Damage from the bronze beetle, *Eucolaspis brunnea* (F.), has also increased in recent years. An alternative to spinosad applications is insect disinfestations through controlled atmosphere treatments of 9 wk of 2% O₂ and 2% CO₂ at 0.5 °C. Internal ethylene concentration was reduced by 84% in CA-stored apples compared to apples stored in air. Future pest management strategies in organic apple production will focus on development of scab-resistant cultivars with enhanced storage capability and reduction in inputs associated with negative environmental and health effects.*

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