

## Other Fruits With Insecticides Known to Have Labels for Use<sup>1</sup>

---

Jorge Pena and Freddie Johnson<sup>2</sup>

### Insect Pests of Annona Crops

The production of *Annona* spp. (sugar apple, atemoya, custard apple) in Florida has escalated from backyard trees to commercial groves. This change has also increased the importance of insect pests attacking these crops. The insects that affect production of *Annona* in Florida include major pests such as the seed borer *Beprattelloides cubensis* Ashmead, and secondary pests such as the papaya scale *Philephedra tuberculosa* Nakahara and Gill. The impact incidental pests such as various lepidopterous (sphinx moths, fruit piercing moths) larvae and some hemipterans (*Acanthocela femorata* (F.)) have on *Annona* is unknown.

#### **Annona Seed Borer, *Beprattelloides cubensis* Ashmead**

The adult female (Figure 1) of the seed borer is a reddish or reddish-brown colored wasp, 1/4 to 1/3 inch long. The main distinguishing characteristic of this wasp is the almost complete absence of males.

The adults can be observed at rest, emerging from fruits or ovipositing during the hottest times of the day. The female life span ranges between 1 to 11 days; the female oviposits its eggs in developing seeds and the incubation of the eggs last 12 to 14 days, the larval stage lasting 42-55 days. The larva is near white to cream colored, legless and swollen near the center. The pupal stage lasts 12 to 13 days. The emerging female tunnels a distance of 0.6 to 1.1 cm through the pulp, leaving a circular hole in the fruit epidermis.

### Dynamics

The annona seed borer populations develop during winter months mostly in bullock's heart (*Annona reticulata*). Because this fruit is not grown extensively, populations of adult wasps, which emerge from February to late May at the end of the fruiting season, are relatively low. Atemoyas which begin setting fruit in April, become infested (Figure 2) early in the season because they are setting fruits when the majority of seed borers are emerging from

---

1. This document is ENY-415, one of a series of the Department of Entomology, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Date first printed: October 1993. Revised: November 2001. Reviewed: 2003. Please visit the EDIS Website at <http://edis.ifas.ufl.edu>.

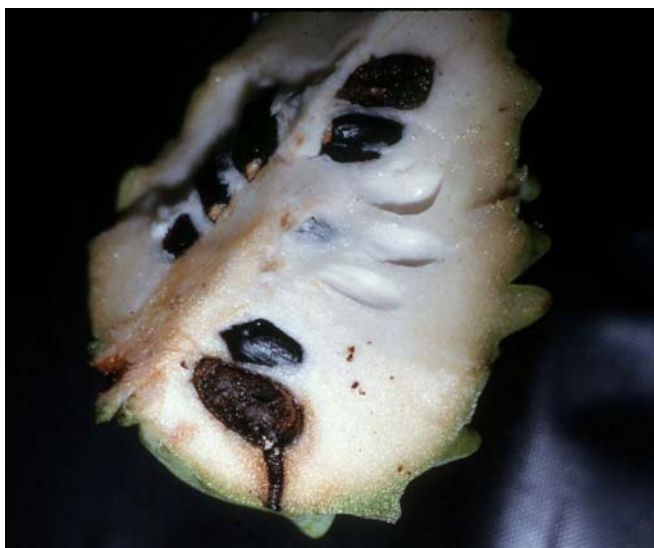
2. Jorge Pena, professor, Entomology and Nematology Department, Tropical Research and Education Center, Homestead, 33031; and Freddie Johnson, professor/district director, Office of District Directors respectively, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication does not signify our approval to the exclusion of other products of suitable composition. Use pesticides safely. Read and follow directions on the manufacturer's label.



**Figure 1.** Annona seed borer adult female.

bullock's hearts. Emergence and new infestations in atemoyas and sugar apples occur for several weeks, and may not abate until the end of the fruiting season. The wasp prefers fruit sizes in the range of 1/2 to almost 2 inches in diameter.



**Figure 2.** Damage caused by annona seed borer.

### **Cultural Control**

Bagging the fruits is the best cultural method to prevent infestation by the annona seed borer. Polyethylene bags held up well for the duration of fruit growth. Small fruits should be bagged before they reach the vulnerable size of 2 inches in diameter.

### **Chemical Control**

See Table 1.

**Table 1.** Other fruits with insecticides known to have labels for use.

<b>CROP</b>	<b>INSECTICIDES</b>
Atemoya	pyrethrins + rotenone (Pyrellin)
Bananas	<i>Bacillus thuringiensis</i> (Dipel, Javelin)
	<sup>A</sup> Diatect premix
	ethoprop (Mocap)
	pyrethrin + rotenone (Pyrellin)
Carambola	insecticidal oils (Saf-T-Side)
	<i>Bacillus thuringiensis</i> (Dipel)
	methidathion (Supracide)
Figs	pyrethrin + rotenone (Pyrellin)
	<i>Bacillus thuringiensis</i> (Dipel)
	chlorpyrifos (Lorsban, 4E)
	<sup>A</sup> Diatect premix
	diazinon (D.z.n., AG 500, 50W)
	oil (Volck, Sun Spray)
Gooseberries	propargite (Omite 30W)
	<i>Bacillus thuringiensis</i> (Dipel)
Guavas	malathion (Cythion)
	<i>Bacillus thuringiensis</i> (Dipel)
Kumquats (See also the Citrus Spray Guide-materials labelled under the broad category of citrus)	pyrethrins + rotenone (Pyrellin)
	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	metaldehyde (Slug and Snail Bait)
	methidathion (Supracide)
	pyrethrin + rotenone (Pyrellin)
	soap, insecticidal (M-Pede)
oil (Sun Spray, others)	

**Table 1.** Other fruits with insecticides known to have labels for use.

<b>CROP</b>	<b>INSECTICIDES</b>
Lemons (See also Citrus Spray Guide and materials labelled under the broad category of citrus)	aldicarb (Temik)
	azinphosmethyl (Guthion)
	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	chlorpyrifos (Lorsban)
	cryolite (Kryocide)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	dimethoate (Cygon)
	endosulfan (Thiodan)
	fenbutatin-oxide (Vendex)
	formetanate hydrochloride (Carzol)
	metaldehyde (Slug and Snail Bait)
	methidathion (Supracide)
	methomyl (Lannate)
	mevinphos (Phosdrin)
	naled (Dibrom)
	oxamyl (Vydate L)
	propargite (Omite)
	pyrethrins + rotenone (Pyrellin)
oil (Sun Spray)	
oxydematon methyl (Meta Systox R)	
(Morestan)	
soap, insecticidal (M-Pede)	
sulfur (Thiolux, others)	
Limes (See also Citrus Spray Guide and materials labelled under the broad category of citrus)	aldicarb (Temik)
	azinphosmethyl (guthion)
	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	chlorpyrifos (Lorsban)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	endosulfan (Thiodan)
	fenbutatin-oxide (Vendex)
	methidathion (Supracide)
	metaldehyde (Slug and Snail Bait)
	methomyl (Lannate)
	oils (Sun Spray, others)
	oxamyl (Vydate L)
	pyrethrins + rotenone (Pyrellin)
	(Morestan)
soap, insecticidal (M-Pede)	
sulfur (Thiolux, others)	
Longan	<i>Bacillus thuringiensis</i>
	methidathion (Supracide)
	pyrethrins + rotenone (Pyrellin)
Lychee	pyrethrins + rotenone (Pyrellin)

**Table 1.** Other fruits with insecticides known to have labels for use.

<b>CROP</b>	<b>INSECTICIDES</b>
-------------	---------------------

**Table 1.** Other fruits with insecticides known to have labels for use.

<b>CROP</b>	<b>INSECTICIDES</b>
Atemoya	pyrethrins + rotenone (Pyrellin)
Bananas	<i>Bacillus thuringiensis</i> (Dipel, Javelin)
	<sup>A</sup> Diatect premix
	ethoprop (Mocap)
	pyrethrin + rotenone (Pyrellin)
	insecticidal oils (Saf-T-Side)
Carambola	<i>Bacillus thuringiensis</i> (Dipel)
	methidathion (Supracide)
	pyrethrin + rotenone (Pyrellin)
Figs	<i>Bacillus thuringiensis</i> (Dipel)
	chlorpyrifos (Lorsban, 4E)
	<sup>A</sup> Diatect premix
	diazinon (D.z.n., AG 500, 50W)
	oil (Volck, Sun Spray)
	propargite (Omite 30W)
Gooseberries	<i>Bacillus thuringiensis</i> (Dipel)
	malathion (Cythion)
Guavas	<i>Bacillus thuringiensis</i> (Dipel)
	pyrethrins + rotenone (Pyrellin)
Kumquats (See also the Citrus Spray Guide-materials labelled under the broad category of citrus)	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	metaldehyde (Slug and Snail Bait)
	methidathion (Supracide)
	pyrethrin + rotenone (Pyrellin)
	soap, insecticidal (M-Pede)
	oil (Sun Spray, others)

**Table 1.** Other fruits with insecticides known to have labels for use.

CROP	INSECTICIDES
Lemons (See also Citrus Spray Guide and materials labelled under the broad category of citrus)	aldicarb (Temik)
	azinphosmethyl (Guthion)
	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	chlorpyrifos (Lorsban)
	cryolite (Kryocide)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	dimethoate (Cygon)
	endosulfan (Thiodan)
	fenbutatin-oxide (Vendex)
	formetanate hydrochloride (Carzol)
	metaldehyde (Slug and Snail Bait)
	methidathion (Supracide)
	methomyl (Lannate)
	mevinphos (Phosdrin)
	naled (Dibrom)
	oxamyl (Vydate L)
	propargite (Omite)
	pyrethrins + rotenone (Pyrellin)
oil (Sun Spray)	
oxydematon methyl (Meta Systox R)	
(Morestan)	
soap, insecticidal (M-Pede)	
sulfur (Thiolux, others)	
Limes (See also Citrus Spray Guide and materials labelled under the broad category of citrus)	aldicarb (Temik)
	azinphosmethyl (guthion)
	<i>Bacillus thuringiensis</i> (Biobit, Dipel)
	carbaryl (Sevin)
	chlorpyrifos (Lorsban)
	diazinon (D.z.n., AG 500, 50W)
	dicofol (Kelthane)
	endosulfan (Thiodan)
	fenbutatin-oxide (Vendex)
	methidathion (Supracide)
	metaldehyde (Slug and Snail Bait)
	methomyl (Lannate)
	oils (Sun Spray, others)
	oxamyl (Vydate L)
	pyrethrins + rotenone (Pyrellin)
	(Morestan)
	soap, insecticidal (M-Pede)
sulfur (Thiolux, others)	
Longan	<i>Bacillus thuringiensis</i>
	methidathion (Supracide)
	pyrethrins + rotenone (Pyrellin)
Lychee	pyrethrins + rotenone (Pyrellin)

**Table 1.** Other fruits with insecticides known to have labels for use.

CROP	INSECTICIDES
Mamey sapote	<i>Bacillus thuringiensis</i> pyrethrins + rotenone (Pyrellin)
Nectarines	azinphosmethyl (Guthion) <i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin) carbaryl (Sevin) chlorpyrifos (Lorsban) diazinon (D.z.n., AG 500, 50W) (Morestan) endosulfan (Thiodan) esfenvalerate (Asana XL) fenbutatin-oxide (Vendex) formatanate hydrochloride (Carzol) malathion (Cythion, others) methidathion (Supracide) methomyl (Lannate) methyl parathion (Penncap) oil (Sun Spray, Volck, others) phosmet (Imidan) propargite (Omite) soap, insecticidal (M-Pede) sulfur (Thiolux, Microthiol, others)
Passionfruit	<i>Bacillus thuringiensis</i> (Dipel) pyrethrins + rotenone (Pyrellin)
Persimmons	<i>Bacillus thuringiensis</i> (Dipel, Javelin) pyrethrins + rotenone (Pyrellin)
Pineapple	<i>Bacillus thuringiensis</i> (Dipel) <sup>A</sup> Diatect diazinon (D.z.n., AG 500, 50W) <sup>B</sup> Pyrellin endosulfan (Thiodan) ethoprop (Mocap) fenamiphos (Nemacur) malathion (Cythion) oxamyl (Vydate L)
Pomegranates	<i>Bacillus thuringiensis</i> (Biobit, Dipel, Javelin) <sup>A</sup> Diatect methomyl (Lannate) pyrethrins + rotenone (Pyrellin)
Sapodilla	<i>Bacillus thuringiensis</i> pyrethrins + rotenone (Pyrellin)
Sugar Apple	malathion (Cythion) methidathion (Supracide) pyrethrins + rotenone (Pyrellin)
<b>Note:</b> Pyrellin (pyrethrin + rotenone) is approved for use on many crops including the following: cactus fruit, calamondin, dates, huckleberries, loquat, mulberries, tamarind.	
<sup>A</sup> Diatect - a premix of silicon dioxide (diatomaceous earth) + pyrethrin + piperonyl butoxide	
<sup>B</sup> Pyrellin - a premix of pyrethrin + rotenone	