He's Only Mostly Dead! Managing Brood II of the 17-year Cicada in the Hudson Valley

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The first two weeks of June 2013 were quite a challenge for fruit growers experiencing Brood II of the 17-year cicada, *Magicicada septendecim*. Populations were variable throughout the Hudson Valley with a very strong edge effect in blocks bordering woodlands and concentrated emergence within apple blocks heavily infested in 1996. The first appearance of adults was observed on the May 27, 2013, with the onset of mate calling or 'singing' on the June 2. Egg-laying slits in pencil size branches occurred the following day. Winds from a June 8 storm front began to break limbs that once bore fruit but were damaged from cicada oviposition.

Tree fruit producers with high-pressure cicada blocks made at least one application of an insecticide to reduce egg-laying damage to branches during the first week in June. Yet growers have had a difficult time discerning how effective these treatments really are. In most first- and second-cover treatments used against PC and codling moth, the cicada can still be found in trees shortly after applications. Some treatments induce a knock down effect lasting only a few hours before the insect is back on its feet, climbing up the trunk and limbs to cause trouble. This 'mostly dead' effect or moribund state, has been observed

Figure 1. The 17-year cicada in a moribund state.

Figure 2. A 17-year cicada adult on a Surround-treated leaf.

in larger insects including the brown marmorated stink bug. The moribund effect can last for a few days before the insects either succumb to the toxic effects of the insecticide or revive and go back to 'business as usual'. During this 'down time' they are vulnerable to predation by mammals and other insects, such as foraging ants.

Materials in the carbamate class, such as Lannate (methomyl), and the pyethroid class, including Asana (esfenvalarate), Danitol (fenpropathrin) or Warrior (lambda-cyhalothrin), have proven to be quite effective against the cicada, often providing high mortality on contact. Given the body mass of the insect, these materials appear to have very short residual toxicity against the migrating adults and emerging nymph. With short residual toxicity, repellency becomes an important mode of action, found to be an effective component of the pyrethroid chemistry.

Of these insecticides, it appears two of the pyrethroids are capable of maintaining low ovipositional damage to trees to reduce limb breakage and fruit loss. In studies conducted by Chris Bergh in Winchester, Virginia, three dilute applications were made at 6-8-day intervals to young trees beginning May 28. Near the end of the egg-laying season, Asana applied at the high-labeled rate of 14.5 oz./acre and Danitol applied at 21.0 oz./acre provided significantly better ovipositional deterrence to the 17-year cicada than did the highest labeled rates of Actara, Calypso, Avaunt 30WG, and Aza-Direct 1.20%. Lannate, Warrior, and Assail, although numerically better, were not significantly different then the best treatments in reducing egg-laying slits, while Danitol provided complete control of limb breakage (Table 1 & 2).

In plots to which we have applied the organic control measures of Surround WP at 50 lbs./acre and highest labeled rate of Pyganic to control plum curculio, we continue to see the presence of the cicada with oviposition into treated wood (Figure 1). In conventionally treated plots employing Imidan and Lannate at the full labeled rates, we have seen re-infestation 3 days post application, also with continued egg-laying to treated wood.

Although pyrthroids have a tainted history of mite flare-up from the disruption of predatory arthropods and

Table 1. Effects of various insecticides on the number 17-year cicada oviposition slits.

Treatment	Rate Per acre	Mean number of cicada oviposition slits/branch			
		May 27	June 3	June 10	June 17
Actara 25WG	5.5 oz	9.9a	21.1a	26.7a	30.2abc
Asana XL	14.5 fl oz	1.3b	2.6b	3.4c	3.5e
Assail 70WP	3.4 oz	2.1b	15.6ab	21.9ab	19.3bcde
Avaunt 30WG	6.0 oz	9.7a	21.1a	31.1a	38.4a
AzaDirect 1.20%	1.0 qt	4.6ab	16.4ab	27.4a	34.3ab
Calypso 480SC	8.0 fl oz	5.1ab	15.1ab	21.1ab	27.1abcd
Danitol 2.4EC	21.0 fl oz	1.2b	1.8b	2.1c	2.1e
Lannate LV	3.0 pt	1.4b	4.9b	9.3bc	11.1de
Warrior 1CS	5.1 fl oz	1.2b	7.6ab	11.1bc	13.3cde
Untreated check		7.9ab	21.3a	28.4a	32.6ab

Means within columns not followed by a common letter are significantly different at odds of 19 to 1.

significant loss of efficacy at higher temperatures, they are relatively 'user friendly' with low mammalian toxicity and broad-spectrum activity to help combat the tree-fruit pest complex, and so, maintain an important role in the toolbox during these days of plague-like emergences of the 17-year cicada and looming presence of the invasive brown marmorated stink bug.

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Table 2. Effects of various insecticides on the incidence of 17-year cicada damage.

Treatment	Rate per acre	Mean no. flagged shoots/tree (June 24)	Mean no. fallen shoots/tree (June 24)
Actara 25WG	5.5 oz	8.3ab	1.75a
Asana XL	14.5 fl oz	0.3e	0.50ab
Assail 70WP	3.4 oz	3.0cde	0.25ab
Avaunt 30WG	6.0 oz	9.0a	1.75a
AzaDirect 1.20%	1.0 qt	4.8abcd	0.75ab
Calypso 480SC	8.0 fl oz	4.5bcde	0.75ab
Danitol 2.4EC	21.0 fl oz	1.0de	0.0b
Lannate LV	3.0 pt	5.0abcd	0.75ab
Warrior 1CS	5.1 fl oz	4.5bcde	0.50ab
Untreated check		7.3abc	1.25ab

Means within columns not followed by a common letter are significantly different at odds of 19 to 1.