

## Preventing Periodical Cicada Damage on Nursery Stock in the Foothills

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### Background

A brood of 17-year periodical cicadas hatched in 2017 in Western North Carolina and in other areas along the East Coast. Damage from periodical cicadas is due to egg laying, not feeding. Female periodical cicadas make slits in the bark of small branches and lay eggs in them. The wounds can kill small branches, which requires pruning off one to two years of growth. Severely damaged plants are unsaleable, and growers must start over. In landscape settings, young trees can be protected from periodical cicadas with netting that excludes the insects. However, this is impractical and costly in nursery settings, which often have large acreage of trees to protect. Growers are in need of a practical method to prevent or reduce damage from periodical cicadas.

### Objective

The objective of this study was to evaluate the insecticide and insect repellent efficacy on periodical cicada oviposition damage.

### Methods

A block of field-grown dogwood trees in Morganton, NC was selected as the study site due to the high population of periodical cicadas in the woods surrounding the field. Trees had been in the field 2-3 years. Seven products were applied preventatively to prohibit periodical cicada females from laying eggs in nursery trees (below). Typically, growers would spray a broad spectrum insecticide, like Talstar (bifenthrin), on trees with the hopes of killing periodical cicadas that landed on treated trees. There are several problems with this approach:

- Periodical cicadas are large, hard bodied insects that require a relatively large dose of insecticide to be effective
- When present, populations of periodical cicadas tend to be extremely high, which means that a lot of chemical has to be applied to be effective
- These products are contact poisons, so if the insect is not sprayed directly, the residual is responsible for killing the insect
- Traditional pesticides have to be applied often as they begin breaking down as soon as they are applied
- Periodical cicada egg laying lasts for 3 to 4 weeks during which treatments must be reapplied regularly
- Broad spectrum insecticides kill natural enemies and often result in outbreaks of secondary pests, like mites

Treatments began on May 10, two days after the first female cicada was observed laying eggs in the block of trees. All treatments except Captiva were applied once every 7 days, or earlier if it had rained. Captiva was applied every 3-5 days per label instructions. Treatment dates were May 10, 13, 17 (Captiva only), 20, 25, and 28 (all except Surround). Applications ceased when

Treatments for Periodical Cicadas		
Product	Active Ingredient	Rate (per 100 gallons)
Scimitar + Capsil	Lambda-cyhalothrin	5.0 fl. Oz.
Surround	Kaolin clay	50 lbs.
Moisturin	Polymer	10 gal.
Azatin	Azadirachtin	16 fl. Oz.
Talstar + Moisturin	Bifenthrin	43.5 fl. Oz.
Acelepryn + Capsil	Chlorantraniliprole	32 fl. Oz.
Captiva	Capsaicin	32 fl. Oz.

cicadas were no longer present in the block of trees. All treatments were applied to runoff using a gas-powered backpack mist blower.



*Periodical cicada female laying eggs in a branch (left). All treatments were applied with a gas-powered mist blower (right).*

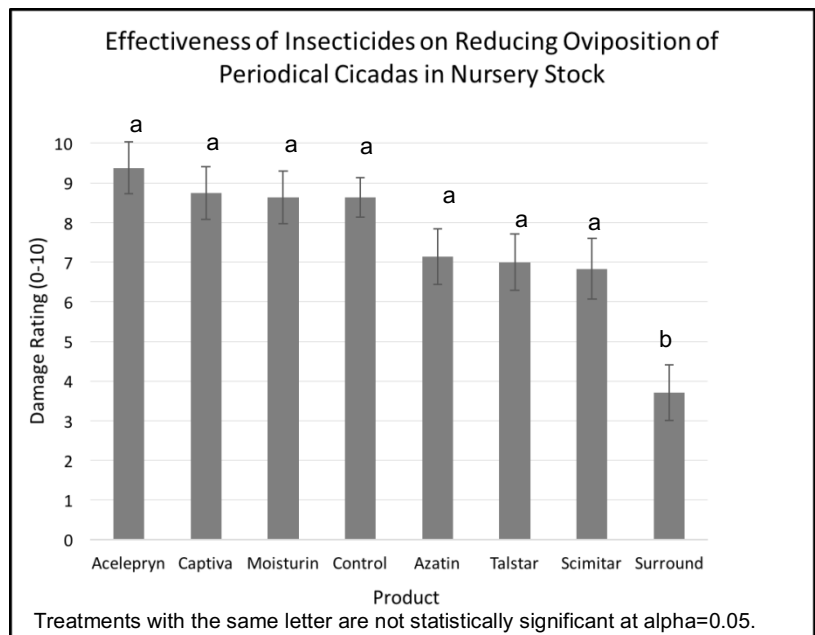
Oviposition damage was assessed at the end of the study using a rating scale of 0 to 10. Trees with a rating of 0 had no oviposition damage, and trees rated a 10 had the most egg laying damage.

### **Results**

Trees treated with Surround (kaolin clay) had approximately 50% less egg laying damage than trees in any other treatment, including untreated trees. The average mean damage rating for untreated trees was 8.6, while that of the Surround treated trees was 3.7. Talstar applied at a rate of 43.5 fl. oz. per 100 gallons did not reduce periodical cicada ovipositing.

### **Discussion**

Trees treated with Surround still had egg laying damage, the number of scars was greatly reduced from other treatments. When periodical cicada females lay eggs in trees, they make a series of 4-12 slits, often on the undersides of pencil-sized and larger branches. While Surround treated trees also had series of egg laying slits, the number of slits in each series was much less. This may be a sign that the fine clay coating was an irritant to their ovipositor and after inserting it into the tree a few times, the female flew to a new tree to lay eggs.



Future studies evaluating periodical cicada egg laying prevention methods should include Surround as a component of a tank mix with other products, including Talstar (Bifenthrin).



*Trees treated with Surround had less egg laying damage than other trees in the study. It seemed that there were fewer egg laying slits in each series on the trees treated with Surround (left) than the trees in any other treatment (right). This may indicate that the clay coating was an irritant to the cicada.*

These results show that non-traditional nursery products, like Surround, can be effective in preventing periodical cicada damage to nursery grown trees. Surround is a kaolin clay product that forms a thin coating over trees that acts as a physical barrier and protects trees from some insects and diseases. It has also been shown to enhance photosynthesis of some plants by reducing leaf temperature during mid-day heat stress.



*Surround forms a fine layer of clay on trees, giving the leaves a bluish tint. The clay layer acts as a protective barrier against some insects and diseases.*

The second objective of this study was to evaluate the effect of insecticide and insect repellent on spider mite populations on maple trees. The distribution of this brood of periodical cicadas was extremely spotty in North Carolina in 2017. The brood's range that we observed this year was smaller than in the past. This created a challenge, because it is impossible to accurately predict where periodical cicadas will emerge and lay eggs on nursery grown maple trees. As such, the study was set up in a block of dogwood trees where the periodical cicada population was so high that there would be damage to the trees.