Periodical Cicadas

Posted by Brittany Kordick

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Brittany Kordick

Registered: 4 years ago

Posts: 211

Periodical Cicadas

February 19, 2021 03:34AM

Last year we experienced 17-year periodical cicadas, in the form of Brood IX, for the first time at our current orchard location. Being that the coming of Brood X in early summer 2021 is starting to make the news story and clickbait rounds, thought I'd share our experience from this past season for any of you unlucky enough to be in range of Brood X this year.

We started hearing about Brood IX in 2019 when local apple growers associations began warning growers to avoid planting new orchards out in 2020. We were planning to do just that, plant a new 8 acre orchard, and for various reasons, could not reschedule. We priced netting to use on the new orchard to physically restrict cicadas, but it was, well, expensive, and after all, we didn't know exactly what we were in for. We had been advised not to prune heavily in winter 2019, anticipating heavy branch damage from cicadas, and though mostly due to lack of time that year, rather than preparedness on our part, many of our oldest trees went mostly unpruned.

We went ahead with planting in late winter/early spring 2020, and waited for the onslaught. By May, we were starting to think our locale must be outside the range of Brood IX after all, then all of a sudden, mid-May, the cicadas were here. Old apple trees on the property were covered with emerging cicadas overnight, and they crunched beneath our feet in other concentrated areas. Our orchard blocks did not historically contain trees; they were cropped in tobacco, corn, wheat, soy, etc., so no cicadas emerged from directly within our established or newly planted orchards.

But what we saw elsewhere on the property was like an alien invasion, and we instantly understood why people insist on referring to periodical cicadas as locusts, even though they are not. We kind of froze for a couple weeks; we had never experienced anything like this before, and the cicadas just seemed to be kind of hanging out and not bothering anything; they hadn't entered the orchards . . . so we didn't bother them. Then, seemingly overnight again, the cacophony of mating filled the air. For weeks, everyone in the vicinity complained; the unceasing trill is like tinnitus, only letting up at night, since cicadas are apparently responsive to light (when I would go out at night with a lantern, cicadas in direct vicinity of the light would start up again. By mid-June, we had millions?billions?trillions?more? of female cicadas ready to lay their eggs, and now is when they turned to our apple trees.

The cicadas flew into the orchards. Pressure was heaviest closest to where the most cicadas emerged: the surrounding woods-lines, and singular yard trees, but no orchard trees that we saw were neglected. Where pressure was heaviest, and on our youngest trees, you could not see any bark; the trees were covered entirely with cicadas. The trees were soaked, always wet with cicada pee (I'm trying to use technical terms here). Every speck of quarter-inch diameter branching on the worst-hit trees was zippered with slits from female cicadas cutting open the branches to deposit their eggs; occasionally, we would find slits on larger wood, even 1 inch diameter trunks, but these were anomalies. Of course, in horror over our mutilated trees, now we decided something must be done, way too late.

Surround is labeled for periodical cicadas, and we decided to give it a go in our newly planted orchard. After a few repeated applications to build up the layer, we gave up as the cicadas were in no way deterred. We did feel the applications weren't entirely in vain, as the shading perhaps provided our severely stressed trees with some relief. One notable exception: when experimenting with Surround early on, we mixed an extremely heavy (and impractical) concentration in a spray bottle and coated one young tree with an almost sludge-heavy layer. The cicadas notably left this tree alone, but the Surround was overly heavy to the point of likely harmful to the tree in question. In desperation, we wrote to a periodical cicada researcher at the Penn State University, Dr. Greg Krawczyk to ask if there was anything else we could do organically at this point. Pyganic is also labeled for periodical cicadas, and while there was no longer much point in trying to control the adults, now we became concerned about round two, 17 years down the road, and we were hoping that we could spray something to either prevent eggs from hatching or targeting larvae. His response:

"Thank you for your e-mail abut unfortunately there is not a lot you can do after cicada's eggs are already deposited. The damage cicada does is related to cutting the opening for egg deposition. If the cut are made on young branches, the branch will be prone to breaking or girdling later, after starting to crop. Winter cutting of affected branches is one of the option to mitigate the future impact.
After eggs will hatch, the young larvae will immediately drop to the ground without doing any extra damage to trees and spend the next 17 years feeding on roots of trees. There is really not a good data to estimate how important is the larval feeding to the tree roots. After all, waiting 17 years to see the results of an experiment is not a very exciting option.

Using Pyganic (natural pyrethrum) should help to prevent more damage but with a very short residual activity, the only effect you will see is a death of some directly treated adults. Against insects like cicada I assume you should use the highest rate from the product’s label.

Using synthetic pyrethroids provides a much stronger and longer lasting residual activity, killing adults directly and affecting females when she is cutting the bark to deposit eggs.
If you are trying to protect young trees, then maybe placing nets around the canopy will help but even this method is not a very cost effective. And the emergence last only about a month, so most likely you will be trying to impact only the late part of the generation.

Surround or PurShade are simply not effective at all as both provide only a very thin mechanical barrier, which is not an issue for female cicada. The whole management of periodical cicada is based on the idea of killing the adults before female are mature enough to cut the bark and lay the eggs. And there is about 10 day period between hearing them making noise and observing the first cuts. That the time to control adults, but I guess, this period has already passed for your area.

I hope this short answer will help with understanding what is happening, but unfortunately I know it is not the solution you were seeking."

By the end of June, the adult cicadas were beginning to die, their work being done, and by July, the cicadas had disappeared entirely. They were fairly indiscriminate overall, not appearing to target tree species over others, so much as small diameter branches. That said, while the surrounding woods were fairly evenly covered with wilt and dead tissue, perhaps there was slight favoring of oak and ash trees in the woods line, based on amount of damage. Other local apple and blueberry growers reported the same, that while their crops were definitely targeted, surrounding woods lines and landscaping were not spared either. An interesting tangential effect of a periodical cicada year: a neighbor has a single huge cherry tree, planted 15 years ago. He has never gotten a crop of cherries, due to bird predation. In 2020, presumably due to the birds having so many cicadas to eat, his cherries were left entirely alone, and he had a huge crop for the first time.

Periodical cicada larvae feed on the xylem of the branches where they hatch out, so necrosis started showing up all over our tree canopies. Thus, fruiting branches were severely weakened, and the weight of fruit made them snap easily, though we were surprised that overall we did not lose more fruit. There was unusually high wind damage to weakened branches and limbs throughout the remainder of the year. Dormant pruning all these months later has been a nightmare. While healing has occurred to a surprising degree, we spend way more time than we'd like testing the strength of affected branches as we prune. We are very concerned about our disease load in 2021 since the trees had so many open cuts last summer, particularly because 2020 was already such a bad fireblight year for us, even before the cicadas emerged. Woolly apple aphids colonized the slits from late summer to early winter to the point of infestation. We're going very heavy on dormant sprays, having hit the orchards with lime sulfur in December (which took care of the woolly apple aphids, as well), following up with copper in February, and a final treatment with PerCarb at bud-swell, hoping to achieve a very clean slate before starting competitive colonization of all those still-healing wounds with EM-1.

What we'd do if we could do it all over again: wouldn't spring for netting for such a huge planting (amazingly, while plenty of young trees and whips have died back to very large degree, we have yet to find one that was outright killed, but it may be dead almost back to the graft union in some cases), but would recommend for smaller acreages -- the long-term effects of disease and so much extra labor and stress dealing with this would be well worth the expense of netting). We would spray Pyganic as the periodical cicadas first emerge from the ground, when they are most vulnerable. The worst part of this experience is thinking about the next time Brood IX shows up in our orchard because now they will emerge directly within the orchards. And of course, one must wonder about 17 years of potential damage to the roots of the trees, though it's all very mysterious and unclear what kind of effects, if any, the cicadas are actually having in this regard. If you've got an especially small orchard of a few trees, very, very heavy coatings of Surround may discourage cicadas to some degree. In larger orchards, we would definitely consider using Surround or PurShade, but only for potential stress relief to the trees. Definitely go light on your dormant pruning pre-periodical cicada year -- they will take care of your pruning for you this year.

So not very scientific here, just trying to get down what I remember of the experience overall, but for the general pest files . . . Dr. Krawczyk's fact sheet on periodical cicadas for PSU can be found here: [extension.psu.edu].

Kordick Family Farm
Westfield, NC
Zone 7a

Edited 3 time(s). Last edit at 02/19/2021 03:29PM by Brittany Kordick.
Reply Quote

Brandt Schisler
Re: Periodical Cicadas
February 23, 2021 11:50PM
Registered: 5 years ago
Posts: 28

Thank you for telling us about your experience. We are a nervous wreck here because, like you, we have 1400 apple trees to plant in spring of 2021 and cannot change the date of planting. My only hopes are that the 200 chickens we will be running in the orchard can help and that applying some of your strategies mentioned above will help us. We are about to start pruning so maybe we will go very light this year knowing the cicadas are going to do some damage.

Brandt Schisler
Hickory Ridge Orchard
Zone 6b in Missouri
Reply Quote

Peter Fisher
Re: Periodical Cicadas
February 24, 2021 01:06AM
Registered: 10 years ago
Posts: 82

According to a map I found online from Newsweek (by Googling "where will periodical cicadas appear this year"), the cicadas won't appear west of Illinois. I hope that's true.

After noting that there could be as many as 1.5 million per acre, the article ends with this quote, which I am sure you will find inspiring:

Raupp said: "This is a wonderful opportunity for millions of people to witness and enjoy a remarkable biological phenomenon in their own backyard that happens nowhere else on the planet, truly a teachable moment."

Turkey Creek Orchard
Solon, Iowa (zone 5A)
Reply Quote

Brittany Kordick
Re: Periodical Cicadas
February 27, 2021 06:50PM
Registered: 4 years ago
Posts: 211

You know, I'll bet that this is one situation that chickens really can help in. The trick would be having enough for them to keep up with the cicadas as they emerge. As they come out of the ground, the cicadas will be helpless against chickens, but the cicadas do try for height if they can get it, climbing to grass shoots/trees to molt, so if they make it past the chickens, they would probably be too high for the birds to control. And even though chickens are bottomless pits, food-wise, I wonder how much feasting they would do on the fairly large cicadas before they got full. Anyway, it'll be interesting to hear how that goes, and chickens should definitely put a solid dent in your population.

Pre-cicada emergence last year, a local community group played up the biological wonder aspect bigtime, even emphasizing how good they are for the environment, aerating the soil and providing "fertilizer" as they molt. Yeah, we were pretty inspired, all right. Not that it isn't neat (what other insects live to be 17 years old, for one thing) and fascinating, and probably a vital part of the ecosystem, and all, but . . .

Anyway, best of luck. At least you guys are going in more prepared than we were!

Kordick Family Farm
Westfield, NC
Zone 7a
Reply Quote

Eliza Greenman
Re: Periodical Cicadas
December 03, 2021 06:09PM
Registered: 9 years ago
Posts: 23

Hi All,

I just visited one of my orchards yesterday to replace tree tubes and I was SHOCKED to see the wooly aphid infestation that had taken hold over the last month or so on my 3 year old trees. We were brood X this year and got hammered by cicadas, but my small trees have taken a beating and are super stressed out due to the cicada damage. I sprayed dormant oil yesterday mixed with neem, and will keep checking on the aphid status and adjusting as necessary, but I'd like to solicit some advice on health regimens to try and save these little trees so I don't need to replace them.

Because of the cicadas, I left the trees as rootstocks this year with plans to top-work in 2022 so I could cut off the damaged wood. I don't think this was the right approach (more in a sec), but I'm looking for ideas to help replenish the reserves taken from cicadas and aphids to help ensure graft take and vigor next year. Without a leaf analyses, what ideas do you have? I'm going to put down powdered azomite next week and amend with some of my autumn olive compost (high nitrogen cycling, but also invites soil fungivores to come on in), as well as remove much of the competition from grass around the tubes.

One of the reasons why I think I should have grafted the trees last spring (2021) instead of in 2022 is that the bradford pears I topworked over to Asian and Asian hybrids in 2021 had incredible vigor and weren't touched at all. I'm starting to think that probably would have been the case for the apples as well.

As an aside: Tree tubes are probably incubators for aphids due to lessening the predator-prey relationship I try to cultivate. If you can avoid tubes, do it!
Reply Quote

Brittany Kordick
Re: Periodical Cicadas
December 03, 2021 09:31PM
Registered: 4 years ago
Posts: 211

The secondary infestation with woolly apple aphids post periodical cicadas was, unfortunately, our experience, as well. It's hard to imagine a more perfect situation for woolly apple aphids to find themselves in, isn't it? Nice big cracks and crevices and weak wood everywhere, just like welcome mats for an aphid in the market for a new home. Happily, our affected trees were mostly older, bearing MM111s, so severe damage by aphid wasn't really a fear. The newly planted orchard either suffered limb dieback from the cicadas to the point that there wasn't much habitat for the woollies or, because dormant spray coverage of the sparse young trees is unfortunately just always better than what our full canopied older trees get, the November spray of lime sulfur we did post cicadas in 2020 seemed to knock out the woolly

apple aphids on the young trees completely. The older trees, on the other hand, had discouraging woolly populations into this growing season 2021.

I think you know Carter Holliday up in Floyd, VA, and his poor trees were even another story, however. He also got bad hit by Brood IX the same year we did, but his trees are on smaller rootstocks and trellised. I thought our infestation was bad, but this past summer Carter's trees looked like they were covered in snow (for his trellis system, he's specifically fostering smaller diameter limbs, thus, virtually everything on his trees was perfect cicada size diameter, and it was all subsequently colonized by the aphids the following year). By now, our larger trees have healed really well and we've more or less kicked the woolly apple aphids' butts. A big part of this we believe, unfortunately, was due to the loss of our entire crop to spring freezes this year, which gave our trees the year to really devote themselves to healing.

Another factor seemed to be our switching out pure neem oil for TerraNeem this season. Long story short, an amazing deal fell into our laps at the right time which rendered a 275 gal tank of TerraNeem vastly more affordable than pure neem oil, and since we had been experiencing an surprisingly pervasive upswing in green cicadas, we weren't opposed to switching in a neem product that might pack a little more punch in the molting disruption department (due to whatever proprietary blenders might be in TerraNeem, as well as the higher azadirachtin content). I will say, however, while we were happy to see the woolly apple aphids disappear from the tree canopies, we feel the population is pretty well entrenched endemically to our orchard now, as we are noticing that our potted apple trees often have thriving woolly aphid colonies in the root systems. We're not into drenching with Pyganic or anything like that, so we've mostly adopted a "see no evil" -- let's just monitor this -- attitude with the root colonies of aphids.

Aside from regular holistic mix sprays throughout the 2021 growing season and our general good tree health practices (we do grind up all our prunings; we do mulch with hay wherever possible, etc.) that may have contributed to the swift recovery of our trees, the vigor of the MM111 rootstock may also have played a significant role here, as must have the loss of our crop. I'm sorry you had to experience this and wish your trees all the best. Cicadas then aphids are definitely a double whammy. Poor Carter was in a deep depression over the state of his trees all season, but when we went up to buy some fruit from him this fall, his trees looked significantly better (I'm not sure that he targeted the aphids much at all, though . . . just the healing nature of growing trees).

Kordick Family Farm
Westfield, NC
Zone 7a

Edited 2 time(s). Last edit at 12/03/2021 09:36PM by Brittany Kordick.
Reply Quote

Brittany Kordick
Re: Periodical Cicadas
January 30, 2022 11:36PM
Registered: 4 years ago
Posts: 211

This really should be a thread in "Bug by Bug" with the heading, "Woolly Apple Aphids," but just wanted to follow up here with some info about using predators to control woolly apple aphid outbreaks that may arise post-cicada infestation. Was just looking through the new Good Fruit Grower mag, and saw this article that details some new research regarding the release of aphid predators for control. In the case of woolly apple aphids, specifically, the use of lacewings, but does also mention *Aphelinus mali*, a parasitoid. [www.goodfruit.com]

Anyway, fyi!

Kordick Family Farm
Westfield, NC
Zone 7a
Reply Quote

Mike Biltonen
Re: Periodical Cicadas
January 31, 2022 01:08AM
Registered: 10 years ago
Posts: 298

Thanks for posting this! I saw this article and it really resonated with a passion of mine over the years, and one we don't talk enough about when we discuss controls. We're all too often focused on sprays and forget to leverage the other aspects of nature that can assist - such as beneficials. Two growers I work with had trees with serious cicada damage last year. The result was damaged trees, fireblight, and the potential for a lot WAA infestations (due to the physical damage from Cicadas to the limbs). I'd like to see more folks implement and use beneficials in their orchards. They may not control 100% (what does though, really?), but could assist in reducing populations and reducing the number of sprays or long term damage.

Mike Biltonen, Know Your Roots
Zone 5b in New York
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