



Apple Measles

Posted by [Brittany Kordick](#)

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[Brittany Kordick](#)

[Apple Measles](#)

March 27, 2022 11:31PM

Registered: 4 years ago

Posts: 211

So I'm going to post this apple measles topic in two different places: Fungal Pathogens and Tree Fruit Nutrition . . . the condition of apple measles is poorly understood and can arise from both out-of-balance nutrients (specifically, manganese toxicity) and a pathogenic fungus (*Helminthosporium papulosum*). We have apple measles and we're not sure of the cause. In fact, for three years or so we haven't known what was causing the blistered bark on some of our trees, and two days ago I heard the term 'measles' associated with apples for the first time. The seminal research was done in 1934 at a WV ag research station: [researchrepository.wvu.edu]. Here's an update from 1970: [www.apsnet.org].

While it sounds like the condition of apple measles is most commonly accepted to be associated with nutrients like magnesium, manganese, and boron (and the influence pH has on their availability), it is also a sort of catch-all condition that has historically been affiliated also with black pox of apples, as well as simple internal bark necrosis. So basically, we feel that we can safely refer to our previous mystery condition as measles (finally, we are finding pictures on the internet that look markedly similar to ours after trying a litany of terms along the lines of 'blister' over the years), but the question still remains as to whether we have a cause or a symptom on our hands.

The background of our experience:

We first noticed this condition about three years ago; it was on a single 'Bevan's Favorite' tree in our test orchard (no other 'Bevan's Favorite' nearby). We gradually noticed its "spread" and sent a sample off to the NCSU plant pathology lab. The NCSU folks speculated that it might be a systemic *Botryosphaeria* infection, and initially detected a slow-growing fungus and tried to culture it, but apparently the results were inconclusive and no other theories surfaced to explain the condition. We've showed the wood to a number of apple folks over the years and heard speculations from virus to rampant *Pseudomonas* infection (thanks to Mike Biltonen and Bill MacKentley -- Mike also mentioned possible nutrient involvement, and it's interesting that the WV research mentions *Pseudomonas*, as well, though who's to say if *Pseudomonas* infection is potentially affiliated because the condition favors this bacteria, rather than *Pseudomonas* being the cause of apple measles directly)

Of the varieties affected (to date, we can confidently say these are 'Wealthy,' 'Bevan's Favorite,' 'Nutmeg,' 'Blue Ridge King,' as well as our unknown variety that is something like a 'Blushing Gold'), most trees of these types are unanimously affected. As stated, we feel like it may be spreading to other varieties, but it's hard to say for sure if we're just being hyper-sensitive or whether we are, in fact, observing an early stage of the condition. Aside from one or two potted trees that we've eventually lost (and they should probably be considered more inherently subject to environmental stress -- if I miss a watering, for example), we really haven't seen any of these affected trees die outright; they just seem to decline, and while they do send out new growth, sometimes quite vigorously, this new growth is eventually overtaken by the condition, as well.

Some of the affected varietal blocks have as many as 36 trees; others are individual trees located sporadically on the farm in separate locations (we have 36 trees of our unknown type within our orchard proper, as well as a single original tree in a completely different location a couple thousand feet away, yet both the block and single tree are affected). Some affected varieties that are in blocks within the orchard are also represented in our potted tree nursery, and again, all these trees are exhibiting the blistered bark.

The closest environmental commonality we can sort of zero in on is wetter, low-lying soil (in comparison to the rest of the orchards) for many, but not all, of the trees in question. But that certainly doesn't explain the incidence among potted trees . . . and in the case of the unknown variety, our large original tree was subjected to months of overly wet conditions resulting from a saturated leaching field . . . but the block of 36 trees of that unknown variety is not in a particularly wet area. But it's food for thought where the nutrients could come into play -- perhaps excessive solubility played a role in a variety that's more susceptible to nutrient imbalance?

At any rate, we'll be looking more closely at our soil test results from over the years to see if anything jumps out, and may send some samples off for plant sap analysis in coming weeks, as well, to see if we can get a better read on any potential nutrient deficiencies or overages within blister-barked trees. In general, we're happy with the pH in our orchard, as we're sitting at about a 6.2 average across our various testing sites. We have a couple outlier areas of both high pH (6.8) in one sample site, as well as low pH (5.9) in another, but the others range from 6.0 to 6.4 with most sitting right at 6.2. We'll be liming the orchard in the fall again to try and maintain/attain our sweet spot pH. Interestingly, though, none of the trees affected are located in particularly low pH areas. (Manganese toxicity seems to be

affiliated with very low pH situations; 5.5 is mentioned a lot.)

However, our manganese results do show some areas with 'high' manganese correlated to the test result index (again, with 25-50 looking to be about ideal, we've got some values from 49 up to 98). Perhaps the affected tree varieties are particularly sensitive to Mn. Right now, our plan is to send off some soil samples extremely specific to the trees in question and send off some leaf samples for plant sap analysis in a few weeks to see how Mn levels are reading in the plant itself. Hopefully, this will help us rule out black pox infection, but in the meantime, we may also get up with our NCSU pathology lab to see if they can test some tissue again with black pox specifically in mind (it's hard to culture, being that can take up to 10 months on bark, but it's seeming more meaningful now that the lab previously detected "a slow-growing fungus").

One coincidental and possible good thing if we do have black pox: we are using Lalstop (*Gliocladium catenulatum* Strain J1446) in our orchard this spring, are about to apply for the second time this season, and it is actually labeled as being active against *Helminthosporium*; we'll be contacting the Lalstop folks tomorrow to ask for specifics as to what species and recommendations specific to black pox.

So two questions for the forum:

- 1.) Anybody have any experience with apple measles in general and how to cope?
- 2.) Suppose the root cause of our apple measles is manganese toxicity -- how does one offer trees remedial treatment in general when it comes to nutrient toxicity? We realized that the AEA Micro-Pak we apply occasionally during the growing season contains Mn, and perhaps we have inadvertently created the problem or made it worse. So we make sure we don't apply any Mn if we can help it . . . but what else can we do to help our trees?

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

Edited 3 time(s). Last edit at 03/27/2022 11:41PM by Brittany Kordick.

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[Brittany Kordick](#)

[Re: Apple Measles](#)

April 03, 2022 08:48PM

Registered: 4 years ago

Posts: 211

A big thank you to Eliza Greenman for hooking us up with a pathologist at Ohio State with a penchant for weird fungal stuff! It sure is a shame the folks in our home state don't seem to be any more interested than they were last year when we first reached out for assistance with diagnosing our blister bark issue . . .

I didn't intend to update this thread until next week, when we should have results from soil tests and plant sap analysis on new leaves from affected trees, however, we've been really upset by further developments. We finished pruning our small pear orchard weeks ago, but went back today to cut down a gorgeous 20 foot tall, 8 inch trunk diameter 'Pound' pear that we realized last week is dead as a doornail. It is always the latest of our pears to break dormancy, so we didn't pay much attention to its lack of bud action until we were doing some hand-spraying and realized that it won't be breaking dormancy at all this year. We assumed it was lost to systemic fireblight, as we have experienced some bad outbreaks in the pear orchard in recent years. Cutting it up for removal today, however, our eyes adjusted to notice that the bark had a very distinctive pattern not unlike what we see in our blister-barked apple trees. We noticed that all of our remaining pear trees are afflicted with the condition, as well. What looks like a perfectly healthy pear tree has almost no green living cambial tissue beneath mature bark in places -- essentially, the trees are "girdled," yet beautiful, healthy new growth with only first flecks of blisters beginning to show on bark above that.. Obviously, this is pretty upsetting, and we expect to lose all our remaining pear trees since the damage is so extensive . . . and we still don't know the root cause!

Pears are also susceptible to 'apple measles,' OK, but still have to figure out if we are dealing with pathogenic fungi or crazy nutritive imbalance somehow. Now seeing the universality of the condition in the pears, it was tempting to cross nutritive stuff off the list -- I mean, if our issue is this widespread throughout our orchards, in very different soil types, the odds seemed much likelier that this is a pathogenic issue. Then I started wondering about commonalities between the pear and apple orchards. We no longer apply neem oil to our pears, only karanja oil, due to defoliation issues on certain varieties. We had already determined that one of the things we occasionally apply, Micro-Pak, contains significant amounts of manganese. I plugged neem, karanja, and manganese into internet searches, remembering that minerals and nutrients are part of the beneficial oil package here. I haven't been able to find any specific information about manganese content for either, just that, yes, it would seem that Mn is part and parcel here. Labels haven't been a help since nutrient analysis is generally not included. So just wondering if anyone out there happens to know anything about what specific nutrients are contained in neem and karanja. Hope to be able to follow up with some definitive answers concerning our situation soon, but we're just trying out any theory that comes to mind until we do, as we're sort of in panic mode here.

Thanks very much.

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Westfield, NC

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Edited 2 time(s). Last edit at 04/03/2022 10:02PM by Brittany Kordick.

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[Brittany Kordick](#)

[Re: Apple Measles](#)

April 12, 2022 02:36PM

Registered: 4 years ago

Posts: 211

Just a brief update to this thread, following the results from a pair of site-specific soil and plant sap analysis tests: it is very unlikely that manganese toxicity is an issue here. The psa was necessarily done on new leaves only, not on a comparative analysis of old and new leaves (we will be following up with comparative samples, however, as older leaves become available on trees in question), which will more accurately reflect what's going on within the plant, Mn-wise. But at 6.44 parts per million (low, bordering on optimum levels) in this new sap, the trees tested are not likely to be experiencing toxicity, particularly when the pH is considered, as well. Since low pH makes for higher Mn availability, a pH of 5.5 or lower is typically associated with Mn toxicity. The soil pH for this particular area actually came back as outlier high within our orchard, 6.9. And since Mn is not very mobile within the plant, we don't expect to see levels skyrocket as leaves age in the next couple weeks. So at this point, we feel comfortable assuming that our apple measles incidence is more likely to be a result of pathogenic infection. As stated above, more accurate testing to confirm this will be done, but at least we feel like we can move forward with spray applications that may contain Mn in the meantime. Incidentally, in investigating Mn toxicity and what to do in the event we are experiencing it in our orchard, we learned that we would probably address such an issue by applying other nutrients to try and bind up that excess Mn.

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