



Critical Points of Influence

Posted by [Michael Phillips](#)

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[Michael Phillips](#)

[Critical Points of Influence](#)

December 18, 2016 09:04PM

Moderator

Registered: 11 years ago

Posts: 621

One area I hope to see more growers explore in the seasons ahead is the use of trace minerals at pink, petal fall, and first cover to facilitate healthy plant metabolism in the fruit tree at key developmental times. Here are some words from the forthcoming book, [Mycorrhizal Planet](#), to whet your appetite:

"John Kempf speaks about *critical points of influence* (CPIs) in every plant's development. Active shoot growth, fruit set, seed ripening, and meristem formation have more exacting nutritional requirements than times in between. Supplying trace minerals to serve as enzyme cofactors at these junctures enhances crop production in healthy ways. Foliar application reaches all parts of the plant more quickly than directing soluble ions into the root zone. Accordingly, I have started trialing [MicroPak](#) (Advancing Eco Agriculture's formulated blend of micronutrients) in my orchard sprays on either side of bloom. Boron, zinc, manganese, copper, cobalt, molybdenum, and sulfur are in a form that can be readily absorbed by both plants and the microbe community waiting on the surface. Time will reveal the gains to be had in terms of overall tree health."

Another good option for trace minerals is [SeaCrop](#), the seawater concentrate containing 89 elements in balanced proportion, without salt overload.

Either tank mixes well with holistic applications. We could spell out a "trace mineral protocol" but the key to recognizing positive results is rather simple: some trees get the treatment; some trees do not. Grower research is all the more powerful when trials can be run with the same cultivar. A whole lot more info about enzyme cofactors is explored in the new book, tied to mycorrhizal fungal connection is the soil. Now I'm merely planting a seed that I hope some of you take up, starting in the 2017 season.

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

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[Michael Phillips](#)

[Re: Critical Points of Influence](#)

January 04, 2017 09:37PM

Moderator

Registered: 11 years ago

Posts: 621

No one took the bait for what I believe will become a core practice in holistic orcharding. Let's try another round of words from [Mycorrhizal Planet](#) to set a fire in your belly this chilly winter day:

"One stellar example of all this is the link between cobalt and apple scab disease. Pathogenic fungi have preferred foods, and in the case of *Venturia inaequalis*, several of the standard amino acids found in leaf cells more than qualify. Cobalt is a cofactor in incorporating amino acids into a complete protein. Including this trace mineral in orchard foliar applications in spring when scab is on the prowl takes more amino acids out of the food stream for this disease organism. Immune function applied; no damage done."

No one has worked with trace minerals? No one has questions? No one is intrigued?

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Zone 4b in New Hampshire

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[Mike Biltonen](#)

[Re: Critical Points of Influence](#)

January 04, 2017 11:12PM

Registered: 10 years ago

Posts: 298

I think we have it all figured out...LOL!

Actually, I am very interested in the whole topic of "critical points of influence" and the role micronutrients play. Conventional approaches to plant nutrition are very limited in scope and don't recognize the valued role that micronutrients - and other macronutrients like sulfur - play in overall plant health and nutrition. Cobalt is one great example. Last year, a slow scab year for sure, we used cobalt as part of regular spray program through fruit set and ended up with virtually no scab. Zinc and boron or two others that already have a substantial role in cold damage recovery. The whole notion of BD501 or rock dust modes for providing minerals, as a growth factor early in the season, a thinning agent etc. has me thinking about what other benefits in addition to minerals they might provide. I mean soil is basically well weathered rocks (and 501/rock dust is just ground up quartz rocks) made up of all different plant nutrients, but other chemistry as well. The role micronutrients play in other critical plant growth processes is wholly under explored. What about winter hardiness, frost protection, cold damage recovery (we all should know about Zn and B in the 'spring tonic' oft proposed), fruit set, fruit thinning, fruit growth and development, fruit maturation, fruit storability. This doesn't even delve into the most important roles they may play in insect and disease controls. Normal tissue (and soil) analyses are superficial; the recommendations from labs even more so. We don't pay enough attention to anything in general.

So I don't have many answers, but I have lots of questions.

I'll start with "which micronutrients are most influential on overall holistic plant growth and development?" - I am not a kitchen sink kind of person. I don't want to apply everything.

Next?

[Mike Biltonen, Know Your Roots](#)

Zone 5b in New York

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[Todd Parlo](#)

[Re: Critical Points of Influence](#)

January 05, 2017 09:31PM

Registered: 10 years ago

Posts: 301

I have been intrigued by the cobalt discussion for scab abatement, but I have not been able to find reproduced studies. Has anyone seen information distinct from Kempf's. I am particularly interested in success rates based on amounts. Plant dynamics can be pretty nuanced with regard to chemical synergies and toxicity levels, so it would be nice to see some good data and advice on protocol.

[Walden Heights Nursery & Orchard](#)

Zone 3 in Vermont

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[Michael Phillips](#)

[Re: Critical Points of Influence](#)

January 05, 2017 10:47PM

Moderator

Registered: 11 years ago

Posts: 621

I've asked my contact at [Advancing Eco Ag](#) more than once for any and all research and/or even a single paper that specifically ties cobalt to arginine to no avail. Arginine being the one amino acid that John Kempf states unequivocally feeds the scab organism . . . but read on please. What I found on my own to substantiate such discussion was research done back in the 1950s. Generational tie-ins like this are incredible when you think of the folks back then on much the same trail. Here's the endnote verbatim from [Mycorrhizal Planet](#) that goes with that passage above:

A fascinating study from the 1950s revealed the proclivity of scab fungi to feed on less-than-complete proteins. The amino acids most preferred were alanine, arginine, aspartic acid, glutamic acid, glycine, and proline. "[Venturia inaequalis: Amino Acids as Sources of Nitrogen](#)" by R. L. Pelletier and G. W. Keitt was originally published in the *American Journal of Botany*, vol. 41, no. 4, in 1954. Research like this reveals generations of thought go into finding wholesome answers . . . eventually!

What I don't have are direct correlations to cobalt (or any other trace mineral for that matter) that serves as a specific enzyme cofactor involved with protein synthesis that thwarts scab disease. True enough, I went with that piece of the puzzle as being put forth by [Advancing Eco Ag](#) but it may not be cobalt alone. Which brings me to Mike's point about foliar isolates versus generalist cooking. Far more is going on the surface of a colonized leaf than mere absorption of this mineral or that mineral. In other words, arboreal biology is very much involved with mineralization and assimilation of an array of elements, and in particular endophytic fungi may play a key role as a carrier, much like mycorrhizal fungi do in the soil. What's important is getting soluble amino acids to embed as complete proteins in the cell membrane of the leaf and the fruit, and thus be no longer available as sustenance for the disease organism. That puts me in the camp willing to use the recommended rate for MicroPak or SeaCrop in the context of biological reinforcement over singular trace minerals. Both are fine ways to explore this avenue of thinking . . . I'm simply being clear that "michael's results" will be those of a generalist cook. Numerous companies offer trace mineral isolates for foliar application, and I tend to think recommended rates are reasonable starting

points.

Bottom line: Researchers like R. L. Pelletier and G. W. Keitt back in the 1950s may have had a chemical motive in seeking to better understand preferred nitrogen sources of scab. Perhaps they even were working towards a stunning cobalt conclusion. Who knows? On the other hand, recognition of how complete protein synthesis is one of the keys to thwarting fungal disease has always been a difficult pill for reductionist scientists to swallow. Similarly, what Dow-funded university researcher today is going to look into how to drop use of all fungicides because plants know how to do "green health" far better than humans? Waiting to act (and I realize, Todd, that's not what you are saying) because no one else has proven a technique works should never hold us back. We growers are the wellspring of progressive holistic knowledge and each new season is our laboratory.

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

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[Michael Phillips](#)

[Re: Critical Points of Influence](#)

April 05, 2017 03:51PM

Moderator

Registered: 11 years ago

Posts: 621

What may be the most exciting means of boosting tree immune function and meristem development hasn't gotten the chatter it deserves. Still, I stand by mineralization as a brilliant addition to a holistic spray program. Here's an [AEA link](#) to more from John Kempf about Critical Points of Influence.

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Zone 4b in New Hampshire

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[Russ Martin](#)

[Re: Critical Points of Influence](#)

April 07, 2017 02:13PM

Registered: 8 years ago

Posts: 19

This question is for Mike B. It sounds like you are foliar feeding Zn, B and Co. I would be interested in knowing form of those elements you are feeding? Also rates in your spray? Timing too. I must have played hooky that day in school when Zinc and Boron for cold damage recovery was discussed.

Thanks,

Russ Martin

Zone 4b Extreme west Central Wisconsin Hager City, WI

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[Carol Gudz](#)

[Re: Critical Points of Influence](#)

June 16, 2023 12:36AM

Registered: 1 year ago

Posts: 21

Very late to an old discussion but I started using Sea Crop on my orchard last year. It was a decent year overall- we'll see how things go this year with the use of Sea Crop again.

Given all the different ingredients in the spray, it is of course challenging to say what is most helpful. Like Michael, I generally use the "kitchen sink" approach.

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