



spring gypsum

Posted by [Michael Phillips](#)

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[Michael Phillips](#)

[spring.gypsum](#)

January 11, 2022 04:18AM

Moderator

Registered: 11 years ago

Posts: 621

Some of you may be familiar with the recommendation from John Kempf and his AEA team to spread gypsum 45 to 60 days prior to bloom. This purportedly gives the soil biology time to break down the calcium sulfate and then deliver bioavailable calcium to the tree just as flowers open and fruitset starts in earnest.

I did precisely this in early April last season, applying 2800# of gypsum in total. The rate varied from 4# to 12# per tree across the dripline as tree size here ranges from just planted to thirty-year-old standards. Note: that pallet of pelleted gypsum is expensive, costing \$775 here on the far edge of the global economy. Anyhow, I followed this up with a ground spray a couple weeks later—consisting of raw milk, blackstrap molasses, activated EM, liquid fish, and Tanio's Spectrum (a multispecies bacterial inoculant)—once green growth was underway. The idea here being to "pulse" the action by stimulating sleepy organisms with good fats and carbon resources.

First round sap samples were taken during bloom. Despite great expectations, calcium levels were in the very low range. Numerous foliar applications followed all this and somehow, by hook or by crook, Ca reached the optimum range by the time of my third round of testing in early August. Needless to say, I think I had my highest quality apple crop ever in 2021.

Yet the question is what role if any did the gypsum actually play? Anyone else trying this and what are you finding?

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

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[Michael Phillips](#)

[Re: spring.gypsum](#)

January 13, 2022 05:19PM

Moderator

Registered: 11 years ago

Posts: 621

A few more bits to explain all this further.

I was certainly glad for the calcium contribution to soil base saturation regardless of immediate sap uptake. No soil test was sent in last year but I can expect this to have bumped up as a result of that gypsum application. A rate more like 250# to 500# an acre is appropriate as a maintenance rate once your calcium numbers are in a good place. The pH here is in the low to middle six range—good by me—whereas the ppm reading is just shy of the desired minimum of 3000 pounds per acre (multiply ppm x 2 to equate the two). This is reflected again in being just shy of the desired 70% base saturation ratio for calcium specified for this soil constitution.

Doing *agriculture* means there's a human element to growing crops. Plants will get 80% of all-important calcium from soil sources... and the other 20% can be cranked up with timely foliar application. Calcium uptake requires boron availability. Manganese in reduced form has an important relationship to balancing other cations like K and Mg. Auxin and cytokinin processes are involved in directing this limited-mobility nutrient towards vegetative stimulus and root tip growth respectively. Translocation to fruit is our ultimate goal. Fungal connection and bacterial cohorts are always the drivers.

All fascinating, all complicated... and exactly what we are here to understand better.

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

Edited 1 time(s). Last edit at 01/13/2022 05:21PM by Michael Phillips.

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[Brittany Kordick](#)

[Re: spring.gypsum](#)

February 22, 2022 03:37PM

Registered: 4 years ago

Posts: 211

Our soil test results from 2021, submitted this past fall, were severely delayed, but we recently got them back and were surprised at the relative lack of movement detected in soil levels of calcium. While our calcium levels weren't hugely low in 2020 soil tests, averaging

54% CEC on samples taken throughout our orchards, that's still less than optimal, and given our fungal rot issues, we definitely want to make sure the trees have all the calcium they could desire. To that end, we've historically applied AEA's HoloCal throughout the growing season, but decided to apply gypsum orchard-wide for the first time in spring 2021 at the rate of 500 lbs per acre.

We subsequently suffered back to back freezes during bloom and lost our crop, so we can't ascertain if there would have been appreciable effects on the fruit quality. However, we were very surprised to see in this year's soil report that our calcium levels did not budge much at all from the previous year. Values from samples at 54% moved to 57% on average, with an outlier movement in one sample from 55% to 61%, and one that even decreased from 54% to 53%. It makes you wonder what those values would have been if the trees had had the occasion to use more calcium for an actual fruit load.

We are mostly perfect on pH, but we've got a couple blocks reading 5.8 and 5.9 now, so can start thinking about applying a bit of lime. We were hoping to apply calcitic lime about now with the double duty goal of adding a bit of calcium that way without gypsum, as well as massaging the pH a little. Unfortunately, we are really getting to be out of time as our spring to-do list spirals out of control and budswell approaches, so it's unlikely we'll get to it . . .

[Kordick Family Farm](#)

Westfield, NC

Zone 7a

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[Mike Biltonen](#)

[Re: spring gypsum](#)

February 22, 2022 05:13PM

Brittany -

I presume you mean base cation ratio (%) and not CEC (Cation Exchange Capacity) when you mention the calcium levels. If that is the case, then yes, any value in the 50s is very low. I like to see CECs between 8-12 with OM at 4-5%. Any higher than that then you are moving into an organic soil territory with either very strong binding effects for cations or very low soil biological activity (as in: nothing to break down the OM).

I expect to see Ca⁺⁺ values in the 70s for any soil I help oversee. Then Mg at about 12-15%, K at about 4-5%, H between 5-10%, and all other cations (e.g., Na) making up the balance. There is a cascade effect that needs to occur for proper uptake of calcium to occur. Of course, if you don't have enough calcium in the soil to begin with then you need to start there. Of course, the levels are less important than their proportionality. But with those ranges and optimal proportionality, and all the other stuff (F:B ratios etc) you should have good uptake and transport. Of course, if the tissue levels of some nutrients are also low this can then further inhibit the transport into the fruit or other tissue. For example, low Mn can reduce the movement of Ca into tissue in favor of K. A divalent cation can take up twice the negatively charged space of a monovalent cation, thereby outcompeting space for uptake and transport. These are just examples of some other potential issues and with an incomplete picture (report) it's hard to really zero in on the problem. Low Ca does seem to be a part of the issue, but there could also be other things going on.

Some other forensic questions:

- what is the soil type?
- were these standard soil or saturated paste analysis?
- what was the lab?
- what are the other cation levels. There is a cascade effect that needs to occur for any cations to be taken up by the roots. e.g., lack of H can reduce the cascade effect severely. This won't have an effect on soil levels per se, but once you get them there, you'll need to make sure everything else is aligned to ensure proper uptake.
- what are the P levels? High P can bind Ca (and Zn) when P levels are too high (>200ppm).
- what are B levels? Lack of B inhibits root growth and reduces the potential for uptake.
- what were the levels of Mg, K, and other micros in the soil?
- what were the Ca, K and Mn levels in tissue? Soil levels are one thing, getting it to where it needs to go to is another.
- what was the pH in the "perfect" blocks?
- pH 5.8-5.9 does require some lime, but depending on the Mg levels do you add dolomitic lime or regular hi-cal lime? If the Mg levels are fine, then 3-4 T/acre of hi cal lime is in order. I would split that in two applications - one spring, one fall.

Not to over-elaborate, but think about the process, the system at work, and not so much the levels per se. 50% Ca seems extremely low for NC soils esp with CaSO₄ apps in place. I've probably forgotten to mention something, but let's keep the convo going. Stump Sprouts is just a week away!!

[Mike Biltonen, Know Your Roots](#)

Zone 5b in New York

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[Brittany Kordick](#)

[Re: spring gypsum](#)

February 22, 2022 05:23PM

Thanks very much for this mental stimulation. It is just so hard to think straight about calcium with all the related complications. Did just want to quickly clarify that, actually, the 54% calcium number does seem to be referring to CEC (we do our soil tests through NC State University, Mehlich-3, and they define Ca% report abbreviations as "%CEC occupied by calcium." I meant to qualify that specifically to

Registered: 11 years ago

Posts: 298

Registered: 4 years ago

Posts: 211

make sure that I, and readers, know if we're comparing apples to apples here when Michael mentions 70% base saturation figures for his own orchard. Very much looking forward to continuing this complicated calcium discussion this coming week! I'm sure calcium will be one of our hottest topics. And yes, soil type is predominantly clay on our farm, but historic farming practices and areas erosion have resulted in surprisingly variable soil types within our primary orchard, and we distinguish between 5, ranging from silty loam to straight clay, with most somewhere in between composition-wise, over that particular 10 acre orchard. We're pleased with our pH throughout averaging about 6.2, with those two outlier 5.8 and 5.9 areas, as well as another at 6.4, in addition to two at 6.2. Our lab gives us HM% "percent humic matter" readings rather than organic matter percentages, and soils in this region are always low; our highest is at 0.46%, and we've been pleased to see our numbers creep, yeah, really creep, but still, up over the years. Our potassium levels are fine, but we will be needing to boost our phosphorus levels.

[Kordick Family Farm](#)

Westfield, NC
Zone 7a

Edited 3 time(s). Last edit at 02/22/2022 05:35PM by Brittany Kordick.

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[Mike Biltonen](#)

[Re: spring gypsum](#)

February 22, 2022 05:50PM

"%CEC occupied by calcium" makes more sense. It's still very low.

Registered: 11 years ago

Posts: 298

[Mike Biltonen, Know Your Roots](#)

Zone 5b in New York

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[Michael Phillips](#)

[Re: spring gypsum](#)

February 22, 2022 09:34PM

Another disparity with gypsum should be noted. The calcium cation will displace magnesium on exchange sites on soil particles as part of the balancing act. This turns out to be not necessarily be helpful with my soils where Mg base saturation skews low, on the order of 8 to 10% across blocks. (Similarly, Ca will displace Na in salt-saturated soils but that's another scenario entirely.) We're discussing what 'nudging investments' make the most sense now to increase exchangeable calcium levels.

Moderator

Registered: 11 years ago

Posts: 621

I recall last year, Brittany, you were considering applying calcium silicate—aka Wollastonite—specifically for its potential [soil silica content](#). According to company literature, this mineral is unique among soil amendments as a source of silicon and *carbon-neutral calcium*. (That carbon-neutral bit sounds a lot like gluten-free bananas to me!) I will be experimenting with micronized wollastonite (from BlueGold in North Carolina, no less) this coming season as an alternate means to up spray tank pH when necessary. That's off topic but I bring it into the discussion as yet another calcium influence.

Yet I'm still hanging as regards understanding spring gypsum as a **calcium boost for fruit set metabolism starting at blossom time**. I'm locking in a better price via [USA Gypsum](#) (in Denver, Pennsylvania) for two pallets of pelleted gypsum by freight delivery. Pallet price for 2000# bagged currently shows as \$414 at the warehouse door. The price is right but is it worth it?

[Lost Nation Orchard](#)

Zone 4b in New Hampshire

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