



For:	XXXXXXXXXXXXXXXXXXXX
Email:	XXXXXXXXXXXXXXXXXXXX
Sample name:	Orchard
Test Date:	2/2/2021
Analysis Date:	2/29/2024

Your order information

Order Number:	XXXXXXXXXXXXXXXXXXXX
Current crop and how it's doing:	140 cider apple trees, up to 8 years old, not producing well.
Growing inside or outside?	Outside
Growing in:	Soil
Method of tillage:	No-till
Location:	California Central Coast
Latitude and longitude:	XXXXXXXXXXXXXXXXXXXX
Additional notes:	The water table for the trees is about 10 feet down. Irrigation is drip placed near the trunk. Amended with gypsum and compost in a ring away from the trunk. Aisles are mowed weeds.



Your full analysis reports (OrganiCalc)

Number of pages:	9
Amendment recommendations are on page:	4
Test description:	The pH 2.5 Mehlich 3 soil test shows us what mineral reserves the plants might reasonably be able to access. We use this data to build mineral reserves in the soil. The saturated paste test tells us what the plants are drinking. The irrigation water test tells us which minerals are coming in with the water.

Our comments –

Location Observations	This soil is likely to be a silty clay. Native organic matter 2.5%, pH of 7.5 https://casoilresource.lawr.ucdavis.edu/gmap/
General Observations Water Test	<p>The irrigation water presents a great opportunity for improvement.</p> <p>The bicarbonates in the water are locking up calcium and magnesium both in the soil solution and inside the trees. Irrigation water with bicarbonates over 150 ppm needs to be treated. Yours is 394 ppm. For foliar sprays, bicarbonates should be less than 70 ppm. https://growabundant.com/foiar-feeding/ Fortunately, we have some practical experience with this - our water has high bicarbonates too. Our adventures in acid injection are documented here: https://growabundant.com/bicarbonates-in-irrigation-water/</p> <p>There are two major considerations around implementing an acid injection system to reduce bicarbonates:</p> <ol style="list-style-type: none"> 1) The Maezzi injector is a venturi that works off a pressure differential, so water pressure is reduced. 2) The on-going cost of the acid. <p>There are side benefits to acid injection. The acid will also drop the pH of your water from 7.7. Also, we will have the capability to fertigate the trees. We are trying a surfactant and some fulvic acid here. Also, we are using humic acid to remove our chloramine.</p> <p>The water also has significant sodium in it. The irrigation water's SAR (sodium absorption ratio) is 2.4. Under 3.0, we don't worry about it. However, we may get some additional benefit from gypsum in loosening up the soil sodium.</p>



	<p>There is boron in the water which likely contributes to the excess boron in the irrigated tree samples.</p>
<p>General Observations Soil and Paste Test</p>	<p>We soil sampled the aisles separately, and the trees about 6" outside the mulched area.</p> <p>Adding lots of calcium as gypsum to try and displace the Mg is one possible approach, however not the one we immediately intend to take. This would take away the Na first, then the K, then maybe the Mg. However, we think more Mg will continue to show up on the soil test. There are likely vast reserves of Mg in the soil. Our Mehlich 3 soil test looks at what minerals the trees might be able to access. It uses a pH 2.5 acid extraction. It does not show the total mineral composition of the soil.</p> <p>Right now we are not inclined to try a lot of gypsum to try and reduce the Mg (though we could on a small area). We are in favor of adding gypsum slowly, every 6 months or every year, to supply sulfur and calcium. With trees it is best to take a long view. Eventually lots of gypsum will be applied.</p> <p>Sulfur is low on both the soil and paste tests. We can apply gypsum to the soil immediately to supply sulfur. More sulfur in the soil will maybe help the low Ca, Mg, K levels in the soil solution. However, this is secondary to fixing the bicarbonates in the irrigation water. Fixing the water and feeding the trees available calcium is the priority.</p> <p>There is significant nitrogen in the soil right now, 32 lbs.ac.</p> <p>Paste Test specific</p> <p>There are lots of issues with what the trees are drinking. Calcium is only 10% of target! This jumps off the page! We had to check it is not a typo. This is because the bicarbonates in the irrigation water are locking the calcium into calcium carbonate (limestone). The rain since may have helped this, but we should prioritize feeding the trees available calcium. Hopefully the trees can absorb a foliar feed of Biomim Calcium when they are breaking dormancy.</p> <p>Use clean water, like reverse osmosis water. I'm not sure acid-treated water is good enough for foliar feeding. Apply the Biomim Calcium without mixing it with anything else (for now).</p> <p>Oddly enough, the paste test shows the high soil Mg is locked up by the</p>



	<p>bicarbonates.</p> <p>Even after the bicarbonates in the water are fixed, excesses of Mg in the soil can result in deficiencies in the plant. There is information on diagnostic foliar feeding in the multi-foliar feeding link.</p> <p>Potassium is low on the paste test too. Hopefully this will improve as the water improves.</p> <p>Sodium is high in the paste test because of the sodium in the water.</p> <p>Copper and zinc are low on the paste test. In general they are not that easy to get into solution. Consider applying these as chelated in a foliar spray. There are Biomin versions of both.</p> <p>We could gain some insight into what the rainwater is doing in the soil solution by running a paste test with the deionized water at the lab. Or, better yet, sending in some rainwater and some acidified water. The lab keeps the soil sample for about a month.</p>
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Amendment Discussion – Orchard trees

These are in addition to the notes in the OC Pro pdf.

Recommended Amendments for 8000 sq feet, 6 inches deep	Amt	Units	Notes
Kelp and/or Azomite, combined (for trace minerals)	80	lbs	An optional one-time application of minerals we don't test for.
Feather Meal (12-0-0)	115	lbs	The soil doesn't need N right now. There are 32 lbs/ac nitrate in the soil, which will leach if we get more rain. The organic matter is good at 4.4%, this will supply a good portion of the N requirements. The 75 lbs/ac N is just a ballpark estimate. There are timing guidelines in the separate schedule of recommended spray and fertilizer application timing document.
Gypsum (Solution grade)	101	lbs	This amount is just enough to supply sulfur to the soil. The soil will very likely need this amount of sulfur every 6 months to 1 year. So, over time, the calcium level in the soil will rise with the gypsum applications. Sulfur is an anion (like nitrate N, boron, and moly) and they all leach. https://growabundant.com/sulfur/



BioMin Copper (4% Cu)	19	pints	Copper in an orchard is often applied as a fungicide. We can probably hold off on the Biomin copper until after a tissue test.
Manganese (not Magnesium) Sulfate	22	lbs	Apply it. Low on both the soil and paste tests.
Zinc Sulfate monohydrate	9.7	lbs	Apply it. Low on both the soil and paste tests.



Foliar / Fertigation Opportunities

Foliar Feeding link: https://growabundant.com/foliar-feeding/	
BioMin Calcium with Boron	Bud break through fruit fill
BioMin Manganese	Prior to fruit fill
Maxicrop kelp (0-0-16)	Fruit set through fruit fill
EM-1 or compost tea with molasses and fulvic acid	Late winter / early spring to establish healthy microbe populations

What's Next?

Where to source amendments:	https://growabundant.com/where-to-source-amendments/
How to apply amendments:	https://growabundant.com/how-to-apply-amendments/

Thanks!

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