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HITTING NUTRITIONAL TARGETS

In order to maximize production, many growers annually have a leaf and soil analysis done on their groves to better understand their tree's nutritional needs. A leaf (sometimes called tissue) analysis will reveal the amount of nutrients found in the tree itself while a soil analysis will reveal what nutrients are available in

the soil and in what form. A careful examination of the results from these tests coupled with the appropriate response can make the difference between a successful, thriving grove and a failing orchard. Leaf and soil testing is an integral part of an avocado cultural program.

The purpose of this article is to give the grower some idea of how to reach the nutritional goals determined by

leaf analysis. Reaching these goals can be a difficult task, depending on the deficiency or excess, and the conditions of the grove itself. First, there are no set rules that apply to all groves such as applying 100 pounds of actual N per acre will increase your leaf N levels by 0.5%. There are just too many variables that differ from grove to grove and sometimes tree to tree within the grove to make hard and fast rules. Some of these variables are:

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Soil. Soils can differ significantly even within the same grove and have different effects on the tree's ability to absorb the applied nutrients. For example, when a nutrient is added to the irrigation water and applied to the grove, areas with a sandy soil are more likely to lose nutrients through leaching than areas having more clay in their soil. Clay soils also tend to have a higher cation exchange capacity (CEC) which is a measure of how effectively a soil can hold nutrients. On the flip side, clay soils tend to contain more reactive minerals in their composition that "tie-up" nutrients rendering them unavailable to the plant.

Tree health. A tree with a healthy root system is more capable of absorbing nutrients than a tree with root rot, thus, a root rot infested tree should be pruned to balance the canopy with the root system. Trees undergoing treatment for root rot should be fertilized frequently, but lightly in an attempt to restore the tree to a healthy state. Even with such treatment, it may take a significant amount of time before the infected tree's root system is capable of absorbing nutrients as efficiently as a healthy tree.

Genetic Variability. Some rootstocks are more effective at absorbing nutrients, or in some cases, excluding damaging nutrients. For example, chlorides are one of the essential plant nutrients, but needed in very small quantities. Since many irrigation waters contain high levels of chlorides in them, trees suffer from chloride toxicity, manifested as tip burn which reduces yields and tree health. For years it's been known that some rootstocks are more capable

than others at absorbing chlorides through their root systems rendering the plant more susceptible to chloride toxicity. The Dusa rootstock, is one rootstock that, in addition to being resistant to root rot, also resists chloride uptake.

There are many variables that can play a role in the ability of the tree to take up nutrients, and to name them all would go well beyond the scope of this article. So what methods are available to reach nutritional targets?

As mentioned, multiple variables affect a tree's nutritional status, so as a practical



matter, the grower must concentrate on averages rather than absolutes for each individual tree within the grove. Most groves have different soils, different rootstocks and some areas of root rot that will all impact nutrient uptake. Developing a sense of the differences within the grove and adjusting nutrient application rates within these different areas can help minimize the differences between individual trees and help optimize yields. Ultimately, the best tool available to meet your grove's nutritional targets is careful note taking and annual testing to determine the success of your fertilizer program.

A typical example.

A leaf analysis completed two years ago indicated that grove X had an average of 1.9% nitrogen and 0.6% potassium. The target levels for these nutrients to maximize yields are about 2.35% and 1.25% respectively. Grove X needed a significant amount of both nitrogen and potassium to hit its nutritional targets. To accomplish this goal, three pounds of actual nitrogen and potassium per tree was applied, and a careful record of when and how much was applied during the course of the year was kept. The next year's leaf analysis indicated the concentration of nitrogen found in the leaf had increased to 2.6% and the potassium to 0.9% resulting in a slight excess of nitrogen, but still deficient in potassium. A review of the nutrient removal based on that year's harvest indicated that an average of one pound of potassium per tree was removed in the crop. Based upon the still deficient potassium test and the additional potassium removed in the harvested crop, the amount of potassium was increased to five pounds per tree for



the next year and since the nitrogen was slightly in excess the amount applied was dropped to 1.5 pounds of actual nitrogen per tree. Careful records will be kept for this year's nutrient applications and harvest in an effort to adjust for next year's nutrient applications accordingly. Below is a list of the macro and micronutrients along with their optimal target levels:

MACRONUTRIENTS	
Element	Percent
Nitrogen	2.2 - 2.5
Calcium	1.5 - 2.0
Potassium	1.0 - 1.5
Magnesium	0.6 - 0.8
Sulfur	0.45 - 0.53
Phosphorous	0.13 - 0.18
Chlorides	< 0.5
MICRONUTRIENTS	
Element	PPM or mg/kg
Zinc	40 - 60
Manganese	< 100
Iron	60 - 90
Copper	8.0 - 10.0
Boron	20 - 30

What is actual nitrogen or actual potassium?

Both organic and conventional fertilizers come in various forms containing different levels of an assortment of nutrients. For example potassium nitrate typically has an assay of 13-0-44 which means it contains 13% nitrogen, 0% P2O5 and 44% K2O. Leaf analysis often refer to these same numbers with nitrogen as N, phosphorous as P2O5 and potassium as K2O, but if these levels are expressed as the elements P and K, then a conversion back to P2O5 and K2O

will be necessary to determine the needed amounts. To convert P to P2O5 simply multiply the result shown by 2.29. To convert K to K2O simply multiply the number by 1.2. To convert P2O5 and K2O back to P and K simply divide by these same numbers rather than multiply.

So, let's say you've decided that you need to apply two pounds of nitrogen and three pounds of potassium per tree and your grove is planted at 120 trees per acre and you have 15 planted acres. You've also decided to use urea as your source of nitrogen and sulfate of potash as your source of potassium. Since nitrogen needs no converting and urea has an assay of 46-0-0 and nitrogen is the first number, you would simply take the number 46, which is the % N in the product, and multiply it by the package size, in this case it was a 50-pound bag, which showed that each bag of urea contained 23 pounds of actual N. Similarly, but with one more computation, the 50-pound bag of sulfate of potash had an assay of 0-51-0, which means that 51% of the product was K2O. Since you want to know how many pounds of potassium and not K2O are in the bag you would divide the percentage of K2O (51%) by 1.2, resulting in 42.5% potassium. Thus, each 50-pound bag of sulfate of potash would contain 21.25 pounds of potassium (50 lbs x 42.5%).

The last step is to determine how many bags of urea and sulfate of potash are needed to supply your target application rates of two pounds of nitrogen and three pounds of potassium per tree. Since there are a total of 15 planted acres at density of 120 trees per acre, the total tree count



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would be about 1,800 trees. Accordingly, you would need 2 X 1,800 or 3,600 pounds of nitrogen and 3 X 1,800 or 5,100 pounds of potassium to supply the targeted nutrients in the proper amounts. As noted above, since each bag of urea contains 23 pounds of actual nitrogen, you would need 3,600/23 or about 157 bags of urea and 5,100/21.25 or 240 bags of sulfate of potash per acre.

What about trace nutrients?

Your grove not only needs macronutrients such as nitrogen, phosphorous and potassium, but other nutrients in much smaller quantities such as iron, copper and zinc. If your leaf analysis shows a deficiency in one of these elements, it's usually only needed at very low concentrations. Don't be fooled into thinking that just because significantly lower amounts are needed they are less important than macronutrients. In fact, a micronutrient which is found to be deficient, or in excess, can have just as much of an impact on yields as a high or low level of a macronutrient. In summary, it's important to keep all nutrients regardless of their amounts within the proper nutritional target ranges to ensure maximum production.

Closing thoughts

Wouldn't it be nice if our tree's nutritional needs were as predictable as our own bodies? This author can tell you with a high degree of certainty and through years of experimentation that consuming one "Big Mac", large fries and a Coke for lunch every day for a week will result in a five pound weight gain. If only our trees

were as predictable, growing avocados would be so much simpler.

JOHN CORNELL, NEWSLETTER EDITOR

SUPPLY UPDATE

The US market has maintained high sales prices and grower returns in 2017. California fruit has successfully garnered a significant premium over imports. This wide margin speaks to the value that consumers place on freshness and flavor. Cosmetics have been excellent on the California crop this year.

We are in the beginning steps of a transition phase in the market. At press time, California was over 70% complete with its harvest. High prices and a small crop have caused the fruit to move to market earlier than ever before. At current harvest levels, California is on track to be through its critical mass by late July/early August.

June is the last month of old-crop shipments from Michoacan. They will transition into Flor-Loca and new crop in July. All eyes are on this transition this year, as the 2016 transition was the nucleus that placed into motion the \$40+ prices that have been enjoyed for most of the last 12 months.

Mexico shipped 20% less fruit during the first six months of this season (July - December). In February and March, they shipped just 5% less than the previous season. In May, they shipped 3-4% more than they did in 2016. This tells us that Mexico will likely

have more fruit for June 2017 than they did last year. Early reports are that the Flor-Loca is medium-to-light, although this will be partially offset by new plantings of Mendez Hass that tend to have earlier fruit



than conventional Hass. High prices will provide incentives for growers to harvest early. Jalisco will not have access to the US market, but will ship to Asia and Europe. Peru has fully begun arriving in the US 3

weeks earlier than last year. Early shipments are heavy to the East coast. Customers have shown greater acceptance to Peruvian fruit after the market volatility of 2016.

The rains this season were welcome throughout California. Bloom has been heavy in all districts, from Escondido to San Luis Obispo. There is cautious optimism that California will alternate to an on-crop for 2018.

This optimism is visible in the market as well. People continue to demand more avocados. During the second week of May in 2016, there were 47.8 million pounds of avocados sold in the US. During the same week in 2017, we had 45.8 million pounds available. This is a supply drop of 4.2%. During the same time period, FOB prices were \$31 per lug in 2016 and over \$50 per lug in 2017. This represents a 61% increase in value and is good news for growers.

GIOVANNI CAVALETTI, V.P., SOURCING

FOOD SAFETY

Food Safety Update from the Field

For the growers who have decided to move forward with a GFSI audit in their orchards, it is important to keep current on your employee training and chemical use reports.

Does Round-Up have a Pre Harvest Interval?

Some growers have been surprised to find out that Round-Up has a Pre-Harvest Interval (PHI) of 14 days. During recent

ranch food safety audits, the auditors have been paying close attention to the application date of herbicides and the logged reentry and harvest dates of those blocks that were treated. Paying close attention to your weed control applications, and your harvesting schedule will help with any unexpected surprises during your next pre-audit inspection.

Employee Training

Keeping current on employee training is important for your food safety program. GFSI certification requires quarterly worker training at the first of the season. Training material should cover worker hygiene and company policies. Index Fresh can help by supplying topics and hand outs to assist you in keeping your training documentation current.

If you have any questions, or would like to schedule an appointment to review your food safety program, please contact Lisa Strickland, (Index Fresh Field Food Safety) or your Field Representative.



Contact information is on the back of this newsletter.

KEITH BLANCHARD, CALIFORNIA FIELD COORDINATOR,

LISA STRICKLAND, FIELD FOOD SAFETY



FRESH FACTS
PICKED DAILY

The Fresh Facts app from Index Fresh is your daily look into the world of avocados. Get useful avocado market information — from bin counts to price estimates to inventory and shipping information — right at your fingertips, every day.

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THE INSIDER BY INDEX FRESH IS A
COMPLIMENTARY RESOURCE FOR
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GLOBAL PRODUCTION

Global demand for avocados continues to rapidly increase. In the United States, Europe, Asia or Latin America, consumers are buying avocados for the first time or rapidly increasing the size of their annual purchases. Demand is being driven by avocado’s health benefits, new usages, the “buy-in” of professional chefs and

increased year-round availability. In order for demand to continue to grow, avocados must be available every day of the year to satisfy retail and food service customers.

In order to better understand where the supply of avocados will come from to meet this growing demand, the following table lays out the attributes of Hass producing countries, including; acreage, production volume, season, major markets, and

whether they are active in the U.S. market. As we look into the future, these countries will be the players in the global avocado market, at times competing with California, but also contributing to increasing demand and building markets in the U.S. and overseas.

DANA THOMAS, **PRESIDENT**

Global Hass Production

Country	Hass Acres (thousands)	Hass 2016 Production (million lbs.)	Season	Major Markets	Active In U.S.	Amount Exported to U.S. in 2016 (million lbs.)
Allowed into the U.S.						
California	51.1	365.8	Feb - Oct	U.S. / Asia	Yes	365.8
Mexico	490.5	3,826.90	Jul - Jun	Dom. / U.S. / Asia	Yes	1,718.70
Chile	64.9	557.5	Aug - May	Dom. / Europe / U.S.	Yes	55.8
Peru	61.7	589.4	Mar - Sep	Dom. / Europe / U.S.	Yes	71.9
Dominican Republic	1.9	8.5	June-Sep	U.S. / Domestic	Yes	4.1
New Zealand	9.2	86.9	May - Apr	Dom. / Asia / Australia	No	0
Israel	10.1	105.5	Aug - July	Domestic / Europe	No	0
Spain	15.8	89.2	Sep - Apr	Europe	No	0
Total	705.2	5629.7				2216.3
Not Allowed into U.S., but pursuing entry						
Colombia	31.6	151.6	Jan - Dec	Europe / Domestic	No	N.A.
South Africa	17.7	138.2	May - Oct	Europe / Domestic	No	N.A.
Total	49.3	289.8				
Not allowed into U.S., not pursuing entry						
Brazil	5.4	16.7	Feb - Nov	Europe / Domestic	No	N.A.
Kenya	4.0	44.6	Mar - Oct	Europe	No	N.A.
Argentina	0.7	4.5	May - Nov	Europe / Domestic	No	N.A.
Australia	22.2	123.2	Jan - Dec	Domestic	No	N.A.
Morocco	7.7	17	Mar-May	Europe/ Domestic	No	N.A.
Total	40.0	206				
Grand Total	794.5					

NOTE: This data is derived from a variety of sources and will be revised as updated information becomes available.



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EVENTS

We look forward to seeing you at our next seminar, this Fall. Stay tuned for more information on our website or via app notifications.

Access the calendar section of our app for more industry events.



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