



THE UNIVERSITY OF ARIZONA,
Cooperative Extension

Taking the University to the People



The Arizona Citrus Newsletter

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A Note from the Editor...

This issue marks the resumption of the Arizona Citrus Newsletter after a 36-month hiatus. Due to budgetary and personnel constraints, we are no longer able to print and mail the Newsletter, so you will find it in your inbox as an Adobe Acrobat (*.pdf) file. We hope to have 12 issues per year.

The new format will not only be more cost-effective, but will allow for several advantages over the paper version. For example, the new format allows for the use of color. Also, we will be able to add hyperlinks so that relevant links to the internet can be accessed directly from the article of interest.

If you have any suggestions, questions or comments, or wish to be added or removed from the mailing list, please contact me.

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Leaf sampling for tree fertility determination

Glenn Wright

Introduction

July through September is the time to sample your citrus tree leaves to determine tree fertility needs. While visual analysis of nutrient deficiency symptoms is useful, the presence of visual symptoms indicates that there are serious nutritional problems that should have already been addressed. Incipient nutrient deficiencies, which are not always apparent but can cause reduced yields and lower fruit quality, can be detected early by using leaf nutrient analysis.

Leaf sampling of mature trees can help to determine tree nutrient status. Nitrogen, phosphorus, iron, manganese and zinc are

Recent Citrus News, Information and Headlines

Brazil confirms new citrus greening disease strain

<http://www.aebrazil.com/highlights/2004/jul/15/43.htm>

Australia has First Outbreak of Citrus Canker in 11 Years

<http://quote.bloomberg.com/apps/news?pid=10000081&sid=a8W0QxF5uy6g&refer=australia>

California Orange Grove Free of Citrus Canker, but Smuggling probe Continues...

http://www.venturacountystar.com/vcs/county_news/article/0,1375,VCS_226_3017825,00.html

nutrients of particular importance in Arizona citrus. Leaf analysis allows a producer to quantify nutrient uptake of the tree, evaluate the nutrition of the tree at a particular time, and compare those results with results from previous sampling dates, and with optimum nutrient levels. Using this information, appropriate fertilizer management decisions can be made. The cost of laboratory analysis and the labor costs associated with leaf collection and preparation are small in comparison with the costs of fertilizer, lost yield and reduced fruit quality that may be incurred when nutrient excesses and/or deficiencies are not prevented. Photos and descriptions (in English and Spanish) of the most common nutrient deficiency symptoms found in Arizona citrus can be found at <http://ag.arizona.edu/pubs/crops/az1007/>.

Selecting the trees to be sampled

It is very important that sampled leaves be collected from similar trees to ensure the most accurate results. The following steps should be taken to ensure uniformity:

1. Partition the grove into units no larger than 20 acres. Larger units are more likely to be less uniform, leading to erroneous results.
2. Ensure that the trees sampled within a unit are the same age, same variety and same rootstock. Trees sampled should not be less than 4 years old. Nutrient uptake varies depending on variety and rootstock; therefore every scion/rootstock combination should be sampled individually.
3. Make sure that all trees sampled are free of disease and excessive insect damage.
4. Within the unit, choose trees at random. Use a zigzag, or diagonal pattern, and avoid choosing trees on the periphery of the unit. Select 75 to 100 leaves per unit, and one or two leaves per tree.

Choosing leaves to sample

As with trees, certain guidelines should be followed to guarantee the most accurate results. These are as follows:

1. Choose leaves from non-bearing shoots. Research shows that nutrient content of leaves on bearing shoots is more variable than on bearing shoots. Also, it is best to select from shoots that have no lateral branching.
2. Select fully-expanded leaves from the spring (new) growth flush (Fig. 1). Leaves should be at least four months old. Do not choose leaves that are too old or too young, these leaves will not accurately reflect the nutrient status of the tree. Do not choose the terminal leaves (shoot tip) of a branch,

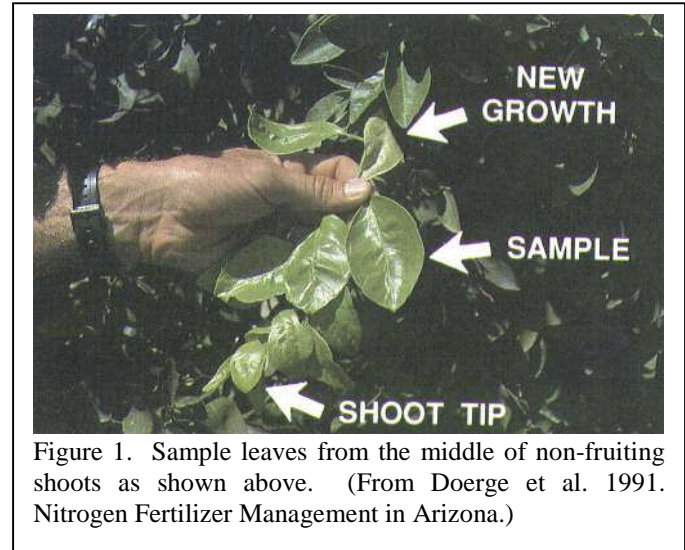
Upcoming Meetings

- **July 27th and 28th** - *Safe Food 2010 ... Food Safety from the Field to the Table conference* Holiday Inn Select, 4300 E. Washington Street, Phoenix, AZ 85034. 8:00 a.m. Fee involved. For more information contact mconner@ag.arizona.edu, or 602-470-8086.
- **August 25th** - *University of Arizona Cooperative Extension 11th Annual Maricopa County Summer Short Course "Two Tough Weeds"* - Biology, Ecology, and Control of Purple Nutsedge (*Cyperus rotundus*) and Annual Bluegrass (*Poa annua*). 5.5 CEU Arizona Hours Granted, .50 GCSAA Education Points Granted. For more information contact Kai Umeda kumeda@ag.arizona.edu 602-470-8086 x-314.
- **September** – Annual Citrus Workshops in Phoenix and Yuma. Dates and locations to be announced.
- **November 3rd** - *CRB-UCCE Citrus Growers' Research Educational Seminar*
Details: 9:00 A.M. - 1:30 P.M.
Topics include: Using compost/mulch (basic background information, pros and cons, local area examples); Glassy-winged sharpshooter impact on citrus and update on Pierce's disease in desert grapes; Info. on lemon varieties for the desert; Using new budget calculator software.
Location: Indian Palms, 48630 Monroe Street, Indio
Contact Info: Phone the CRB office at (559) 738-0246 or e-mail Info@citrusresearch.org

terminal leaves typically have lower nutrient levels.

3. Choose several non-shaded leaves at a uniform height for several positions around the tree. For example, the sampler might choose two leaves from each of the north, east, south and west points of the tree, about 4 to 5 feet above the ground.

4. In healthy units, choose leaves without obvious nutrient deficiency symptoms. If samples are taken in



areas with special nutrient problems, these leaves should be handled as a separate sample. In weak areas, choose leaves that appear to be healthy, or only slightly-affected leaves, rather than those that appear to be most affected.

Handling the Leaf Samples

Proper handling of the leaf sample is essential. Leaves should be placed in a marked paper bag, and protected from too much heat. An ice chest is an excellent place to place leaves when sampling is not complete. Leaves can be stored overnight in the refrigerator.

It is best to choose a laboratory that will wash the leaves as part of their analysis procedure. Otherwise, wash each leaf carefully with cold water, pat dry with a paper towel, and place in a new paper bag. Bags can typically be requested from the laboratory.

Along with the samples, laboratories typically require the full name, address, and telephone and fax number of the person to whom results should be addressed; the full name, address, and telephone number of the person to whom an invoice should be addressed; the purchase order number if

Why do the leaves appear chlorotic, but the analysis shows sufficient levels of iron?

This situation can sometimes occur when trees are grown in calcareous soils, such as those in Arizona. In this case, iron exists as precipitates within the leaf, but is not available for use by the chloroplast, and thus cannot help the leaf to appear green.

Arizona Citrus Resources

- **Arizona Crop Information Site (ACIS)** Click on "Crops", then on "Citrus"
<http://ag.arizona.edu/crops/crops.html>
- **2002 Citrus and Deciduous Fruit and Nut Research Report** (2001 Research)
<http://cals.arizona.edu/pubs/crop/s/az1303/>
- **Arizona Citrus Research Council and 2003 Citrus and Deciduous Fruit and Nut Research Projects** (2002 Research)
<http://agriculture.state.az.us/CD&P/citrus.htm>
- **Other University of Arizona Citrus Publications online**
Type Citrus in the "Title contains" box, then press "Show Publications"
<http://pubs1.cals.arizona.edu/search/srch.cfm>

Citrus Resources from other States

- **University of California Citrus Publications**
<http://anrcatalog.ucdavis.edu/>
- **University of Florida Citrus Publications**
<http://edis.ifas.ufl.edu/>
- **Ultimate Citrus Newsletter**
A Florida site that contains a great variety of information and links
<http://www.ultimatecitrus.com/>

appropriate; complete and unique sample descriptions; and a detailed list of analyses to be performed for each sample.

Choosing the Laboratory

There are many laboratories around the United States that can provide accurate results with a quick turnaround time. Laboratories in California and Arizona or other citrus-growing areas typically provide guidelines for critical and desired nutrient levels for citrus as well as interpretation of the results at no extra charge, while those in non-citrus growing areas will not provide this service. Labs that process a higher volume of samples will typically have lower per sample prices. Prices can vary widely, so it is a good idea to shop around. In any event, it is best to choose a laboratory and stay with it. Consistency in laboratory procedures will minimize the variability from one sample to the next.

Interpreting the Results

If the laboratory does not interpret the results, then interpretation may be done by the producer. Table 1 provides some guidelines.

Table 1. Mineral nutrition standards for leaves from mature orange trees based on dry-weight concentration of elements in 4 to 6 leaves from non-fruiting branch terminals.

element	unit	deficiency	low	optimum	high	excess
N	%	2.2	2.2-2.4	2.5-2.7	2.7-2.8	3.0
P	%	0.9	0.09-0.11	0.12-0.16	0.17-0.29	0.3
K (Calif.*)	%	0.40	0.40-0.69	0.70-1.09	1.1-2.0	2.3
K (Florida*)	%	0.7	0.7-1.1	1.2-1.7	1.8-2.3	2.4
Ca	%	1.5	1.6-2.9	3.0-5.5	5.6-6.9	7.0
Mg	%	0.16	0.16-0.25	0.26-0.6	0.7-1.1	1.2
S	%	0.14	0.14-0.19	0.2-0.3	0.4-0.5	0.6
Cl	%	?	?	<0.03	0.4-0.6	0.7
Na	%	?	?	<0.16	0.17-0.24	0.25
B	ppm	21	21-30	31-100	101-260	260
Fe	ppm	36	36-59	60-120	130-200	250?
Mn	ppm	16	16-24	25-200	300-500?	1000
Zn	ppm	16	16-24	25-100	110-200	300
Cu	ppm	3.6	3.6-4.9	5 - 16	17-22?	22

*California and Florida recommendations for K are sufficiently different that they are presented separately. The California standards are for production of table navels and Valencias, and those for Florida were developed primarily for juice oranges like Valencia.

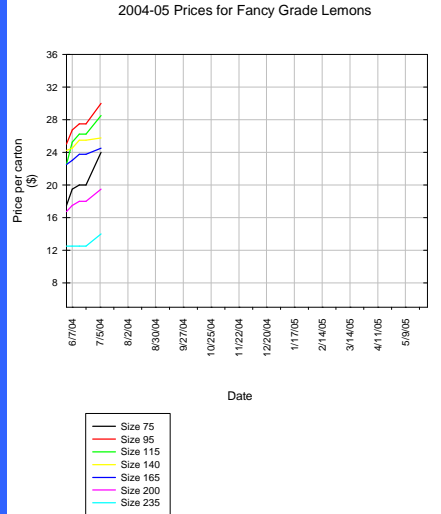
From: Kallesen, C. 2003. Fall Leaf Tissue Samples Important For Maintaining Citrus Growth, Fruit Quality and Yield. Topics in the Subtropics Newsletter, Vol. 1, Issue 3.
<http://cetulare.ucdavis.edu/pub/Subtropics%20Fall%2003.pdf>

While this table is for oranges nitrogen deficiency values for other citrus varieties are slightly different. Research on grapefruit suggests a deficiency value of 1.9 to 2.0% N, and studies on lemon suggest a recommended optimum N value of 2.2 to 2.4%.

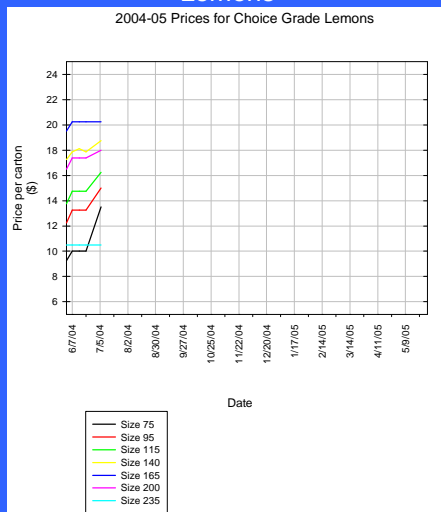
Leaf nutrient data can be used to determine the rate and type of fertilizer which needs to be applied. The overall goal is to optimize annual fertilizer application to produce higher yields of marketable fruit. Records of annual fertilizer applications and management practices will be necessary to interpret leaf nutrient values.

Citrus Prices

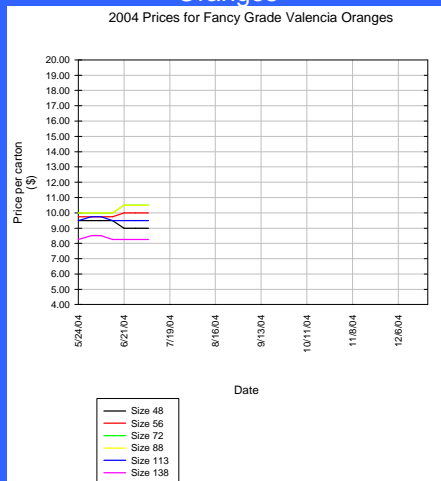
Los Angeles FOB Prices for Fancy Lemons



Los Angeles FOB Prices for Choice Lemons



Los Angeles FOB Prices for Valencia Oranges



NEWS Flash.....Mosquitoes really suck!

Chris Sumner, Manager Yuma County Pest Abatement District

Nothing newsworthy in that statement, but is there more to this than an itchy welt?

At this point, if you haven't heard about mosquito-transmitted diseases like West Nile, you must have been off the planet, so what's new?

Here are some mosquito facts that may be useful.

1. Not all mosquitoes can transmit West Nile virus. The real troublemakers are active only after dark, and are NOT aggressive biters. The mosquitoes that are abundant during the monsoon season about a week after a rain or a heavy irrigation that didn't perk for 4-5 days, often attack by the 1000s even in the afternoons, and belong to a different group entirely. This group is collectively known as "floodwater mosquitoes", of the genus Psorophora or Aedes. Floodwater mosquitoes present little risk of disease transmission compared to the timid night flying "vector mosquitoes" of the genus Culex.

These floodwater mosquitoes are often a bi-product of human enthusiasm for irrigating the desert. As with most things, more is not always better. If irrigating 2 inches is adequate for crop needs, 6 inches will give a bumper crop of mosquitoes and little else.

- **Take home message:** Bring your irrigator up to speed on how much water is enough. Over irrigating is not only wasteful, unnecessary but can have side effects that "really suck".

2. Protect yourself and your employees from mosquito bites. Just like using seat belts, this is a no-brainer, but few people actually use repellents. There are a thousand excuses why not, but this is a real "prevention is better than cure" situation. Those unlucky people who develop the more severe form of West Nile disease have the rest of their lives to be remorseful over not taking simple precautions. They will deal with a long list of on-going problems often including paralysis, profound fatigue, loss of cognitive function etc. Protect yourself, use repellent!

- **Take home message:** Put a can of repellent in every vehicle where it will be seen and used. Tell your staff of the risks of West Nile, and how to protect themselves.

DEET repellents work the longest and best, some other kinds are effective, many are not. Information on repellents is available at the local UA Cooperative Extension office; Tel# 726-3904 in Yuma.

3. Do you have ponds, lagoons, tailwater areas, livestock troughs, culverts, or ditch turnouts etc on your property that breeds mosquitoes? A quick look at the water will tell you if there is a problem. The larvae are ¼ to ½ inch long, worm like and wiggle in the water; the pupae are comma shaped and tumble down from the surface if they observe movement. If you see anything like this in the Yuma area, call either Yuma County Pest Abatement District at 726-1030, or Yuma County Health Department at 317-4584, so they can check it out and eliminate the mosquito breeding, all at no charge!
 - **Take home message:** Check around your house, corrals, backyard and irrigated acreage for areas large or small that hold water for weeks rather than days. Dump out pet water dishes *at least* weekly. Larger water troughs can have fish added to control mosquitoes. *If you breed them, you feed them*; I know it's corny but it's true.

Is this for real?

As of July 26th, 163 human cases of West Nile infection have been confirmed in Arizona. About two thirds of these cases presented with neuro-invasive disease, and 2 patients have died. These numbers will continue to rise during the summer, so don't be a statistic, protect yourself. Use repellent; avoid unnecessary outdoor activity after dark, check for mosquito breeding.

West Nile symptoms:

Symptoms may range from none to fever, severe headaches, stiff neck, body rash to more severe involvement of the meninges, brain and spinal cord. This neuro-invasive form of the infection can result in profound fatigue, difficulty in movement, flaccid paralysis, confusion, Parkinsonism, coma, and occasionally death. The incidence and severity of symptoms is greater in patients over 50 years of age. Diagnosis requires testing of blood or cerebro-spinal fluid for West Nile specific antibodies. No vaccines are approved for human use at this time. Medical intervention is primarily supportive care. Recovered West Nile patients are thought to have life-long immunity.

Track West Nile on the following website:

http://www.westnileaz.com/wnv_update.htm

