University of California Cooperative Extension Subtropical Horticulture News

Quarterly Newsletter for Subtropical Horticulture Growers in Riverside & San Diego Counties
Vol 1, Issue 2

Note from the Editor:

Hello Subtropical Horticulture Community! I would like to thank you for joining me for our second edition of our local quarterly newsletter specifically for Subtropical Horticulture stakeholders in Riverside and San Diego Counties.

We had a busy Fall and early Winter season, so far. With the Macadamia and Date Palm Field daya,we had great turn outs and growers where showered with useful information. The Avocado Production Course for new growers has come to an end, however, we are getting ready for our first Citrus Production Course which will be held in Riverside starting in March 2020. Our free Avocado Grower seminars are in their final phases of planning and are gearing up to start in February.

We want this newsletter to be valuable for you so *please,* share your feedback and suggestions to help us improve. Don't forget to sign up for the quarterly newsletter, Topics in Subtropics (Please contact Lea O'Reilly and request to be placed on my email list (lboreilly@ucanr.edu) and join the Topics in Subtropics Blog, to subscribe click on the link: https://ucanr.edu/blogs/blogcore/subscribe.cfm

Sonia Rios

Subtropical Horticulture Farm Advisor

Riverside & San Diego Counties

Macadamia Production in California-a Hidden Gem of an industry?

Sonia Rios, Subtropical Horticulture Farm Advisor- UCCE Riverside/San Diego Counties
Gary Bender, Subtropical Horticulture Emeritus Farm Advisor- UCCE San Diego County
Ben Faber, Subtropical Horticulture Farm Advisor- UCCE Ventura

Most of the nut acreage in California can be found in the Central Valley. There you can find almonds, pistachio, pecans, and walnuts, however what you won't find is the macadamia tree. The macadamia tree can be found in high humidity subtropical climates such as coastal Southern California and some parts of the central coast. The bulk of the macadamias that are grown in California are grown in the San Diego County area. Most of the crop gets sold at farmers markets and other local venues, and through a small cooperative, the Gold Crown Macadamia Association. Macadamia nuts have the hardest shells to crack of the California nuts. The process of cracking the nuts also makes them a rare and expensive treat. The macadamia nut tree is a medium-sized evergreen tree with heavy, dark green foliage that is native to Australia. Hawaii is the leading macadamia-producing state in the US, and major global competitors for macadamias include Kenya, Costa Rica, South Africa and Australia.

Macadamias are in the Proteaceae family, and the two species which are grown are *Macadamia integrifolia* and *M. tetraphylla.* The tetraphylla species is thought to be more tolerant of cold temperatures and is primarily grown in California. The integrifolia species is more suitable for tropical countries and is grown in Hawaii for their macadamia industry.

California History

In 1879 Professor C. H. Dwinelle of the University of California, Berkeley obtained seeds of *M. integrifolia i*n Australia and planted the first known trees in the state along a creek in Berkeley. However, it wasn't until around 1910 that 2 nurserymen in Southern California, Ernest Braunton and Charles Knowlton placed the first macadamia seedling tree, a tetraphylla selection for sale. Though trees had been sold in Southern California for a few decades, it wasn't until 1946 that Wells W. Miller and Vernon A. Nuthall founded the M and N Nursery in Vista, CA and became the first to specialize in and promote the macadamia as a replacement for avocados that had died on phytophthora root-rot infested lands. Currently, the California macadamia industry has 3 major varieties that are used, 'Cate' (*M. tetraphylla*), 'Beaumont' (a hybrid between *M. tetraphylla* and *M. integrifolia*) and 'Vista' (a hybrid).

Biology

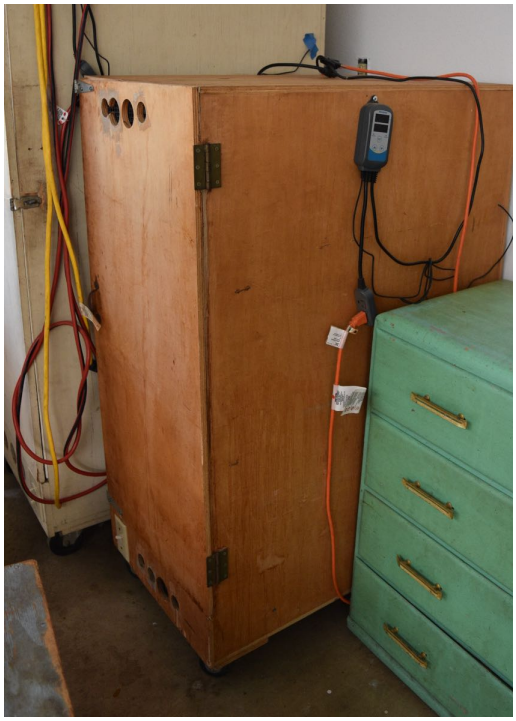
For commercial production the trees are propagated by grafting. Macadamias are a long-term crop taking an average four to five years from planting before cropping commences, seven years before commercially viable yields are produced and 10 to 12 years before breakeven. However, they have been known to live up to and keep producing up to 100 years old. The trees are evergreen and everbearing; they have leathery leaves much like holly that are shiny and 7-12 in long. Integrifolia leaves are smooth sided and the tetraphylla leaves are somewhat spiny along the edges. The trees themselves can grow up to as much as 60 ft high in the tropics, but usually about 25-30 ft high in California. Many of the selections are alternate-bearing, meaning alternate years produce light then heavy crops from a single tree. The 'Cate' variety does not show very much alternate bearing and is the preferred variety in California.

They produce clusters of flowers (known as racemes) that are white or pink; about 300-600 flowers appear in sprays. The flowers are perfect but incomplete, they lack petals. The flowering of the trees occurs over a four to six-month period. The trees have bee-pollinated flowers, so beehives are usually imported into the orchards. Each flower spray produces up to 20 nuts, which have green, fibrous husks and hard, outer shells called pericarps. The shells do not split in the tetraphylla selections on the tree, but sometimes split as the nuts ripen on the trees in the some of the hybrid selections. Each nut (including the kernel in its shell) is approximately ½ in to 1 in. in diameter. The nuts mature at different times over the course of the year but most of the crop in California will fall to ground from late fall through spring. It is recommended to collect the nuts from the ground because shaking the trees will knock down immature nuts.

Common Cultivation Practices

Macadamia trees require rich soil, about 50 in of rain per year (in the tropics) or supplemental irrigation in California (about equal to an avocado tree) and temperatures that are not only frost-free but that vary within a limited range. The soil must also drain well as the trees do not do well in clay soils as the trees' tap roots cannot survive in such heavy soils (most of the tree roots are located on the top 3 feet of the soil line). Most growers use drip systems or micro-sprinklers in their orchards to conserve water. It is highly recommended to use mulch to reduce water loss and tensiometers or other types of moisture-monitoring equipment will be helpful with irrigation management. The ideal soil pH for macadamias is 6 to 6.5. To raise pH levels, one would add either

Photo to the Left: Drying racks



lime, wood ashes, organic matter, or seaweed. If pH levels are too alkaline, growers will add sulfur, or peat moss and run acid fertilizer.

As mentioned, ripened and un-ripened nuts look identical, so growers usually wait until the nuts fall to the ground and harvest multiple times a season. The nuts are harvested through a complicated process that includes clearing weeds and debris from underneath the trees, gathering by hand or picking them with a mechanical picker (including golf-ball retrievers). In Hawaii, blowers are sometimes used to blow the nuts and fallen leaves into windrows so they can be collected by machine, but this can seldom be done in California due to the hilly terrain. Nuts are immediately run through a de-husking machine and then air dried on racks for two to three weeks. The drying is necessary to prevent mildew and rot. Heat drying is then usually done to finish the process. This could be done at temperatures of 95 to 110 degrees for about 2 to 5 days. The nuts are then packed in heavy plastic bags for storage and shipping.

Pests

Macadamias are susceptible to vertebrate pests such as squirrels, gophers, and rats. Squirrels and rats can cause erosion and damage the developing macadamia nut. Gophers will chew on the roots, weakening them making it to susceptible to root rots. Traps seem to be the most commonly used practice in the industry.

Stink bugs and navel orange worms (NOW) are considered moderate pests of macadamias but usually not to the point where treatment has to occur. Navel orange worms can be quite a challenge to control because the larvae live inside and cause damage in the growing nut making it difficult for pesticide application. Green stink bugs can also cause havoc in a macadamia orchard. They use their stylet to pierce through the nut causing mold and pathogens to reproduce, resulting in a discolored ruined nut. Stink bug damage can be reduced by removing compost piles away from the orchard, they use these piles for reproduction and shelter.

Above: Rat damage

Besides being a tasty treat macadamia nuts are an excellent source of iron, calcium, vitamin B, and phosphorus. Although they contain 73-80% fat, the fat is monosaturated or "good" and as acceptable as olive oil in many diets. So, the demand for local macadamias is at an all-time high. However, macadamia production in California will continue to struggle and be threatened due to water and land prices in San Diego County. They are a labor-intensive commodity and will take many years for growers to get a return profit. In our experience, California macadamias growers seem to enjoy growing their nuts and despite the slim profits look forward to working the farmer's markets and the companionship of the other farmers and their customers.

Work Cited

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2019 Macadamia Field Day

Sonia Rios

The macadamia tree can be found in high humidity subtropical climates such as coastal Southern California and some parts of the central coast. Once a year the states macadamia growers meet for a field day. The field day helps the growers stay current on industry news, the current market, and any new research that is taking place. The field day also serves as a refresher training seminar in basic cultivation practices such as irrigation, propagating, fertilizing, and pest management. The 2019 Macadamia field day was held in Fallbrook on September 21st. Speakers included Gary Bender, UCE, Sonia Rios, UCCE, and Niamh Quinn, UCCE. Rios spoke about how unpredictable the weather has been and the consequences of these natural disasters. This included winds, fire, drought, excessive heat and excessive cold. She stressed the importance of watching the weather and proper irrigation techniques can make a dramatic difference in most of these situations. Dr. Quinn gave an excellent review on vertebrate pest management. She focused on rats, squirrels and gophers and how to manage them in macadamia orchards. She brought along her taxidermy rodents for ID

purposes and different traps in which she recommends growers use for specific pests. There was as also a tour of a grower's macadamia production set up at his home, along with macadamia. orchard tour. Dr. Gary Bender did an air grafting demonstration and suggested to the growers that this method could be successful in macadamias. He also gave a quick recap on grafting.

Avocado Production Course Wraps Up Another Year

Gary Bender UC ANR Emeritus Farm Advisor and Farm Advisor, Sonia Rios wrapped up the 7th Avocado Production Course in Escondido. The class was held at the new San Diego Farm bureau location and had a total of 28 students this year. The class was held once a week in two-hour block period for 7. weeks. The class is targeted at new growers to help guide them to become successful avocado growers. Every student was given a copy of Gary Benders Avocado Production manual and a copy of the UC ANR Avocado Pest Management book.

The students learned about avocado physiology, grafting, nutrition, irrigation, planting and pest management. The class also took two field trips and visited growers and observed different types cultivation practices, including high density plantings. This gave the students a hands-on approach

from what they learned in class. We look forward to seeing more new growers in the fall of 2020!

Photos below: Gary Bender shows the class his high-density trial in Valley Center, CA.

2019 Date Palm Field Day – November 21, 2019
THERMAL, CA

Commercial dates, *P dactylifera*, the date palm, are produced in the United States. California produces the largest amounts of dates, followed by Arizona. These two states account for almost all US date production. Most date production takes place in the Coachella Valley, Riverside County, CA; Imperial County, CA; and Yuma County, AZ. The principal date cultivars produced are 'Deglet Noor' and 'Medjool'. In 2017, California produced 35,000 tons of dates from 9,900 acres. Yield per acre was 3.82 tons, priced at $2,840 per ton. The total value of the crop was $98.8 million ("Noncitrus Fruits" NASS, 2018).

Every few years the UCCE collaborates with other government agencies such as the USDA/ARS, CA Date Commission and UCR to host a date palm field day. During these field days growers from California, Arizona, and even Mexico come and learn about all the most recent research that is happening in date palms. Growers take valuable information from these meetings, which in general will help them become more productive, competitive. in the world market, and more sustainable.

This year there were over 65 growers, producers, farm managers, and other date stakeholder present.

5th Annual Riverside County Agriculture Summit

Sonia Rios

The California Agriculture Summit brings a diverse agricultural stakeholders together to spur a dialogue on resource challenges faced by growers and ways that research and technology can be part of the solution. The 2019 Ag Summit took place in Palm Desert on November 20 to support and promote our world-class agricultural industry. The summit had a great line up of speakers who stressed the importance of agriculture to the state's and County's economy. Just to name a few speakers, Karen Ross, California Secretary of Agriculture, Ruben Arroyo, Riverside Ag Commission, and Supervisor Manuel Perez were present and gave ethicistic presentations. There were many vendors present, including the University of California Cooperative Extension (UCCE) Riverside office, which also included a liaison from the Master Gardner Program. Noreen Shein, Office manager and 3 Farm Advisors were present to answer questions about their programs and handed out educational and informational handouts. Program posters were also on display. We look forward to next year's Summit.

(Left) Karen Ross, California Secretary of Agriculture visited the UCCE table and asked about our current programs. (L to R – Jose Aguilar, Vegetable/Small Farms Advisor, Noreen Shein, office Manager, Sonia Rios, Subtropical Horticulture Farm Advisor, Karen Ross)

(Above) Photo by: Riverside EDA

(Left) Photo by: Lisa Brandl- Karen Ross speaking.

UCCE Riverside-San Diego Out and About

Grow Riverside Conference: October 2, 2019 (Left)

UCR Pumpkin Festival: October 26,2019 (Above)

San Diego County Farm Bureau Ag Expo: November 6, 2019 (Left/Below)

Announcements for Upcoming Events:

University of California Cooperative Extension

Citrus Production Course for New Growers

March 12, 2020 – May 5, 2020 (8 Week course)
Tuesdays, 9:30am -11:30am
Location: 4500 Glenwood Dr # A, Riverside, CA 92501
(Riverside-Corona Resource Conservation District building)

Cost: $325
Cost includes class materials:
UC ANR Citrus Production Manual – *second edition* (retail at $75)
Integrated Pest Management for Citrus—*third Edition* (retail at $40)
Weed Pest Identification and Monitoring Cards (retail at $25)
Please register at: http://ucanr.edu/survey/survey.cfm?surveynumber=28699

Coffee, water, and snacks will be provided at every class

Syllabus- Spring 2020

Date (Tuesdays)	Topic	Speaker	Email Contact
March 17, 2020	California Citrus History	Sonia Rios	sirios@ucanr.edu
March 17, 2020	Physiology and Phenology	Dr. Ashraf El-Kereamy	ashrafe@ucr.edu
March 24, 2020	CCPP Program/grafting	Dr. Georgios Vidalakis	georgios.vidalakis@ucr.edu
March 24, 2020	Field Establishment/Soils	Dr. Gary Bender	gsbender@ucanr.edu
March 31, 2020	Nutrition	Craig Kallsen	cekallsen@ucanr.edu
March 31, 2020	Pruning	Craig Kallsen	
April 7, 2020	Post-Harvest	Dr. Mary Lu Arpaia	mlarpaia@ucanr.edu
April 14, 2020	Invasive pests/ACP/HLB	Dr. Mark Hoddle	
April 21, 2020	Field Trip of UCR citrus variety collection	Dr. Tracy Kahn	tracy.kahn@ucr.edu
April 21, 2020	Tour Nat'l Citrus Clonal Germplasm Repository	Dr. Marylou Polek	marylou.polek@usda.gov
April 28, 2020	9:30-10:10-Diseases	Dr. Peggy Mauk	peggy.mauk@ucr.edu
April 28, 2020	10:10-10:50- Nematodes	Dr. Ole Becker	obecker@ucr.edu
April 28, 2020	10:50- 11:30 -Weeds	Dr. Travis Bean	trbean@ucr.edu
May 5, 2020	Irrigation	Dr. Robert Krueger	robert.krueger@usda.gov

Please contact Sonia Rios, if you have any questions sirios@ucanr.edu, (951) 683-6491 EXT 224

FREE Avocado Grower Seminars

California Avocado Society, Inc., California Avocado Commission, and University of California Cooperative welcome everyone to FREE Avocado Grower Seminars throughout the year, starting in February 2020. Please see tentative schedule below.
All Southern California seminars will be held at the Farm Bureau in Escondido: 420 S Broadway, Escondido, CA 92025

February seminars focused on the recent World Avocado Congress (WAC). Dr. Mary Lu Arpaia and California Avocado Commission Research Program Director Dr. Tim Spann, both of whom attended the WAC, will share what they learned while in Colombia.

The seminars will take place as follows.

February 4, 2020
1:00 – 3:00 p.m.
San Luis Obispo Farm Bureau
4875 Morabito Place
San Luis Obispo, CA

February 5, 2020
9:00 – 11:00 a.m.
Ventura Cooperative Extension Office
669 County Square Drive
Ventura, CA

February 6, 2020
1:00 – 3:00 p.m.
San Diego Farm Bureau
420 South Broadway
San Diego, CA

APRIL SEMINAR TOPIC

FIELD DAYS

(Looking at 2019 pruning effects, high-density plantings, and healthy soils and mulch/compost/cover crop.)

Speakers:
TBA
Dates/Times/Locations:
Tuesday, April 14, 2020, 1:00 p.m. to 3:00 p.m.
Cal Poly
Wednesday, April 15, 2020, 9:00 a.m. to 11:00 p.m.
Pine Tree, Santa Paula, CA
Thursday, April 16, 2020, 1:00 p.m. to 3:00 p.m.
TBA

JUNE SEMINAR TOPIC

VARIETIES LIKE GEM, MALUMA, AND FUTURE VARIETIES & ROOTSTOCK UPDATE

Speakers:
Dr. Mary Lu Arpaia: CE Subtropical Horticulture Specialist.
Eric Focht: Staff Research Associate at the Department of Botany and Plant Sciences, UCR
Dr. Patricia Manosalva: Assistant Professor of Plant Pathology and Director of the UCR Avocado Breeding Program at UC Riverside.

Dates/Times/Locations:
Tuesday, June 9, 2020, 1:00 p.m. to 3:00 p.m.
UC Cooperative Extension Office Auditorium, 2156 Sierra Way, San Luis Obispo, CA 93401
Wednesday, June 10, 2020, 9:00 a.m. to 11:00 p.m.
UC Cooperative Extension Office Auditorium, 669 County Square Dr., Ventura, CA 93003
Thursday, June 11, 2020, 1:00 p.m. to 3:00 p.m.
San Diego Farm Bureau, 420 S. Broadway, Escondido, CA 92025

AUGUST SEMINAR TOPIC

LIFE WITHOUT GLYPHOSATE, WEED ID, AND A REVIEW OF MICROBIAL AMENDMENTS

Speakers:
Sonia Rios: Area Subtropical Horticulture advisor for both Riverside and San Diego Counties.
Travis Bean: Assistant Weed Science Specialist in Cooperative Extension
Ben Faber: Soils/Water/Subtropical Crops Advisor
Tim Spann: CAC Research Program Director

Dates/Times/Locations:
Tuesday, August 4, 2020, 1:00 p.m. to 3:00 p.m.
UC Cooperative Extension Office Auditorium, 2156 Sierra Way, San Luis Obispo, CA 93401
Wednesday, August 5, 2020, 9:00 a.m. to 11:00 p.m.
UC Cooperative Extension Office Auditorium, 669 County Square Dr., Ventura, CA 93003
Thursday, August 6, 2020, 1:00 p.m. to 3:00 p.m.
San Diego Farm Bureau, 420 S. Broadway, Escondido, CA 92025

Sonia Rios – Subtropical Horticulture, Riverside/San Diego
Phone: (951) 683-8718
Email: sirios@ucanr.edu
Website: http://cesandiego.ucanr.edu