Topics in Subtropics Newsletter

University of California Cooperative Extension

Fresno, Kern, Madera, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara,Tulare,&Ventura Counties

News from the Subtropical Tree Crop Farm Advisors in California

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TOPICS IN THIS ISSUE – Peggy Mauk, Editor

FARM ADVISORS AND SPECIALISTS

Greg Douhan – Area Citrus Advisor, Tulare, Fresno, Madera
Phone: (559) 684-3312
Email: gdouhan@ucanr.edu
Website: http://cetulare.ucanr.edu

Ashraf El-kereamy – Extension Citrus Specialist, UCR
Phone: (559) 592-2408
Email: ashrafe@ucr.edu

Ben Faber – Subtropical Horticulture, Ventura/Santa Barbara
Phone: (805) 645-1462
Email: bafaber@ucdavis.edu
Website: http://ceventura.ucdavis.edu

Sandipa Gautam – Citrus IPM Advisor
Phone: (559) 592-2408
Email: sangautam@ucanr.edu
Website: https://lrec.ucanr.edu/

Craig Kallsen – Subtropical Horticulture & Pistachio, Kern
Phone: (661) 868-6221
Email: cekallsen@ucdavis.edu
Website: http://cekern.ucdavis.edu

Fatemeh Khodadadi – Professor of Extension and Plant Pathologist, UC Riverside
Phone: (951) 827-4764.
Email: fatemeh.khodadadi@ucr.edu
Website: https://subtropicalplantpathology.com/category/blog-posts/.

Peggy Mauk – Professor of Extension Subtropical Horticulture and Director of Citrus Research Center, UC Riverside
Phone: 951-827-4274
Email: peggy.mauk@ucr.edu
Website: http://www.plantbiology.ucr.edu/

Philippe Rolshausen – Professor of Extension Subtropical Crops, UCR
Phone: (951) 827-6988
Email: philrols@ucr.edu
Website: http://ucanr.edu/sites/Rolshausen/

Eta Takele – Area Ag Economics Advisor, Southern California
Phone: (951) 313-9648
Email: ettakele@ucanr.edu
https://ucanr.edu/sites/Farm_Management

Introducing Fatemeh Khodadadi, Assistant Professor of Extension and Plant pathologist

Dr. Fatemeh Khodadadi joined UCR as an Assistant Professor of Extension and Assistant Plant Pathologist in October 2022. She is a plant pathologist with broad experience in fungal and bacterial diseases of fruit and nut trees. Dr. Khodadadi received M.S. and Ph.D. from University of Kerman, Iran with Shahid Bahonar. Upon completion of her Ph.D., she had two postdoctoral fellowships (Cornell University and Virginia Tech). Both focused on fungal and bacterial diseases of nut and fruit trees. Dr. Khodadadi's M.S. research, she worked on aflatoxin-producing fungi contaminating pistachio. The first part of her master's project was focused on isolation, morphological and molecular identification, and the genetic variability of the aflatoxin-producing fungal species in pistachio nut samples collected from storages. The second part used the High-Pressure Liquid Chromatography (HPLC) coupled with molecular detection using aflatoxin biosynthetic genes including *aflR* for differentiation of toxigenic and non-toxigenic isolates and detection of aflatoxin B1 and B2 released from *Aspergillus flavus* and *A. parasiticus* species. In her Ph.D. research, she worked on the interaction between walnut and bacterial blight disease caused by *Xanthomonas arboricola* pv. *juglandis* (*Xaj*). She used walnut as a model to clarify the roles of polyphenol oxidases (PPO) in defense responses to *Xaj* using different molecular techniques and evaluated the susceptibility of walnut cultivars to pathogen, gene expression and enzyme activity of PPO and pathogenesis related proteins in walnut-bacterium interaction. Given that the modification of PPO expression in transgenic plants provides an opportunity to study the contribution of PPO to plant disease resistance, she transferred the *JrPPO1* gene from walnut into tobacco to determine the reaction of transgenic tobacco plants against *Pseudomonas syringe* pv. *tabaci*. Part of her Ph.D. was conducted at University of California, Davis. In her postdoc at Cornell University and Virginia Tech, she conducted wide-spectrum basic and applied research in bacteriology, mycology, genomics, plant pathology and plant disease management focusing on *Colletotrichum* species (bitter rot of apple), *Erwinia amylovora* (fire blight), and *Diplocarpon coronaria* (Apple Leaf and Fruit Blotch). They used viability digital PCR (v-dPCR) in several key projects aiming to improve accuracy of exiting fire blight disease prediction models, elucidate fire blight biology, epidemiology and management and identify key stress factors that could aid in management of *E. amylovora*. She identified, described, and characterized for the first time a new *Colletotrichum* species that causes apple bitter rot and belongs to *C. gloeosporioides* complex of species. It was named *C. noveboracense* and was first found on apple as a host.

The purpose of her research program in UC-Riverside is improving knowledge and understanding of plant pathogen diagnostics and detection, plant-pathogen interaction, biology and population dynamic of pathogens that could facilitate development of new disease management strategies on subtropical trees especially citrus and avocado. The three areas of her research focus are: 1. Identification, characterization and developing molecular methods to detect fungal, bacterial and viral diseases affecting citrus and avocado including but not limited to avocado branch canker and dieback caused by *Botryosphaeria* species, *Phytophthora* Root Rot, Sweet Orange Scab caused by *Elsinöe australis*, avocado sunblotch viroid, and other problematic pathogens on citrus and avocado in California; 2. Studying the citrus, avocado defense responses and molecular interaction with above pathogens; 3. Fungicides and bactericide efficacy trials *in vitro* and in the field and developing new strategies, tools and programs for disease management. The purpose of her extension program is to provide growers and industry with disease diagnostics and disease management recommendations specific to each fruit crop in cooperation with other Cooperative Extension Specialists and Farm Advisors throughout California. She is looking forward to conducting trials, participating in grower meetings as well as making farm visits and tours. She is available via phone cell phone and emails, workshops and her blog webpage: https://subtropicalplantpathology.com/category/blog-posts/.

Agave Mites: A Tiny Menace

Eric Middleton, Area IPM Advisor
Gerry Spinelli, Production Horticulture Advisor
http://cesandiego.ucanr.edu

Agave are a common sight in Southern California and are frequently used in landscaping for homes, businesses, and in public spaces. You've almost certainly seen agave growing in your neighborhood and may even have some growing yourself. Many varieties of agave are grown in San Diego nurseries to keep pace with the demand for these plants across the state and country. As the climate continues to warm and California becomes increasingly dry, hardy and water-conscious plants, like agave, will more frequently be used in xeriscaping and as ornamentals. However, there is an almost invisible enemy that threatens many of these agave plants. Greasy streaks and smudges appear on leaves (Figure 1), followed by lesions and plant decline. Sometimes, the entire core of the agave collapses. The plants look sickly and unattractive, dismaying homeowners and nursery growers alike. What is causing this damage?

Figure 1. Greasy spots and lesions caused by agave mite feeding.

Identification

The answer are tiny agave mites, invisible to the naked eye. Agave mites, also known as grease mites, are a type of Eriophyoid mite. Like other Eriophyoid mites, agave mites are elongated and have a wormlike appearance, with 4 small legs positioned around their head. Adults are a translucent pale whitish color and lay oval translucent eggs. Depending on the temperature, agave mites can complete a lifecycle and develop from eggs into adults in just a few weeks. Agave mites are very small (Figure 2): Adults are around 1/3 mm long and 50 microns wide while eggs are around 20 microns wide. You will not see them at all unless using a microscope or powerful hand lens. Adults can be seen using 30x magnification, but even greater magnification will be needed to see any detail. While the exact species is currently unknown, agave mites are believed to be in the genus *Oziella*. Their method of dispersal is also unknown, but it is assumed they catch air currents and drift on the wind to find new hosts like other Eriophyoid mites do. If conditions are correct, mites like these can travel hundreds of miles on the wind.

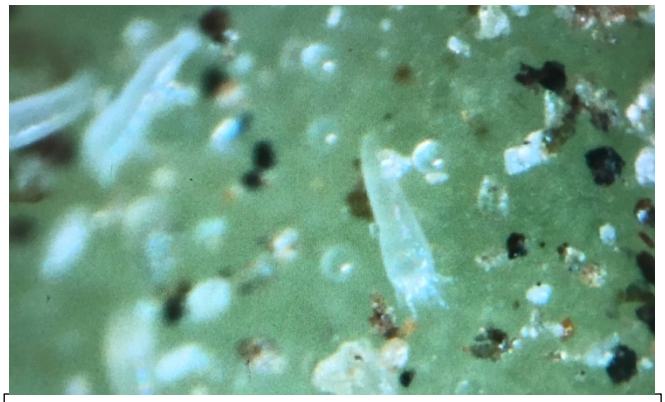


Figure 2. Agave mite (center) with several eggs around it.

Damage

Agave mites feed on the surface of agave leaves, living hidden at the very base of leaves or inside the core of the agave. If they are present, they are almost always on the whitish, unexposed leaf tissue and are unlikely to be found on visible sections of leaves. Feeding and damage takes place out of sight, and symptoms only appear once the damaged leaves have grown out. By the time damage is observed, the agave plant is already well infested with mites (Figure 3). To find the mites themselves, the agave must be cut open and leaves peeled away.

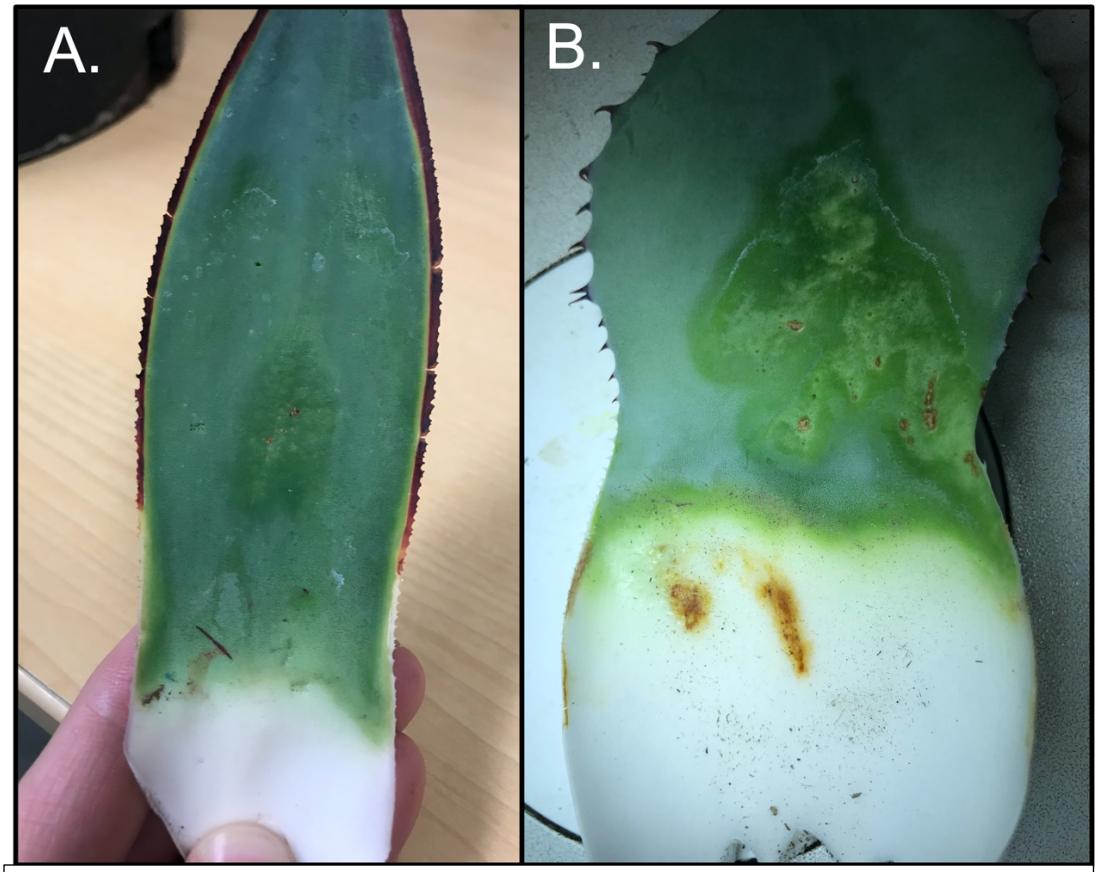


Figure 3. A. Blue glow agave leaf with a greasy section characteristic of mite damage in the middle; B. Parry's agave leaf with mite damage visible on the green section of the leaf, and active mite damage visible as yellowish lesions on the white section of the leaf. Agave mites live and feed on the white sections at the base of leaves pictured here.

Agave mite damage is often easily recognizable but can also be subtle. Agave mites are colloquially called grease mites and with good reason: the most characteristic sign of agave mite feeding is a greasy smudge or streak appearing on agave leaves. It will often look like someone dipped their thumb in grease and left a fingerprint on the leaf surface. These greasy spots can be small or hidden in the event of minor infestations. Areas around greasy spots frequently appear yellowish and will lack the powdery blue-white surface color that many agaves

have. When infestations are more severe, greasy spots can be seen all over the plant, and lesions or dying plant tissue are present in the greasy areas. Mites concentrated at the core of the plant can severely damage the new leaves and cause the core to collapse from their feeding.

Host Plants

Multiple species and varieties of agave are susceptible to agave mites. While most agave appear to be suitable hosts, there is still uncertainty about which varieties experience the most damage. Blue glow agave (*Agave attenuata* x *Agave ocahui*) and Parry's agave (*Agave parryi*) are two commonly grown ornamental agave that can be heavily damaged by agave mite, but other susceptible species include *Agave americana, A. celsii* Nova*, A. franzosinii*, *A. guadalajarana, A. isthmensis, A. macroacantha, A. palmeri, A. parryi* var. truncata, *A. potatorum, A. parrasana, A. shawii, A. titanota*, *A. weberi, and A. xylonocantha.*

Management

Agave mite control is both difficult and not well understood. Their small size and hidden feeding locations make agave mites extremely hard to detect, and by the time damage is found it is too late to prevent the agave from being infested with mites. Vigilance, persistence, and a willingness to make difficult choices is required to effectively manage agave mites.

Prevention is key to agave mite management. For both home gardeners and commercial growers, make sure you can recognize the symptoms of an infested agave, and don't bring in other agave that show signs of a mite infestation. Proactively monitor your agave for symptoms so you catch any mite outbreaks as early as possible. If you do find symptoms, you have a difficult choice to make: Get rid of the infested plant and hope the mites haven't already spread. Or you can keep the infested plants and hope the symptoms do not become progressively worse and that the mites haven't already spread to other agave plants. Commercial growers should proactively remove plants showing signs of infestation, especially if the symptoms are advanced. For home gardeners, the choice is difficult. If you don't mind some cosmetic damage, agaves can frequently tolerate mite damage without dying. However, this is a risk, and you may end up with some very sad-looking and damaged agave. If you choose to dispose of infested plants, make sure they are kept in a sealed container to prevent mites from spreading on air currents, and preferably keep the infested plants downwind of any other agave you have. If you handle an infested plant, make sure you wash and sanitize hands and tools before moving on to other agave plants.

Saving already infested plants is difficult. One extreme option involves coring an infested plant and waiting for new pups to emerge. To do this, remove most of the inner leaves with scissors or a knife, and then destroy the agave core with a drill fitted with a shovel bit. Be sure to collect and promptly dispose of the macerated tissue and remove all the leaves on one side of the plant to ensure water does not pool in the now damaged and removed center of the agave. Removing the core and some of the inner leaves should in theory remove most of the mites, which tend to live at the base of inner leaves. If this is successful, the agave should still survive, and will produce pups even though it will no longer be able to grow itself. This technique is best used in combination with chemical control to increase the chance that mites are eliminated. For commercial growers, it is unlikely to be feasible due to the time it takes to implement. Again, this is an extreme option that is not guaranteed to work, and will result in serious damage to your plant, so only use it as a last resort.

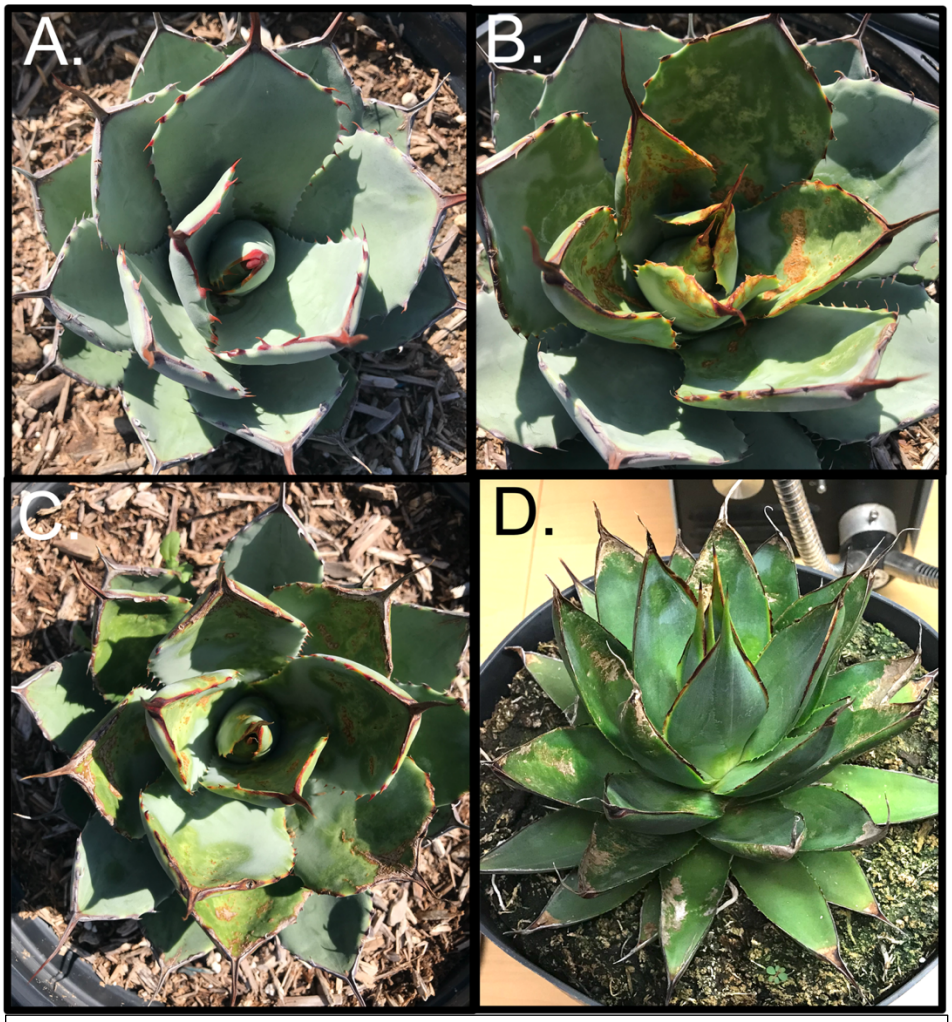


Figure 4. Symptoms on Parry's agave (A-C). A. Undamaged; B. Severe mite damage on internal leaves and core; C. Extensive mite damage; D. Blue glow agave with extensive mite damage.

While some predators like Phytoseiid mites and predatory thrips do feed on Eriophyoid mites, it appears unlikely they can provide adequate control of agave mites. Predators may provide some measure of control and could potentially prevent new agave mite infestations from starting, they will probably not eliminate already-present agave mites.

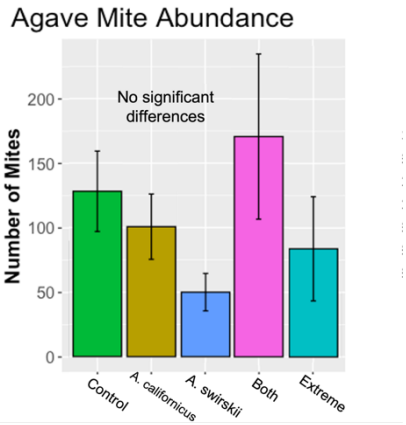
Miticides labeled for use against Eriophyoid mites may be effective against agave mites. The biggest challenge is finding a miticide that can affect agave mites protected in the core and at the base of leaves. For this reason, systemic insecticides like Savate (Spiromesifen) and Kontos (Spirotetramat) appear promising, although contact insecticides like Akari (Fenpyroximate) could also work if very thorough coverage is achieved. Similar products have been effective against other Eriophyoid mites but have not been directly tested against agave mites. Anecdotally, agave plants can grow out of the damage caused by agave mites if treatments eliminate infestations. However, this takes time, and effective treatments have not yet been established for agave mite.

In short, there are currently few options to treat infested agave plants. While some miticide treatments exist, little is known about their efficacy against agave mite. There are many unknowns and preventing agave mite infestations from occurring in the first place seems to be the best option.

Current Research

To help determine how best to manage agave mites, UC Cooperative Extension advisors Eric Middleton and Gerry Spinelli are currently conducting research on various agave mite treatments. Working in collaboration with the Center for Applied Horticultural Research, we began a series of trials in October 2022 to better understand agave mite biology and management.

The research plan consists of 3 main experiments. First, we will test how long it takes for clean agave plants to become infested with mites when already infested plants are placed nearby, and how far mites can travel from these infested plants. Second, we will determine which commercially available miticides are effective at cleaning up agave mite infestations. Two different species of predatory mites, *Amblyseius swirskii* and *Neoseiulus californicus* will also be tested to see if they can eliminate agave mite infestations. Finally, using the miticides and predators that worked in the previous experiment, we will conduct a long-term experiment over the course of a year to evaluate if these control options can prevent agave plants from becoming damaged and infested by agave mites.



So far, we have completed part of the second experiment and evaluated both *Amblyseius swirskii* and *Amblyseius californicus* as agave mite predators. We placed predatory mites on symptomatic agave plants and destructively sampled the agave after 2 weeks to determine if predators decreased the number of agave mites and eggs. Our treatments consisted of 20 *A. swirskii* mites, 20 *A. californicus* mites, 10 of each species, and an extreme treatment where 7ml of predator mite substrate from both species was applied resulting in hundreds of both predator species being added to each agave. All were compared to an untreated control. While the *A. swirskii* treatment appeared to reduce agave mite abundance, there ended up being no significant differences between treatments and none of the treatments eliminated agave mite infestations. Our results show that commercially available predator mites of these two species are not effective as a curative treatment for agave mite.

Preliminary Conclusions

Agave mites are a difficult pest to manage and can be a serious problem on multiple types of agave. Being proactive and removing infected plants is currently the best way to protect your agave from mite infestations. Recognizing agave mite symptoms and being ruthless with eliminating plants is key to preventing damage. Research on management options is just beginning and there are still many unknowns, so please contact us if you are having issues with agave mites at your nursery, if you have questions, or if you think there is something we should know about. Stayed tuned for future results and hopefully some better news on how to manage this tiny menace!

New pest in young avocado orchards

Peggy Mauk, Professor of Extension – Subtropical horticulture and Director of the Citrus Research Station at UC Riverside.

Red imported fire ant (RIFA), *Solenopsis invicta*, has been reported as a pest in Florida where the fire ants girdle young citrus trees https://crec.ifas.ufl.edu/media/crecifasufledu/extension/extension-publications/2021/2021_jan_fireant.pdf. Florida researchers found that RIFA girdled the trees and killed them. In the summer of 2022, we discovered young avocado trees being girdled and killed by fire ants at UCR's research station in Riverside. Dr. Dong-Hwan Choe, Professor of Extension – Entomologist at UC Riverside, identified it as *Solenopsis* sp. We observed fire ant activity and subsequent girdling and plant death on approximately 2% of the trees. Figure 1 shows the initial damage to an otherwise healthy avocado tree which weeks later was completely girdled and dead. The fire ant "mound" in Figure 1B is not typical of *Solenopsis invicta* in lawns or landscapes. The mounds are flatter and less obvious. We were able to achieve control of the fire ants after 2 applications of a commercial fire ant bait. No further plant death has occurred after the second bait application. The following link is a description of RIFA and a list of registered products for controlling this important invasive species: https://ipm.ucanr.edu/PMG/PESTNOTES/pn7487.html

As soil temperatures warm, growers need to be watchful for ant activity on young avocado and treat proactively.

A. B. C.

Figure 1: (A) initial holes made by fire ants. (B) girdled tree and mounds in basin of tree and (C) dead tree.

Planting Avocados

Ben Faber, Farm Advisor, UCANR Ventura County

It seems like the simplest thing is the hardest. Recently, I was called out to evaluate why newly planted trees were failing at two sites and they both had a common problem. In one case, the trees had been planted too deeply at the beginning. At another, a large amount of planting amendment had been incorporated, and over a year's time, the trees had settled, so that they too had their graft unions covered with soil. In the latter case, the trees' unions were 4-8 inches below grade. It seems appropriate to review basic planting practices. In the best-case scenario, trees are planted from February to May, but depending on the area, they can be planted at other times, as well. So, I just got a call about planting, so it's probably time for a refresher.

Often times the grower harkens to the old adage: "dig a $5 hole for a 50-cent plant." And so a lot of time and money and energy are put into that hole. Nothing costs $5 anymore. Trees cost closer to $50, so there might be a greater urge to do it all right. So the first thing first is forget the planting mix and those mycorrhizal inoculums. They either don't work or they might just damage your expensive tree.

Adding organic matter to a planting hole appears to be a promising step towards achieving that five-dollar hole. It seems logical that steer manure, peat moss, compost, etc. would improve poor soils by increasing aeration, nutritional value, and water holding capacity. And it does - in the immediate vicinity of the planting hole. Eventually, amended planting holes will have negative consequences to plant health.

The initial results are positive; roots grow vigorously in this ideal environment as long as irrigation is provided. But what happens when these roots encounter the interface between the planting hole and the native soil? Native soil contains fewer available nutrients, is more finely textured and is less aerated. Roots react much in the same way as they do in containers: they circle the edge of the interface and grow back into that more hospitable environment of the planting hole. The roots do not establish in the native soil, eventually resulting in reduced growth rates.

Soil water movement is problematic as well. Amended backfill has markedly different characteristics than surrounding native soil; it is more porous and water will wick away to the finer-textured native soil. In the summer, moisture within the planting hole will be depleted by the plant but not replaced by water held more tightly in the native soil. When irrigating, water will move quickly through the amended soil only to be held back by the more slowly draining native soil. The resulting bathtub effect, where water accumulates in the planting hole, floods the roots and eventually kills the plant.

Finally, all organic material eventually decomposes. If you've incorporated organic matter, within a few years that organic matter will have become ash and the bulk has turned into carbon dioxide. The soil will have settled and if you have followed the rule of thumb of 25% by volume, the trunk stem probably will have sunk below grade and the bud union will be buried. The buried union only exacerbates the flooding problem during irrigation or wet conditions. This was the problem that I went out to see.

Basic planting steps

1) Dig a hole somewhat wider, but no deeper than the sleeve that the tree comes in. Making the hole wider (18 inches) allows room to manipulate the tree by hand and remove the sleeve once it is in the hole. Making the hole deeper than the sleeve allows for soil to accumulate around the graft union. Even if the hole is backfilled to the "appropriate" depth, because of subsidence of the loose earth, the tree can become buried. Do not put gravel in the bottom of the hole. This is commonly thought to improve drainage. It does not, it makes it worse.
2) Gently tamp loose earth around the tree. Do not back fill with a planting mix. This creates a textural discontinuity which interferes with water movement both to and anyway from the tree. The fill soil should be free of clods to avoid air gaps and poor contact between roots and soil. Do not cover the root ball with soil; the irrigation water needs to come into direct contact with the root ball.
3) The trees should be watered as soon as is practical after planting.

4) Using drip irrigation the, the emitter should be near the trunk, so that water goes directly onto the root ball. Shrinking and swelling of the polyethylene tubing can move the emitter off the ball.
5) After about 4-6 months the drip emitters can be moved from the trunk to 6-8 inches from the tree. Moving the emitters avoids keeping the trunks wet and reduces the likelihood of crown rot.
6) In most situations, newly planted trees should be irrigated every 5-10 days with 2-5 gallons of water for the first 2-4 months until the roots get out into the bulk soil. Depending on what the weather is like, they still might require frequent irrigations, because the rooted volume holding water is still small. After the first year in the ground, another dripper can be installed on the opposite side of the tree. As the tree grows the number of drippers should be increased or the system converted to fan or microsprinklers.

And in the case of mycorrhizae, they are wonderful. They are nature's gift to all of us. They aid plants in their uptake of nutrients, improve plant health and may actively transmit information from one plant to another. They are a diverse range of fungi associated with plant roots and are everywhere – even Antarctica. And that's the point, introducing them to the planting is not going to help. They are there already, a sea of them. Putting a few nursery-grown spores into a planting hole when there are already highly adapted fungi present just does not happen easily. So not using a planting mix and not adding mycorrhizal inoculum is going to make that hole a little bit cheaper.

In root rot conditions
Planting in ground that has had root rot can add some new steps to the planting process. On relatively flat ground (<15 degree slope) trees will benefit from being planted on a berm or mound. This creates better aeration and drainage for the roots. It also means that the trees tend to dry out faster, so more frequent irrigation may be necessary. Where machinery can be employed, creating berms is usually less expensive. Surrounding soil should scraped to the planting site, and little incorporated with the soil surface where the berm or mound is to be built. In bringing surrounding native soil to the planting site, it is important that an interface between the imported soil and the soil surface is not created that alters water flow through the mound into the bulk soil. The berms can be built 1.5 to 2 feet high with a 4:1 slope. The raised planting position should be irrigated to settle the soil. The soil should then be allowed to dry out prior to planting to avoid mucky soil. Only clonal rootstocks should be replanted into root rot soil. Applying gypsum (15 pounds per tree), a thick layer of mulch around the base of the tree (3-6 inches deep, but not immediately on the stem of the tree) and finally application of fungicides will help. Application on the berm or mound also protects the soil from eroding away with rains.

The key to root rot has always been dependent on irrigation management. There is nothing more important than getting the right amount on at the right time. If you are doing interplanting into an existing orchard where trees have died, it is imperative that the new trees be put on their separate irrigation line so that they can be irrigated according to their needs. Simply putting a smaller emitter on the young trees compared to the older trees means that they will still be irrigated on a cycle that is not optimum for their survival. It doesn't matter if you are using clonals; they will die just as easily with poor water management as a seedling.

The following is a pictorial guide to proper tree planting.

A.

B.

C.

D.

E.

F.

G.

H.

I.

Figure 1. Pictorial of step-by-step planting instructions for avocado. **A)** The hole is dug 2X the width of the root ball and the depth is about the same depth as the root ball. Use handle shovel to measure depth. **B)** If the tree is in an open-bottom sleeve, set the tree with the sleeve intact into the hole. If the tree is in a pot with a solid bottom, carefully remove the pot and set the tree into the hole. Always support the bottom of the root ball with a hand to prevent breakage of the ball and loss of roots. The top of the root ball should be slightly above the grade of the surrounding soil. **C)** Cut the sleeve with a knife being careful to not penetrate and damage roots. **D)** While the sleeve is in place, partially fill the hole with soil while the sleeve is in place. The sleeve is temporarily left in place to support the root ball. **E)** Remove the sleeve. **F)** Backfill native soil into the hole. DO NOT add mulch or soil amendments to the soil. This will help avoid excessive salinity and ammonia gas. **G)** Finish by tamping down the backfilled soil to eliminate air pockets. **H)** If replanting in root-rot infested soil, it helps to apply gypsum (10-20 lbs/tree) on the soil surface around the base of the tree. **I)** Add wood or bark-based mulch around the tree but not against the trunk.

One, one hundred, one thousand

Ben Faber, Farm Advisor, UCANR Ventura County

This little mnemonic, or memory aid, in the title is helpful in remembering the critical levels of toxic constituents in irrigation water. The “one” stands for 1 part per million (ppm) of boron (B), the” one hundred” flags 100 ppm of sodium (Na) and chloride (Cl) and the “one thousand” represents the level of total soluble solids (TDS or salts) in water. Levels exceeding the critical values for any of these constituents can present problems for tree growers. The problems typically show themselves as tip-burn and defoliation. The B, Na and Cl are toxic elements at relatively low concentrations, but symptoms appear similar to the damage caused by high salinity.

Water that exceeds the critical levels mentioned in the mnemonic has a greater tendency to cause damage if sufficient leaching is not applied. It doesn’t mean the water is impossible to use, only that greater attention needs to be made to ensure that these salts are adequately leached. High levels of these salts accumulate in the soil with each irrigation; the salts are absorbed by the tree and end up in the leaves where they do their damage.

Irrigation is a necessary evil. Every time we apply irrigation water we apply salts, and unless some technique is used to minimize salt accumulation, damage will result. This damage can be more than just leaf drop, but also the stress that induces conditions for root rot. In most years we rely on winter rainfall to correct the salt imbalance resulting from irrigation water.

The last two years have had winters largely without rain. Irrigation water was applied throughout the winter, spring, summer and fall and many trees looked stressed this spring. Even well irrigated orchards in the spring of 2022 had leaf burn due to the gradual accumulation of salts from irrigation. Avocados, which are generally more sensitive to salts than citrus, dropped their salt-burned leaves this spring when flowering began.

We usually think that it is not necessary to irrigate in the winter, but these last two winters should change that opinion. To add to the lack of rain problem, it may be necessary to irrigate even if there is rain in the future. The wetted pattern that is created by a drip or microsprinkler emitter also creates a ring of salt in the outer band of the wetted patter. If there is less than an inch of rainfall to push this salt down, this salt tends to diffuse towards the tree where it can accumulate back in the root system. Orchards with even good water quality would find it advisable to run the irrigation system with the first rains. Those with poor water quality definitely should run the microsprinkler system with an equivalent of one-half inch applied water (13,500 gallons per acre) during or soon after the first events of less than one-half inch rainfall. Growers with water quality exceeding one, hundred, or thousand should be especially alert to the need to manage water in low rainfall winters.



UC Riverside and CAPCA SoCal Chapter partner to provide:

UC Riverside Citrus Field Day for growers and industry members

Thursday, March 2, 2023

7:15 a.m. to 1:30 p.m. (lunch included)

1060 Martin Luther King Blvd, Agricultural Operations, Riverside, California

7:15 – 7:30	**Registration and Parking at the USDA NCGRCD**
7:30 – 7:35	**Welcome**, Tracy Kahn and Peggy Mauk, Botany and Plant Sciences, UC Riverside
7:35 – 8:05	**Update on ACP/HLB Regulations**, Ruben Arroyo, Riverside Co. Ag Commissioner
8:05 – 8:25	**Detection and therapeutics of graft-transmissible diseases of citrus and USDA-UCR Finger lime project**, Robert Krueger, USDA NCGRCD.
8:30 – 9:00	**Graft-transmissible and vectored citrus diseases**, Georgios Vidalakis, Microbiology and Plant Pathology, UC Riverside
9:00 – 9:30	**Utilizing drone technology for pest management**, Mehdi, Talos Drones
9:35 – 9:50	**Prospects for Deploying Microbiome-Based Strategies to Address Challenges in Citriculture,** Philippe Rolshausen, Dept Botany and Plant Sciences, UC Riverside
9:50 – 10:05	**Field evaluation of insecticides for the control of ACP,** Frank Byrne, Entomology, UC Riverside
10:10 –10:30	**Break**
10:30 – 10:45	**Rootstock and Scion Research for lemons in CA,** Glenn Wright, U of Arizona
10:45 – 11:05	**Use of biodegradable hydrogel to deliver boric acid baits targeting pest ants in citrus,** Dong-Hwan Choe, Dept. Entomology, UC Riverside
11:10 – 11:50	**Display and opportunity to provide feedback on unreleased scion hybrids, new irradiated selections and introductions**, Toni Siebert Wooldridge, Karene Trunnelle, Claire Federici, Tracy Kahn, Mikeal Roose, Botany and Plant Sciences, UC Riverside
12:00 – 12:30	**Citrus huanglongbing: finding solutions for disease management and long-term cultivation**, Chandrika Ramadugu, Dept. Botany and Plant Sciences, UC Riverside.
12:30 – 1:30	**Lunch and guest speaker: New initiative for greenhouse research facilities**, Zachary Thomas, Botany and Plant Sciences, UC Riverside
1:30 – 2:30	**Optional Informal Tour of the Givaudan Citrus Variety Collection.**

Register online at https://capca.com/events/march-2-2023-socal-capca-and-uc-riverside-citrus-field-day/

DEADLINE for registration is FEBRUARY 23, 2023. The cost is $30 and includes lunch. This is an outdoor field meeting. Participants should wear footwear appropriate for walking in citrus groves and on uneven ground and prepared for adverse weather conditions. We will have vans but some participants may need to drive their own vehicles to the various stops. If you need assistance or are unable to participate in walking portions of the meeting, please contact Agricultural Operations at 951-827-5906 so we can try to accommodate your needs.

UCR researchers appreciate the ongoing support of the Citrus Research Board.