Field Notes
San Joaquin County
November 2020

University of California
Agriculture and Natural Resources

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Second Generation Almond Tree Nitrogen Needs Following Whole Orchard Recycling

In a previous study conducted by David Doll ('The Almond Doctor'), he determined that conventionally planted first year almond trees grew best when given between 3-4 ounces of actual nitrogen (N) per tree (25-35 lbs N/acre) in their first growing season. This recommendation may not be enough, however, following whole orchard recycling (WOR), especially if 45-80 tons of wood chips are incorporated back into the soil. WOR involves grinding whole trees into wood chips, spreading the wood chips evenly on the soil surface, and incorporating them into the soil before replanting.

In 2017, we tripled David's recommendation by applying 11 ounces of N per tree through the season (approximately 100 pounds N per acre) after we noticed reduced shoot growth in Louie Tallerico's recycled almond orchard in Manteca, where 65 tons per acre were recycled. Trees that had initially showed reduced shoot growth responded nicely to the additional N. However, we estimate that only 20% of the applied N and water reach the trees early in their first growing season when applied through a double-line drip irrigation system. As the trees mature and their roots expand, the double-line drip system will be more efficient at delivering N and water to trees.

In 2018, we put out a N trial in Jeff Warkentin's first-year orchard in Parlier to see if we could determine more accurately the N requirements of first year almond trees after WOR. In order to more precisely apply the N, triple 15 granular fertilizer (15-15-15) was hand-applied to each tree. We put out five treatment rates with 5 tree replicates in a Latin Square designed experiment. After five months, each treatment received 0, 2, 3, 4, and 5 ounces of additional N per tree. These applications were in addition to Jeff's fertigation through his double-line drip system at a rate of 1.73 ounces of N applied monthly from April to August. Again, we expected that the grower applied N through the double-line drip system was not immediately available because of emitter spacing and the limited range of the small tree roots.

Our first triple 15 application in March seemed to have an almost immediate impact on tree growth. Considerable precipitation in March effectively dissolved the granular nitrogen, and differences in shoot growth were visible between treatments in April (Fig. 1). Leaf analysis showed that our N treatments early in the season had a greater impact on N tissue levels than applications later in the season (Fig. 2). Trunk diameter data showed that we did not receive any additional benefit for applying more than 4 ounces of actual N per season per tree, in addition to what the grower applied. Timing of N may be more critical early in the growing season after WOR. In Dr. Greg Browne's studies, where he applied N with WOR and anaerobic soil disinfestation (ASD), he too observed

Figure 1. A) Nitrogen control treatment, and B) Nitrogen rate of 0.80 oz per tree.

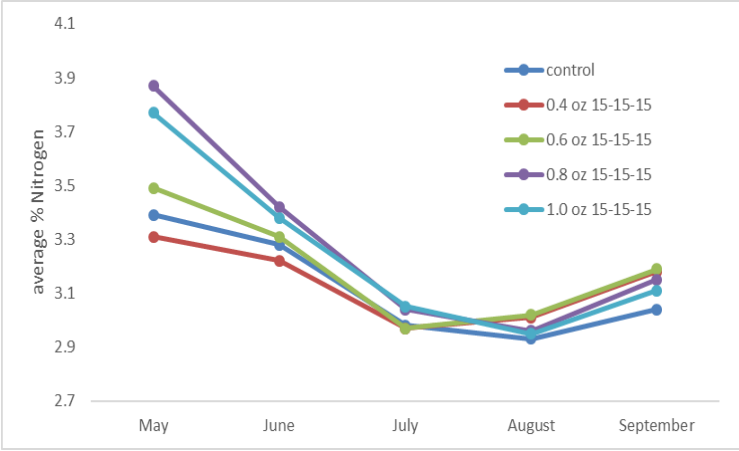

Figure 2. Percent N in leaf tissue from May-September.

(Continued on page 2)

Table of Contents:

an increase in shoot growth early in the spring with early N applications.

We hypothesized that we might be able to use less N more efficiently if we applied it earlier in the growing season or at planting time. In our 2019 WOR trial, at the Kearney Research and Extension Center, 75 tons of wood chips per acre were recycled. We applied ¼ ounce of N in the form of triple 15 at planting time, and again every two weeks with each irrigation, from April through June. Then, we fertigated with 1 ounce of actual N per tree per month from July to September with UAN32. We used button emitters, rather than drip irrigation, so that we only applied water and fertilizer at each tree site. We ended up applying 5 total ounces of N per tree or 46.6 lbs N per acre. For the first time in our research trials, we observed a significant increase in trunk diameters from trees growing after WOR compared to control trees, growing where the previous orchard was not recycled, and given the same amount of N and phosphorous (P) their first season (Fig. 3)! There is also evidence, from Drs. Greg Browne and Phoebe Gordon's trials, that P could be important in first year tree nutrition after WOR. They found that extra applications of P and N, as separate treatments, each improved tree growth, alone and in combination.

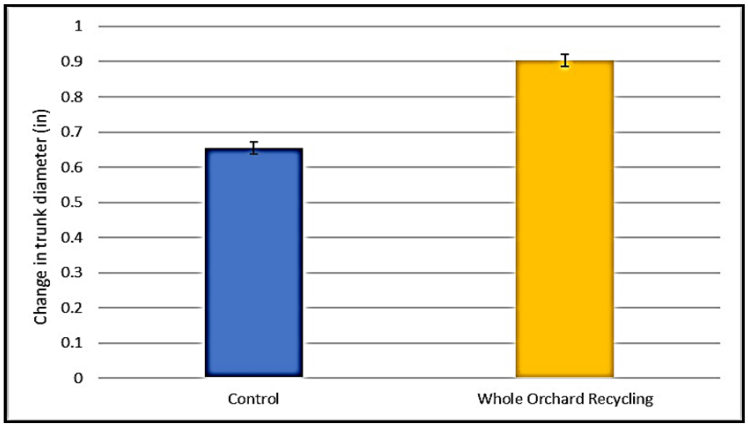

Figure 3. Change in trunk diameters of first year almond trees fertilized at planting and given the same amount of N.

We are continuing to studying early N and irrigation efficiency in more detail in our new trial at Kearney, but at this point in our studies, we would recommend that growers apply at least 5-8 ounces of actual N per tree (45-75 lbs N per acre) in the first year of tree growth following WOR. We also recommend that early applications, starting at planting time, are more important than applications later in the season. Remember that N applications should be spread out so that no more than 1 ounce of actual N is applied per tree per application in the first year of tree growth, in order to prevent N burn. Another advantage of using granular fertilizer applications early in the season is that some growers have applied too much water too early in the season in order to deliver the desired amount of N and have experienced Phytophthora Root and Crown Rot infections.

In our WOR trials, we did not have to apply additional N above our normal recommendation in the second or subsequent years to achieve the desired tree growth. We hypothesize that in the first season after WOR, the microorganisms decomposing the wood chips compete for available N while the carbon to nitrogen ratio has been dramatically increased. Samples of wood chips were analyzed for their nutrient contents, which averaged 0.31% nitrogen, 0.20% potassium, 0.60% calcium, and 50% carbon. Thus, in our Manteca trial, where we recycled 64 tons of wood chips per acre—we added 396 pounds of nitrogen, 768 pounds of calcium, 256 pounds of potassium, and 64,000 pounds of carbon per acre. These nutrients will not be immediately available to the next-generation orchard, but as the wood chips decompose, nitrogen should be released slowly and become available for uptake by the trees.

Brent Holtz, Farm Advisor and County Director

Field Corn Variety Trial Results

The 2020 UCCE Delta field corn variety trial, located on Tyler Island, was planted on April 21st by air planter and consisted of three replicate blocks of seventeen varieties. The seventeen varieties included fourteen varieties submitted by seed companies and three submitted by the grower. All varieties were glyphosate tolerant. Each plot consisted of four 30-inch beds on an average row length of 1080 feet. Seed was planted approximately two inches deep and six inches apart down the row. The soil is a Rindge mucky silt loam with approximately 20 percent organic matter in the top 15 inches of soil. The Rindge series is a mucky peat soil down to about 60 inches, and approximately 55,600 acres in the Delta are described by the Rindge classification. The previous crop in the field was corn. Subsurface irrigation by "spud ditch" was employed twice. The fertilizer program consisted of pre-plant UN-32 (115 lb N/acre) and at-planting 8-24-6 with ½ percent of zinc (30 lb N/acre). Weed control was by cultivation and glyphosate herbicide program, and Onager miticide was applied. The field was harvested on September 25th.

Stand counts were made approximately two weeks after planting. The stand was assessed in the center two rows of each four-row plot, counting the plants along a 10-foot length. All varieties reached bloom during the week of June 29th (68-72 days after planting). We monitored diseases (Fig. 1) and plant lodging in mid-September. Incidence of Fusarium ear rot and head smut were similar between 2020 and 2019. A sign of Fusarium ear rot is white fungal mycelium around the kernels. The disease is usually introduced to the ears by corn earworm or by thrips that travel down the corn silks at pollination. Incidence may be reduced in varieties with longer or tighter husks that prevent insect infestations. Planting earlier in the season may also reduce incidence, as the crop may reach pollination before insect pests are prevalent. Head smut, a disease that replaces ears with dark brown spores, had low incidence this year.

Figure 1. Diseases monitored in the UCCE Delta field corn variety trial: A) Fusarium ear rot, B) head smut, and C) common smut.

(Continued on page 3)

Table 1. 2020 UCCE Delta field corn variety trial By: Michelle Leinfelder-Miles, UCCE farm advisor

Entry Name	Company Name	Stand Count* (Plants/A)	Fusarium Ear Rot* (%)	Head Smut* (%)	Common Smut* (%)	Plants Lodged (%)	Ear Height* (in)	Moisture (%)	Bushel Wt.* (lbs/bu)	Yield‡ (lbs/acre)
INT 6533	Grower entry	37171	4 bcde	1 abc	2 b	0	50 abc	13.4 fghij	60.6 ab	15158 a
SX 5583VT2P	Baglietto Seeds	37462	0 de	1 abc	0 b	0	45 cdefg	13.9 cdefg	60.5 ab	14543 ab
INT 6588VT2PRIB	Integra	36300	3 bcde	1 abc	3 ab	0	51 ab	14.8 abc	61.4 ab	13642 abc
SX 5543RR	Baglietto Seeds	36300	1 cde	1 abc	0 b	0	39 g	14.3 bcd	61.8 ab	13474 abc
LG 7514	Grower entry	36590	3 bcde	0 c	0 b	0	43 defg	14.2 bcd	61.7 ab	13434 abc
MS 1457VT2PRIB	Mission Seeds	36010	2 cde	0 c	0 b	0	42 efg	12.8 hij	60.5 ab	13117 abc
P 1366AM	Pioneer	36590	6 bcd	2 abc	1 b	0	47 bcde	12.7 j	60.5 ab	13038 abc
A 647-90VT2RIB	Agrigold	36010	6 bc	0 bc	6 a	0	50 abc	14.5 abcd	62.2 a	12763 abc
CP 5678SS/RIB	Croplan	37752	1 cde	0 bc	0 b	0	40 fg	14.1 cdef	61.8 ab	12544 abc
P 1055AM	Pioneer	34267	29 a	0 c	0 b	0	46 bcdef	12.4 ij	60.6 ab	12533 abc
INT 6695TRE	Integra	36300	3 cde	5 ab	0 b	0	52 ab	13.9 cdefg	61.7 ab	12445 abc
LG 67C45STX	LG Seeds	36300	0 e	1 abc	0 b	0	49 abcd	15.3 a	60.6 ab	12382 abc
LG 61C48VT2PRO	LG Seeds	36300	5 bcd	3 ab	1 b	0	43 defg	13.0 ghij	60.3 ab	12329 bc
P 1197	Grower entry	37752	4 bcde	1 abc	0 b	0	50 abc	13.6 defgh	61.1 ab	12300 bc
MS 1687VT2P	Mission Seeds	35719	2 bcde	2 abc	1 b	0	47 bcde	12.4 efghi	60.2 b	11520 cd
NK 1694-3111	Northrup King	35719	4 bcde	2 abc	3 ab	0	54 a	15.0 ab	57.9 c	10940 cd
A 644-04-3110	Agrigold	35429	12 ab	6 a	1 b	0	52 ab	14.3 bcdef	60.9 ab	8962 d
Average		**36351**	**5**	**2**	**1**	**0**	**47**	**14**	**60.8**	**12654**
Coefficient of Variation (%)		**2**	**30**	**48**	**64**	**-**	**2**	**2**	**0.6**	**6**
Significant variety effect (P value)		**0.4578**	**<0.0001**	**0.0001**	**0.0019**	**N/A**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**

Results for each variety are expressed as the average across three replications.
* Data were transformed for analysis. Arithmetic means are presented.
‡ Yield adjusted to 15% moisture.

Common smut occurs in hot, dry conditions and was more prevalent in 2020 compared to previous years, especially for certain varieties. Common smut appears as gray galls filled with spores that replace kernels. These three diseases are generally managed by variety selection.

Table 1 presents mean values for the three replicates. The statistical method used to compare the means is called the Tukey's range test. Varieties were considered statistically different if their P value was less than 0.05, or 5 percent. What this means is that when differences between varieties exist, we are 95% certain that the two varieties are actually different; the results are not due to random chance. Differences between varieties are indicated by different letters following the mean. For example, a variety that has only the letter "a" after the mean yield value is different from a variety that is followed by only the letter "b", but it is not different from a variety whose mean value is followed by both letters ("ab"). Similarly, a variety whose mean yield is followed by the letters "ab" is not different from a variety whose mean yield is followed by the letters "bc". Twelve varieties have a letter "a" following their mean yield, which means that those twelve varieties all performed similarly in the trial. In other words, based on this research, we cannot attribute numerical differences to varietal differences.

In addition to yield, there were also statistical differences among varieties in Fusarium ear rot, head smut, common smut, ear height, grain moisture, and bushel weight. The CV, or coefficient of variation, is the standard deviation divided by the mean, or a measure of variability in relation to the mean. For the diseases, the variability among the three replicates was very high. Special thanks go to the cooperating growers, Gary and Steve Mello, and the participating seed companies.

Other announcements: Please consider subscribing to my blog, SJC and Delta Field Crops (https://ucanr.edu/blogs/sjcfieldcrops/). In the next couple months, I will post articles about other research trials.

Michelle Leinfelder-Miles, Farm Advisor, Delta Crops

Phytophthora Root and Crown Rot & Paradox Canker Disease in Walnuts

Diagnosis of Phytophthora and Paradox Canker Diseases

Phytophthora crown and root rots and Paradox canker disease are difficult to detect until the above-ground parts of the tree show symptoms, which usually appear at a later stage of the infection especially in the summer time. These trees may have decreased yield and vigor for a few years before succumbing to the disease.

Phytophthora disease can first be managed with an accurate diagnosis. Many types of cultural practices and chemical controls can be implemented for Phytophthora problems, but collecting all the facts/patterns related to this problem for an accurate diagnosis will help long-term management efforts. Knowing the appropriate conditions that favor pathogen development also helps the diagnosis. However, the most important factor for an accurate diagnosis is the presence of the organism on the affected plant.

(Continued on page 4)

Phytophthora can be detected by plating diseased tissue onto selective agar medium, or by baiting the organism by placing the rotted material or soil in a container of water and floating a healthy piece of plant material (e.g. pear). If the desired pathogen is present, it may grow out from the tissue and then could be identified based on morphological and molecular means. The problem with these methods is that the chance of recovering the pathogen alive is low in some cases, like at certain times of the year. The less frequent recovery of the organism during the summer time has raised the question whether this is due to differences in soil composition or different climatic conditions.

On the other hand, trees declining from Phytophthora root and crown rot are frequently misdiagnosed as suffering from "wet feet" (root asphyxiation), or are sometimes confused with paradox canker disease. Paradox canker disease is still under investigation, and no recognized pathogens have been isolated to be identified as the causal agent.

Phytophthora

Symptoms. Usually, disease symptoms appear as dark, water-soaked lesions with irregular margins and are similar among Phytophthora species. Declining trees are characterized by chlorotic foliage as well as wilting, defoliation and eventual tree death. Trunks often expressed gumming together with crown rot symptoms (Fig. 1). This year we visited several walnut orchards in San Joaquin County with trees showing typical symptoms of Phytophthora crown and root rot disease (Fig. 1). Most orchards are between 10 – 15 years old. The increased number of symptomatic trees that showed up this summer make us think that infections on these orchards started a few years ago (~2-3 years). In recent years, we have faced environmental conditions that may favor tree stress and disease, including late winter and early spring rains and hot and dry summers. These conditions are conducive for infection, allowing the pathogen to infect plant roots/crown, causing tree decline and eventual death.

Figure 1. Symptoms of Phytophthora disease in walnut trees: dark, water-soaked lesions with irregular margins.

Causal Organism and Disease Cycle. Species of Phytophthora, which are fungus-like microorganisms, are members of the Oomycetes or "water molds". Present in virtually all California tree crop orchards, it can cause significant disease problems. In walnut, Phytophthora rots can girdle the rootstock just below the soil surface (crown rot), and cause necrosis and death of roots (root rot). Multiple species of Phytophthora have been implicated in tree damage with *P. cinnamomi* and *P. citricola*, two of the more significant species.

Phytophthora species are present in most orchard soil and can cause root and crown rots. They mainly persist as thick-walled spores called chlamydospores, which are extremely resilient and can remain viable in the soil for long periods of time. In the presence of water, such as during wet weather, Phytophthora chlamydospores or oospores germinate to form sporangiophores bearing sporangia. These sporangia are full of swimming zoospores, which in saturated soils can move/swim to find new roots to attack.

Cultural Controls. In the beginning to mid-summer, check your orchards for trees with weak aerial growth or declining symptoms, especially where there is poor soil drainage. When Phytophthora rots are suspected, check the base of the tree at and below the soil line for any crown and root rot symptoms.

Monitor soil moisture and limit periods of soil saturation. Rapid build-up of pathogen inoculum and a high rate of infection are more likely influenced by the presence of water and excessive moisture. Plant trees on berms/ridges to help raise their crowns above the primary zone of zoospore activity and provide important protection, especially for young trees. Prevent soil compaction and do not allow water to splash on tree trunks (if using sprinklers). Duration of irrigation should not exceed 24 hours in soils with low infiltration rates or high holding capacities. In these soils, shorter irrigation sets should be applied.

Rootstock selection: Resistant rootstocks are the best solution for the control of Phytophthora diseases. Clonal Paradox RX1 rootstock, which has high resistance to *P. cinnamomi* and moderate to high resistance to *P. citricola*, could be the best rootstock choice in soils with a Phytophthora history or when conditions are conducive for Phytophthora development.

Chemical Controls. Focus on cultural control methods first. These methods can be very effective. Chemicals are used to help supplement these methods. Phosphonate fungicides may be used to manage the disease in an integrated management program. Applications are typically made one to two times a growing season, such as in spring and early fall as preventative treatments.

Paradox canker disease

Symptoms. Crown symptoms of this disease superficially resemble those of Phytophthora crown rot: bleeding bark that originates below the soil surface and spreads up and around the root crown and tree trunk. Upon peeling back the outer bark of the trunk, Paradox canker disease cankers tend to be more rounded or lobed at their margins compared to those caused by Phytophthora (relatively irregular margins) (Fig. 2).

(Continued on page 5)

Figure 2. Symptoms of Paradox Canker disease in walnut trees: cankers tend to be more rounded or lobed at their margins.

Control. The cause of Paradox canker is still unknown. Identification of the causal agent is of utmost importance for controlling plant diseases and mitigating the economic losses they can cause. For now, the best thing to do is to remove dead trees without spreading any of the dead tissue in the orchard.

Mohamed Nouri, Orchard Systems Advisor
Natalia Ott, PhD student, UC Davis
Greg Browne, Research Plant Pathologist, USDA-ARS and UC Davis

Fall Irrigated Pasture Management

With the irrigation season coming to a close, now is a good time to take a quick look at the health of your irrigated pastures. After a summer of grazing, sometimes fairly intensively, weeds of all kinds are easier to spot. The easiest weeds to spot are curly dock, yellow starthistle, bull thistles, and cockleburs that can be common weeds in irrigated pasture, but other, more subtle weeds that would have been hidden in the lush grass earlier in the season are now visible.

I am starting to see more of an invasive grass in irrigated pastures that has been in the Sacramento Valley for a while now – smutgrass (*Sporobolus indicus*). It is a perennial grass, native to tropical America, and it gets its name from a black fungus (smut) that is often found on seed heads in humid regions. The smut probably acts as a natural biocontrol in humid, tropical regions. However, in the low humidity of California, smutgrass is missing the smut.

Early in the season from a distance, it will not be very evident that you have a problem since smutgrass really doesn't start to grow until later in the season. It resembles other perennial grasses in your pasture. It is not palatable and is often avoided. It is more easily spotted once seeds are developed in late summer (August roughly) and your grazing pressure has been steadily selecting more desirable grasses, leaving this tall bunch grass behind. This time of the year, chances are, the only tall forages in the pasture are not palatable. This gives you a chance to walk the pasture (or even just drive by for a quick glance), assess what went well, and determine what you need to put on your 'to do' list for next year.

For smutgrass control, you have a few options, and some of them will also work for other weeds. Burning has been looked at in Florida, but it was not successful in controlling smutgrass alone and needed to be used with another control method. Mechanical control has mixed results, with continuous mowing showing some success in reducing the amount of smutgrass. Once you stop mowing, however, it quickly returns. If you try to use some other mechanical removal (hoe, disk, etc.), disturbing the soil tends to create more of a problem than if you had left it alone. Each plant can produce up to 45,000 seeds per year, last for more than two years in the soil, and has a 94% germination rate on disturbed soils (while only a 9% germination on undisturbed sites). Mechanical control can create a perfect environment to grow more smutgrass. Grazing, even intensive rotational grazing, will have very little impact. However, good grazing management can help reduce the potential for smutgrass to establish by not overgrazing and creating any bare spots where smutgrass seeds can germinate.

Chemical control is limited to glyphosate since it is a non-selective herbicide. Since smutgrass is not palatable, you can create the situation where you have a height difference between your desired forages (orchard grass, fescue, rye grass, clovers, etc.) and smutgrass. This allows you to use some sort of a weed wiper to apply glyphosate only to the smutgrass, or any weed that was not grazed. (I have seen some homemade ones, as well as commercially available ones, and you can search YouTube for "homemade weed wiper" for ideas.) If you use a wiper to apply glyphosate instead of spot spraying, you should note that your rates will be drastically different, but the overall costs and actual amount of product applied will be similar for both application methods. A rate of at least 33% glyphosate is needed for the wiper application, and moving towards 50% had good control (Fig. 1), compared to a 2% rate if using spot spraying.

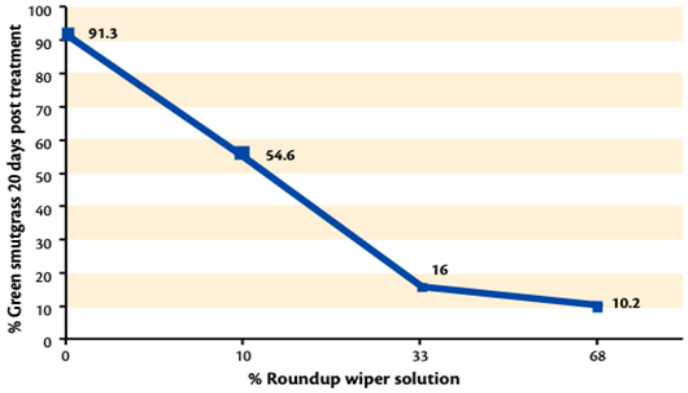

Figure 1. Roundup WeatherMax wiper solutions on germination of smutgrass. (Source Davy, et al 2012.)

Follow any treatment with seeding to replace smutgrass with a desirable forage. Additionally, if you are able to irrigate on a 7-day rotation instead of a 14-day rotation, this has also been shown to be beneficial at decreasing smutgrass while increasing desirable forages.

Most ranches need their irrigated pastures to maintain their herd for the summer. Good pasture management, including weed control, can help keep your pasture productive year after year.

Other announcement: Match.Graze is a free online platform that connects livestock producers and landowners throughout the state of California. The Match.Graze map (see https://matchgraze.com) displays pertinent data from individuals that have voluntarily submitted information to the database, such as acreage or animal type available, forage characteristics, approximate location, and contact information. Search the map to find an answer to your personal grazing needs. With this service, University of California Cooperative Extension (UCCE) aims to support the expanded use of grazing to achieve California's collective habitat enhancement and fuels reduction goals.

Theresa Becchetti, Livestock and Natural Resources Advisor, Stanislaus and San Joaquin counties

Broomrape, a parasitic weed impacting tomato

In the past decade, there have been a few cases of broomrape infestations that were reported from California tomato fields. Although these cases are isolated and relatively rare, they still are of great concern because we don't want these weeds to become widespread and established here. We have heard and seen from other countries that the impacts of these weeds can be devastating to tomatoes, and control programs are not highly effective. Therefore, California efforts continue to eradicate these weeds if possible, to mitigate financial impacts to growers who report it, and to research ways to manage these weeds should they become established. CTGA is leading talks with USDA about Federal crop insurance coverage for broomrape, and CTRI is funding UC research to evaluate control of broomrape in tomato with herbicides.

These efforts have been a collaboration between CTRI, CTGA, and University of California, Davis researchers and Cooperative Extension. However, despite all these important efforts, the single most important thing is for all of us to be AWARE of this weed and to REPORT IT to the local Ag Commissioner when found. Harvesting an infested field is a risky endeavor, not just for that grower, but for the entire industry.

Here are some more ways to get information, including photos and descriptions and preliminary research results:

- Branched broomrape information on CTRI's Tomato Net website: http://tomatonet.org/branchedbroomrape
- Getting familiar with branched broomrape: a parasitic weed in California processing tomato (August 2020 UC Weed Science Blog post): https://ucanr.edu/b/~4HB
- Broomrape in field crops (June 2018 UC Blog post by Gene Miyao et al.): https://ucanr.edu/b/~F97

Fusarium diseases of tomato

Fusarium diseases remain among the greatest pest-related threats to local tomato production. Although there are now four Fusarium diseases in local tomatoes, the two primary diseases are Fusarium wilt race 3 and the new Fusarium falciforme crown rot and vine decline. Fusarium falciforme, unfortunately, is continuing to spread and was documented in a number of local fields, some of them severely impacted by widespread vine decline in the field. In 2020, we observed Fusarium wilt race 3 continue to cause problems, although some of the widely grown cultivars do have resistance to race 3. As of the week ending October 17, data from PTAB indicate that among the tomatoes delivered from San Joaquin County, race 3-resistant varieties accounted for about 33% of the loads. My own research efforts this season included a cultivar evaluation trial in a local commercial field with both Fusarium wilt race 3 and Fusarium falciforme, as well as a chemical control trial that assessed the efficacy of both pre-plant fumigation (K-Pam, metam potassium) as well as fungicides applied as drenches at transplanting and/or via early-season chemigation via the buried drip system. Detailed trial results will be available soon, and will be presented at winter meetings (Save the Date! January 22nd Virtual Tomato Meeting, more info to come). But to summarize where we are at with these two diseases:

F3 cultivars remain the best way to manage Fusarium wilt race 3. If planting a non-resistant (F2) variety, then pre-plant fumigation and avoiding plant stress can help reduce disease incidence. Based on observations in local fields, rotation out of tomatoes has not been as effective as one might have hoped.

For more information on Fusarium wilt, please see a newsletter article written by Kelley Paugh and Cassandra Swett of UC Davis, on the UCCE San Joaquin County website: https://ucanr.edu/sites/veg_crop_sjc/files/338917.pdf.

Fusarium falciforme studies are still underway. There are not resistant varieties, but there does seem to be some degree of tolerance among commercially grown varieties (in other words, varieties that still get the disease, but seem to yield decently anyway). We do not yet have enough information on crop rotation to make recommendations about how well crop rotation works and what crops are most effective in reducing soil inoculum potential. As with Fusarium wilt, pre-plant fumigation is effective, although it only suppresses the disease for a short time but does increase yields. As with Fusarium wilt, plant stress is likely also a factor, but this is still under study.

Figure 1. Typical symptoms of bacterial bulb rotting include leaf dieback

Figure 1b. and neck rot which progresses down into the bulb, sometimes only affecting certain scales, other times rotting the entire bulb.

(Continued on page 7)

Bacterial bulb rots of onion

We are at the end of the first year of a four-year project studying bacterial bulb rots of onion with funding from USDA ('Stop the Rot' USDA NIFA SCRI Onion Bacterial Project #2019-51181-30013). This is a large, multistate effort to characterize the bacteria that causes these diseases and to develop tools for diagnosis as well as protocols for onion breeders to use to breed for tolerance or resistance. We are also looking at management strategies in field trials. In our first season, we surveyed six California fields to determine what bacteria are present on leaves and bulbs that had symptoms of bacterial disease. Survey fields were located in Kern, Kings, Fresno, Sacramento and Siskiyou counties.

We did not find any bacterial bulb rot affected fields in San Joaquin County, but I encourage you to contact me during this upcoming season if you see any leaf dieback suggestive of bacterial problems (Fig. 1). The bacteria collected this past season are still being identified, and the results will be shared in February. Next season, we will continue the survey work to determine which bacteria are the major ones causing disease. We will also be initiating management trials, evaluating chemical control measures as well as irrigation and possible interactions with herbicide damage and bacterial diseases. For more information on the larger, multistate project, please see the Alliumnet website (https://alliumnet.com/projects/stop-the-rot/) or contact me.

Brenna Aegerter, Vegetable Crops Farm Advisor

Calendar of Events/ Announcements

Alfalfa IPM Virtual Workshop
December 3-4, 2020
9:00am to 12:00pm each days
For more information and to register, visit https://ucanr.edu/survey/survey.cfm?surveynumber=32200.
Contact: Michelle Leinfelder-Miles, mmleinfelder-miles@ucanr.edu

CA Cherry Research Review Meeting
Thursday, January 21, 2021
9:00am to 1:00pm
This event will likely be a virtual meeting.
Contact: Mohamed Nouri, mnouri@ucanr.edu.

UCCE Processing Tomato Production Virtual Meeting
Friday, January 22, 2021
9:30am to 12:00pm
More information to come. For 2021, this will take the place of the regional meetings that have traditionally been held in Woodland, Modesto and Five Points.
Contact: Brenna Aegerter, bjaegerter@ucanr.edu

California Rangeland Virtual Summit
January 26-29, 2021
1:00pm to 3:30pm each day
Registration link will be available soon!
Contact: Theresa Becchetti, tabecchetti@ucanr.edu

Virtual Statewide Walnut Day
February 16-17, 2021
8:00am to 12:00pm
More information to come.
Contact: Mohamed Nouri, mnouri@ucanr.edu

A Message from a Partner: Walnut Grower Survey, CSU Fresno

FRESNO STATE Discovery. Diversity. Distinction.

Dr. Annette Levi and Dr. Jason Liang of the Department of Agricultural Business at California State University, Fresno are conducting a survey of walnut growers to learn their preferences for walnut rootstocks. You will be asked about your preferences in rootstock attributes, the amount you would be willing to pay for enhanced characteristics of the rootstock, and demographic information.

The estimated time for the survey is 10 minutes, and the survey is anonymous. Questions should be directed to Constance Jones, Chair, 559-278-4468. More information and the survey can be accessed from http://tiny.cc/walnuts19

UC CE

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Notes from the Field

November2020