Sacramento Valley Almond News

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Agriculture and Natural Resources | Cooperative Extension

In This Issue

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Pocket gopher management: don't wait too long!

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Introduction

Pocket gophers are short, stout burrowing rodents, usually 6–8 inches in length. They spend most of their time below ground where they use their front legs and large incisors to create extensive burrow systems. Common forms of damage include consumption of roots and girdling of stems and trunks that result in a loss in vigor of the plant, loss of irrigation water down burrow systems, and chewing on subsurface irrigation lines. Mounds can also result in additional problems including serving as weed seed beds, causing damage to farm equipment, serving as a hazard to farm laborers, interfering with harvest operations, and causing channeling that can lead to substantial soil erosion.

In California, pocket gophers (*Thomomys* spp.) may be responsible for more damage to orchards than any other mammal species given their widespread distribution, yet many growers choose to ignore them assuming that they will not cause substantial losses. To be sure, there are many orchards where pocket gophers are found, yet damage is not apparent. However, damage to root systems may still be present, potentially reducing yields; this needs to be studied further. Additionally, pocket gophers can be present in an orchard for several years without causing apparent mortality, yet within a short period of time they can switch to feeding on tree crops leading to substantial losses. The only way to ensure that pocket gophers will not cause substantial concerns is to minimize their presence in orchards. This is particularly important for young trees which are highly susceptible to pocket gopher damage.

Pocket gophers can breed at different times throughout the year, although there is typically a pulse in reproduction toward late winter through early spring. Management efforts implemented before this reproductive pulse will often be more effective as there will be fewer individuals to remove at that time. Additionally, pocket gophers mound more frequently during this period given high natural soil moisture. This makes identification of active tunnel systems easy, thereby reducing the time required to treat an orchard while also increasing the efficacy of these management efforts. It should be pointed out that if you intend to use burrow fumigants, high soil moisture is also key for effective control. All of this points to the importance of focusing management efforts on the winter and early spring seasons to minimize pocket gopher damage.

A number of options are currently available for managing pocket gophers although most control programs center on trapping, burrow fumigants, and toxic baits. Given space limitations, I will focus on these three options. For additional information on managing pocket gophers, I suggest checking out the UC IPM Pocket Gopher Pest Note (http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html).

Trapping

Trapping is safe and one of the most effective methods for controlling pocket gophers, with recent studies showing that a 90% reduction in pocket gopher density is possible after two trapping sessions separated by 1 to 2 weeks. A third trapping session has resulted in complete removal of pocket gophers from some fields. Although a bit more time-consuming than burrow fumigation and rodenticide baiting, recent research has shown that trapping is actually a very cost-effective approach when soil conditions are ideal for trapping efforts (i.e., moist, friable soils with relatively shallow burrow systems) given the high efficacy observed with trapping. Trapping becomes a less practical large-scale management tool when treating hard, dry soils, but it still can be a good follow-up approach to alterative management options even in more difficult trapping conditions because it allows you to target remaining individuals that other tools might miss. In short, I think trapping should be a tool that all growers employ to some extent, even if it is not the primary tool they prefer to use.

The most common type of trap is a two-pronged, pincher trap such as the Macabee, Easy Set, or Gophinator, which the pocket gopher triggers when it pushes against a flat, vertical pan. Another popular type is the choker-style box trap, although these traps require extra excavation to place and may be a bit bulky to be practical in a large field setting. All pocket gopher traps can be effective, although the Gophinator has proven to be the most effective in recent trials. We have not seen a substantial benefit to covering trap sets. As such, it is generally easier to leave trap sets uncovered to speed up the trapping process. We have not observed any impact of human scent on traps, nor have we been able to identify an attractant that increases capture success.

Fumigation

Burrow fumigants can be effective at managing pocket gopher populations. Primary burrow fumigants have historically included aluminum phosphide and gas cartridges. However, as of January 1, 2012, carbon monoxide producing machines can now be used to apply pressurized exhaust to burrow systems.

Aluminum phosphide is the primary fumigant used for pocket gopher control; it is quite effective (around a 90% removal rate after two treatment periods) and has a low material cost, although labor costs can be higher. The primary method for applying aluminum phosphide is similar to that of hand baiting. You use a probe to find a pocket gopher tunnel, and drop the label designated number of tablets into the probe hole. The opening is then sealed to eliminate light from entering and the toxic gases from exiting the tunnel. Typically, you treat each burrow system twice to maximize efficacy. The key with aluminum phosphide treatments is to only apply when soil moisture is relatively high. Because of this, fumigation is typically most effective in late winter and early spring. However, fumigation after irrigation can also be a good strategy. Please note that aluminum phosphide is a restricted-use material. Applicators must be licensed and trained on its proper use.

Carbon monoxide producing machines are increasing in popularity for managing pocket gopher populations. The most common and best studied device is the Pressurized Exhaust Rodent Controller (PERC) machine. Efficacy with this device (~55 to 65%) has been lower than with aluminum phosphide, trapping, and strychnine baiting. Additionally, purchase costs for the machine are quite high. That being said, multiple burrow systems can be treated at once (up to 6), allowing applicators to treat fields much more rapidly. If the PERC machine is used very extensively, it appears to provide cost effective results, but it must be used very extensively to be considered as cost effective as burrow fumigation with aluminum phosphide, trapping, or strychnine baiting.

Burrow fumigation with gas cartridges is generally ineffective and expensive for pocket gophers, although their efficacy may be somewhat increased if a blower is used to diffuse the smoke throughout the burrow system.

Toxic baits

There are three baits for pocket gopher control: 1) strychnine, 2) zinc phosphide, and 3) anticoagulants (e.g., chlorophacinone and diphacinone). Both strychnine and zinc phosphide are considered acute toxicants. This means that they kill after a single feeding. Strychnine has historically been available in two concentrations in California: 0.5% and 1.8%. However, due to supply issues, strychnine importation into the U.S. is currently very low. As such, the 1.8% strychnine bait is no longer available for purchase. That being said, a recent investigation showed that 0.5% strychnine is still highly efficacious, with 100% removal rates observed across three fields. Keep in mind that pocket gophers can develop a behavioral resistance to strychnine if repeatedly used over time. As such, strychnine baiting should be supplemented with other management approaches to reduce this potential.

Zinc phosphide is also available for pocket gopher control; it comes in a 2.0% concentration. Bait acceptance can be low with zinc phosphide, as it has a distinctive odor and taste that pocket gophers are often averse to. Anticoagulants such as chlorophacinone and diphacinone are multiple feeding toxicants. With these rodenticides, individuals must consume the bait multiple times over the course of 3 to 5 days to receive a toxic dose. This means larger amounts of bait are required to maintain a ready bait supply over this time period. Because of this, acute toxicants are typically preferred over anticoagulants for pocket gopher control although none of these products have proven as consistently effective as strychnine.

There are two primary methods for baiting in fields: 1) hand baiting with an all-in-one probe and bait dispenser, and 2) a burrow builder. Hand baiting can be effective if you have relatively few pocket gophers in a field. For this approach, an all-in-one probe and bait dispenser is used to locate a tunnel. Once the tunnel is located, bait is directly deposited via a hand-crank or lever. Typically, it is recommended that each burrow system be treated at least twice to maximize efficacy.

Although hand baiting can be effective for smaller pocket gopher populations, the burrow builder can be a more practical method for treating larger areas. The burrow builder is a device that is pulled behind a tractor on a 3-point hitch and creates an artificial burrow at a set depth. Bait is then deposited at set intervals along the artificial burrow. While engaging in normal burrowing activity, pocket gophers will come across these artificial burrows and consume the bait within. This device must be used when soil moisture is just right. If the soil is too dry, the artificial burrow will cave in, but if it is too wet, the burrow will not seal properly and will allow light to filter in; pocket gophers will not travel down burrows if they are not sealed. Although convenient, the efficacy of this method has varied extensively among growers. Experimentation is key to determining the applicability of this approach for each grower.

Summary

All of the techniques listed previously can be effective at removing pocket gophers from orchards. However, it is important to understand that most, if not all, techniques will require multiple applications to maximize removal rates. Not all individuals in a population will be actively creating mounds at a given time; you will not be able to target treatment applications if you do not know that a pocket gopher is present. As such, it is strongly recommended that you treat fields at least twice, preferably separated by 1 to 2 weeks, so as to maximize the likelihood that you will encounter all, or almost all, pocket gophers in the field. Your ultimate goal should be a reduction in population size of at least 90%. Even with effective removal, reinvasion into orchards will occur. As such, long-term monitoring will be required to remove reinvaders before populations have a chance to reestablish.

It is important to utilize pocket gopher management tools in an integrated manner. Continued reliance of one technique will ultimately result in lower efficacy as pocket gophers will adapt to avoid the management tool (e.g., strychnine behavioral resistance). Incorporating these tools with other management options such as flood irrigation and habitat manipulation will further increase the effectiveness of pocket gopher management programs.

An alternative preemergence herbicide strategy for summer grasses in orchards

Brad Hanson, UC Cooperative Extension Specialist, UC Davis

As most orchardists and pest control advisors are well aware, glyphosate-resistant weeds have been one of the biggest weed management challenges in California orchard crops for several years.

Depending on where you are located in the Central Valley, your biggest challenges in the glyphosate-resistant weed department are probably one or more of the following winter annual weeds. In the San Joaquin Valley, hairy fleabane and horseweed (also known as mare's tail), dominate. While in the Sacramento Valley and in some North coast areas, annual or Italian ryegrass is more common. For an extra challenge, many growers have a mix of several of these, in addition to their other common orchard weed spectrums.

In developing management strategies for these winter annual weeds, we've typically focused our herbicide-based programs on timely applications of preemergence herbicides. Because preemergence herbicides generally work on germinating weed seed or very small seedlings, "timely" applications for these winter annual species usually means getting the herbicide treatments out in late fall or early winter. In normal rainfall seasons, this timing ensures water-incorporation of the herbicide at about the same time as the seeds germinate and, hopefully, good control. Mission accomplished, right?

Recently, we've been seeing new glyphosate-resistant weed challenges that require a different management approach. The species I mentioned a moment ago are all winter annuals, which means they typically germinate and emerge during our cool season and reach a reproductive stage by spring or early summer. However, several recently confirmed (or suspected) glyphosate-resistant species are summer annual grasses. Summer annual weeds typically germinate and emerge as our season warms up in the late spring and early summer and they grow well into the summer before reaching maturity. A few examples include junglerice, threespike goosegrass, and several other glyphosate-questionable species such as feather fingergrass, sprangletop, and witchgrass. So, how do these grasses present such a different challenge?

The challenge with glyphosate-resistant summer grasses is that even though we have a number of good preemergence herbicides that can work very well on grasses, these species emerge long after our typical orchard preemergence herbicide programs are applied. Thus, herbicide programs that are applied during mid-November to mid-February targeting winter annual weeds sometimes fail to control summer annual weeds that emerge in May-July. If spring applications of foliar materials like glyphosate fail because of resistance, problems can quickly become apparent. How can we use our existing preemergence herbicide tools to help address this problem?

To answer that question, it's useful to think about what happens to a preemergence herbicide when you apply it to the soil. Herbicides "dissipate" in soil, a term that encompasses a suite of processes by which the herbicide is either broken down or made unavailable. Chemists use terms like "half-life" to describe differences in dissipation rates but this doesn't exactly get at our interest in weed control performance. From a performance standpoint, it's more useful to think of a herbicide concentration threshold. When the amount of herbicide in the soil solution is above the threshold for a certain weed, it remains effective on that weed. However, dissipation processes will eventually reduce the herbicide concentration below the threshold and the herbicide begins to "break". The threshold may occur at different levels for different weed species and dissipation rates may vary in different areas of the fields (wet vs dry areas, for example).

So, how do we typically account for dissipation of preemergence herbicides in orchard crops? I tend to think of three general strategies:

- Use mixtures of more than one preemergence herbicide
- Apply a higher (labeled!) rate of a preemergence herbicide
- Use a sequential approach to preemergence programs in orchards.

Mixtures: Using herbicide mixtures, particularly products with different modes of action, is a great strategy for managing and delaying herbicide resistance but doesn't really help in this situation. Because herbicide dissipation rates are affected primarily by the chemistry of the individual herbicide and the environmental conditions, a tankmix will not exactly help extend the residual control beyond what we'd expect from the longest-lasting material. Or, to say it another way: if you mix a short residual herbicide with a long residual herbicide, one will last a short time and the other a long time but the mix will not last longer.

Higher rates: Many, but not all, preemergence herbicide labels have a range rates registered in a crop to account for differences in soils, required level of control, weed spectrums, etc. Within the labeled rate, it stands to reason that given similar dissipation processes, a higher rate will result in the soil concentrations of the herbicide remaining above the efficacy threshold for a longer time than a lower rate. This is generally true and is a common approach when we only have one opportunity to make a preemergence herbicide application. However, I think this is an indirect way to approach the problem of summer grasses in orchard crops.

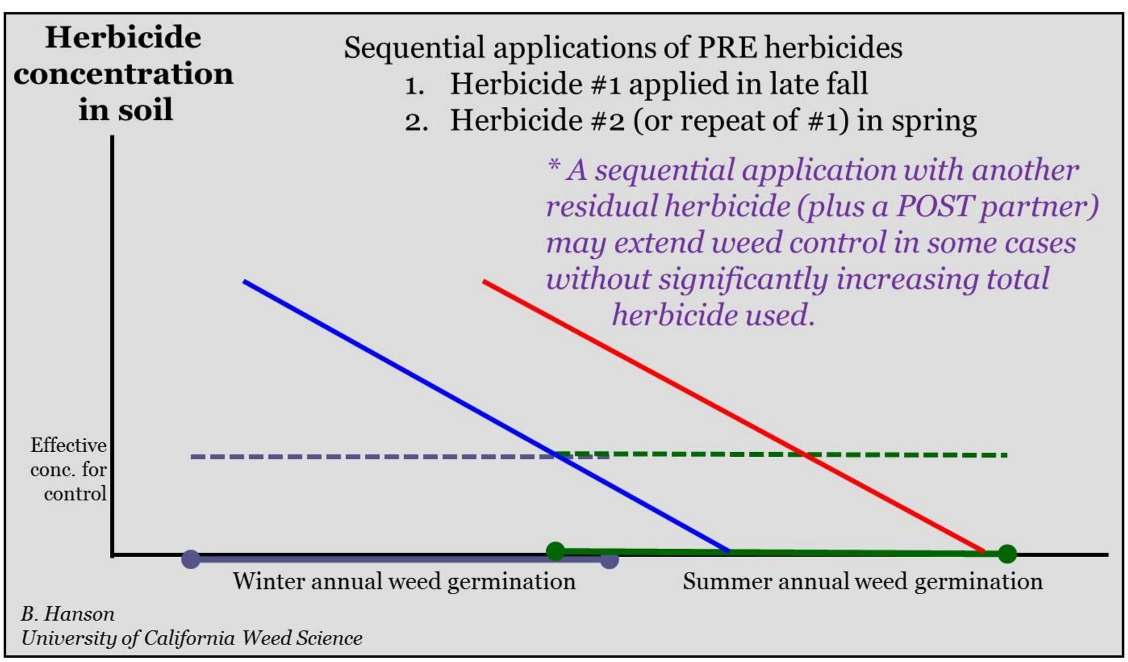
Sequential approach: In the orchard cropping system, some growers may want to consider using a sequential approach to available preemergence herbicides to tackle problems with glyphosate-resistant summer annual grass weeds. Conceptually, this approach simply moves a portion of the winter preemergence herbicide program to a bit later in the year to late winter or early spring. A preemergence herbicide with activity on summer grasses would be applied along with the grower's spring burndown herbicide program and, thus, would be present in the soil solution much closer to the timeframe when summer grasses begin to germinate and emerge. Importantly, I think this could be achieved in many situations with no significant changes in cost, number of field operations, or negative environmental impacts.

Illustration: An almond grower who typically uses an effective preemergence program (pick your favorite program) applied around the first of December followed by a March "cleanup" treatment with glyphosate may still have difficulty managing glyphosate-resistant grasses. The grower knows that herbicides like oryzalin or pendimethalin (eg. Surflan or Prowl H2O) could help with grasses. Using the higher rate approach, the grower could use a high label rate one of these materials in December with the idea that it will persist long enough to control summer grasses emerging six months later. Using the sequential approach, the grower could move all or part of the oryzalin or pendimethalin component of the program to the March timing to more directly target those summer germinating grasses, possibly at a the same or even lower total application rate.

Who might want to consider a sequential approach? This approach requires a bit of close management attention. First, because incorporation of preemergence herbicides is key to their performance, moving some of this product to late spring will require either timely rain or overhead irrigation capabilities. Growers with solid-set or micro sprinkler systems should have little problem with this, but single- or double-line drip irrigated orchards will need to get a rain and should not delay too late in the spring.

Second, moving all or part of the preemergence grass herbicide to late in the year requires that growers know their weed spectrum. If you know or suspect glyphosate-resistant summer weeds, this may be an approach to consider. You should also have an idea of what weeds you are managing during the winter season too and make sure that your winter program still addresses that part of the weed spectrum.

Weed management in orchard crops is complex and getting further complicated by new glyphosate-resistant weeds. Because of our relatively mild climate and seasonally variable temperature and moisture conditions, we encounter weed germination and emergence in every season. Strategies to manage one fraction of the weeds present in a given orchard may not work equally well for other species. Handling shifting weed problems may require different approaches in order to make the most effective use of existing weed management tools.



Weekly Soil Moisture Loss Reports to Assist With Water Management

Katherine Pope, UCCE Farm Advisor, Yolo, Solano, Sacramento Counties

UC Cooperative Extension and regional offices of the Department of Water Resources have teamed up to provide **"Weekly Soil Moisture Loss Reports"** for almond, prune and walnut orchards to aid with irrigation scheduling. Each report gives the amount of water used by healthy, bearing orchards in the previous week and predictions for the coming week based on crop-specific evapotranspiration (ETc) estimates. Estimates integrate the crop growth stage and weather measurements from nearby CIMIS stations. These reports can help you decide when to start irrigating and how much to apply when you irrigate, based on the idea of replacing the water used by evapotranspiration.

Reports are delivered weekly by e-mail. Reports from Allan Fulton cover Gerber, Durham and Colusa CIMIS stations, and also include pasture, olives, citrus and turf grass. Reports from Kat Pope cover Dixon, Davis, Woodland, and Verona CIMIS stations. Email Allan (aefulton@ucanr.edu) or Kat (kspope@ucanr.edu) if you would like to receive these weekly reports.

In-Season Almond Pest and Disease Considerations

Luke Milliron, Former UCCE Horticulture Intern, Agronomy Tech at Dellavalle Laboratory Inc.

Pest Management:

- ✓ Proper navelorange worm (NOW) sanitation and substantial rainfall during dormancy increase overwintering mortality. In April, establish a NOW biofix by monitoring egg traps. Trapping form and degree-day model: http://ipm.ucanr.edu/PMG/C003/m003bceggtrapsnvl.html. Although there is often talk in the San Joaquin Valley of May sprays, this practice does not directly protect this year's crop (since it is not vulnerable until hull split), and it can result in flare ups of secondary pests (e.g., spider mites). However, the use of softer spray materials such as diamides and insect growth regulators in May can minimize impact on beneficial insects while providing suppression of NOW populations in large blocks with poor winter sanitation (i.e. high resident population).
- ✓ Monitor for peach twig borer (PTB) shoot strikes beginning mid-April. PTB shoot strikes can devastatingly damage the scaffold selection of young trees, whereas they are often seen as inconsequential to mature trees. Consider providing control measures (timed by trap catches and degree-days) if monitoring indicates shoot strikes to 1st leaf, or the primary scaffolds of 2nd leaf trees. Monitoring and control information: http://ipm.ucanr.edu/PMG/r3300211.html.
- ✓ Monitor ant mounds in May and June to determine if the number of southern fire ant or pavement ant mounds warrants a bait application before harvest. Some baits (for example, Clinch®) should be applied almost 2 months ahead of harvest for best results. Monitoring and bait application information at: ipm.ucanr.edu/PMG/r3300411.html.
- ✓ Starting in May, monitor weekly for spider mites and their predators, paying particular attention to water stressed areas of the orchard and other previous hot spots. Use UC IPM thresholds to determine if a miticide is necessary. Monitoring and control information at: http://ipm.ucanr.edu/PMG/r3400211.html.
- ✓ San Jose scale (SJS) feed on nutrients from limbs and spurs and inject toxins that can kill fruiting wood. The pest is not usually significant when broad-spectrum sprays have not disrupted parasitoid activity. Monitor in season with pheromone traps to detect male scales and parasitoid activity. Monitoring and control information at: ipm.ucanr.edu/PMG/r3300811.html.

- ✓ Monitor for pocket gophers throughout early spring. Winter through early spring is the key reproductive time for this pest and the key management practices of trapping, fumigation and toxic baits are particularly effective (*see article in this newsletter*).
- ✓ Whenever possible, employ the use of softer pesticides as part of your integrated pest management program. You can find more information on the toxicity of various pesticides on beneficial insects at: ipm.ucanr.edu/PMG/r3900311.html.

Disease Management:

- ✓ Time spray applications properly relative to host susceptibility and disease pressure. A key resistance management practice is to never use a single-site or even a pre-mixture fungicide when attempting to control a widespread disease outbreak. Resistance can also be managed by using effective materials for the observed disease and rotating FRAC groups to avoid resistance. Tables with this information can be found on pages 31-34: ipm.ucanr.edu/PDF/PMG/fungicideefficacytiming.pdf.
- ✓ Substantial late spring rain events bring an increased risk of almond scab. Once twig lesions sporulate in April, apply a protective fungicide spray prior to forecasts of significant rain. Monitoring and control information: ipm.ucanr.edu/PMG/r3100411.html.
- ✓ Anthracnose can infect nuts and spurs until spring rains end, which may require fungicide applications as late as May. Sanitation, cultural control, and fungicide rotation information can be found at ipm.ucanr.edu/PMG/r3101111.html.
- ✓ Monitor for Alternaria (leaf spot) from May to June, looking for 0.5 to 0.75 inch brown spots that become black when spores are produced. If the disease is present in mid-April follow the treatment recommendations at: ipm.ucanr.edu/PMG/r3101611.html.
- ✓ Shot hole, a fungal disease most commonly observed as lesion spots on leaves and fruit, can become widespread due to growth and reproduction of rain or sprinkler splashed spores. A shot hole outbreak can result in defoliation, weakened trees and reduced yields. Monitor leaves in spring for spores with reproductive structures (small dark speck at lesion center) and if found, apply fungicide controls at the labeled interval as long as the wet conditions conducive to the disease persist. Disease identification and control information can be found at: ipm.ucanr.edu/PMG/r3100211.html.
- ✓ If rust was present last year, monitor leaves in young orchards and on replants for lesions from April to June. If rust is present, spray to prevent premature defoliation. Control guidelines can be found at: ipm.ucanr.edu/PMG/r3100711.html.

Organic almond production field meeting planned

Franz Niederholzer, UCCE Farm Advisor, Sutter, Yuba, Colusa Counties

An organic almond production field meeting is planned for the afternoon of May 19 (2-5 PM) at the Nickels Soil Lab in Arbuckle (same location as the annual field day at Nickels that morning, map included in this newsletter). Topics include organic production strategies, marketing, plus disease, weed and nitrogen management. Speakers will be from industry and University of California Cooperative Extension. A final agenda will be available soon and posted at UCCE Colusa (http://cecolusa.ucanr.edu/Pomology/) web site.

Herbicide Registration on California Tree and Vine Crops -*(updated March 2016 - UC Weed Science)*

	Herbicide-Common Name (*example trade name*)	Site of Action Group[1]	Almond (tree nut)	Pecan (tree nut)	Pistachio (tree nut)	Walnut (tree nut)	Apple (pome)	Pear (pome)	Apricot (stone fruit)	Cherry (stone fruit)	Nectarine (stone fruit)	Peach (stone fruit)	Plum / Prune (stone fruit)	Avocado	Citrus	Date	Fig	Grape	Kiwi	Olive	Pomegranate
Preemergence	dichlobenil (*Casoron*)	L / 20	N	N	N	N	R	R	N	R	N	N	N	N	N	N	N	R	N	N	N
	diuron (*Karmex, Diurex*)	C2 / 7	N	R	N	R	R	R	N	N	N	R	N	N	R	N	N	R	N	R	N
	EPTC (*Eptam*)	N / 8	R	N	N	R	N	N	N	N	N	N	N	N	R	N	N	N	N	N	N
	flazasulfuron (*Mission*)	B / 2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N	N	N
	flumioxazin (*Chateau*)	E / 14	R	R	R	R	R	R	R	R	R	R	R	NB	NB	N	NB	R	N	R	R
	indaziflam (*Alion*)	L / 29	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	R	N
	isoxaben (*Trellis*)	L / 21	R	R	R	R	NB	NB	NB	NB	NB	NB	NB	NB	NB	N	NB	R	NB	NB	NB
	mesotrione (*Broadworks*)	F2/27	R	R	R	R	N	N	N	N	R	N	R	N	R	N	N	N	N	N	N
	napropamide (*Devrinol*)	K3 / 15	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	R	R	N	N
	norflurazon (*Solicam*)	F1 / 12	R	R	N	R	R	R	R	R	R	R	R	R	R	N	N	R	N	N	N
	oryzalin (*Surflan*)	K1 / 3	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R
	oxyfluorfen (*Goal, GoalTender*)	E / 14	R	R	R	R	R	R	R	R	R	R	R	R	NB	R	R	R	R	R	R
	pendimethalin (*Prowl H2O*)	K1 / 3	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	R	R
	penoxsulam (*Pindar GT*)	B / 2	R	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	pronamide (*Kerb*)	K1 / 3	N	N	N	N	R	R	R	R	R	R	R	N	N	N	N	R	N	N	N
	rimsulfuron (*Matrix*)	B / 2	R	R	R	R	R	R	R	R	R	R	R	N	R	N	N	R	N	N	N
	sulfentrazone (*Zeus*)	E / 14	N	N	R	R	N	N	N	N	N	N	N	N	R	N	N	R	N	N	N
	simazine (*Princep, Caliber 90*)	C1 / 5	R	R	N	R	R	R	N	R[4]	R	R	N	R	R	N	N	R	N	R	N
Postemergence	carfentrazone (*Shark*)	E / 14	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	clethodim (*SelectMax*)	A / 1	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	N	R	N	N	NB	N	NB	N
	clove oil (*Matratec*)	NC[3]	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	2,4-D (*Clean-crop, Orchard Master*)	O / 4	R	R	R	R	R	R	R	R	R	R	R	N	N	N	N	R	N	N	N
	diquat (*Diquat*)	D / 22	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
	d-limonene (*GreenMatch*)	NC[3]	R	R	R	R	R	R	R	R	R	R	R	N	R	N	R	R	R	N	N
	fluazifop-p-butyl (*Fusilade*)	A / 1	NB	R	NB	NB	NB	NB	R	R	R	R	R	NB	R	NB	NB	R	N	NB	NB
	glyphosate (*Roundup*)	G / 9	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	glufosinate (*Rely 280*)	H / 10	R	R	R	R	R	N	N	N	N	N	N	N	R	N	N	R	N	N	N
	halosulfuron (*Sandea*)	B / 2	N	R	R	R	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
	paraquat (*Gramoxone*)	D / 22	R	R	R	R	R	R	R	R	R	R	R	R	R	N	R	R	R	R	R
	pelargonic acid (*Scythe*)	NC[3]	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	N
	pyraflufen (*Venue*)	E / 14	R	R	R	R	R	R	R	R	R	R	R	N	N	R	R	R	R	R	R
	saflufenacil (*Treevix*)	E / 14	R	N	R	R	R	R	N	N	N	N	N	N	R	N	N	N	N	N	N
	sethoxydim (*Poast*)	A / 1	R	R	R	R	R	R	R	R	R	R	NB	NB	R	NB	NB	R	N	NB	NB

Notes: R = Registered, N = Not registered, NB = nonbearing. This chart is intended as a general guide only. Always consult a current label before using any herbicide as labels change frequently and often contain special restrictions regarding use of a company's product.

NICKELS SOIL LAB ANNUAL FIELD DAY

Thursday, May 19, 2016

Marine Ave., Arbuckle, CA

NO PCA CE credits available

2.5 hours of CCA CE credit requested

8:30 am — **Registration**

Coffee and Donuts provided by Farm Credit Services of Colusa-Glenn, ACA

9:00 am — **Field Topics:**

Site specific irrigation with plant stress monitoring
Shrini Upadhyaya, Professor, UC Davis Biol & Ag Engineering Department
Francisco Rojo, UC Davis Biol & Ag Engineering Department

Why consider precision ag and where to begin
Allan Fulton, UCCE Water Resources Advisor, Tehama/Glenn/Colusa Counties

Precision farming management with wireless technology
Bob Coates and Mike Delwiche, UC Davis Biol & Ag Engineering Department
Jack Coots, Farm Data Systems

Orchard replant options if cogen goes away
Brent Holtz, UCCE Farm Advisor and County Director, San Joaquin County

Rootstock and varietal differences in almond tree response to salt stress
Patrick Brown, Professor, UC Davis Plant Sciences Department

Almond rootstock options for Sac Valley: What we are learning
Katherine Pope, UCCE Farm Advisor, Sacramento/Solano/Yolo Counties

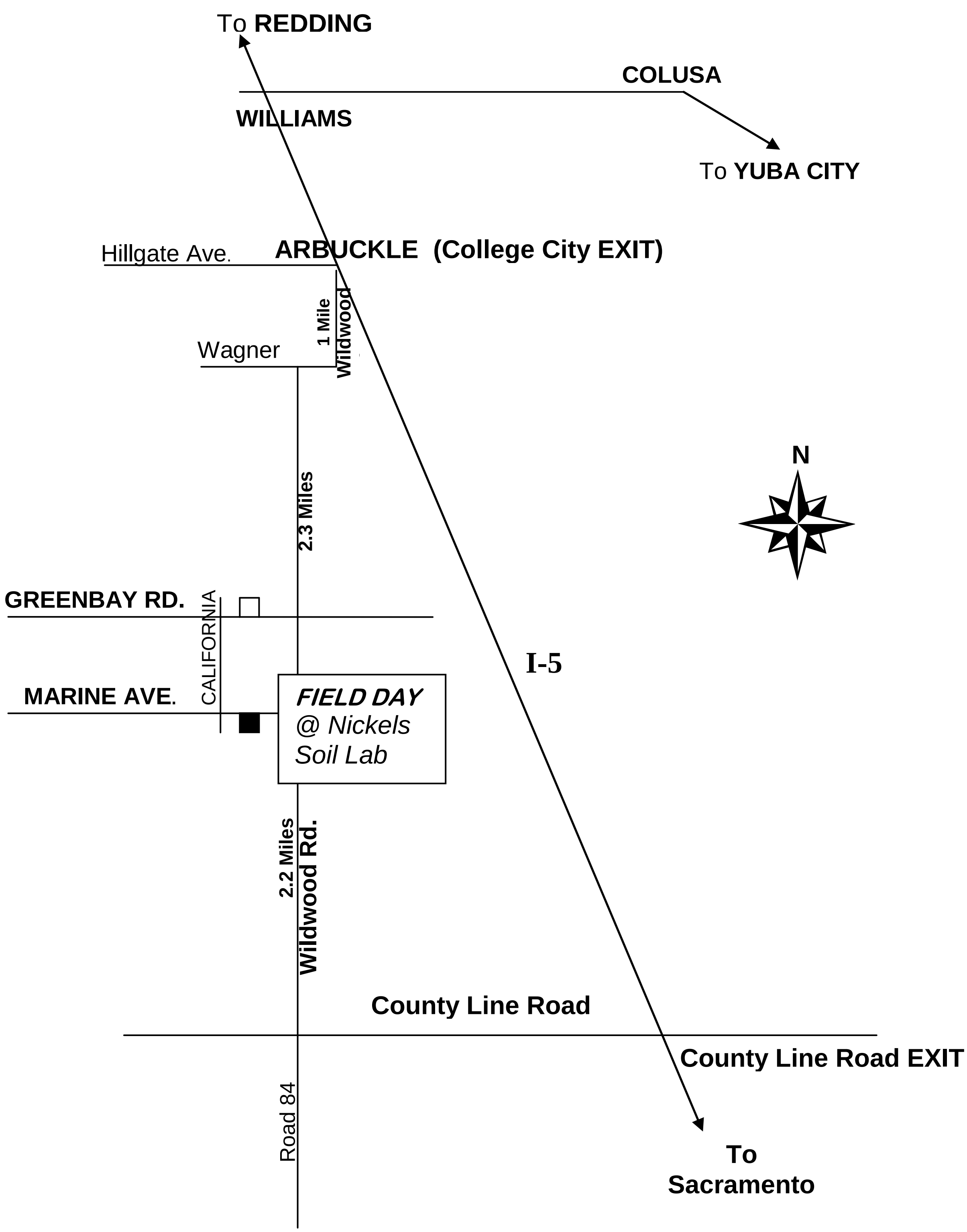
Update on Water Production Function and related projects from Merced County
David Doll, UCCE Farm Advisor, Merced County

Maximizing grower return: pollinizer combinations with Nonpareil
Franz Niederholzer, UCCE Farm Advisor, Colusa and Sutter/Yuba Counties

12:15 pm – **BBQ Tri-Tip Lunch** by reservation.
RSVP to the UCCE Colusa Office at (530) 458-0570 $15 prepaid, $20 at the door
Prepared by and proceeds to the Pierce High School (Arbuckle, CA) FFA Program

Orchard incorporation Demo following lunch (1 PM)

Program organized by Franz Niederholzer, UCCE Farm Advisor,
University of California Cooperative Extension, Colusa and Sutter/Yuba Counties



To REDDING
COLUSA
WILLIAMS
To YUBA CITY
Hillgate Ave.
ARBUCKLE (College City EXIT)
1 Mile
Wildwood
Wagner
N
2.3 Miles
GREENBAY RD.
CALIFORNIA
I-5
MARINE AVE.
FIELD DAY
@ Nickels
Soil Lab
2.2 Miles
Wildwood Rd.
County Line Road
County Line Road EXIT
Road 84
To
Sacramento

<u>LUNCHEON RESERVATION FORM</u>

Lunch Benefits Pierce High School FFA Program

<u>Cost:</u> **$15.00/person (Prepaid Reservation)**
$20.00/person at the door

<u>Make checks payable to:</u> **Pierce High School**

<u>Mail to:</u> **Cooperative Extension**
P.O. Box 180
Colusa, CA 95932

Name:		
Address:		
City:	**State:**	**Zip:**
Phone:		
Name(s) of Attendees(s):		
Total Amount Enclosed:		

Please return this form & your check by May 13 to receive the discounted price.