Topics in Subtropics Newsletter

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News from the Subtropical Tree Crop Farm Advisors in California

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Editor's Note:

Please let us know if your mailing address has changed, or you would like to add someone else to the mailing list. Call or e-mail the farm advisor in the county where you live. Phone numbers and e-mail addresses can be found in the right column.

Please also let us know if there are specific topics that you would like addressed in subtropical crop production. Copies of Topics in Subtropics may also be downloaded from the county Cooperative Extension websites of the Farm Advisors listed.

Gary S. Bender
Editor of this issue

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Ag Waivers for San Diego County

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There has been a lot of discussion recently about the Agricultural Waiver Program and the implications for local growers. According to the language in the actual waiver, "Discharges from lands used for agricultural or nursery operations can be significant sources of sediment, dissolved solids, nutrients, pesticides, hydrocarbons, pathogens (i.e., bacteria, viruses, protozoa), and other pollutants which can adversely affect the quality of waters of the state if growing operations, irrigation return flows, and stormwater runoff are not properly managed."

The Ag Waiver, as we refer to it, is actually a waiver of the requirement to file a report of waste discharge, or to have waste discharge requirements placed upon the activity of a business. This waiver is reserved for those types of activities that are assumed to be a low threat to the waters of the State. Businesses and activities that are assumed to have a greater impact on waterbodies face much more stringent reporting requirements. The Ag Waiver is a "conditional" waiver, which means that specific conditions can be added to it when necessary. It also means that it will not be the same in all areas of the state – each Region of the State Water Resources Control Board (there are 9 Regions statewide) has the opportunity to prepare their waiver to meet the needs of their location.

So what does the waiver mean to you as a grower? Compliance with the waiver applies to every agricultural operation that has a gross income of $1000.00 in the previous year, or expects to have income of $1000.00 in any year during the next 5 years. The biggest change for San Diego growers is that water quality monitoring is now required of all growers, which can be very expensive. Fortunately, you will have the opportunity to monitor water quality in groups, instead of individually. This will allow the growers to split the cost of monitoring among a potentially large group, instead of each managing and paying individually for their own monitoring. This group approach is currently underway in several counties.

There will most likely be costs associated with belonging to a group however. The group has to be managed, and monitoring will also cost. However, once again, it will be far less expensive to join a monitoring group and pay the associated fees than to pay individually for monitoring. In the San Diego area, there are monitoring groups forming. The largest is the San Diego Region Irrigated Lands Group Educational Corporation (SDRILG), a nonprofit 501 (c) (3) that is being managed by the San Diego County Farm Bureau. Other private groups and water districts are also considering starting monitoring groups. If you choose to join a monitoring group instead of going it alone, you must join by December 31, 2010.

In addition to the monitoring component of the Ag Waiver, growers are required to do a few more things. A notice of Intent (NOI) to comply with the waiver must be filed with the Regional Board by January 1, 2011. If you are a member of a monitoring group, this will be done for the groups as a whole, and you as an individual will not have to file your own NOI. You will also need to keep records of your activities that affect water quality, and attend two hours of water quality educational programs per year.

More information on the AG Waiver program can be found on the State Water Resources Control Board Region 9 website:
http://www.swrcb.ca.gov/rwqcb9/board_decisions/waivers/docs/Conditional_Waiver_4_Final.pdf
We are also trying to provide the growers with as many tools as possible to meet the waiver requirements. These include record keeping systems, management practice guidelines, and in the near future, online courses that will help you meet your educational requirements. These can be found on the UC Cooperative Extension, San Diego County Website at:
http://cesandiego.ucdavis.edu/Clean_Water/

Spray Adjuvants: What's in a Name?

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If you can't speak the language, you can't follow the conversation. Talk about adjuvants used in agriculture can be filled with unfamiliar terms like activator, non-ionic surfactant, penetrant, humectants, and buffers. To help growers who want follow a sales pitch or discussion on adjuvants, the following article lists and describes common adjuvant categories by function. This is the first of a series to help growers better understand adjuvants and their effective use.

There are two types of adjuvants – spray adjuvants and formulation adjuvants. Spray adjuvants are packaged separate from pesticides. Formulation adjuvants are mixed with the pesticide active ingredient during

packaging and formulation. This article is concerned specifically with spray adjuvants.

Spray adjuvants are pesticides according to California Department of Pesticide Regulation (CDPR). They must be registered. Spray adjuvants are defined by CDPR as *"a product solid in a separate package and intended to be used with another pesticide to aid the application or enhance the activity of the pesticide*." Growers must report spray adjuvant use in their monthly pesticide use reports.

There are two general categories of spray adjuvants: 1) activator adjuvants and 2) utility adjuvants. Activator adjuvants directly enhance pesticide performance once the spray hits the plant target. They include wetter-spreaders, stickers, penetrants, and humectants. Utility adjuvants help make the spray application process go better. This group includes defoamers, drift control agents, deposition aides, water conditioners, acidifiers, buffers, and colorants. A single adjuvant product can be both an activator and a utility adjuvant. For example, a product that contains a spreader/penetrant plus a buffer/acidifier is both an activator and utility adjuvant.

There are several categories based on product function within the general groups of activator and utility adjuvants. Many adjuvants fit into multiple categories, as a particular set of ingredients may provide spreading and penetrating properties to a single packaged product.

Wetter-Spreaders: contains surface-active ingredients – surfactants -- that reduce the contact angle of the spray droplet on the target (see Figure 1.). This allows the spray solution to contact more of the target surface. Spreading is essentially an extension of the wetting process. A spreader adjuvant allows the spray droplet to spread over a larger area of the target compared to a droplet with no spreader.

Most pesticides are mixed with water and sprayed. Wetter-spreaders behave differently in your spray tank based on their electrical charge in water. Surfactants – the active ingredients in wetter-spreader adjuvant -- are further categorized as non-ionic, cationic, anionic, or amphoteric surfactants. Why is this important to a grower? When choosing an adjuvant to use with a water soluble ionic herbicide, you don't want an adjuvant "tying up" your pesticide and reducing pest control. For example, when mixed in the spray tank, a cationic spreader may bind to an anionic herbicide, possibly reducing the pesticide activity. If you use an adjuvant, make sure it matches the pesticide label adjuvant recommendation.

Wetter-spreaders are surface active because they contain surfactant molecules that have a fat/wax loving (lipophilic) end and a water loving (hydrophilic) end. Common ingredients include fatty amines, glucosides, alkyphols, alkylamine ethoxylates, polyethylene oxides, and organosilicones.

Stickers: contains non-evaporating ingredients that resist dislodging of the spray deposit from the target surface. Common sticker ingredients include synthetic latex, low volatile oils, pinene polymer, water-soluble polymers, and resins. The less water soluble the ingredients the lower the "wash off" potential of the pesticide deposit.

Humectants: contains ingredients that reduce spray droplet evaporation before and after it reaches the target. Humectant materials include glycerin, various glycols, petroleum oils, vegetable oils, and urea.

Penetrators: contain ingredients that help the chemical enter the target plant once the spray is deposited. Petroleum oils, vegetable oils, or modified vegetable oils are common penetrator ingredients.

Compatibility Agents: commonly used to keep a homogeneous solution in a spray tank that contains multiple ingredients, usually including liquid fertilizer.

Defoamers: eliminate or suppress foam in the spray tank.

Drift Control Agent: used to reduce the percentage of spray droplets below a certain diameter in an application. Small droplets are considered "driftable fines". The smaller the droplet, the farther it will move with wind. Droplets with a diameter less than 150 μm (micrometers) are frequently characterized as "driftable". Drift control agent commonly include polyacrylamides and polysaccharides.

Deposition agent: do not change spray droplet size, but improve the amount of pesticide deposited on the target – indirectly reducing drift -- or improve the uniformity of spray deposits.

Water Conditioner: eliminates or reduces the interaction of ions in the spray solution with the pesticide. For example, glyphosate efficacy can be reduced when hard water is used in the spray tank. A range of materials including chelating agents, citric acids, and fertilizer salts such as ammonium sulfate and ammonium nitrate are used as water conditioners to

improve glyphosate activity when the spray water source contains hard water.

Acidifier: usually a dilute strong acid solution used to reduce spray water pH. An acidifier will commonly not maintain – that is, buffer – the spray solution at a certain desired pH range. Addition of an alkaline pesticide or fertilizer will increase the spray solution pH that was initially lowered by an acidifier.

Buffer: a product that will resist change in the spray solution pH. Buffers will limit the change in solution pH when an acid or base are added to the tank. A buffer/acidifier will reduce spray water pH AND hold the pH in a certain range. How long the pH is held in a certain range when other pesticides or fertilizers are added differs between products. The correct rate of buffer depends on the water source and materials in the tank. Commonly used buffers are buffer/acidifiers using ingredients such as phosphates or organic acids.

Colorants: alters the color of the spray solution so that previous spray passes are visible to the applicator.

So, there's the general "line up" of adjuvant materials. Once you know the players and their roles in the spray tank, you can begin to select the right material for the job. General adjuvant selection will be the topic of future articles.

Strategizing for Water Cutbacks…Is there a Logical Method?

Gary Bender and David Shaw
(UCCE tree crops advisor and ornamental/landscape advisor respectively, San Diego County)

By now almost everyone growing tree crops in California is undergoing some amount of mandatory water cutbacks, especially if they are buying water from water districts. Some districts in the San Joaquin Valley have had really severe cuts, up to 80%. For a lot of growers who are **not** buying water, they may be facing severe water shortages due to water tables that are dropping.

San Diego County is a good example. In 2008 all of the avocado and citrus growers in San Diego County had a mandatory 30% water cutback, if they were in the water discount program known as the Interruptible Ag Water Program. Fearing that the cuts would be even higher in 2009 if they stayed in the program, most growers opted out, but were then faced with paying full price for their water. Now, it looks like most of these growers will be faced with a mandatory cut of about 8% (this depends on the water district), and will have to pay full price for ag water. **But wait!** Because the districts aren't selling as much water, they need to raise prices to cover their fixed costs. For instance, Fallbrook Public Utility District recently announced they were raising prices 13%. Many districts in San Diego County have simply followed water wholesalers (MWD and SDCWA) in their price increases.

Please make sure that you are in touch with your local water district. They may have a different cutback rate than the 8% mentioned as well as conservation guidelines and regulations. You are responsible for knowing this information and you could be looking at some hefty fines for using more water than allowed.

So what can you as a grower do when faced with this scenario? Before we start with our recommendations, let's start by thinking about what you **can't** do. (This always confuses the issue, so let's get this off the table).

1. You can't make it rain more. We are in a prolonged drought, this happens periodically in California, and that's just the way it is. Can you lobby for more storage for when it does rain in excess? **Yes!**
2. You can't solve the Delta smelt issue, not unless Congress cancels the Endangered Species Act. A solution for bypassing the Delta with a pipeline from the Sacramento River down to the State Water Project canal which supplies Southern California would certainly help. Researchers at UC Davis have determined that the canal would be the most economically feasible way to fix the delta issues. However, given California's budget woes, it probably won't happen soon.
3. There are no magical solutions that work to "inactivate" the salts in your well water. There are a lot of devices sold that make lots of claims, but there is no University research evidence that shows that any of them work. The only thing that does work is reverse osmosis, but be careful because these systems produce brine which must be disposed of legally. The brine cannot go into the local creek.

OK! Let's Strategize. There are four steps for everybody to consider, it doesn't matter if you have a backyard lawn and landscape or if you have 700 acres of avocados.

1. **Maintenance: Irrigation System and Cultural Practices**
2. **Improve Irrigation Scheduling**
3. **Deficit Irrigation**
4. **Reduce Irrigated Area**

1. **Maintenace**
   a. **Irrigation System.**
      - Fix leaks. Unfortunately, there are almost always leaks for all kinds of reasons. Pickers step on sprinklers, squirrels eat through polytube, branches drop on valves, coyote puppies like to chew….the system should be checked during every irrigation
      - Drain the lines. At the beginning of each year every lateral line should be opened in order to drain the fine silt that builds up.
      - Maintain or increase the uniformity of irrigation so that each tree or each area gets about the same amount of water. Common problems include different sized sprinklers on the same line or pressure differences in the lines. Where there are elevation changes, every line should have a pressure regulator, they come pre-set to 30 psi. Having all of your lines set up with pressure regulators is the only way you can get an even distribution of water to all of the trees, and it solves the problem of too much pressure at the bottom of the grove and not enough at the top.
      - Clean the filters often. You don't have a filter because you think that the district water has already been filtered? Hah! What happens if there is a break in the line in the street and the line fills with dirt during the repairs? All of your sprinklers will soon be filled with dirt.
      - Is water flow being reduced at the end of the lateral line? It could be because scaffold roots are growing old enough to pinch off the buried line. The only cure is to replace the line.

   b. **Cultural Management**.
      - Control the weeds because weeds can use a lot of water.
      - Mulch? Mulching is good for increasing biological activity in the soil and reducing stress on the trees, but the mulch will not save a lot of water if you are irrigating often….the large evaporative surface in mulches causes a lot of water to evaporate if the mulch surface is kept wet through frequent irrigation. Mulches are more helpful in reducing water use if the trees are young and a lot of soil is exposed to direct sunlight.

2. **Improve the Irrigation Scheduling.**
   - CIMIS will calculate the amount of water to apply in your grove based on last week's water evapotranspiration (ET). You can get to CIMIS by using several methods; for avocado growers the best method is to use the irrigation calculator on the www.avocado.org website. If you need further instruction on this, you can call our office and ask for the Avocado Irrigation Calculator Step by Step paper. You need to know the application rate of your mini-sprinklers and the distribution uniformity of your grove's irrigation system.
   - CIMIS tells you how much water to apply, but you need tensiometers, soil probes or shovels to tell you **when** to water.
   - "Smart Controllers" have been used successfully in landscape and we have used one very successfully in an avocado irrigation trial. The one we used allowed us to enter the crop coefficient for avocado into the device, and daily ET information would come in via a cell phone connection. When the required ET (multiplied automatically by the crop coefficient) reached the critical level, the irrigation system would come on, and then shut down when the required amount had been applied. Increased precision can be obtained by fine tuning these devices with the irrigation system precipitation (application) rate.

3. **Deficit Irrigation.**
   - **Deficit irrigation** is the practice of applying less water than the ET of the crop or plant materials. Deficit irrigation is useful for conserving water in woody landscape ornamentals and drought tolerant plants where crop yield is not an issue. Water conserved in these areas may be re-allocated to other areas on the farm or landscape.
   - There hasn't been enough research on deficit irrigation of avocado for us to comment. We suspect, however, that deficit irrigation will simply lead to dropped fruit and reduced yield.
   - **Stumping** the avocado tree could be considered a form of deficit irrigation. In this case, the tree should be stumped in the spring, painted with white water-based paint to reflect heat, and the sprinkler can be capped for at least 2 months. As the tree starts to re-grow, some water should be added back, probably about 10-20% of the normal water use of a mature tree.
   - **Regulated Deficit Irrigation for Citrus** is an important method for saving water, and in some cases will reduce puff and crease of the peel. In one orange trial done by Dr. David Goldhammer in the San Joaquin Valley, an application of 25% of ETc from mid-May to mid July saved about 25% of applied water for

the year and reduced crease by 67%, without appreciably reducing yield.

4. **Reduce Irrigated Area.**
   - **Taking trees out of production.** Trees that are chronically diseased and do not produce fruit (or the fruit is poor quality) should be taken out of production during this period. Also consider: trees in frosty areas, trees in wind-blown areas, trees near eucalyptus and other large trees that steal the water from the fruit trees.
   - **Changing crops.** You may want to take out those Valencias during this period and replant to something that brings in more money, like seedless, easy-peeling mandarins. The young trees will be using a lot less water.
   - **Fallow Opportunities.** You may decide to do some soil preparation, tillage or cultivation, or even soil solarization of non-irrigated areas.

We have found that this four step process is a logical way to achieve water cutbacks with least impact. It is possible to achieve a ten percent reduction in water by only improving irrigation system uniformity and scheduling procedures. Often, these two measures also result in better crop performance and reduced runoff. Reducing irrigated area or taking areas out of production should be a last resort and a well thought out decision. Plan for the future, hopefully water will be more available in future years.

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