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IRRIGATION NEWS

Less Water Equals More Dollars?

Making due with less is a common problem for agriculture. As profit margins become thinner, growers look at every option to economize their operations. One less spray application, lower fertilizer rates, and fewer passes with a tractor can all save money. For many, a reduction in water supply has meant idling land, so that crops with higher return potentials are saved. In those years when water is limited more than normal, even those crops are forced to due with less. Many crops can handle such stresses; the trick is knowing when they can and still produce acceptable yields/quality without impacting the yield potential for the next season.

Delaying irrigation water application to change plant behavior works successfully in many crops. In field crops, the delaying of an irrigation shifts the growth pattern from vegetative (more leaves and stems) to reproductive. Water stress changes the hormonal balance within the plant, and accelerates the development of flowers or other reproductive bodies.

If the stress occurs too quickly, or at the wrong time, the water supply will be exhausted before the work is complete. Such processes are easily observed in nature, as weeds remain small and close to the ground when water is in short supply, yet they grow vigorously when ample supplies exist. The keys are in the amount of stress induced and the timing of the stress application (stage of crop development). Improperly applied, yields will be decreased. The effect on a grower's bottom line would be disastrous.

In vineyards, it is known that delaying irrigation can curtail cane growth, thus reducing the problems caused by mildew, and allowing more air and light into the plant canopy. It can also impact the sugar content of the berries, allowing the grower to tailor the crop to the needs of the winery.

In almonds, delays in applying post harvest irrigations can have a devastating impact on the following year's crop, as the buds that contain next years flowers are forming shortly after harvest. In-season water management is critical as well, as excessive water at hull split can encourage fungal infections.

However, delaying irrigation only postpones the next irrigation event, and usually does not reduce the total water applied for the season. New research looks at reducing the total applied for the season by reducing the amount applied during specific development phases of the crop, thus inducing a stress to the crop without completely depriving it of the water that is needed.

Every crop has a maximum water usage for the season. Apply more water than that value during the year and the excess is simply wasted (with the exception of the amount added to manage salts within the rootzone). Apply less than that maximum value, and stress is applied to the crop that potentially can impact the yield. Increase the level of stress applied, and long term damage to the plant can occur. It is important to know when the plant can take maximum advantage of the available water supply, and when it can do with less.

This principle has been studied in various crops over the years, as the value of irrigation water as a commodity has increased. For citrus growers, research has shown that reductions in irrigation water can be made without impacting yields if done at the proper times. In some research, the distribution of fruit grades shifted slightly, but the overall gross returns remained unchanged. The benefit for the growers is the reduction in water costs, which in some cases can be significant.

(Continued on back page)

IRRIGATED LANDS PROGRAM WORKSHOP

An Introduction to Agricultural Management Practices

A pair of **FREE** workshops has been scheduled for **November 5, 2007** to cover coalition activities in regards to the Agricultural Discharge Waiver Program.

Discussions on Agricultural Management Practices for irrigation, chemical applications, and other topics will be presented.

The morning session will be held at **Kearney Ag Center**, 9240 S Riverbend Ave, Parlier from **9:00-noon**.
The afternoon session will be held at the **Riverdale Community Center**, 3160 W Mt. Whitney Ave, Riverdale from **1-4 pm**.

3 hours of DPR Continuing Education credits may be available.

Refreshments will be served.

Less Water Equals More Dollars? (Continued)

A four-year study published in 2001 (Regulated Deficit Irrigation for Orange under High Evaporative Demand, by David Goldhamer) compared 14 different deficit irrigation schedules (called regulated deficit irrigation, RDI) to a fully irrigated control on mature, microsprinkler-irrigated citrus in the southern San Joaquin Valley.

Water savings ranged from 9 to 26 percent over that of the control blocks, with no significant differences in gross yields, fruit loads, or packable cartons. The full irrigation treatment used 36.1 inches of water, and the RDI treatments used between 27.9 and 33.3 inches per season. The only concern was that fruit growth was delayed with some of the treatments, but once the irrigation amounts were increased back to normal levels, fruit growth returned to normal as well.

One RDI treatment that reduced the irrigations by 25 percent of the ETc (evapotranspiration-crop) value during the period of mid May to mid July resulted in a seasonal decrease in water use of 25 percent and reduced peel creasing by 67 percent, to an average of 9.7 percent of the fruit packed when compared to the full irrigation treatment.

This increased the percentage of fruit graded as Fancy over that of the control and reduced the overall percentage that went to juice. The benefit to the grower is the increased value of the crop, plus the reduction in irrigation costs (shorter run times during the stress period). There was no mention of the impacts of such a program on the following year's crop. It is reasonable to assume that since the irrigation pattern returned to normal after the mid July period, the trees would have had sufficient time to recover for the following season.

It should also be noted that this does appear to be variety specific. Similar research done during the 2004 season on "Lane Late" navel oranges showed that fruit size and color were negatively impacted by the RDI regimes used when compared to the control treatment. Granulation was reduced in the RDI treatments, and "open core" was dramatically reduced in two of the treatments, where water was withheld later in the season. Another variable to be considered is the soil profile with the field, as changes in soil texture within the profile can impact whether the RDI regime used will be of benefit or not.

Research in many of the field crops tested showed that the crops acclimated themselves to the conditions present. If the season began with reduced water supplies within the rootzone, adding normal amounts of water later did not seem to make any difference, as the growth pattern for the season had already been set. This is in line with earlier research that points to early season conditions setting what the yield potential will be for the year—a poor spring leads to average to below average yields, while ideal conditions open the door to much higher than average yields, assuming other conditions (pests, weather) don't occur.

So, how much water can be saved without damaging the crop? No research points to a specific number. Most crops require 24 to 36 inches of water per year, with some crops needing upwards of 48 inches. Even a 10 percent reduction would only save 2.5 to 5 inches over that range.

Weather is the major player in the equation. Cool, wet conditions during the winter and early spring will conserve much of the available soil moisture for later, while warm conditions will deplete the soil reserves faster. Under dry conditions, it would be a good idea to kill off any groundcover in place, so as to preserve the moisture for the crop. Leave the residue on the surface to shade the soil, thus reducing direct evaporation of the available moisture. If the conditions are wet, leave the cover alone to remove excess moisture from the soil and to minimize soil compaction.

The citrus research noted in this article was found at the Citrus Research Board's website, www.citrusresearch.com. Summaries of the research done can be found there. Other data came from internet searches, including papers from USDA and some research from Australia. Should you have any questions regarding the topic presented here, please feel free to contact Eric Athorp at (559) 237-5567, ext. 117.

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