DROUGHT ADVISORY

EM4820

TREE FRUITS

The following information highlights critical management concerns and possible options in managing fruit trees under drought conditions. Other, more detailed information on water and tree management is available from Washington State University Extension. Information on soil moisture monitoring and crop evapotranspiration from Washington's Public Agricultural Weather Stations (PAWS) and Washington Irrigation Scheduling Expert (WISE) are available on the Scientific Irrigation Scheduling (SIS) website: ***sis.prosser.wsu.edu***. For information on tree fruit irrigation in north central Washington, see ***www.ncw.wsu.edu/treefruit/irrigation/*** online.

Critical Growth Stages Related to Water Use

Flowering. Water application, either under tree or over tree, are used for frost protection. Because of the delicate nature of flower buds, and because of their susceptibility to cold damage, the application of less than adequate quantities of water for frost protection (generally 70–80 gpm/acre for over tree sprinklers and 40–50 gpm/acre for under tree sprinklers) is not feasible.

Flowering Plus Four Weeks. The period from full bloom to approximately 4 weeks postbloom is the period of most rapid cell division within fruit, determining its potential final size and quality. It is also a period of fruit set. Water stress on the tree at this time can reduce the amount of fruit that the tree will set and also ultimate fruit size. Crop water use during this growth stage is very low. Stored soil moisture may be adequate to meet crop demand.

Final Fruit Swell. Water deficit during the final fruit swell can reduce fruit size and quality. This preharvest period is the last 3 weeks prior to harvest for cherries, and over 2 months for apples. (In stone fruits this final swell is referred to as stage III and occurs after stage II, pit hardening. Apples and pears do not have three distinctly different growth stages.)

Fall Dormancy. Growers can eliminate final fall irrigation with fewer detrimental effects than if they were to withhold water during the growth stages just mentioned. Dry soils in the fall do increase the chance of cold damage to the roots.

Production Practices Under Water Deficit

Soil Moisture Monitoring. In order to know the rate of water use, it is essential to monitor the soil moisture. In addition, soil moisture monitoring will confirm that irrigation water is really getting into the root zone.

Cover Crop Management. Mow the cover crop closely, either mechanically or chemically, or remove it entirely to conserve water. Keep the area around trees, especially young trees, clear of weeds and grass.

Fruit Thinning. Heavy fruit thinning may reduce total water consumption. Thinning will increase size and quality of the remaining fruits, and will improve tree survival and cropping the following year.

Improve Irrigation Application Efficiency. Irrigation systems used in fruit orchards inherently operate at less than 100% efficiency. Tests have shown that many irrigation systems used in orchards could be improved to increase the application efficiency by at least 50%. This can be done by being certain that application amounts and pressures are consistent throughout the irrigation system. The result will be a more uniform application of water and less chance of either over- or underirrigation.

Improve Irrigation Scheduling. The objective of scientific irrigation scheduling is to apply the proper amount of water at the correct time. Improved irrigation scheduling can result in a water savings by avoiding overirrigation. Irrigation scheduling strategies will be influenced by the amount and timing of water availability. If the water supply will only last a short time, ideally the soil profile should

be filled before the irrigation water is shut off. If there is a choice, save some water for the final fruit swell. If supplemental but inadequate water is available, as little as 10 percent of the evapotranspiration can be applied. Apply this amount frequently (at least twice a week) to a reduced soil volume near the base of the tree.

Irrigation System Modifications. Changing the irrigation system to reduce the soil volume wetted can reduce water use. Applying water near the base of the tree is recommended. If this is done by drip emitters, an important consideration is the proposed interval between irrigations. If there will be a longer period between irrigations, it is more important to wet more of the soil profile to ensure adequate moisture reserves.

Tree Painting. Trees under drought stress are more susceptible to sunburn. To protect them, apply whitewash or diluted white latex paint to exposed portions of main scaffold branches.

Heavy Pruning. Under experimental drought conditions, very heavy pruning or "dehorning" that substantially reduced the tree canopy size reduced tree water use and increased the probability of tree survival. Because of its severe effect on production, consider this treatment only under severe drought conditions. Paint "dehorned" trees to protect them from sunburn.

Other Management Considerations

Economic. Estimate the potential reduction in income from crop and tree loss due to drought. Growers should consider removal of older, less profitable blocks of fruit to allow additional water use on more profitable areas of the orchard.

Alternative Water Sources. In some locations, wells or other alternative sources of water may be available. Balance the added costs of procuring additional water against the probable benefits.

Water required to maintain bearing fruit trees during peak periods of evaporation in summer. Values calculated for different size trees and expressed in gallons of water per day.

Tree size limb spread	Gallons of water used per tree/day in normal water situation	Minimum gallons of water required per tree/day for survival
1–7 ft.	15	2
7–15 ft.	30	4
15–23 ft.	48	8
over 23 ft.	90	14

Drought advisories and other Washington State University Extension bulletins are available at ***http://pubs.wsu.edu*** online. Type "drought" in the search box for downloadable files.

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