

HORTICULTURE

Shaping Up Pecans With Irrigation

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Installation of an irrigation system is one of the most important steps in establishing a new pecan orchard. Water is critical to produce healthy

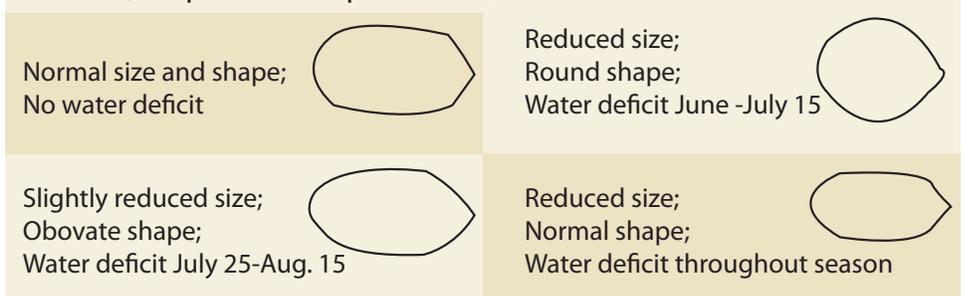
trees capable of optimal fruit production. This is especially important during dry seasons when trees can become significantly stressed without additional water.

Research has shown that irrigation improves kernel percent, grade, fill percentage and nut specific gravity – all indicators of fruit quality.^{1,2,3,4,5,6}

Water availability also impacts tree size (trunk circumference and canopy) and overall fruit yield.^{1,6} Madden (1969) found that irrigated trees averaged over 400 pounds of fruit per acre and had 17.8 fewer nuts per pound than non-irrigated trees. This increase in fruit quality is supported by other research that found that nut size increased with irrigation use, particularly during dry periods.^{1,4,5,7}

The timing of soil moisture can significantly influence the development of nuts as shown in the figure. Following are developmental periods where the availability of irrigation could ensure successful nut harvests:

Figure 1. Effect of the timing of water deficit on nut shape and size (Adapted from Sparks 2006).



Bud break: non-uniform bud break and weak, non-vigorous growth. Inadequate water after pollination causes misshaped (more rounded) nuts.

Nut sizing (June-August): excessive nut drop, small nuts or misshaped nuts (reduces basal diameter). Water stress during this period followed by a sudden influx of water can lead to water stage fruit split.

Nut filling (August-October): poorly filled nuts (poor nut quality), slightly reduced in size and obovate shape (teardrop shaped). Increase in shuck decline during heavy crops (shuck deteriorates and opens prematurely with poorly filled kernels).

Shuck split: delayed shuck split, increasing percentage of stick tights or pops (nuts with unopened shucks).

Increased occurrence of vivipary (nut germinates and sprouts on the tree).

Water timing is critical for successful harvest, but how should the water be applied? How much is needed to ensure success? When watering pecan trees, not all roots have to be in the wetting zone. Water will be translocated from roots in moist areas to roots in dry areas⁸. This is the premise behind drip and micro irrigation. Most of the water taken up by pecan trees is in the upper 32 inches of the soil. Pecans are deep-rooted trees; however, when a tree has to pull water from deeper moisture reserves, it is for survival and not for fruit production. Therefore, irrigating should occur until the water reaches the bottom of the root zone (less than 32 inches). Watering beyond this is wasteful. When using drip and micro irrigation, approximately 40 percent of the soil surface should be ►

wetted in order to provide adequate coverage. Use of soil moisture sensors is recommended to determine optimal irrigation levels.

The amount of water a pecan tree requires is debatable. In general, mature trees in the West have been reported to use 39 to 51 inches of water per season⁹. Thompson (1974) reported large trees in New Mexico used approximately 42 inches, while medium-sized trees in southwest Texas used around 27 inches of water

per year. Madden (1969) estimated that pecans in the West required 50 inches of water. So there is considerable variation in water needs. My recommendation for Oklahoma and northern Texas is 30 to 50 inches per season or 1 to 2 inches per week from June through October.

In Oklahoma and northern Texas, irrigation is typically a supplement to rainfall. However, after a dry year like 2011, we see the importance of water and properly designed irrigation sys-

tems. When installing irrigation and especially when establishing a new orchard, I highly recommend use of an irrigation designer who has experience developing systems for pecan orchards. ■

¹Alben, 1958; ²Daniel and Heaton, 1984; ³Heaton et al., 1982; ⁴Stein et al., 1989; ⁵Worley, 1982; ⁶Romberg et al., 1958; ⁷Madden, 1969; ⁸Taylor and Fenn, 1985; and ⁹Miyamoto, 1983.