

## Irrigation Investigations in Pistachio

**Bruce Lampinen**, Specialist in Cooperative Extension, Dept. of Plant Sciences, UC Davis

**Mae Culumber**, UCCE Farm Advisor, Fresno County

**Phoebe Gordon**, UCCE Farm Advisor, Madera County

**Elizabeth Fichtner**, UCCE Farm Advisor Tulare County

**Sam Metcalf**, Staff Research Associate, Dept. of Plant Sciences, UC Davis

**Loreto Contador**, Assistant Specialist, Dept. of Plant Sciences, UC Davis

### INTRODUCTION

It is difficult to measure midday stem water potential on pistachio, due to the bleeding of latex that occurs as you begin to pressurize the leaf in the pressure chamber. Our goals were to improve the accuracy of measuring water potential in pistachio and to investigate the relationship between current season water statuses, internode production and shoot growth. The plan is to look at the shoot growth in 2018 as it relates to the water potential that was present on the shoot at different points in 2017.

In order to investigate this, we installed a planting of nursery grafted Kerman trees, from Sierra Gold Nursery, on May 1, 2017, on campus at UC Davis. The trees had 9-10 leaves that had emerged by the time of planting. Four irrigation treatments were set up, 50 percent ET, 100 Percent ET, 150 percent ET and 200 percent ET. The levels of irrigation were determined by trying to maintain the 100 ET treatment near the fully watered baseline, using the fully watered baseline for almonds as the reference.

We also did additional water potential and shoot-growth characteristic measurements in a commercial pistachio orchard in Kings County (Golden Hills on PG1 rootstock).

### RESULTS

**UC Davis trial on campus:** The midday stem water potentials were not very different among the different irrigation treatments, averaging -9.7, -8.8, -9.2 and -8.8 bars among the 50, 100, 150 and 200 percent ET treatments respectively. This is despite putting on over three times as much water on the 200 compared to the 100 percent ET treatments. Water on the 50 and 100 percent ET treatments were ceased during September 2017, yet they only fell to 2 and 1 bars below the baseline through late fall.

In terms of scion length, the greatest amount of growth occurred on the 100 percent ET treatment with all other treatments putting on about 90 percent as much growth. Again, the pattern of trunk growth and scion diameter were similar, with the greatest growth in the 100 percent ET treatment, but no significant differences. In terms of the number of nodes produced, the 100 percent ET treatment had the most (about 80) while the 150 percent ET treatment had significantly less (about 60), and the others were in between. The 100 percent ET treatment was also the tallest (although not significantly taller). The production of 80 leaves in the 100 percent ET treatment means that one leaf was produced about every 2 days (a little faster than the 3-days-per-leaf production rate we have observed in walnut).

In 2018 we will observe how many shoots emerge, how many leaves there are per shoot, and how many leaflets there are per leaf, and then try to relate this to the previous season's water relations. Our goal is to relate these characteristics to the water potential during the previous year, when this section of shoot was emerging. We have found that in walnut, the number of leaves per shoot and the number of leaflets per leaf can be impacted by the previous year's water status during the time that section of shoot was forming. We have also found that shoots that are excessively wet, during elongation, produce blank nodes

in that zone the following year. We also plan to investigate the effect of in-season tipping and dormant heading on the rate of shoot emergence the following year.

**Kings County grower trial:** Less intensive midday stem water potential readings were done in the Kings County grower orchard trial, but results were quite similar to those at the UC Davis trial. In general, the trees ran at 1-3 bars below the fully watered baseline. However, there was enough variation from tree to tree that we will be able to assess the impacts of previous-year water relations on current-year shoot emergence and growth.

## **CONCLUSION AND APPLICATIONS**

There is a lot of work needed on understanding impacts of midday stem water potential on pistachio tree growth characteristics. In particular, we plan to look at how current-season water relations, during shoot development, impact the following year's shoot emergence.