Winter Water Management Assessing Recharge in Almond Orchards - Fresno

Project No.: **15-PREC9A-Volder(AIM/COC)**

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Objectives:

Establish a field research site to complement the other two more northern recharge site. At this site we will aim to: 1) conduct field studies to test the effectiveness of late spring flood irrigation as a sustainable groundwater recharge strategy, and 2) as part of these field studies, to document any negative or positive effects of late spring irrigation on almond yield and/or root development

Interpretive Summary:

We instrumented (in December 2015) and a first research site near Fresno. This site was abandoned in June 2016 due to lack of water availability to implement the treatments, although

several loggers with soil water sensors were left on site in case water would become available. A second site, near Madera, was instrumented early June with the express intent to collect data prior to and immediately after an early summer water application this season. Unfortunately, the treatment was not applied and we have not been able to collect any data related to recharge on this site yet.

Materials and Methods:

We intended to test the impact of late spring irrigation for recharge purposes (i.e., an additional 12 inches applied on top of normal irrigation practices). At each of the sites instrumented (Fresno first, Madera later) we selected three blocks. Within each block we designated at least three rows of trees (two pollinizers, one Nonpareil) per treatment (normal grower practice; grower practice + 12" additional water for recharge). In the Nonpareil row we selected five trees per treatment for intense measurements; root observation tubes were installed to 60 cm depth, stem water potential was measured six times at the Fresno site and once at the Madera site. Other observations included pre- and post-expected treatment light bar readings for canopy light interception at the Madera site, as well as bloom ratings at the Fresno site. In addition, each site had two dataloggers installed per block with measurements of soil water content collected hourly at 15 and 45 cm depth. At the Fresno site, soil nutrient concentrations (N, P, K, salt) and soil texture were determined in November by extracting 1.5 in diameter soil cores of 10ft length using a Geoprobe push drill. A total of 5 soil cores were extracted. Soil texture, nitrate-nitrogen, phosphorus, salt content, and potassium were determined.

Results and Discussion:

Besides equipment installation, initial soil core extraction and sample processing, datalogger download and information processing, collecting canopy light interception data (twice), and collection of root images, considerable effort was dedicated to collecting stem water potential data prior to expected treatment application. There was no difference in stem water potential between assigned treatments at any of the assigned dates at the Fresno site. Stem water potential became more negative as the season progressed, with a low of close to 6 bars below the baseline in mid-April. As it became clear that no water would be available to apply treatments, instruments were moved to a new site near Madera on June 7. At this site, the pre-treatment measurements showed that the trees in the rows designated for recharge were significantly ($P<0.01$) more negative (2.3 bars below the baseline) than the trees designated for the control treatment (0.7 bar below the baseline). Unfortunately, due to unforeseen circumstances, treatments were not applied at this site either. As treatments were not applied at either site this year it is not possible to evaluate the data we collected in the context of the objectives of the study.