Pre-Treatment Uniformity in Soils, Irrigation, SWP, Canopy, & Yield for Water Production Function (WPF) Research

Project No.: **11-HORT15-Shackel**

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Interpretive Summary:

Almonds are known to be relatively drought resistant in terms of tree survival, but almond yield can also be very responsive to increasing water and N availability. Beginning with the 2013 season, our group will be determining a Water Production Function (WPF) at three locations in the state (Kern, Merced, and Tehama counties) by applying a range of irrigation levels at each site (See Project 12.HORT17.Sanden/Fulton/Doll/Shackel – Defining a Central Valley Almond ET/Yield Production Function for Almonds). However, since each orchard represents a unique combination of soil, environmental, and management conditions, yield and canopy cover information for the 2012 season will be collected, prior to any irrigation treatments. These yields will serve as a reference value for all the subsequent yields, and will increase the accuracy of the WPF based on these yields. Yield data is currently being collected, and canopy cover measurements (light bar) data will be used to interpret the yield data. Spatial variation in soil and canopy, as well as midday stem water potential (SWP) will be important factors in locating the experimental plots in the field, but these data are still being collected and only satellite NDVI (Normalized Difference Vegetation Index) images have been analyzed. This analysis is consistent with the spatial patterns shown on Google earth for the experimental sites, showing “weak” and “strong” areas which will be used as blocks for the WPF.

Materials and Methods:

Commercial VERIS data was collected in 2012, water meters are being used to monitor spatial variability in irrigation, and periodic measurements of SWP are being made. Canopy cover (light bar) data was collected and will be combined with yield data (being collected) to determine the plot layout for treatments to be imposed in 2013. Landsat images of each orchard were obtained for Spring/summer 2010, and the spatial patterns in NDVI were compared.

Results and Discussion:

Satellite NDVI images for each of the sites were obtained, analyzed for spatial patterns, and overlaid on recent Google earth images (example for the Tehama site shown in **Figure 1**). Commercial VERIS maps for these sites were obtained in the spring of 2012 (**Figure 2**), and a tentative plot plan established (**Figure 3**). Yield, canopy cover, and SWP data will be evaluated based on tentative plot assignments, to ensure that subsequent irrigation treatment effects will not be confounded by block effects.

Research Effort Recent Publications:

Munoz H, 2011, Carry-over effects of water stress in the vegetative development, flowering, fruit set, and yield of almond trees. MS Thesis, UC Davis.

Shackel KA. 2010. A Plant-based Approach to Deficit Irrigation in Trees and Vines. Hort.Sci. 46:173-177.

Stewart WL, Fulton AE, Krueger WH, Lampinen BD, Shackel KA. 2011. Regulated deficit irrigation reduces water use of almonds without affecting yield. Cal Ag. 65: 90-99.

References Cited:

None

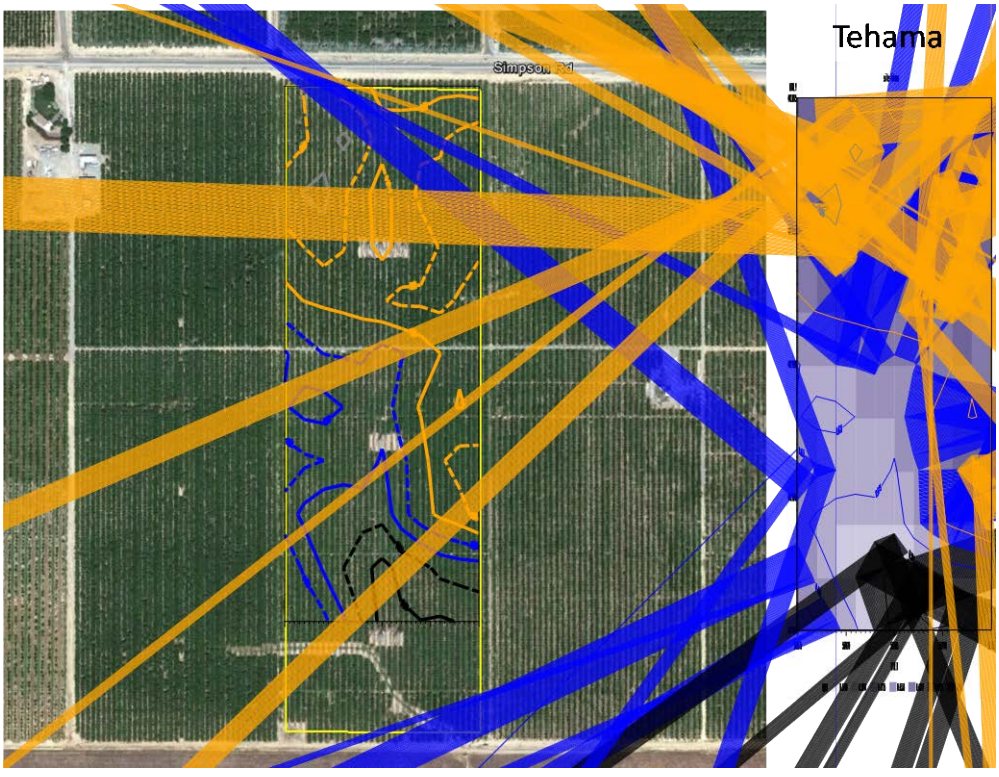

Figure 1. NDVI map (right) analyzed to show contours of equal NDVI (lines), and the same contours superimposed on a recent Google earth map of the field (left)

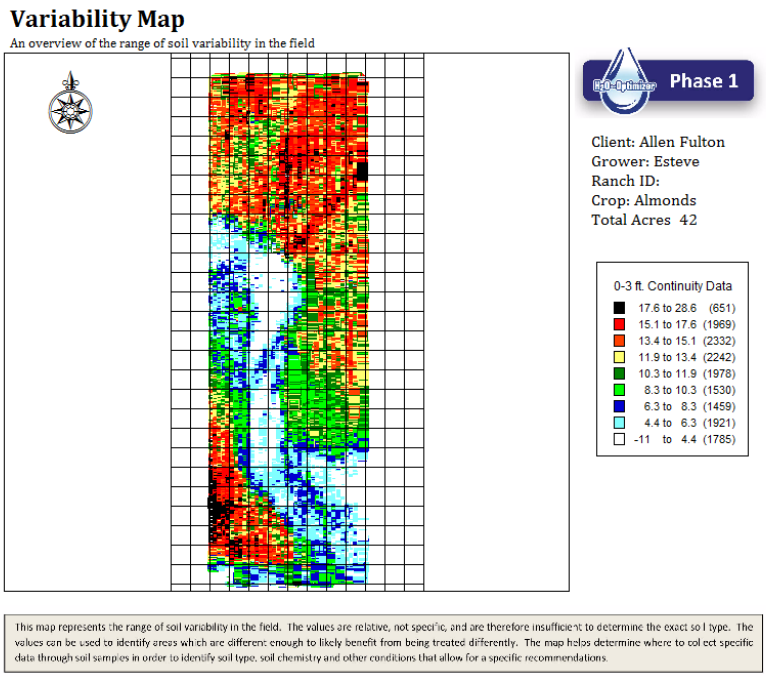

Figure 2. Commercial VERIS soils map for the Tehama site in spring, 2012.

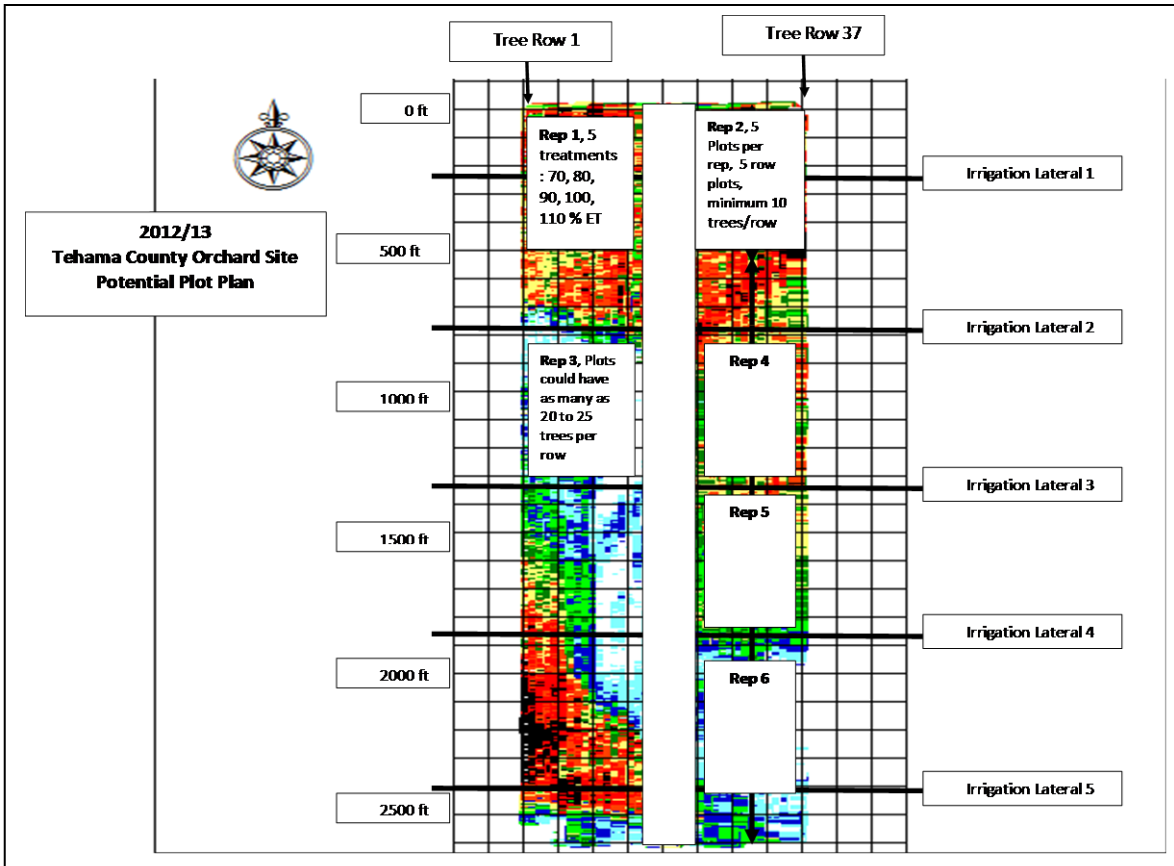

Figure 3. Tentative plot assignments for the Tehama site.