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## Plant water stress based precision irrigation using a wireless network of sensors and controllers

Precision irrigation–applying the right amount of water at the right place at the right time–has the potential to conserve our precious water resource without sacrificing yield or quality of the product. To implement precision irrigation sensors to indicate plant and soil water status are necessary. Plant physiologists suggest that plant water status (PWS) rather than the soil moisture content is a better indicator of irrigation requirements of orchard and vineyard crops since they have an extensive root system. PWS is often measured in terms of stem water potential using a pressure chamber, which is labor intensive and tedious to use and is not suitable for obtaining a large amount of data necessary to implement precision irrigation. To address this issue, our research group has developed and tested a continuous leaf monitoring system for use in orchard and vineyard crops. These leaf monitors along with soil moisture sensors, pressure sensors and latching solenoid valves were connected to nodes which formed a wireless network and deployed it in an almond orchard at Nickels Soil Laboratory in Arbuckle, CA. The sensor information was accessed remotely through PCs or mobile devices. Plant water stress based precision irrigation was conducted at this experimental site over the last three growing seasons. The results showed that variable rate irrigation management practice resulted in 70% of the water applied compared to ET demand and 85% of water applied compared to grower practice that used soil moisture sensors without any loss in yield or quality of the product.

### Biography

Shrinivasa K Upadhyaya is a Professor, Department of Biological and Agricultural Engineering, University of California, Davis. He received his PhD in Agricultural Engineering from Cornell University in 1979. He spearheaded research in the area of soil-plant-machine interaction and precision agriculture. He has about 300 publications and holds seven patents. He has made several invited presentations and is a recipient of numerous awards, honors and recognition. He was inducted as the Fellow of ASABE in 2011 and received the prestigious John Deere Gold Medal for his contributions to the area of conservation of soil and water resources in 2013.

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