IRRIGATION MANAGEMENT AS A TOOL TO STABILIZE AND REVITALIZE A DECLINING ‘CHANDLER’ ORCHARD

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ABSTRACT

Symptoms of lack of vigor, yellowing and leaf browning at margins in a six year old ‘Chandler’ orchard were found to be related to excessively wet soil conditions. Even brief periods of rainfall or over watering, resulting in excessively wet soil conditions in late summer were found to cause symptoms of browning of leaf margins and general yellowing of canopy within days.

INTRODUCTION

In September 2001, a six year old ‘Chandler’ orchard on Paradox rootstock was showing yellowing and a lack of vigor in a few areas. Two days after an irrigation event, one tree collapsed and died while a general yellowing showed up in other areas in the orchard. At the time of measurement in September 2001, trees were in the -4.2 to -5.0 bar range a week or so after the irrigation.

In September 2002, similar symptoms appeared. Backhoeing of dead and dying trees indicated a very shallow root system with few feeder roots. Most roots below one foot or so were dead and living roots had swollen lenticels. Healthy trees were in the -7 to -8 bar range while trees showing yellowing were in the -4 to -5 bar range. Pump records suggest about 70 inches of water were applied in 2002.

On Sept. 24, 2002, data loggers with Watermark sensor at depths of 18, 42 and 66 inches were installed in a vigorous, healthy growing area in the orchard (good area) and in an area showing stunted growth and general yellowing (poor area). In addition, stem water potential monitoring was begun on a transect of trees ranging from healthy to small and stunted in another area in the orchard. In 2003 and 2004, this transect of trees as well as the trees adjacent to the good and bad area dataloggers were monitored for midday stem water potential approximately every 1-2 weeks during the growing season. Leaves were bagged in mylar bags at least 15 minutes before measuring in a Scholander pressure chamber (Soil Moisture Instruments, Goleta, CA; PMS Instrument Company, Corvallis, OR).

RESULTS AND DISCUSSION

Irrigation events generally registered on the 18” deep Watermark sensor in the good area (Fig. 1a) of the orchard but not in the bad (Fig. 1b). This suggests that in the poor growing areas, rooting depth was very shallow (the top one foot or so only). Arrows at top of figure indicate periods in August 2003 and again in August 2004 when Watermark sensors registered zero briefly.
Before each of these events, trees appeared to be in good health. Shortly after these events, trees in worst areas showed a general yellowing and leaves high in outer canopy positions showed browning and curling on the margins. Only in these heavy irrigation/rainfall events did any water reach the 42” and 64” Watermark sensors. This suggests most roots in orchard were likely above the 42” sensors.