

Understanding AZMET's Daily Heat Stress Reports

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Introduction

The Arizona Meteorological Network now generates daily heat stress reports for many of the state's cotton production regions. The reports utilize hourly weather data collected at local AZMET weather stations to provide a daily updates on heat stress conditions. Two reports are presently generated each day -- a Statewide Report and a Colorado River Area Report. A description of each report is provided below.

Statewide Report

The statewide report provides the computed stress levels and estimated crop temperatures for the most recent seven days for 21 locations served by AZMET. Stress levels are labeled as **ns** for no stress, **L1** for Level 1 stress, and **L2** for Level 2 stress. A location receives an ns label when average crop temperatures runs below 82.4°F. The L1 label is assigned when crop temperature averages 82.4-86°F while the L2 label is assigned when crop temperatures exceed 86°F. Presence of a double dashed line indicates data are not available for that particular location. The second table in the Statewide Report contains the average crop temperatures in degrees F for each location.

Colorado River Area Report

The Colorado River Area Report summarizes heat stress conditions for Yuma Valley, Parker, and Mohave Valley for the most recent seven days. Four columns of information are provided for each location. Columns 1 and 2 provide the day of the year and the calendar date, respectively. Columns 3 and 4 provide the average crop temperature in degrees F and the stress level respectively. Stress levels are labeled as **ns** for no stress, **L1** for Level 1 stress, and **L2** for Level 2 stress. A location receives an ns label when average crop temperatures runs below 82.4°F. The L1 label is assigned when crop temperature averages 82.4-86°F while the L2 label is assigned when crop temperatures exceed 86°F. Presence of a double dashed line indicates data are not available for that particular location.

Understanding Level 1 & Level 2 Heat Stress

Level 1 heat stress develops when crop temperature averages between 82.4°F and 86°F for the 24-hour day. Periods of Level 1 stress commonly generate light to moderate fruit shed and smaller sized bolls. Fruit shed usually subsides rather quickly when the stress is relieved. The impact of Level 1 stress on cotton reproductive development is often variable. Possible reasons for this variable response include: 1) relative heat tolerance of varieties; 2) field microclimate (e.g. topography and canopy development); 3) crop condition (e.g. fruit retention and crop vigor); and 4) errors associated with estimating crop temperature (representativeness of weather data and errors in model used to estimate crop temperature).

Level 2 heat stress develops when crop temperatures average in excess of 86°F for the 24-hour day. Level 2 stress is the more severe stress and typically produces heavier fruit shed as well as malformed (hooked) and/or smaller bolls. Fruit shed generally subsides once the stress is alleviated, but Level 2 stress also impacts the viability of young (14 days pre-bloom) squares and thus can produce a second, delayed fruit shed nearly two weeks after the stress event ends.