



Canopy Temperature: A Window into Plant Water Status

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Canopy temperature refers to the temperature of the plant's foliage and is a key indicator of plant water status, stress levels, and overall health. Monitoring canopy temperature helps in assessing plant responses to environmental conditions, particularly in relation to water stress and heat tolerance.

To measure canopy temperature using an infrared (IR) thermometer, follow these steps:

1. Instrument Selection: Choose a reliable handheld infrared thermometer suitable for agricultural applications. Ensure it has appropriate accuracy and a suitable field of view for your target area.

2. Measurement Timing: Conduct measurements during consistent environmental conditions, preferably around solar noon when sunlight is most direct, to minimize variability.

3. Positioning: Hold the IR thermometer at a consistent angle and distance from the canopy. Avoid including soil or non-plant surfaces in the field of view to ensure accurate readings.

4. Data Recording: Take multiple readings across different sections of the canopy to account for variability. Record the data systematically for analysis.

The best time to measure canopy temperature using an infrared thermometer is typically between midday (11 am – 3 pm), with the ideal time around 1–2 pm.

This is because:

- 12 pm (noon) may still have some atmospheric instability, and temperatures might not have peaked yet.
- 1–2 pm is generally better because it's when air temperature is most stable and plant stress due to heat or water limitations is more pronounced.

Key Considerations for Measuring Canopy Temperature

- ✓ Avoid early morning or late afternoon – The difference between air and canopy temperature is lower, making stress detection less reliable.
- ✓ Ensure minimal wind interference – Strong winds can cool leaves, affecting accuracy.
- ✓ Avoid measuring immediately after irrigation or rainfall – This can temporarily lower canopy temperature.

Effect of Irrigation on Canopy Temperature and Water Status

After irrigation, the canopy temperature drops because plants take up water, leading to increased transpiration and cooling of the leaves. This means that immediately after irrigation is NOT an ideal time to measure canopy temperature if you're assessing plant stress.

Key Points to Consider

Before irrigation: If the plant is water-stressed, the canopy temperature will be higher than the air temperature because the stomata close to conserve water, reducing transpiration.

After irrigation: The canopy temperature will decrease as water availability increases, leading to higher transpiration and cooling.

Best time to measure water stress

- Ideally, measure just before irrigation to capture the maximum stress level.
- If measuring after irrigation, wait at least 24–48 hours to allow the plant's water status to stabilize.
- position of taking readings like hiding sun is not recommended right

Positioning While Taking Canopy Temperature Readings

No, hiding from the sun or shading the canopy while taking readings is NOT recommended. Proper positioning is crucial for accurate infrared (IR) temperature readings.

Best Practices for Taking IR Canopy Temperature Readings

Face the Sun (Avoid Self-Shading) – The person taking the reading should not block sunlight from reaching the canopy. Shading the canopy will cause an artificial temperature drop, leading to inaccurate readings.

Measure at a 45° Angle – Instead of pointing directly downward, hold the infrared thermometer at a 45-degree angle to minimize reflection errors and ensure you're capturing leaf temperature, not the background.

Stand at a Consistent Distance – Keep a uniform distance (as recommended for the IR thermometer being used) to avoid measurement inconsistencies.

Avoid Measuring Bare Soil or Other Objects – The IR gun should focus only on plant foliage to prevent background interference.

Conclusion

Canopy temperature is an important physiological indicator that reflects the water status and overall health of plants. It is closely related to transpiration and stomatal conductance, as adequate water availability allows transpiration to cool the leaf surface, maintaining a lower canopy temperature. Under water stress conditions, stomatal closure reduces transpiration, leading to an increase in canopy temperature. Therefore, monitoring canopy temperature provides a useful and non-destructive method to detect plant stress, evaluate crop performance, and improve irrigation management. Overall, canopy temperature serves as a valuable tool in understanding plant responses to environmental conditions and enhancing agricultural productivity.