**Crop Water Stress Index:**
The crop water stress index (CWSI) produces a value from 0 (a plant not stressed for water) to 1 (fully water-stressed), used as an indicator of a crop’s health and water needs. As shown in Fig. 2, \((T_c - T_a)\) represent the difference between canopy temperature and ambient temperature. \(D_c\) and \(D_a\) are baselines for a crop’s temperature difference when non-stressed and fully stressed, respectively. Both baselines are calculated based on data taken from the specific climate and plant being indexed. This project investigated using both the Idso and Jackson method of determining CWSI.

![Fig. 2: A labelled depiction of the formula for CWSI.](image)

**Design Additions:**
This project has revealed important additions that could be made to the design to increase functionality. First, adding a level system to the handheld device could aid accuracy of the human input and both the Idso and Jackson methods (which use different variables to calculate CWSI) would provide better understanding of the accuracy of results. Finally, connecting the app to weather station data would be required in order to gain access to the necessary variables for computing CWSI without overcomplicating the system.

**Key Insights and Future Research:**
As baselines are dependent on crop and climate, a large number of baselines would be required for the average Vietnamese small farm as they typically feature a variety of plants. Furthermore, Vietnam has a tropical, fluctuating climate. Since this technology is more often used for certain crops on large farms in locations such as the south west USA, more data is necessary to determine baselines for calculating crop water stress indices for the small plots found on the farms and gardens in Vietnam.

Future research will focus on finding suitable baselines to be used in the EPICS team’s product algorithm, along with creating a procedure for the farmers to use when taking plant canopy temperatures in order to minimize human error.

![Fig. 4: The size of a small plot of crops in the Tra Que vegetable garden in Hoi An, Vietnam.](image)

**References:**

**Acknowledgements:**
Thank you, Prof. Loughman and Dr. Vivoni, for your guidance!