Amrita School of Computing
Department of Computer Science and Engineering

Minor Project: 19CSE495
(2020-2024 B. Tech CSE)

Problem Definition Document

I. Project Title:

Analyzing Drought Resistance In Crops Using Thermal Imaging.

II. Team members:

Roll No.	Name
AM.EN.U4CSE20111	ANZEN T GEORGE
AM.EN.U4CSE20122	DEVITHAA M DEEPAK
AM.EN.U4CSE20130	GOWRI PARVATHY DEVI

III. Abstract

This project focuses on using UAVs with thermal cameras to assess drought resistance in wheat varieties under deficit irrigation. Deficit irrigation is a commonly water-saving technique used when water resources are limited, but it can lead to drought stress and decreased crop yield. Therefore, the identification of suitable wheat varieties for maximizing yield under different degrees of deficit irrigation is crucial, particularly in drought-prone or semi-arid areas. UAVs with a thermal camera can obtain thermal imagery which has a sub-meter spatial resolution, So it makes it possible to accurately obtain canopy temperature even at high altitudes and in a short time. With these advantages, UAV thermal infrared images can quickly assess the spatial temperature situation of crops and then estimate the water stress status of crops. Moreover, UAV thermal infrared images were used to evaluate and rank the physiological performance of different wheat genotypes under moderate and high salty treatments, successfully identifying the salt tolerance of each genotype. However, UAV thermal infrared imagery has widely been used, especially in the field of stress monitoring and variety identification. In contrast, little is known about the identification of the drought resistance of wheat varieties in different deficit-irrigation regimes.

IV. Motivation

The motivation behind using UAV thermal imaging for wheat drought resistance assessment arises from the urgent need to develop efficient and accurate methods for evaluating crop resilience in the context of wheat production. Drought stress significantly affects wheat productivity and food security globally, necessitating the identification of drought-resistant varieties. Traditional assessment methods are time-consuming and may not provide real-time information, prompting the demand for innovative techniques. UAVs equipped with multi-temporal thermal imaging can capture dynamic drought stress patterns, enabling timely and spatially explicit monitoring of crop water status. This research aims to enhance wheat productivity and resilience in the face of water scarcity and climate change, contributing to sustainable agriculture and food security.

In regions experiencing frequent droughts and water scarcity, we are motivated to address the challenges faced by wheat farmers in maintaining crop yields and ensuring food security. Traditional methods of assessing drought resistance in wheat are time-consuming and inadequate for timely decision-making. To overcome these limitations, we are exploring the use of unmanned aerial vehicles (UAVs) equipped with multi-temporal thermal imaging capabilities. This innovative approach aims to provide real-time, spatially explicit information on crop water status, enabling the identification of drought-tolerant wheat varieties. By revolutionizing the assessment of wheat drought resistance, this

research strives to contribute to sustainable agriculture practices, improve food security, and support farmers in drought-prone regions.

Student's Name and Signature

Anzen T George 

Devithaa M Deepak 

Gowri Parvathy Devi 

Guide's Name & Signature

SARATH S