# Assessment Week 1

## Problem Statement

In the pursuit of sustainable agriculture, minimizing crop loss and optimizing yield are critical priorities. One of the most persistent threats to achieving this goal is the rapid spread of undiagnosed plant diseases, particularly in regions with limited access to expert agricultural support. Traditional methods of disease identification rely heavily on manual inspection, which is time-consuming, inconsistent, and often inaccessible to small-scale farmers.  
  
This project proposes the development of an intelligent Plant Disease Detection System that leverages computer vision and machine learning to diagnose plant diseases directly from leaf images. By integrating this technology into a user-friendly platform, the system empowers farmers to detect diseases early, take preventive measures, and reduce dependency on harmful chemical treatments. This not only protects crop health but also aligns with environmentally responsible farming practices, contributing to the broader mission of sustainable agriculture.

## Project Pipeline

1. 1. Data Collection and Loading

A labeled dataset containing images of healthy and diseased plant leaves is prepared. The dataset is split into three categories: Train (for training the model), Test (for model testing), and Validation (for tuning hyperparameters and checking for overfitting).

1. 2. Data Upload and Access

The dataset is zipped and uploaded to Google Drive. In Google Colab, the drive is mounted, and the dataset is unzipped for further use.

1. 3. Image Processing and Augmentation

Images are resized to a fixed dimension (e.g., 128×128 pixels). Techniques like rotation, flipping, and zooming are applied to augment the dataset, increasing its diversity and improving model robustness.

1. 4. Model Development (CNN Model)

A Convolutional Neural Network (CNN) is used for image classification. The model is trained on the processed and augmented dataset.

1. 5. Model Testing and Evaluation

The trained CNN model is evaluated using the test set. Performance metrics like accuracy, precision, recall, and confusion matrix are used to assess model quality.

1. 6. Prediction and Result Visualization

After evaluation, the model is used to predict diseases in new plant images. The results are visualized using prediction labels and plotted output for clear interpretation.