Literature Review

Cassava is a crucial food crop, particularly in tropical and subtropical regions, serving as a staple for over 800 million people worldwide. However, cassava plants are highly susceptible to diseases such as **Cassava Mosaic Disease (CMD), Cassava Brown Streak Disease (CBSD), Cassava Green Mottle (CGM), and Cassava Bacterial Blight (CBB),** which significantly impact yield and food security. Traditional disease identification methods rely on manual inspection by farmers or agricultural experts, which is time-consuming and prone to errors. With advancements in **machine learning (ML) and deep learning (DL)**, automated image-based classification has emerged as a promising solution for accurate and efficient disease detection.

Several studies have explored the use of **deep learning techniques** for cassava disease classification. Ramcharan et al. (2017) conducted one of the earliest studies using **Convolutional Neural Networks (CNNs)** to classify cassava diseases, achieving over **90% accuracy**. Their study demonstrated that deep learning significantly outperforms traditional machine vision techniques in agricultural disease identification. However, they also highlighted challenges such as the need for high-quality datasets and extensive computational resources. Building on this, Mwebaze et al. (2019) introduced the **iCassava 2019 Challenge**, which provided a large, labeled dataset for cassava disease classification. Their research evaluated multiple deep learning architectures, including **ResNet, InceptionV3, and DenseNet,** with the best-performing model achieving an **accuracy of over 92%.** This study emphasized the importance of real-world applications, particularly the potential for **mobile-based disease detection tools**. More recently, Ayu et al. (2021) compared different **transfer learning models (EfficientNet, MobileNet, and VGG16)** for cassava disease classification. Their findings showed that **EfficientNet achieved the highest accuracy of 94.2%,** demonstrating its effectiveness for agricultural image classification. However, they also recommended further research on real-world testing and model optimization for deployment on mobile applications.

These studies indicate that **CNNs and transfer learning approaches** hold great potential for cassava disease detection.As this project progresses, insights from these studies will be leveraged to explore the most effective **machine learning models** for cassava disease detection and their potential deployment in practical agricultural settings.