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Effectiveness of Using Deep Learning for Blister Blight Identification in Sri Lankan Tea

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Ceylon tea industry faces a major challenge in the form of pathogen-induced crop loss, with Blister Blight (BB) caused by Exobasidium vexans posing the greatest threat, leading to harvest losses of over 30%. This fungus attacks the tender tea shoots, resulting in a direct negative impact on the tea harvest. This paper presents a system to identify the suspicious tea leaves and BB disease at its early stages along with an assessment of severity, offering a potential solution to this critical issue. By utilizing real-time object detection, the system filters out non-tea leaves from the captured initial image of a segment of a tea plant. The identified tea leaves are then subjected to BB identification and severity assessment based on differing visual symptoms of the BB stages. This approach enables the system to accurately identify BB in the initial stage and severity stage, allowing for timely and targeted intervention to minimize crop losses. The YOLOv8 model has been able to correctly identify 98% of the objects it has detected as relevant (precision), and it has been able to correctly identify 96% of all the relevant objects present in the scene (recall). The Residual Network 50 (Resnet50) convolutional neural network (CNN) model was selected as the final model, achieving an accuracy of 89.90% during the training phase and an accuracy of 88.26% during the testing phase.

Keywords: *Blister Blight, CNN, image processing, Mask R-CNN, tea diseases, YOLOv8*