

Cinnamon Care: Digitizing Disease Detection and Treatment Recommendations for Cinnamon Plants Using Image Processing and Machine Learning

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Cinnamon is one of the most essential spice crops with significant global economic importance, and Sri Lanka is renowned for producing the highest quality cinnamon, known as Ceylon Cinnamon. Contributing to over 90% of the global spice market, cinnamon is the most exported spice from Sri Lanka, particularly to countries such as Mexico, the USA, and Peru. Between 2017 and 2022, cinnamon exports increased by 1,618 metric tons, and its export value grew by Rs. 40,843 million. However, diseases such as leaf spot, rough bark disease, and stripe canker present significant threats to cinnamon cultivation, impacting both yield quality and quantity. This study aimed to address these challenges by developing a machine learning and image processing-based system for the early detection of these three prevalent cinnamon diseases. The system not only identifies the diseases but also provides detailed information on symptoms and treatments, improving disease management for farmers. A dataset of diseased cinnamon plant images, provided by the National Cinnamon Research Center in Matara, was used for training, consisting of leaf spot, rough bark, stripe canker, and healthy image samples. The DenseNet-121 model was employed to train the system, which achieved a high accuracy rate of 94%. This system has the potential to significantly mitigate the adverse effects of these diseases, enhancing both productivity and the quality of cinnamon quills. Additionally, it offers guidance to cinnamon peelers by providing a peeling guide to support the peeling process. Ultimately, this study aimed to enhance cinnamon production through timely disease detection and effective treatment strategies.

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