Perspective

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Leaf Spot Diseases with Some Texture Features

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Description

The olive tree is a profoundly helpful organic product tree with the earliest known history of its ranch returning to 6000 years. Climate change and the spread of diseases pose a significant threat to olive oil production today. Image processing techniques are used to analyze and classify olive disease in this paper. A correlation between some texture features and the signatures of Neofabrea leaf spot disease and Peacock leaf spot disease is discovered through image texture analysis of olive plant leaves. Neofabrea leaf spot disease is very similar to peacock leaf spot disease in that it manifests itself as distinct circular spots. Histogram thresholding and k-means segmentation are used to isolate the infected area in the proposed method. The accuracy of k-mean segmentation was higher than that of the other method. We were able to determine the connection between infection and one or more texture features thanks to the application of texture analysis with first to fourth order moments in the subsequent step. The identification of a strong correlation between the infection area and texture characteristics like energy, homogeneity, and entropy also assisted in classifying the two diseases as being similar.

Isolating of Pathogen

Through both passive and active defense mechanisms, plants defend themselves against pathogens. Systemic acquired resistance or SAR is the second type of defense that encompasses the entire organism. SAR involves, among other things, the production of Reactive Oxygen Species (ROS) ion fluxes across the plasma membrane, the reinforcement of the cell wall, the production of phytoalexins and Pathogenesis-Related (PR) proteins, and an increase in the production of many compounds that are used in passive defense. By disrupting essential biochemical processes and isolating the pathogen at the primary entry point, for instance, the rapid accumulation of phenolic compounds at the infection site may limit its spread. In addition, when the plant becomes infected, it releases a number of Volatile Organic Compounds (VOCs) into the air. This makes it easier for signals to travel to other parts of the infection site and to a neighboring plant. The oxidative burst, which is caused by the increased production of Reactive Oxygen Species (ROS), primarily superoxide anion radical (O2) and hydrogen peroxide (H2O2), is one of the early and frequently occurring events that occur when plants respond to pathogen attack. For the plant to begin its defense against pathogens, this oxidative burst is essential. As a sufficiently stable compound that serves as a crucial mediator of defense signals and an antimicrobial agent,H2O2 is thought to be the more significant ROS form that has been produced at this time. The constitutive equilibrium between pro- and antioxidative cell factors, represented by ROS and antioxidants, in plant tissues is necessary for proper metabolism. This equilibrium is altered by any environmental stress due to either increased ROS generation or decreased antioxidant activity. Catalase and ascorbate peroxidase are two examples of class III peroxidases that regulate the level of H2O2 in cells, among other things. APX and POX are present in all subcellular compartments and have numerous isoforms, whereas CAT is most likely restricted to peroxisomes. The primary function of APX in plant cells is to remove water vapor from the mitochondria, cytosol, and chloroplasts. Although CAT is thought to be the most important H2O2 scavenging enzyme in aerobic organisms, its characteristics of a rapid turnover rate and lower affinity for H2O2 than APX suggest that it is not effective at removing low concentrations of H2O2.

Variety of Diseases

Phaeoisariopsis griseola is the pathogen that causes bean angular leaf spot. The disease, which can cause yield losses of up to 80%, is very important in tropical and subtropical regions. According to Saettler (1991), the disease is particularly destructive in warm, humid regions and affects foliage and pods. The symptoms of the pod are circular to elliptical reddish-brown lesions, whereas the symptoms of the leaf lesions begin as small brown or grey spots that grow angular and necrotic and are constrained by the veins of the leaf. Spots on the leaf eventually congregate, resulting in premature defoliation. Additionally, the disease has an impact on the seed's quality and marketability in all bean-producing regions of the world. Losses caused by ALS have been estimated to be around 374 800 t in Africa's Great Lakes Region. The selection of resistant varieties is the most effective method for disease control. Due to the pathogen's highly variable pathogenicity, breeding for ALS resistance is difficult, making it difficult to achieve durable resistance. Multiple authors have reported that P. griseola has a lot of genetic and pathogenic variation. There are hints that the common bean went through at least two major, morphologically distinct domestication events. These events, in turn, produced two major gene pools: Large-seeded beans from the Andes and small to medium-sized beans from Middle America. Bean crops are susceptible to a variety of diseases in every region where they are grown, which can significantly lower their yield potential. Rust caused by Uromyces appendiculatus is one of the leaf diseases. In Brazil, Pseudocercospora griseola Crous & Braun's unger and Angular Leaf Spot (ALS) are destructive. Chlorophyll and raised pustules on the surface of leaves, sometimes also on pods and petioles, are signs of rust, but it doesn't cause much defoliation. Necrotic lesions on all aerial parts caused by ALS, on the other hand, can lead to severe defoliation. For the control of both diseases, resistant cultivars and fungicides have been the most commonly recommended methods. However, genetic resistance that is controlled by a single major gene has been deemed to be short-lived due to the presence of numerous physiological races of these pathogens. However, if resistant fungal strains emerge, fungicides may lose their effectiveness as a result of prolonged excessive use. Today, environmental and public health concerns about toxic residues are growing worldwide. The induction of plant resistance emerges as an eco-friendly alternative in this context, typically demonstrating effectiveness against a diverse range of pathogens and their races. A reduction in the size and/or number of lesions caused by the virulent pathogen can be achieved by activating defense responses in response to a variety of natural and synthetic elicitors that are recognized by the host. Systemic Acquired Resistance (SAR) and Induced Systemic Resistance (ISR) are the two most well-defined types of induced resistance. They are distinct in a number of important physiological and biochemical ways.