

# Fusarium Wilt detection on Davao del Norte, Philippines using Satellite Images of Landsat-8 and Diwata-1

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Banana Industry is one of the largest agricultural sector in the Philippines. It is ranked 3<sup>rd</sup> in the world as top producer of Cavendish banana and was valued by Food and Agriculture Organization (FAO) of United Nations at \$1.1 billion last 2014. Unfortunately, on the succeeding year, the industry experienced huge losses. It suffered 5.35% decrease in production, loss \$500 million in profit and 2000 hectares of banana plantation. These losses are effects of Fusarium Wilt outbreak that has affected the Davao Region, which is the top producer of Cavendish banana in the country.

Fusarium Wilt or more popularly known as “Panama disease” is a disease caused by several pathogens referred to as *Fusarium oxysporum*. It is a vascular disease that causes yellowing and wilting of banana leaves which eventually kills the tree, preventing it to bear fruits and to reproduce. It has affected the 5 provinces in Davao Region with an area over 20,000 sq. km.

In stopping the spread of the disease, early detection of the existence of the disease is the key and remote sensing using satellite images can be an indispensable tool. Landsat-8 has been widely use for vegetation monitoring and has a huge potential on detecting the disease because of it having a wide range of bands and resolution of 30 m. Diwata-1, which is the 1<sup>st</sup> microsatellite of the Philippines, is equipped with Liquid Crystal Tunable Filter (LCTF) which enables super multi-color imaging and increase the spectral resolution of a camera greatly. As compared to Landsat-8’ s 11 bands, Diwata-1 has 587 bands. With this high spectral resolution, it can provide more detailed information, making healthy vegetation more distinguishable from unhealthy ones.

In this study, ground spectral measurements were done in a Panama disease infested farm in Davao del Norte using FieldSpec 4 spectroradiometer. A ground-based LCTF imager were also used to capture Panama disease infected trees at spectral resolution same with Diwata-1’ s camera. Banana trees at the area were geo-tagged using GPS. Cross-analysis comparing spectral data of healthy from Panama-disease-infected tree and other diseases found in the banana tree were done to create a decision tree for LCTF-based imagers and for Landsat-8 spectral resolution. This decision tree were then applied to the LCTF Imager’ s images acquired in the area and to Landsat-8 images. The resulting areas identified using the decision tree matches the geo-tagged trees in the ground. Spectral response of Diwata-1’ s camera were then simulated by using its transmittance and ground spectral measurements and wavelengths sensitive to Panama disease were identified.

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