"*Impedimetric DNA Biosensor for the detection of Erwinia mallotivora (Dieback Disease) in Papaya* "

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Agriculture losses due to crop infections are a major concern across the globe. In Malaysia, the persistent issue of papaya dieback disease is a threat to the industry. Advance disease detection in papaya is of paramount importance in order to minimize the damage, yield and economic losses. With this regard, early detection by electrochemical DNA biosensor offers the most cost-effective and efficient means in plant disease management. We report here the development of DNA impedance biosensor for the detection of *Erwinia mallotivora* bacteria, the causal agent for papaya dieback disease. Genome comparison via bioinformatic analysis on six *Erwinia* spp. has identified 45 gene clusters with 114 genes sequence found to be unique to *E.mallotivora*. Two types of unique genes, flagellar biosynthesis protein (Flg) and hypothetical protein (Hypo), were selected for primer design, PCR-amplified reaction and purified to be used as DNA target in impedimetric DNA sensor study. Protein concentrations ranging from 0 ng to 250 ng of DNA were immobilized on thiol-modified gold screen-printed electrodes for electrochemical studies. Electrochemical impedance spectroscopy (EIS) technique was carried out in 5 mM ferri/ferrocyanide in 0.1 M phosphate buffer, pH 7.0 solution. Nyquist plots' semi-circles and charge transfer resistance (ΔR_{ct}) for 0 ng - 250 ng target DNA increased linearly with R^2=0.9209 and R^2=0.9803 for Flg and Hyp proteins respectively. This preliminary result indicates the ability of the impedimetric DNA sensor to detect the DNA sequence of selected *E.mallotivora* protein genes at lower concentrations in early detection of papaya dieback disease.

Keywords: *Erwinia mallotivora,* dieback disease, electrochemical impedance spectroscopy, biosensor, plant disease management

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