

INDUCED SYSTEMIC RESISTANCE (ISR): AN EFFICIENT TOOL TO CONTROL BACTERIAL TRANSMITTED PAPAYA DIEBACK AND BANANA BLOOD DISEASES

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ABSTRACT

The Malaysian Government is focused on increasing the production of fruit types that can contribute economically to the industry. Among the fruits, are papaya and banana, which are important for local consumption and export. However, the goal to increase the production and export has been hampered by the emergence of invasive alien diseases namely papaya bacterial dieback and banana blood disease, which are transmitted by bacterial pathogens. Various approaches including chemical and biological controls have been attempted but none were successful in controlling these diseases. One of the techniques that has not been fully explored is the enhancement of plant resistance against diseases known as the Induced systemic resistance (ISR). The aim of this study was to induce systemic resistance in plants against both bacterial diseases using Plant growth-promoting rhizobacteria (PGPR). ISR technology to control both papaya bacterial dieback and banana blood disease was developed by bio-prospection and manipulation of ISR inducing PGPR from soil. For papaya, the ISR seedlings showed total recovery against the dieback infection while the Control seedlings (non-ISR) totally succumbed to the disease. When papaya seedlings (ISR and non-ISR) were produced and tested in a hotspot for dieback disease, for one crop cycle (2 years), all treatments except one survived, compared to the control where none of the plants survived. In another trial, one of the ISR treatment was selected and up-scaled in a farmer's plot (hotspot). 95% of resistance against the dieback disease was recorded. This success enabled the technology to be commercialized and the product made available in the market for farmers to adopt. This success on papaya, compelled a repetition of the same approach to develop ISR technology against blood disease of banana. When the ISR banana seedlings were challenged to the pathogen, three treatments had recorded 100% suppression and another two had 75% suppression against the disease, whereas all the control plants did not survive. All these five treatments were tested in a hotspot area (area of elevated disease occurrence) where disease development was observed. During the first crop harvested from the mother plants, the ISR treatment recorded 0-8% disease infection compared to the Control which recorded three-fold higher incidences of infection than the ISR treatment (24%).

Keywords: papaya bacteria dieback, blood disease of banana, induced systemic resistance (ISR), plant growth-promoting rhizobacteria (PGPR)