World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:12, No:11, 2018

The Influence of Substrate and Temperature on the Growth of Phytophthora palmivora of Cocoa Black Pod Disease

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Abstract : Black pod is the most commonly destructive disease of cacao (Theobroma cacao) which cause major losses to global production of cocoa beans. The genus of Phytophthora is the important pathogen of this disease worldwide. The species of P. megakarya causes black pod disease in West Africa, whereas P. capsici and P. citrophthora cause the incident in Central and South America. In Malaysia, this disease is caused by P. palmivora which infect all stages of pod development including flower cushion, cherelle, immature and mature pods. This pathogen destroys up to 10% of trees yearly through stem cankers and causes 20 to 30% pod damages through black pod rot. Since P. palmivora has a high impact on cocoa yield, it is crucial to identify some of the abiotic factors that can constrain their growth. In an effort to evaluate the effect of different substrates and temperatures to the growth of P. palmivora, a laboratory study was done under a different range of temperatures. Different substrate for the growth of P. palmivora were used which are corn meal agar (CMA) media and detached pod of cocoa. An agar plug of seven days old of P. palmivora growth was transferred on both substrates and incubated at 24, 27, 30, 33 and 36°C, respectively. The diameter of lesion on pod and the cultural growth of pathogen was recorded for 7 consecutive days. The optimum incubation temperature of P. palmivora on both substrates is at 27°C. However, the growth tends to be inhibited as the temperature increases. No lesion developed on pod surface incubated at 36°C and only a small lesion observed at 33°C. The sporulation with the formation of white mycelial growth on pod surface was only visible at optimum temperature, 27°C. On CMA, the pathogen grew over the entire range of temperatures tested. The study is, therefore, concluded that P. palmivora grow the best at temperature of 27°C on both substrates and their growth begin to inhibit when the temperature rises to more than 27°C. The growth pattern of this pathogen is similar on both pod surface and cultural media.

Keywords : cocoa, Phytophthora palmivora, substrate, temperature
Conference Title : ICACC 2018 : International Conference on Agriculture and Climate Change
Conference Location : Singapore, Singapore
Conference Dates : November 22-23, 2018