Evaluation on the effectiveness of combination of biocontrol agents in managing Ganoderma boninense of oil palm

ABSTRACT

Aims: The development of an effective biocontrol formulation for inhibition of Ganoderma boninense, a well-known destructive pathogen in oil palm plantation is important to prolong the palm's lifespan and reduce the losses due to this disease. In this paper, we present some new bioformulations with combination of different types of biocontrol agents in managing basal stem rot (BSR) disease. Methodology: The effectiveness of the treatments designed as T1 (Trichoderma harzianum + Lecanicillium spp. + Streptomyces sundarbansensis + Pseudomonas aeruginosa), T2 (Penicillium simplicissimum + Lecanicillium sp. + S. sundarbansensis + P. aeruginosa), T3 (P. simplicissimum + P. aeruginosa) and T4 (LEStani®) was evaluated through treatment on the oil palm seedlings artificial infected by G. boninense and the results were expressed in disease severity index (DSI), bole severity index (BSI) and ergosterol content. Conclusion, significance and impact of study: All tested treatments (T1-T4) managed to control the severity of the Ganoderma infection from continuously increasing when the treatments were applied either one month before or after artificial inoculation. The disease severity of infected seedlings without treatments had increased for almost 2-fold at the end of the trial. Moreover, T1 had the greatest inhibition of G. boninense with the lowest ergosterol content (a bioindicator of Ganoderma colonization) detected (676.67 μg/mL), which is about 1.9-fold lower than control (1273.33 μg/mL) without treatments and a BSI score of 1. Based on the effectiveness among the four tested biocontrol formulations, T1 is the most promising formulation to be further evaluated in the field for control of BSR disease. However, more research is needed in the future to estimate the effective amount for application in open environment.