

Bacillus thuringiensis entomotoxicity activity in wastewater sludge-culture medium towards *Bactrocera dorsalis* and their histopathological assessment

ABSTRACT

This study investigates the production of biopesticide based on *Bacillus thuringiensis* activity in culture media supplemented with semi-solid wastewater sludge as one of the raw ingredient. A series of testing using mixture of sludge and source of protein as *B. thuringiensis* growth media were carried out and selection of media was based on viable spore count. The entomotoxicity test of *B. thuringiensis* was carried out against larvae of fruit fly using diet incorporation method. Further impact of entomotoxicity was observed based on histology deformities on columnar epithelial cell and goblet cell of the midgut. A mixture of sludge with 60% wheat bran produced up to 1.64×10^{10} CFU/mL of viable spore count within 10 days of incubation. Based on entomotoxicity test, incorporation of 12 mL of semi-solid wastewater sludge-culture media into fruit fly artificial diet caused the highest fruit fly mortality at 64.8%. The value of semi-solid wastewater sludge-culture media concentration for LC50 was determined at 8.43%. Effect of entomotoxicity can be seen started from 3rd instar larvae where histopathological studies showed that up to 10% of columnar epithelial cells in the intestine were swollen and severe reduction of goblet cell's size. Thus, it decreases the survivability of the fruit fly larvae. The present study indicated that semi-solid wastewater sludge has the potential to enhance *B. thuringiensis* entomotoxicity activity.

Keyword: Diet; Goblet cell; Histopathology; Lumen; Semi solid; Wheat bran