

## ABSTRACT

### **THE EFFECT OF ENTOMOPATHOGENIC BACTERIA *Bacillus thuringiensis* CONCENTRATION ON THE MORTALITY OF RHINOCEROS BEETLE (*Oryctes rhinoceros*) LARVAE IN VITRO**

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The rhinoceros beetle (*Oryctes rhinoceros* L.) is a major pest of oil palm plantations, capable of reducing yield and causing the death of immature plants. An environmentally friendly alternative for pest control is the application of entomopathogenic bacteria *Bacillus thuringiensis* (Bt). This study aimed to determine the effect of Bt concentration on the mortality of *O. rhinoceros* larvae, as well as to identify the most efficient concentration, lethal concentration (LC<sub>50</sub>), and lethal time (LT<sub>50</sub>). The experiment consisted of six Bt treatments (0%, 4%, 5%, 6%, 7%, 8%) with four replications (a total of 480 larvae at instar stages 2-3). Observed variables included morphological changes, mortality rate, LC<sub>50</sub>, and LT<sub>50</sub> values. The results showed that Bt significantly affected larval mortality. A concentration of 7% was found to be the most effective, resulting in 98,8% mortality at 14 days after application (DAA) and the shortest LT<sub>50</sub> of 7 days. Treatments of 6% and 8% also resulted in 100% mortality at 20 DAA, but with longer LT<sub>50</sub> values (9 days). Symptoms of infection were characterized by larval bodies becoming darkened, softened, and a foul odor. It is concluded that a 7% Bt concentration is the most efficient for controlling *O. rhinoceros* larvae *in vitro*, and has strong potential as a biological control agent to replace chemical insecticides.

**Keywords:** *Bacillus thuringiensis*, concentration, mortality, *Oryctes rhinoceros*

## ABSTRAK

### **PENGARUH KONSENTRASI BAKTERI ENTOMOPATOGEN *Bacillus thuringiensis* TERHADAP MORTALITAS LARVA KUMBANG TANDUK (*Oryctes rhinoceros*) SECARA *IN VITRO***

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Kumbang tanduk (*Oryctes rhinoceros* L.) merupakan hama utama kelapa sawit yang dapat menurunkan produksi hingga menyebabkan kematian pada tanaman belum menghasilkan. Alternatif pengendalian ramah lingkungan adalah penggunaan bakteri entomopatogen *Bacillus thuringiensis* (Bt). Penelitian ini bertujuan mengetahui pengaruh konsentrasi Bt terhadap mortalitas larva *O. rhinoceros*, menentukan konsentrasi efisien, konsentrasi letal (LC<sub>50</sub>), dan waktu letal (LT<sub>50</sub>). Penelitian ini terdiri atas enam perlakuan Bt (0%, 4%, 5%, 6%, 7%, 8%) dengan empat ulangan (total 480 larva instar 2-3). Variabel yang diamati adalah perubahan morfologi, mortalitas, nilai LC<sub>50</sub>, dan nilai LT<sub>50</sub>. Hasil penelitian menunjukkan bahwa Bt berpengaruh nyata terhadap mortalitas larva. Konsentrasi 7% paling efisien dengan mortalitas 98,8% pada 14 HSA dan LT<sub>50</sub> tercepat yaitu 7 hari. Perlakuan 6% dan 8% juga mencapai mortalitas 100% pada 20 HSA namun LT<sub>50</sub> lebih lama (9 hari). Gejala infeksi ditandai dengan tubuh larva menghitam, melunak, dan berbau busuk. Disimpulkan bahwa konsentrasi 7% Bt paling efisien dalam mengendalikan larva *O. rhinoceros* secara *in vitro* dan berpotensi sebagai agen pengendali hayati pengganti insektisida kimia.

**Kata kunci:** *Bacillus thuringiensis*, konsentrasi, mortalitas, *Oryctes rhinoceros*