Aplikasi *Small RNA* Target Gen Manganese Peroxidase (MnP) *Ganoderma Boninense* Penyebab Penyakit Busuk Pangkal Batang Tanaman Sawit Secara *In Vitro*

INTISARI

Ganoderma boninense merupakan jamur penyakit busuk pangkal batang (*Basal Stem Rot*), yang menimbulkan kerugian pada industri perkebunan kelapa sawit. Jamur ini bersifat patogen karena mampu mendegradasi lignin dengan memproduksi *cell wall degrading enzymes* (CWDEs), seperti manganese peroxidase (MnP). Penelitian ini dilakukan untuk mengevaluasi potensi aplikasi *small interfering* RNA (siRNA) yang dirancang secara *in silico* dengan tujuan untuk *silencing* gen MnP pada *Ganoderma boninense* KM8 dan B93 secara *in vitro*. Penelitian menggunakan tiga konsentrasi siRNA MnP, yaitu 0, 20, dan 75 ng/µL dan diameter koloni diukur selama 28 hari. Analisis ekspresi gen MnP dilakukan menggunakan RT-qPCR dengan metode $2^{-}\Delta\Delta Ct$ dan gen *eef2* sebagai *housekeeping*. Analisis level ekspresi dilakukan pada hari ke-7, 14, 21 dan 28. Data pertumbuhan koloni dan ekspresi gen dianalisis dengan ANOVA. Hasil menunjukkan bahwa aplikasi siRNA MnP pada konsentrasi 75 ng/µL, berpotensi menghambat pertumbuhan koloni *Ganoderma boninense* KM8 dibandingkan kontrol dan strain B93. Analisis ekspresi gen MnP menunjukkan penurunan ekspresi pada hari ke-7 (turun 31%), ke-14 (turun 12%), dan ke-28 (turun 60%), dan kenaikan ekspresi pada hari ke-21 (naik 53%) terhadap kontrol. Penelitian ini mengindikasikan bahwa aplikasi siRNA MnP berpotensi menekan pertumbuhan dan menurunkan ekspresi gen MnP pada *Ganoderma boninense*, serta dapat menjadi dasar awal pengembangan strategi pengendalian penyakit busuk pangkal batang yang berbasis pada pendekatan RNAi.

Kata kunci: *Ganoderma boninense,* siRNA, manganese peroxidase, RT-qPCR

Application of Small RNA Targeting the Manganese Peroxidase (MnP) Gene of *Ganoderma boninense,* the Causal Agent of Basal Stem Rot Disease in Oil Palm, Under In Vitro Conditions

ABSTRACT

Ganoderma boninense is the causal agent of Basal Stem Rot (BSR), which causes significant losses in the oil palm plantation industry. This fungus is pathogenic due to its ability to degrade lignin through the production of cell wall-degrading enzymes (CWDEs), including manganese peroxidase (MnP). This study aimed to evaluate the potential application of small interfering RNA (siRNA), designed in silico, to silence the MnP gene in *Ganoderma boninense* strains KM8 and B93 under in vitro conditions. Three concentrations of siRNA MnP (0, 20, and 75 ng/µL) were applied, and colony diameter was measured over a 28-day period. MnP gene expression analysis was performed using RT-qPCR with the $2^{-}\Delta\Delta Ct$ method, employing the eef2 gene as a housekeeping reference. Expression levels were analyzed on days 7, 14, 21, and 28. Colony growth and gene expression data were analyzed using ANOVA. The results showed that siRNA MnP at a concentration of 75 ng/µL potentially inhibited the colony growth of *Ganoderma boninense* strain KM8 compared to the control and strain B93. Gene expression analysis revealed that MnP was downregulated on day 7 (31% decrease), day 14 (12% decrease), and day 28 (60% decrease), and upregulated on day 21 (53% increase) relative to the control. These findings suggest that siRNA targeting MnP can potentially suppress colony growth and downregulate MnP gene expression in *Ganoderma boninense*, providing a preliminary basis for developing RNAi-based strategies to control Basal Stem Rot disease.

Keywords: *Ganoderma boninense,* siRNA, manganese peroxidase, RT-qPCR