

Induksi *Small-Interfering RNA* (siRNA) Target *Chitin synthase* (CHS) pada *Ganoderma boninense* Penyebab Basal Stem Rot (BSR) secara *In-vitro*

Intisari

Basal Stem Rot (BSR) salah satu penyakit dengan tingkat infeksi tertinggi yang dapat menurunkan hasil produksi kelapa sawit hingga 50–80%. *Ganoderma boninense* merupakan salah satu jamur fitopatogen dapat menyebabkan busuk pangkal batang bawah atau *basal stem rot* (BSR) dan *upper stem rot* (USR) pada batang tanaman kelapa sawit. Penerapan bioteknologi modern dengan RNA *interference* berbasis *small-interfering RNA* (siRNA) dalam upaya mengendalikan penyakit BSR pada kelapa sawit merupakan salah satu metode presisi dan efektif untuk menekan BSR. Pembentukan siRNA pada gen target *chitin synthase* dari analisis *in-silico* dengan metode penyelarasan *map to reference* antara *dataset* WGS Gabo G3 (strain *G. boninense* Indonesia) dan *dataset* WGS Ganleu1 menghasilkan kandidat siRNA CHS1 dan CHS2. Selanjutnya, kedua kandidat siRNA diuji secara *in-vitro* pada isolat KM8 dan B93 dengan variasi konsentrasi; kontrol (K0), 20 ng/μl (K20) dan 75 ng/μl (K75). Hasil laju pertumbuhan diameter koloni isolat B93 setelah aplikasi siRNA CHS1 dan CHS2 menunjukkan hasil tidak berbeda nyata jika dibandingkan K0, namun isolat KM8 aplikasi siRNA CHS1 K20 memiliki laju pertumbuhan koloni yang rendah jika dibandingkan K0 dan K75. Perbedaan laju pertumbuhan diameter koloni pada aplikasi siRNA CHS2 berbanding lurus dengan hasil analisis ekspresi relatif gen target *chitin synthase*, aplikasi siRNA CHS2 lebih rendah jika dibandingkan aplikasi siRNA CHS1 baik pada konsentrasi K20 dan K75, dengan persentase penghambatan gen target *chitin synthase* masing-masing sebesar 26% dan 29%.

Kata kunci: BSR, *Ganoderma boninense*, *small-interfering RNA*, CHS1, CHS2

Induction of Small-Interfering RNA (siRNA) Targeting *Chitin synthase* (CHS) pada *Ganoderma boninense* Causes Basal Stem Rot (BSR) with *In-vitro*

Abstract

Basal stem rot (BSR) is a high-infected disease that significantly can reduce the oil palm production yields up to 50–80%. *Ganoderma boninense* is a phytopathogenic fungus causing basal stem rot (BSR) and upper stem rot (USR) diseases in oil palm. The application of modern biotechnology with RNA interference based on small-interfering RNA (siRNA) as an effort to control BSR disease in oil palm is one of the precise and effective methods for suppressing the BSR. The assembly of siRNA on the *chitin synthase* from *in-silico* analysis using the map to reference alignment method between the WGS Gabo G3 dataset (Indonesian *G. boninense* strain) and the WGS Ganleu1 dataset produced siRNA candidates CHS1 and CHS2. Furthermore, these two siRNA candidates were tested *in-vitro* on KM8 and B93 isolates with varying concentrations; control (K0), 20 ng/μl (K20) and 75 ng/μl (K75). The results of the growth rate of colony diameter of B93 isolate after application of CHS1 and CHS2 showed that the results were not significantly different when compared to K0, however KM8 isolate with the application of CHS1 K20 had a low colony growth rate when compared to K0 and K75. The difference in the growth rate of colony diameter of KM8 and B93 is directly proportional to the results of the gene relative expression of *chitin synthase*, the application of CHS2 is lower when compared to the CHS1 both of the K20 and K75 concentrations, particularly with the percentage of down-regulation of *chitin synthase* around 26% and 29% respectively.

Keywords: BSR, *Ganoderma boninense*, small-interfering RNA, CHS1, CHS2