INTI SARI

Penyakit hawar daun bakteri oleh *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) mengakibatkan kehilangan hasil panen padi ±20-50% di dunia. Penggunaan varietas tahan merupakan upaya pengendalian penyakit, namun menyebabkan evolusi patogen. Nanopartikel kitosan dapat berperan sebagai elisitor resistensi tanaman yang efektif. Penelitian bertujuan untuk mengetahui kemampuan nanopartikel kitosan dalam meningkatkan ekspresi gen resistensi padi *Xa21* dan *Xa1* serta perannya pada perkembangan penyakit hawar daun bakteri. Penelitian menggunakan larutan nanopartikel kitosan 0,065% pH 3,31; kultur *Xoo;* serta benih IR64 dan Inpari17. Analisis ekspresi gen dilakukan pada hari ke-0 (saat inokulasi) dan ke-4 setelah inokulasi menggunakan PCR konvensional dan *real-time* PCR, serta 4x pengukuran % intensitas penyakit dan nilai AUDPC dengan interval 1 minggu. Variabel percobaan meliputi *mock* / inokulasi akuades steril sebagai kontrol, K(+) / inokulasi *Xoo,* CNP(-) / dengan nanopartikel kitosan dan inokulasi akuades steril, serta CNP(+) / dengan nanopartikel kitosan dan inokulasi *Xoo*. Penyemprotan nanopartikel kitosan interval 1 minggu dilakukan sejak padi umur 16 s/d 69 hari setelah pindah tanam. Hasil penelitian menunjukan bahwa nanopartikel kitosan mampu meningkatkan ekspresi gen *Xa21* pada CNP(-) kedua varietas serta meningkatkan ekspresi gen *Xa1* pada CNP(-)IR64 maupun CNP(-)IP17 dan CNP(+)IP17. Hasil skoring berdasarkan % intensitas penyakit secara umum dan nilai AUDPC tidak berbeda signifikan antara K(+)IR64 dan CNP(+)IR64, serta berbeda signifikan lebih besar pada CNP(+)IP17 dibanding K(+)IP17, sehingga dapat disimpulkan bahwa nanopartikel kitosan dapat meningkatkan ekspresi gen resistensi *Xa21* dan *Xa1* padi, namun belum optimal untuk mengendalikan perkembangan penyakit hawar daun bakteri.

Kata kunci : Hawar Daun Bakteri, tanaman padi, nanopartikel kitosan, respon ketahanan

Abstract

Bacterial leaf blights by *Xanthomonas oryzae* pv. *oryzae* (*Xoo*) results in a loss of rice yields of ±20-50% in the world. Resistant varieties used to control the disease, but cause pathogens evolution. Chitosan nanoparticles act as effective plant resistance elicitors. The research aims are to determine the ability of chitosan nanoparticle for increasing the expression of *Xa21* and *Xa1* resistance genes, also for the development of bacterial leaf blight. The study used chitosan nanoparticle solution 0,065% pH 3,31; *Xoo* culture; IR64 and Inpari17 seeds. The research methods included analysis of gene expression of day 0 (during inoculation) and 4th day after inoculation using conventional and real-time PCR, and 4x scoring symptoms of % disease intensity and AUDPC value after inoculation at 1 week interval. Experimental variables included mock / inoculation of sterile distilled water, K(+) / *Xoo* inoculation, CNP(-) / with chitosan nanoparticle and sterile distilled water inoculation, and CNP(+) / with chitosan nanoparticle and *Xoo* inoculation. Spraying of chitosan nanoparticles was carried out at 7 days intervals, since rice aged 16 to 69 days after transplanting. The results showed that chitosan nanoparticle was able to increase *Xa21* gene expression of CNP(-) both varieties and increase *Xa1* gene expression of CNP(-)IR64, CNP(-)IP17, and CNP(+)IP17. Scoring results based on % of disease intensity in general and AUDPC values did not differ significantly between K(+)IR64 and CNP(+)IR64, and significantly greater differences in CNP(+)IP17 than K(+)IP17, so can be concluded that chitosan nanoparticles were able to increase *Xa21* and *Xa1* genes expression, but had not been able to control bacterial leaf blight.

Keywords: Bacterial Leaf Blight, rice plants, chitosan nanoparticles, resistance response