

RINGKASAN

Padi merupakan salah satu komoditas tanaman pangan yang penting bagi masyarakat Indonesia karena produk padi menjadi makanan pokok bagi 95% penduduk di Indonesia. Salah satu penyakit penting yang menginfeksi padi dan memiliki pengaruh besar terhadap kehilangan hasil dalam proses budidaya tanaman padi yaitu penyakit hawar daun bakteri (HDB) yang disebabkan oleh bakteri *Xanthomonas oryzae* pv. *oryzae* (Xoo) sehingga mengakibatkan kehilangan hasil mencapai 70-80%. Pengendalian hayati merupakan salah satu teknik pengendalian organisme pengganggu tanaman dengan memanfaatkan musuh alami seperti *Bacillus subtilis* yang diformulasikan menjadi nanopartikel untuk meningkatkan efektivitas dalam pengendalian penyakit hawar daun bakteri dan meningkatkan pertumbuhan dan hasil padi.

Penelitian dilaksanakan di lahan sawah yang terletak di Desa Tambaksari Kidul, Kecamatan Kembaran, Kabupaten Banyumas dan Laboratorium Perlindungan Tanaman Fakultas Pertanian, Universitas Jenderal Soedirman, Purwokerto pada bulan Februari sampai dengan Agustus 2022. Metode penelitian disusun dengan Rancangan Acak Kelompok (RAK) dengan 3 perlakuan dan 9 kali ulangan. Perlakuan sebagai berikut: (K) = Kontrol, (N) = Pemberian bakteri *B. subtilis* B315 formula nanopartikel, dan (B) = Pemberian bakterisida *Bactocyn* dengan bahan aktif *Copper Hydroxide*. Variabel pengukuran meliputi intensitas penyakit, laju infeksi, AUDPC, tinggi tanaman, jumlah anakan, jumlah daun, bobot tanaman segar, bobot tanaman kering, dan uji protease. Data dianalisis dengan menggunakan uji F dan uji lanjut menggunakan BNT (Besar Nyata Terkecil) dengan taraf kesalahan 5%.

Hasil penelitian menunjukkan bahwa *B. subtilis* B315 formula nanopartikel efektif dalam mengendalikan penyakit hawar daun bakteri padi. Aplikasi *B. subtilis* B315 formula nanopartikel memiliki efektivitas dalam menurunkan intensitas penyakit pada umur 80 HST sebesar 16,14%, laju infeksi sebesar 0,007 unit/hari, dan AUDPC sebesar 21,30%/hari. Aplikasi *B. subtilis* B315 formula nanopartikel juga memiliki efektivitas dalam meningkatkan pertumbuhan dan hasil padi seperti jumlah anakan sebesar 16,69%, jumlah daun sebesar 16,62%, bobot segar tanaman sebesar 58,04%, dan bobot kering tanaman sebesar 65,57%. Hasil uji protease menunjukkan suspensi *B. subtilis* B315 dan *B. subtilis* B315 formula nanopartikel mempunyai aktivitas proteolitik yang dibuktikan dengan terbentuknya zona bening.

Kata kunci: *Bacillus subtilis* B315, hawar daun bakteri, nanopartikel, padi

SUMMARY

*Rice is a crucial food crop for Indonesians, serving as a staple food for 95% of the population. One of the most significant diseases affecting rice and significantly impacting yield losses during cultivation is bacterial leaf blight (BLB), caused by the bacterium *Xanthomonas oryzae* pv. *oryzae* (Xoo), resulting in yield losses of up to 70-80%. Biological control is a technique for controlling plant pests by utilizing natural enemies, such as *Bacillus subtilis*, formulated into nanoparticles to increase the effectiveness of bacterial leaf blight control and improve rice growth and yield.*

*The research was conducted in rice fields in Tambaksari Kidul Village, Kembaran District, Banyumas Regency, and at the Plant Protection Laboratory of the Faculty of Agriculture, Jenderal Soedirman University, Purwokerto, from February to August 2022. The research method used was a randomized block design (RBD) with three treatments and 9 replications. The treatments were as follows: (K) = Control, (N) = Application of *B. subtilis* B315 nanoparticle formula, and (B) = Application of bactericide with the active ingredient Copper Hydroxide. Measurement variables included disease intensity, infection rate, AUDPC, plant height, number of tillers, number of panicles, number of leaves, plant fresh weight, plant dry weight, and protease test. Data were analyzed using the F test and further testing using BNT (Minimal Real Difference) with a 5% error level.*

*The research results show that *B. subtilis* B315 nanoparticle formula is effective in controlling bacterial leaf blight disease in rice. Application of *B. subtilis* nanoparticle formula was effective in reducing disease intensity at 80 days after planting by 16.41%, infection rate by 0.007 units/day, and AUDPC by 21.30%. The application of *B. subtilis* nanoparticle formula was also effective in increasing rice growth and yield, including increases in tiller number by 16.69%, panicle number by 43.02%, leaf number by 16.62%, plant fresh weight by 58.04%, plant dry weight by 65.57%, and grain dry weight by 16.26%. Protease test results showed that the *B. subtilis* B315 suspension and *B. subtilis* B315 nanoparticle formula exhibited proteolytic activity, as evidenced by the formation of a clear zone.*

Keywords: *Bacillus subtilis* B315, bacterial leaf blight, nanoparticles, rice