

INTISARI

Penyakit moler yang disebabkan oleh *Fusarium* spp. merupakan kendala utama dalam budidaya bawang merah. Pemanfaatan agens hayati menjadi alternatif pengendalian yang berkelanjutan dan ramah lingkungan. Penelitian ini bertujuan untuk mengetahui efektivitas kombinasi *Trichoderma* sp. dan *Bacillus velezensis* B-27 dalam menekan penyakit moler serta pengaruhnya terhadap pertumbuhan dan hasil bawang merah asal biji (TSS). Penelitian meliputi uji kompatibilitas, uji antagonis in vitro, percobaan in vivo di rumah kaca, dan uji lapangan menggunakan varietas Sanren dan Lokananta. Parameter yang diamati mencakup daya hambat patogen, kejadian dan intensitas penyakit moler, pertumbuhan tanaman, kandungan klorofil, serta hasil produksi bawang merah. Analisis molekuler menunjukkan bahwa isolat *Trichoderma* (TH) termasuk dalam klad *Trichoderma asperelloides* dan bersifat kompatibel dengan *B. velezensis* B-27. Kedua agens hayati menunjukkan aktivitas antagonistik terhadap *Fusarium acutatum*, yang ditandai dengan penghambatan pertumbuhan koloni serta kerusakan dan lisisnya hifa *F. acutatum* secara mikroskopis. Aplikasi kombinasi agens hayati dapat meningkatkan ketahanan bawang merah varietas Sanren dan Lokananta terhadap penyakit moler, dengan kejadian dan intensitas penyakit 0% pada penelitian rumah kaca. Penelitian di lapangan kejadian penyakit sebesar 42.78% dan intensitas penyakit 32.94% pada varietas Sanren. Perlakuan SAI (kombinasi agens hayati + inokulasi) juga menghasilkan kandungan klorofil total tertinggi, yaitu 0.43 mg g⁻¹ di rumah kaca dan 0.23 mg g⁻¹ di lapangan, serta bobot kering umbi varietas Lokananta sebesar 3.66 g dan bobot kering tanaman 1.21 g yang tidak berbeda nyata dibandingkan perlakuan fungisida.

Kata kunci: *Bacillus velezensis*, bawang merah, pengendalian hayati, penyakit moler, *Trichoderma* sp.

ABSTRACT

Twisted disease caused by Fusarium spp. is a major constraint in shallot cultivation. The use of biological control agents represents a sustainable and environmentally friendly alternative for disease management. This study aimed to evaluate the effectiveness of a combined application of Trichoderma sp. and Bacillus velezensis B-27 in suppressing moler disease and to assess its effects on the growth and yield of true shallot seed (TSS)-derived shallots. The research comprised compatibility tests, in vitro antagonistic assays, in vivo greenhouse experiments, and field trials using the Sanren and Lokananta varieties. Observed parameters included pathogen growth inhibition, disease incidence and severity, plant growth characteristics, chlorophyll content, and yield components. Molecular analysis revealed that the Trichoderma isolate (TH) belonged to the Trichoderma asperelloides clade and was compatible with B. velezensis B-27. Both biological agents exhibited antagonistic activity against Fusarium acutatum, as indicated by suppressed colony growth and microscopic evidence of hyphal damage and lysis. The application of a combined biological agent treatment enhanced the resistance of shallot cultivars Sanren and Lokananta to moler disease, resulting in 0% disease incidence and severity under greenhouse conditions. Field trials showed a disease incidence of 42.78% and a disease severity of 32.94% in the Sanren cultivar. The SAI treatment (combination of biological agents + inoculation) also produced the highest total chlorophyll content, reaching 0.43 mg g⁻¹ in the greenhouse and 0.23 mg g⁻¹ in the field, as well as a Lokananta bulb dry weight of 3.66 g and plant dry weight of 1.21 g, which were not significantly different from the fungicide treatment.

Keywords: *Bacillus velezensis, biological control, moler disease, shallot, Trichoderma sp.*