

RINGKASAN

Penyakit antraknosa oleh infeksi jamur *Colletotrichum* sp. merupakan salah satu penyakit penting pada tanaman cabai rawit, dengan kerugian dapat mencapai 65%. Salah satu pengendalian alternatif yaitu menggunakan agensia hayati berupa *Bacillus* sp. yang dapat hidup secara endofit. Putri malu (*Mimosa invisa* Mart. ex Colla.) kaya akan mikroba simbiosis pada akar dan daerah perakaran. Penelitian ini bertujuan untuk mengisolasi dan mengkarakter *Bacillus* sp. endofit akar putri malu asal dataran menengah, mengetahui kemampuan antagonis *Bacillus* sp. endofit dalam menekan pertumbuhan patogen, dan memacu pertumbuhan tanaman, serta untuk mengetahui kemampuan *Bacillus* sp. endofit dalam mengendalikan antraknosa pada cabai rawit.

Penelitian dilakukan dari bulan Mei 2024 hingga Maret 2025 di Laboratorium Perlindungan Tanaman, Fakultas Pertanian, Universitas Jenderal Soedirman. Penelitian ini dimulai dengan eksplorasi bakteri endofit dari akar tumbuhan putri malu sehat, yang kemudian dikarakter berdasarkan bentuk makroskopis, mikroskopi, dan biokimia. Isolat *Bacillus* sp. endofit selanjutnya diuji terhadap *Colletotrichum* sp., *Fusarium oxysporum*, *Rhizoctonia solani*, *Ralstonia solanacearum*, dan *Xanthomonas oryzae*, serta sebagai PGPE pada benih mentimun. Terdapat tiga isolat terbaik diaplikasikan pada buah cabai rawit untuk mengetahui kemampuan dalam mengendalikan penyakit antraknosa secara *in vivo*. Variabel yang diamati di antaranya pada uji PGPE (Panjang akar, bobot segar kecambah, bobot segar akar), pada uji *Detach fruit* variabel yang diamati di antaranya masa inkubasi, luas serangan, dan indeks sampah. Data dianalisis dengan sidik ragam (ANOVA) taraf 5% dan uji lanjut dengan DMRT 5% jika terdapat perbedaan nyata.

Hasil eksplorasi didapatkan 15 isolat *Bacillus* sp. dengan karakter koloni berbentuk bacil, tepi *undulate* hingga *lobate*, bakteri Gram positif, uji katalase dan oksidase positif, serta mampu menghasilkan endospora. Berdasarkan uji antagonis dan PGPE, dari 15 isolat dipilih 3 isolat terbaik yaitu BEM14, BEM15, dan BEM24. Pada pengujian antagonis 3 jamur patogen persentase daya hambat dari ketiga isolat sebesar 38,26% hingga 65,00%. Pada uji antagonis 2 bakteri patogen, zona bening yang terbentuk sebesar 7,85 mm hingga 27,50 mm. Hasil aplikasi pada buah cabai rawit isolat BEM14 mampu menekan munculnya gejala 0,5 hari atau 16,67% lebih lama dibanding dengan kontrol.

SUMMARY

Anthracnose disease, caused by the fungus Colletotrichum sp., is a significant problem in chili pepper plants, with losses potentially reaching 65%. One alternative control method is using biological agents, such as endophytic Bacillus sp., which can live symbiotically within the plant. Sensitive plant (Mimosa invisa Mart. ex Colla) is rich symbiotic microbes in roots and rhizosphere. This research aimed to isolate and characterize endophytic Bacillus sp. from the roots of sensitive plants originating from medium altitudes, determine the antagonistic ability of endophytic Bacillus sp. in suppressing pathogen growth, and promote plant growth. It also aimed to assess the ability of endophytic Bacillus sp. to control anthracnose in chili peppers.

The research was conducted from May 2024 to March 2025 at the Plant Protection Laboratory, Faculty of Agriculture, Jenderal Soedirman University. The study began by exploring endophytic bacteria from the roots of healthy sensitive plants, which were then characterized based on macroscopic, microscopic, and biochemical features. The isolated endophytic Bacillus sp. subsequently tested against Colletotrichum sp., Fusarium oxysporum, Rhizoctonia solani, Ralstonia solanacearum, and Xanthomonas oryzae, as well as for Plant Growth Promoting Endophyte (PGPE) activity on cucumber seeds. The three best isolates were applied to chili pepper fruits to determine their ability to control anthracnose disease in vivo. Variables observed in the PGPE test included root length, fresh weight of sprouts, and fresh root weight. In the Detached Fruit test, observed variables included incubation period, lesion area, and disease severity index. Data were analyzed using Analysis of Variance (ANOVA) at a 5% significance level, and further tested with DMRT 5% if significant differences were found.

The exploration yielded 15 Bacillus sp. isolates with bacillus-shaped colonies, undulate to lobate margins, positive Gram stain, positive catalase and oxidase tests, and the ability to produce endospores. Based on the antagonistic and PGPE tests, the three best isolates were selected from the 15: BEM14, BEM15, and BEM24. In the antagonistic test against three fungal pathogens, the inhibition percentage of these three isolates ranged from 38.26% to 65.00%. In the antagonistic test against two bacterial pathogens, the clear zones formed ranged from 7.85 mm to 27.50 mm. Application results on chili pepper fruits showed that isolate BEM14 was able to delay the appearance of symptoms by 0.5 days longer compared to the control.