

RINGKASAN

Penyakit antraknosa oleh *Colletotrichum* spp. merupakan salah satu penyakit penting tanaman cabai rawit, dengan kerugian mencapai 60%. Salah satu alternatif pengendalian yaitu dengan penggunaan agensia hayati *Bacillus* sp., yang dapat hidup secara endofit. Tumbuhan putri malu (*Mimosa invisa* Mart. ex Colla) dikenal kaya akan simbion *Bacillus* sp pada akarnya. Penelitian ini bertujuan untuk mengisolasi *Bacillus* sp. dari jaringan akar putri malu dataran rendah, mengetahui potensi *Bacillus* sp. endofit sebagai antagonis terhadap patogen tanaman dan sebagai *Plant Growth-Promoting Bacteria Endophytes* (PGPE), dan untuk mengetahui efektivitasnya dalam mengendalikan antraknosa buah cabai rawit.

Penelitian dilakukan dari Juni 2024 hingga Januari 2025 di Laboratorium Perlindungan Tanaman Fakultas Pertanian, Universitas Jenderal Soedirman. Penelitian dimulai dengan eksplorasi bakteri endofit dari dalam jaringan perakaran tumbuhan putri malu sehat, kemudian dikarakter berdasarkan bentuk koloni, sel, dan biokimia. Isolat *Bacillus* sp. selanjutnya diuji terhadap *Colletotrichum* spp., *Pythium* sp., *Fusarium* sp., *Xanthomonas* sp., dan *Ralstonia* sp. serta sebagai PGPE pada benih mentimun. Lima isolat terbaik diaplikasikan pada buah cabai rawit untuk mengetahui kemampuannya mengendalikan penyakit antraknosa dengan perlakuan kontrol dan fungisida sebagai pembanding menggunakan Rancangan Acak Lengkap yang diulang sebanyak empat kali. Variabel yang diamati yaitu kecepatan tumbuh benih, panjang akar, bobot segar akar dan kecambah, masa inkubasi, luas serangan, penekanan persentase penyakit, dan indeks sampah. Data dianalisis dengan ANOVA 5% dan uji lanjut BNJ 5% jika terdapat perbedaan nyata.

Hasil eksplorasi diperoleh 22 isolat dengan karakter sel berbentuk batang, bakteri Gram positif, uji katalase dan oksidase positif, dan memproduksi endospora. Berdasarkan uji antagonis dan sebagai PGPE, dari 22 isolat dipilih 5 isolat terbaik, yaitu BE15, BE16, BE17, BE25, dan BE211, yang ditunjukkan dari penghambatan terhadap *Pythium* sp., *Colletotrichum* spp., dan *Fusarium* sp. lebih dari 50%. Pada uji antagonis terhadap *Xanthomonas* sp., isolat BE15 mampu membentuk zona bening sebesar 1,61 mm, sedangkan terhadap *Ralstonia* sp., isolat BE211 membentuk zona bening terbesar yaitu 3,5 mm. Hasil aplikasi isolat BE15 dan BE25 menunjukkan isolat paling efektif dalam mengendalikan penyakit antraknosa buah cabai rawit, dengan efektivitas masing-masing sebesar 63% dibanding kontrol, serta dapat mengurangi indeks sampah masing-masing sebesar 33,6 dan 33,91 %.

SUMMARY

Anthrachnose caused by *Colletotrichum* spp. is one of chili important diseases with losses reaching 60%. One of alternative control is the use of biological agents such as *Bacillus* sp., which can live endophytically. Creeping-sensitive plant (*Mimosa invisa* Mart. ex Colla) is known to be rich in *Bacillus* sp. symbionts on the root. This research aimed to isolate endophytic *Bacillus* sp. from the low land creeping-sensitive plant root network, to know the bacterial potential as antagonists and *Plant Growth-Promoting Bacteria Endophytes* (PGPE), and to determine effectiveness of *Bacillus* sp. in controlling anthracnose of chili pepper.

The research was conducted from June 2024 to January 2025 at the Plant Protection Laboratory, Faculty of Agriculture, Jenderal Soedirman University. The research began with the exploration of endophytic bacteria from within the root tissue of healthy Maluku plants, then they were characterized based on colony shape, cells and biochemistry. Isolate *Bacillus* sp. then tested against *Colletotrichum* spp., *Pythium* sp., *Fusarium* sp., *Xanthomonas* sp., and *Ralstonia* sp. as well as PGPE in cucumber seeds. The five best isolates were applied to cayenne pepper fruit to determine their ability to control anthracnose with control and fungicide treatments as a comparison using a Completely Randomized Design which was repeated four times. The variables observed were seed growth speed, root length, fresh weight of roots and sprouts, incubation period, area of attack, disease suppression percentage, and litter index. Data were analyzed using 5% ANOVA and 5% BNJ further test if there were significant differences.

The exploration results showed that 22 isolates were characterized by rod-shaped cells, Gram-positive bacteria, positive catalase and oxidase tests, and producing endospores. Based on the antagonist test and as PGPE, from 22 isolates the 5 best isolates were selected, namely BE15, BE16, BE17, BE25, and BE211, which showed inhibition against *Pythium* sp., *Colletotrichum* spp., and *Fusarium* sp. more than 50%. In the antagonist test against *Xanthomonas* sp., isolate BE15 was able to form a clear zone of 1.61 mm, while against *Ralstonia* sp., isolate BE211 formed the largest clear zone, namely 3.5 mm. The results of the application of isolates BE15 and BE25 showed that the isolates were the most effective in controlling cayenne pepper fruit anthracnose disease, with an effectiveness of 63% compared to the control, and could reduce the waste index by 33.6 and 33.91% respectively.