Karakterisasi dan aplikasi bakteri agen biokontrol: Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW terhadap Kapang Patogen Fusarium oxysporum Schlecht f. sp. cubense pada tanaman pisang (Musa acuminata) var. Cavendish = Characterization and applications of biocontrol bacteria agents: Bacillus sp. 140-B and Streptomyces sp. L. 3.1-DW toward pathogenic fungi Fusarium oxysporum Schlecht f.sp. cubense on Banana Plant (Musa acuminata) var. Cavendish

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Abstrak

Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW diisolasi dari tanah dan rizosfer tanaman dari perkebunan nanas dan pisang di Provinsi Lampung. Kedua bakteri tersebut diuji kemampuannya dalam melawan patogen Fusarium oxysporum Schlecht f. sp. cubense (Foc) secara in-vitro dan in-vivo. Aplikasi Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW sebagai isolat tunggal maupun kombinasinya secara in-vivo pada tanaman pisang var. Cavendish dilakukan dalam rumah kaca selama 30 hari.
Tujuan dari penelitian ini adalah untuk mengkarakterisasi dan menguji potensi Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW sebagai agen biokontrol dalam menghambat patogen Foc dan mengkaji kemampuannya untuk menghasilkan enzim ketahanan tanaman pisang. Potensi Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW sebagai agen biokontrol ditunjukkan dengan kemampuannya dalam menghambat pertumbuhan patogen Foc, sintesis enzim protease dan kitinase ekstraseluler, produksi hormon tumbuh Indole-Acetic Acid (IAA), dan produksi enzim ketahanan tanaman phenylalanine ammonia-lyase (PAL) and tyrosine ammonia lyase (TAL). Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW juga berperan sebagai plant growth-promoting rhizobacteia (PGPR), yang diindikasikan dengan peningkatan pertumbuhan tanaman pisang, di mana perlakuan Streptomyces L.3.1-DW memiliki rata-rata tinggi tanaman tertinggi dibandingkan perlakuan lainnya, dengan atau tanpa infeksi Foc.
Hasil penelitian secara in-vitro dan in-vivo menunjukkan bahwa Streptomyces sp. L.3.1-DW memiliki kemampuan sebagai agen biokontrol yang lebih baik dibandingkan Bacillus sp. 140-B. Penelitian ini mengindikasikan bahwa Bacillus sp. 140-B dan Streptomyces sp. L.3.1-DW dapat digunakan sebagai alternatif untuk mengendalikan infeksi Foc.
.....Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW were isolated from soil and rhizosphere area of pineapple and banana plantation in Lampung Province. Those bacteria were evaluated in-vitro and in-vivo tests againts Fusarium oxysporum Schlecht f. sp. cubense (Foc). Application of Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW as single isolate or in combination in banana plant var. Cavendish were tested under greenhouse conditions for 30 days.
The aims of this study were to characterize and investigate the potentials of Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW as biocontrol agents to inhibit Foc pathogen and investigate their abilities to produce plant resistancy enzymes. The potentials of Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW as biocontrol agents were showed by their abilities to inhibit growth of Foc pathogen, synthesize extracellular protease and chitinase enzymes, produce growth hormone, such as Indole-Acetic Acid (IAA), and produce plant resistancy enzymes, such as phenylalanine ammonia-lyase (PAL) and tyrosine ammonia lyase (TAL).

Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW also act as plant growth-promoting rhizobacteia (PGPR), that indicated by improvement of banana growth, in which Streptomyces L.3.1-DW caused the highest growth of banana either with or without Foc infection.

In-vitro and in-vivo tests was showed that Streptomyces sp. L.3.1-DW had better biocontrol activities compared to Bacillus sp. 140-B. This study indicated that Bacillus sp. 140-B and Streptomyces sp. L.3.1-DW could be used as alternative solutions to control Foc pathogen.