

RINGKASAN

Tantangan pertanian padi di Indonesia adalah degradasi lahan akibat pupuk kimia dan pestisida, yang diperburuk oleh perubahan iklim. Penggunaan bakteri endofit dalam pertanian padi merupakan pendekatan yang ramah lingkungan dan berkelanjutan yang meningkatkan keragaman mikroba dan produktivitas tanah. Penelitian ini menyelidiki pengaruh aplikasi bakteri endofit indigenus terhadap keragaman mikroba tanah di lahan padi Inpari 32 (*Oryza sativa* L.). Penelitian ini terdiri atas aplikasi bakteri endofit indigenus pada tanaman padi, isolasi, karakterisasi, evaluasi keragaman mikroba tanah menggunakan Indeks Keragaman *Shannon-Wiener*, analisis kimia tanah, dan analisis hasil padi. Penelitian ini menerapkan formula bakteri endofit secara merata pada permukaan bawah dan atas daun padi menggunakan penyemprot, dengan perlakuan yang diberikan lima kali pada 56, 62, 67, 72, dan 77 hari setelah tanam. Penelitian ini bertujuan untuk mengetahui keragaman mikroba tanah setelah aplikasi bakteri endofit indigenus, mengetahui peningkatan kesuburan tanah setelah aplikasi bakteri endofit indigenus, dan mengetahui pengaruh aplikasi bakteri endofit indigenus terhadap hasil padi Inpari 32.

Penelitian ini dilaksanakan di Desa Linggasari (117 mdpl), Kecamatan Kembaran, Kabupaten Banyumas, Laboratorium Perlindungan Tanaman Fakultas Pertanian Universitas Jenderal Soedirman, dan Laboratorium Ilmu Tanah Fakultas Pertanian Universitas Jenderal Soedirman. Penelitian dilaksanakan mulai bulan Juli - November 2024. Penelitian ini dilakukan dengan menggunakan Rancangan Acak Kelompok (RAK) yang terdiri atas 5 perlakuan yaitu kontrol (K), perlakuan bakteri endofit isolat A5, A6 dari Petanahan, Kebumen (A), perlakuan bakteri endofit isolat KR4, KR7 dari Karangwangkal, Banyumas (B), perlakuan bakteri endofit isolat SB3 dari Sumbang, Banyumas (C), dan konsorsium bakteri endofit isolat A5, A6, KR4, KR7, SB3 (D). Setiap perlakuan diulang sebanyak 5 kali, sehingga terdapat 25 petak perlakuan.

Hasil penelitian menunjukkan bahwa perlakuan tersebut meningkatkan keragaman mikroba tanah, termasuk genus seperti *Paenibacillus*, *Micrococcus*, *Methylobacterium*, *Streptomyces*, *Actinomyces*, *Acremonium*, dan *Penicillium*. Indeks keragaman menunjukkan bahwa perlakuan dari isolat Petanahan Kebumen (A), Karangwangkal Banyumas (B), Sumbang Banyumas (C), dan konsorsium (D) termasuk dalam kategori keragaman sedang. Uji hipersensitivitas mengungkapkan bahwa isolat C104 1 U2 menunjukkan gejala nekrosis (patogenik), sedangkan isolat lainnya bukan patogen. Aplikasi bakteri endofit indigenus terhadap kesuburan tanah dapat meningkatkan pH tanah pada fase generatif dibandingkan fase vegetatif tanaman, N-tersedia pada perlakuan konsorsium dibandingkan kontrol, kadar P-tersedia, dan K-tersedia pada perlakuan isolat Petanahan (A5, A6); Karangwangkal (KR4, KR7); Sumbang (SB3); dan konsorsium dibandingkan kontrol. Aplikasi bakteri endofit indigenus terhadap hasil padi dapat meningkatkan pada bobot 1000 butir terhadap perlakuan isolat Sumbang (SB3).

SUMMARY

*The challenge of rice farming in Indonesia is land degradation due to chemical fertilizers and pesticides, which is exacerbated by climate change. The use of endophytic bacteria in rice farming is an environmentally friendly and sustainable approach that enhances microbial diversity and soil productivity. This study investigated the effect of indigenous endophytic bacteria application on soil microbial diversity in Inpari 32 (*Oryza sativa* L.) rice fields. The study consisted of application of indigenous endophytic bacteria to rice plants, isolation, characterization, evaluation of soil microbial diversity using the Shannon-Wiener Diversity Index, soil chemical analysis, and rice yield analysis. This study applied the endophytic bacteria formula evenly on the lower and upper surfaces of rice leaves using a sprayer, with treatments given five times at 56, 62, 67, 72, and 77 days after planting. This study aims to determine the diversity of soil microbes after the application of indigenous endophytic bacteria, determine the increase in soil fertility after the application of indigenous endophytic bacteria, and determine the effect of the application of indigenous endophytic bacteria on the yield of Inpari 32 rice.*

This research was conducted in Linggasari Village (117 meters above sea level), Kembaran District, Banyumas Regency, Plant Protection Laboratory, Faculty of Agriculture, Universitas Jenderal Soedirman, and Soil Science Laboratory, Faculty of Agriculture, Universitas Jenderal Soedirman. The research was conducted from July to November 2024. This research was conducted using a Randomized Group Design (RGD) consisting of 5 treatments, namely control (K), treatment of endophytic bacteria isolates A5, A6 from Petanahan, Kebumen (A), treatment of endophytic bacteria isolates KR4, KR7 from Karangwangkal, Banyumas (B), treatment of endophytic bacteria isolate SB3 from Sumbang, Banyumas (C), and consortium of endophytic bacteria isolates A5, A6, KR4, KR7, SB3 (D). Each treatment was repeated 5 times, resulting in 25 treatment plots.

*The results showed that the treatment increased soil microbial diversity, including genera such as *Paenibacillus*, *Micrococcus*, *Methylobacterium*, *Streptomyces*, *Actinomyces*, *Acremonium*, and *Penicillium*. The diversity index showed that the treatments from the isolates of Petanahan Kebumen (A), Karangwangkal Banyumas (B), Sumbang Banyumas (C), and the consortium (D) fell into the medium diversity category. Hypersensitivity tests revealed that isolate C104 1 U2 showed symptoms of necrosis (pathogenic), while other isolates were not pathogenic. The application of indigenous endophytic bacteria to soil fertility can increase soil pH in the generative phase compared to the vegetative phase of plants, N-available in the consortium treatment compared to the control, P-available levels, and K-available in the treatment of isolates Petanahan (A5, A6); Karangwangkal (KR4, KR7); Sumbang (SB3); and consortium compared to the control. The application of indigenous endophytic bacteria on rice yield can increase the 1000-grain weight on the treatment of Sumbang isolate (SB3).*