

RINGKASAN

Penggunaan pestisida secara terus-menerus, tidak sesuai dosis, dan frekuensi aplikasi dapat menyebabkan residu klorpirifos terakumulasi dalam tanah. Bakteri *indigenous* tanah koleksi Laboratorium Agroekologi Fakultas Pertanian Universitas Jenderal Soedirman yang memiliki sifat resistensi terhadap klorpirifos berdasarkan penelitian sebelumnya berpotensi digunakan sebagai agen bioremediator. Bakteri ini juga memiliki karakter *Plant Growth Promoting Rhizobacteria* (PGPR) sehingga perlu dilakukan identifikasi dan karakterisasi. Penelitian ini bertujuan untuk mengetahui karakter molekuler, karakter biokimia, karakter PGPR, dan respon fase perkecambahan tanaman tomat saat aplikasi bakteri uji.

Penelitian dilaksanakan bulan Januari – Maret 2022 di Laboratorium Agroekologi Fakultas Pertanian Universitas Jenderal Soedirman, Purwokerto. Isolat bakteri yang digunakan dalam penelitian ini berasal dari lahan pertanian bawang merah Kabupaten Brebes, Kecamatan Ketanggungan dengan kode isolat BR1s dan CL5s. Tahapan yang dilakukan dalam penelitian ini, yaitu peremajaan isolat bakteri, pengiriman *sample* isolat ke PT. Genetika Science untuk dilakukan analisis sekuensing gen 16S rRNA, penentuan kemiripan dengan spesies terdata di *GenBank* dengan analisis bioinformatika N-Blast, pembuatan pohon filogenetik 15 isolat data *GenBank* yang memiliki kemiripan tinggi, karakterisasi biokimia (uji produksi H₂S, *simmons citrate*, *methyl red*, *vogues-proskauer*, hidrolisis pati, hidrolisis urea, gelatinasi, oksidatif/fermentatif, dan CMC), karakterisasi PGPR (uji penambat N, pelarut P, dan penghasil IAA), dan *bioassay* terhadap fase perkecambahan tanaman tomat untuk mengetahui pengaruh aplikasi bakteri terhadap variabel perkecambahan dan karakter agronominya.

Hasil analisis bioinformatika menunjukkan bahwa isolat BR1s memiliki tingkat kemiripan 97,73% dengan *Bacillus tropicus* dan isolat CL5s memiliki tingkat kemiripan 99,93% dengan *Priestia flexa*. Kedua isolat menunjukkan respon positif pada karakterisasi biokimia dengan uji *methyl-red*, hidrolisis pati, gelatinasi, dan oksidatif/fermentatif. Kedua isolat menunjukkan positif terhadap karakter PGPR, yaitu pelarut P dan penambat N. Hasil *bioassay* menunjukkan aplikasi isolat bakteri BR1s meningkatkan variabel potensi tumbuh maksimum, daya kecambah, kecepatan tumbuh, bobot kering kecambah normal, tinggi tanaman, panjang akar, dan jumlah daun. Isolat CL5s hanya meningkatkan variabel jumlah daun.

Kata Kunci: *Bioassay*, Biokimia, Karakterisasi, Molekuler, Tomat.

SUMMARY

Continuous use of pesticides can cause chlorpyrifos residue accumulated in the soil. Indigenous bacteria collections of the Laboratory of Agroecology, Faculty of Agriculture, Jenderal Soedirman University which has resistance of chlorpyrifos have potential to be used as a bioremediation agent and PGPR for plants, so it needs to be identified. The aim of study was to know molecular characteristic, biochemical characteristic, PGPR characteristic, and the response of germination phase on tomato plants.

The research was conducted from January to March 2022 at the Agroecology Laboratory, Faculty of Agriculture, Jenderal Sudirman University, Purwokerto. The bacterial isolates used in this study came from the shallot farms of Brebes Regency, Ketanggungan District with isolate codes BR1s and CL5s. The steps carried out in this research are rejuvenation of bacterial isolates and then sent to PT. Genetika Science to do PCR with primers 27F and 1492R, sequencing with 16S rRNA gene, bioinformatics analysis by performing N-Blast at the NCBI site to determine with species recorded in GenBank, phylogenetic analysis for 15 isolates of GenBank data that have high identity to make phylogeny tree, biochemical characteristics (positive/negative response to H₂S production test, simmons citrate, methyl red, vogues-proskauer, starch hydrolysis, urea hydrolysis, N fixing, gelatination, P solvent, IAA producer, oxidative/fermentative, and CMC) , then a bioassay on the germination phase of tomato plants to determine the effect of application on germination variables and agronomic characters.

*The results of the bioinformatics analysis showed that BR1 had an identity of 97.73% with *Bacillus tropicus* and isolate CL5 had an identity of 99.93% with *Priestia flexa*. Both isolates showed a positive response to biochemical characterization by methyl-red, starch hydrolysis, gelatinization, and oxidative/fermentative assays. PGPR characterization showed positive response to N fixing and phosphate solubilizing test. The results of the bioassay showed that there was a significant effect of the application of bacterial isolate BR1 on the variables of maximum growth potential, growth speed, dry weight of normal sprouts, plant height, root length, and number of leaves, while the CL5s isolate only had a significant effect on the variable number of leaves.*

Keywords: Bioassay, Biochemistry, Characterization, Molecular, Tomato.