RINGKASAN

Isolat bakteri BR2 dan SJ3 memiliki potensi resisten dan dapat mengurangi cemaran kadmium di tanah. Identifikasi spesies isolat bakteri indigenus potensial perlu dilakukan untuk pengaplikasian lebih lanjut. Penelitian ini bertujuan untuk 1) mengetahui identitas isolat bakteri resisten kadmium perakaran bawang merah melalui analisis bioinformatika berbasis sekuen 16S rRNA; 2) mengetahui hubungan kekerabatan isolat bakteri yang diuji dengan bakteri lainnya yang terdata di GenBank; 3) mengetahui karakteristik biokimia isolat bakteri resisten Cd; dan 4) mengetahui respon perkecambahan dan pertumbuhan tanaman tomat setelah pemberian isolat bakteri resisten Cd.

Penelitian dilaksanakan di Laboratorium Agroekologi Fakultas Pertanian, Universitas Jenderal Soedirman, Grendeng, Purwokerto Utara. Tahapan yang dilakukan dalam penelitian meliputi peremajaan bakteri, analisis sekuensing, analisis filogenetika, pengujian biokimia, perkecambahan tomat, dan pertumbuhan tanaman tomat dengan sistem hidroponik sumbu. Variabel yang diamati pada uji biokimia adalah adanya perubahan warna atau bentuk pada lima media biokimia. Hasil positif apabila ada perubahan dan negatif apabila tidak ada perubahan bentuk atau warna. Variabel yang diamati dari perkecambahan tanaman tomat meliputi daya kecambah, potensi tumbuh maksimum, *first count test*, kecepatan tumbuh, keserempakan tumbuh, bobot kering kecambah normal, dan karakter agronomi (tinggi tanaman, jumlah daun yang tumbuh, dan panjang akar). Variabel yang diamati dari respon pertumbuhan tanaman tomat meliputi tinggi tanaman, jumlah daun, panjang akar, dan bobot kering tanaman.

Hasil penelitian menunjukkan identitas isolat bakteri SJ3 merupakan *Bacillus cereus* dan BR2 merupakan *Bacillus tropicus* berdasarkan hasil N-BLAST. Isolat bakteri BR2 dan SJ3 bersifat negatif terhadap hidrolisis urea, hidrolisis CMC, pelarut fosfat, penghasil IAA, dan bersifat positif dalam menghasilkan gelatinase. Pemberian isolat bakteri BR2 dan SJ3 pada tanaman tomat meningkatkan bobot kering kecambah normal, tinggi tanaman, dan panjang akar, tetapi tidak meningkatkan daya kecambah, potensi tumbuh maksimal, *first count test*, kecepatan tumbuh, keserempakan tumbuh, dan jumlah daun (p *value* > 0,05). Bakteri SJ3 lebih baik daripada bakteri BR2 dalam meningkatkan bobot kering kecambah normal, tinggi tanaman, dan panjang akar.

SUMMARY

The BR2 and SJ3 bacterial isolates had resistance potential and could reduce cadmium pollution in soil. Identifying potential indigenous bacterial species was necessary for further application. The research aimed to 1) determine the identity of cadmium-resistant bacterial isolates in shallot roots through 16S rRNA sequence-based bioinformatic analysis; 2) understand the relationship between bacterial isolates and other GenBank-listed bacteria; 3) ascertain the biochemical characteristics of Cd-resistant bacterial isolates; and 4) understand the germination and growth response of tomato plants through the application of Cd-resistant bacterial isolates.

The research carried out in the Agroecology Laboratory, Faculty of Agriculture, Universitas Jenderal Soedirman, Grendeng, North Purwokerto. The research stages included bacterial rejuvenation, sequencing analysis, phylogenetic analysis, biochemical testing, tomato germination, and hydroponic wick system tomato plant growth. Biochemical test variables observed changes in color or shape on five biochemical media. Positive results indicated changes, while negative results indicated no changes in shape or color. Variables observed during tomato plant germination included germination capacity, maximum growth potential, first count test, growth speed, growth uniformity, dry weight of normal germination, and agronomic characteristics (plant height, number of growing leaves, and root length). Variables observed in the response of tomato plant growth included plant height, number of leaves, root length, and dry weight of plants.

Research revealed that the SJ3 bacterial isolate was identified as Bacillus cereus, and BR2 was identified as Bacillus tropicus based on N-BLAST results. BR2 and SJ3 bacterial isolates were negative for urea hydrolysis, CMC hydrolysis, phosphate solvent, and IAA production and positive for gelatinase production. The application of BR2 and SJ3 bacterial isolates on tomato plants increased the dry weight of normal germination, plant height, and root length. However, it did not significantly increase germination capacity, maximum growth potential, first count test, growth speed, growth uniformity, and the number of leaves (p-value > 0.05). SJ3 bacteria performed better than BR2 in enhancing the dry weight of normal germination, plant height, and root length.