

## **Pengaruh Inokulasi Bakteri Penghasil ACC-Deaminase terhadap Pertumbuhan Tanaman Padi varietas Situ Bagendit di Latosol dalam Cekaman Kekeringan**

### **Intisari**

Kekeringan merupakan suatu cekaman bagi tanaman padi yang memicu sintesis etilen secara berlebih dan berdampak pada penghambatan pertumbuhan dan produktivitas tanaman. Bakteri penghasil ACC-deaminase dapat mengurangi jumlah etilen di dalam tanaman dengan mengubah ACC (*1-aminocyclopropane-1-carboxylate*) sebagai prekursor etilen menjadi  $\alpha$ -ketobutirat dan amonia, sehingga dapat mendukung pertumbuhan tanaman. Penelitian ini bertujuan untuk mengetahui pengaruh inokulasi bakteri penghasil ACC-deaminase (ACC-D) terhadap pertumbuhan tanaman padi varietas Situ Bagendit di Latosol yang tercekam kekeringan. Taraf kekeringan yang digunakan adalah kadar air tanah pada titik layu permanen ( $pF = 4.2$ ), 80% kapasitas lapangan ( $pF = 3.36$ ), dan kapasitas lapangan ( $pF = 2.54$ ). Isolat bakteri yang digunakan adalah *Pseudomonas putida* (PIR 3), *Stenotrophomonas maltophilia* (PIR 5), *Lysinibacillus pakistanensis* (PIC 5), *Bacillus aryabhatai* (PIC 11), dan *Raoultella terrigena* (PCM 8). Tanaman padi diinokulasi campuran bakteri ACCD, kemudian dibandingkan dengan perlakuan tanpa inokulasi. Parameter pertumbuhan yang diamati meliputi tinggi tanaman, kandungan klorofil daun, dan bobot tanaman. Jumlah bakteri penghasil ACC-deaminase di rhizosfer diamati dengan *total plate count* (TPC), sedangkan visualisasi keberadaan bakteri penghasil ACC-deaminase di dalam akar tanaman diamati dengan *Scanning Electron Microscope* (SEM). Hasil penelitian menunjukkan bahwa inokulasi bakteri penghasil ACC-deaminase mampu meningkatkan tinggi tanaman secara signifikan hingga 23% pada kondisi TLP, 11.4% pada kondisi KLP, dan 5.6% pada kondisi KL; meningkatkan kandungan klorofil daun hingga 137.5% pada kondisi TLP, 5.4% pada kondisi KLP, dan 2.5% pada kondisi KL; serta berat kering tanaman hingga 385.7% pada kondisi TLP, 43.1% pada kondisi KLP, dan 38.9% pada kondisi KL. Bakteri penghasil ACC-deaminase yang diinokulasikan mampu mengkolonisasi akar tanaman padi. Berdasarkan hasil tersebut, dapat disimpulkan bahwa inokulasi bakteri ACC-D dapat meningkatkan secara signifikan pertumbuhan tanaman padi Situ Bagendit di Latosol yang tercekam kekeringan.

**Kata Kunci:** Padi varietas Situ Bagendit, Latosol, cekaman kekeringan, bakteri penghasil ACC-deaminase

## Effect of ACC-Deaminase-Producing Bacteria on the Growth of Situ Bagendit Rice Variety in Latosol under Drought Stress

### Abstract

Drought stress is a challenge for rice plants that triggers excessive ethylene synthesis, resulting in growth inhibition and reduced plant productivity. Bacteria producing ACC-deaminase can reduce the amount of ethylene in plants by converting ACC (*1-aminocyclopropane-1-carboxylate*), a precursor of ethylene into  $\alpha$ -ketobutyrate and ammonia, thereby supporting the plant growth. This study aims to determine the effect of inoculating ACC-deaminase-producing bacteria (ACC-D) on the growth of rice var. Situ Bagendit in Latosol under drought stress. The drought levels used are the soil water content at PWP (permanent wilting point,  $pF = 4.2$ ), HFC (80% field capacity,  $pF = 3.36$ ), and FC (field capacity,  $pF = 2.54$ ). The bacterial isolates are *Pseudomonas putida* (PIR 3), *Stenotrophomonas maltophilia* (PIR 5), *Lysinibacillus pakistanensis* (PIC 5), *Bacillus aryabhattai* (PIC 11), dan *Raoultella terrigena* (PCM 8). Rice plants were inoculated with a mixture of ACC-deaminase-producing bacteria and compared with non inoculated treatment. The growth parameters observed include plant height, leaf chlorophyll content, and plant weight. The population of ACC-deaminase-producing bacteria in the rhizosphere was observed using total plate count (TPC). The presence of ACC-deaminase producing bacteria inside plant roots was observed using Scanning Electron Microscope (SEM). The results showed that inoculation with ACC-deaminase producing bacteria significantly increased plant height by up to 23% under PWP condition, 11.4% under HFC condition, and 5.6% under FC condition; increased leaf chlorophyll content by up to 137.5% under PWP condition, 5.4% under HFC condition, and 2.5% under FC condition; and dry weight of plants by up to 385.7% under PWP condition, 43.1% under FC condition, and 38.9% under FC condition. Inoculated ACC-deaminase producing bacteria were able to colonize the root of the rice plants. Based on this result, it can be concluded that ACC-D bacterial inoculation can significantly increase the growth of rice var. Situ Bagendit in Latosol under drought stress.

Keywords: Rice var Situ Bagendit, Latosol, Drought stress, ACC-deaminase-producing bacteria.