

Desi Triwahyuni. 2019. Isolasi dan Karakterisasi Bakteri *Indigenous* Pendegradasi Residu Herbisida Glifosat dari Lahan Perkebunan Kelapa Sawit Lampung Tengah.

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ABSTRAK

Glifosat (*N-phosphonomethyl-glycine*) adalah herbisida yang paling umum digunakan di seluruh dunia. Penggunaan intensif Glifosat (*N-phosphonomethyl-glycine*) untuk mengendalikan gulma di wilayah pertanian di seluruh dunia memerlukan perhatian khusus karena toksisitasnya terhadap organisme non target. Penggunaan glifosat yang berlebihan di bidang pertanian telah menyebabkan akumulasi di tanah dan menyebabkan berbagai efek buruk. Karena kekhawatiran akan toksisitasnya, salah satu cara alternatif untuk mengurangi efeknya adalah melalui bioremediasi, yaitu eksplorasi kemampuan bakteri *indigenous* untuk mendegradasi zat beracun yang berbahaya menjadi bentuk yang kurang beracun. Penelitian ini bertujuan untuk : (1) mengetahui bakteri *indigenous* yang mampu tumbuh pada media yang telah ditambah tanah tercemar residu herbisida glifosat, (2) mengetahui karakter isolat bakteri *indigenous* pendegradasi glifosat, (3) mengetahui persentase degradasi glifosat oleh isolat bakteri *indigenous* yang ditemukan di lahan perkebunan kelapa sawit yang tercemar residu herbisida glifosat, (4) mengidentifikasi nama isolat bakteri *indigenous* yang paling potensial mendegradasi residu herbisida glifosat. Penelitian ini merupakan penelitian observasional dan eksperimental. Bakteri pendegradasi herbisida glifosat diisolasi dari lahan perkebunan kelapa sawit yang ditumbuhkan pada media modifikasi MSM (*Mineral Salt Medium*) dengan tambahan herbisida glifosat. Parameter yang digunakan untuk mengetahui kemampuan biodegradasi isolat bakteri adalah persentase degradasi (%). Persentase penurunan herbisida glifosat dianalisis menggunakan Spektrofotometer UV-Vis. Spesies isolat bakteri *indigenous* terpilih diidentifikasi berdasarkan karakteristik makroskopis, mikroskopis, dan uji fisiologis menggunakan *microbact*TM 12A dan 12B *identification kits* (OXOID). Semua data dianalisis secara deskriptif. Hasil penelitian ditemukan 4 isolat bakteri hasil isolasi, yaitu SKS1, SKS2, SKS3 dan SKS4 yang mampu bertahan pada herbisida dengan konsentrasi 27,6 ppm. Hasil uji degradasi menunjukkan kemampuan isolat dalam mendegradasi herbisida glifosat berturut-turut dari yang paling tinggi ke yang paling rendah adalah SKS3 80,86 %, SKS1 78,57%, SKS2 77,41% dan SKS4 76,72%. Satu isolat bakteri yang memiliki persentase degradasi tertinggi adalah isolat SKS3. Berdasarkan hasil uji fisiologis diketahui isolat SKS3 memiliki kemiripan 82% dengan spesies bakteri *Bacillus subtilis*.

Kata kunci: Herbisida glifosat, kelapa sawit, bakteri *indigenous*, biodegradasi.

Desi Triwahyuni. 2019. Isolation and Characterization of Indigenous Bacteria Degradation of Glyphosate Herbicide Residues from Central Lampung Palm Oil Plantation Land.

This thesis was under the supervision of Prof. Dr. Ir. Tini Surtiningsih, DEA dan Dr. Fatimah, S.Si., M.Kes., Departementof Biology, Faculty of Science and Technology, Airlangga University, Surabaya

ABSTRACT

Glyphosate (N-phosphonomethyl-glycine) is the most commonly used herbicide throughout the world. The intensive use of Glyphosate (N-phosphonomethyl-glycine) to control weeds in agricultural regions around the world requires special attention because of its toxicity to non-target organisms. Excessive use of glyphosate in agriculture has caused accumulation in soils and caused various adverse effects. Because of concerns about its toxicity, an alternative way to reduce its effect is through bioremediation, namely the exploration of the ability of indigenous bacteria to degrade harmful toxic substances into less toxic forms. This study aims to: (1) find out the indigenous bacteria that are able to grow on media that have been added to contaminated soil with glyphosate herbicide residues, (2) find out the character of the indigenous bacterial glyphosate degrading isolates, (3) find out the percentage glyphosate degradation by indigenous bacterial isolates found in the land oil palm plantations that are contaminated with glyphosate herbicide residues, (4) identify the names of indigenous bacterial isolates that have the most potential to degrade glyphosate herbicide residues. This research is observational and experimental. The glyphosate herbicide degrading bacteria were isolated from oil palm plantations grown on MSM (Mineral Salt Medium) modified media with additional glyphosate herbicides. The parameter used to determine the biodegradation ability of bacterial isolates is the percentage of degradation (%). Decrease percentage of glyphosate herbicides was analyzed using UV-Vis Spectrophotometer. Selected indigenous bacterial isolates were identified based on macroscopic, microscopic characteristics, and physiological tests using microbact™ 12A and 12B identification kits (OXOID). All data were analyzed descriptively. The results found 4 isolates of isolated bacteria, namely SKS1, SKS2, SKS3 and SKS4 which were able to survive on herbicides with a concentration of 27.6 ppm. The degradation test results showed that the ability of isolates to degrade glyphosate herbicides was 80.86% SKS3, 78.57% SKS1, 77.41% SKS2 and 76.72% SKS4, respectively. One bacterial isolate that had the highest percentage of degradation was SKS3 isolate. Based on the results of physiological tests it was found that SKS3 isolates had a similarity of 82% with the bacterial species *Bacillus subtilis*.

Keywords: Glyphosate herbicide, palm plantation, indigenous bacteria, biodegradation.