

RINGKASAN

Penggunaan herbisida kimiawi yang berlebihan dapat memberikan dampak negatif pada lingkungan, organisme non-target, keragaman hayati, dan ketahanan gulma terhadap herbisida. Tingginya residu herbisida yang diserap dan terakumulasi dalam tanah dapat menyebabkan keracunan pada manusia, berpengaruh pada ketahanan tanaman dan mikroba, serta berpengaruh pada tanaman yang dipanen dan lingkungan sekitar. Metabolit sekunder khususnya *Pseudomonas* sp., telah banyak diteliti kemampuannya dalam mendegradasi berbagai senyawa hidrokarbon. Penelitian ini bertujuan untuk 1) mengetahui pengaruh aplikasi metabolit sekunder *P. fluorescens* P60 dalam mendegradasi residu senyawa herbisida glifosat di dalam tanah, 2) menganalisis kandungan senyawa glifosat di dalam tanah, setelah aplikasi sesuai dengan dosis perlakuan yang ditentukan, 3) mengetahui pengaruh aplikasi metabolit sekunder *P. fluorescens* P60 terhadap pertumbuhan tanaman pada tanah tercemar residu herbisida glifosat yang telah diremediasi.

Penelitian ini dilaksanakan pada bulan November 2020 sampai dengan Maret 2021 di Screen Housed Laboratorium Perlindungan Tanaman Fakultas Pertanian, Universitas Jenderal Soedirman. Rancangan percobaan yang digunakan adalah Rancangan Acak Kelompok (RAK) dengan 5 perlakuan, yaitu tanah tercemar herbisida glifosat tanpa aplikasi metabolit sekunder *P. fluorescens* P60, dan tanah tercemar herbisida glifosat dengan aplikasi metabolit sekunder *P. fluorescens* P60 50, 100, 150, dan 200% dengan 5 ulangan. Variabel yang diamati yaitu tinggi tanaman, jumlah daun, panjang akar, bobot segar tanaman, bobot kering tanaman, kandungan klorofil, dan kadar residu herbisida glifosat pada tanaman jagung yang dianalisis di Balai Besar Perbenihan dan Proteksi Tanaman Perkebunan Surabaya.

Hasil penelitian menunjukkan bahwa 1) Aplikasi metabolit sekunder *P. fluorescens* P60 mampu menurunkan nilai kadar residu herbisida glifosat di dalam tanah melalui proses bioremediasi, 2) Penurunan residu herbisida glifosat terbaik terjadi pada perlakuan aplikasi metabolit sekunder *P. fluorescens* P60 konsentrasi 200% sebesar 28,5%. 3) Perlakuan metabolit sekunder *P. fluorescens* P60 meningkatkan tinggi tanaman, jumlah daun, panjang akar, bobot segar tanaman, bobot kering tanaman, dan kandungan klorofil daun masing-masing sebesar 1-3, 2-6, 19-27, 17, 57-67, dan 25% dibanding dengan kontrol.

SUMMARY

*The overuse of chemical herbicides can have a negative impact on the environment, non-target organisms, biodiversity, and weed resistance to herbicides. The high residues of herbicides that are absorbed and accumulated in the soil can cause poisoning in humans, affect plant and microbial resistance, and affect the harvested plants and the surrounding environment. Secondary metabolites, especially *Pseudomonas* sp., have been extensively studied for their ability to degrade various hydrocarbon compounds. This study aims to 1) determine the effect of secondary metabolite application of *P. fluorescens* P60 in degrading residues of the herbicide glyphosate in the soil, 2) analyze the content of glyphosate compounds in the soil after application according to the prescribed treatment dose, 3) determine the effect of secondary metabolite application of *P. fluorescens* P60 on plant growth in soil contaminated with remedied glyphosate herbicide residues.*

*This research was conducted from November 2020 to March 2021 at the Screen House and the Plant Protection Laboratory of the Faculty of Agriculture, Jenderal Soedirman University. The experimental design used was a Randomized Block Design (RBD) with five treatments, namely soil contaminated with glyphosate herbicide without the application of *P. fluorescens* P60 secondary metabolite, and soil contaminated with glyphosate herbicide with *P. fluorescens* P60 secondary metabolite application 50%, 100%, 150%, 200% with 5 replicates. The variables observed were plant height, the number of leaves, root length, plant fresh weight, plant dry weight, chlorophyll content, and residual levels of the herbicide glyphosate in maize analyzed at the Center for Plant Seeds and Plant Protection Surabaya.*

*The results showed that 1) the application of the secondary metabolite *P. fluorescens* P60 was able to reduce the residual value of the glyphosate herbicide residue in the soil through the bioremediation process, 2) The best reduction in glyphosate herbicide residues occurred in the treatment of secondary metabolite application of *P. fluorescens* P60 at a concentration of 200% at 28,5%, 3) Treatment of secondary metabolites *P. fluorescens* P60 increased plant height, number of leaves, root length, plant fresh weight, plant dry weight, and leaf chlorophyll content by 1-3%, 2-6%, 19-27%, 17%, 57-67% and 25% respectively compared to control.*