RINGKASAN

Padi (*Oryza sativa* L.) merupakan tanaman utama yang dikonsumsi oleh mayoritas penduduk Indonesia. Pengembangan produksi tanaman pangan di Indonesia terhalang pada masalah buruknya sifat-sifat kimia fisik tanah yang terjadi karena faktor-faktor produksi. Biochar berperan penting bagi tanaman sebagai bahan pembenah tanah (amelioran tanah). Biochar terbukti meningkatkan total karbon organik, kapasitas tukar kation, dan menurunkan kandungan Cd dan Pb. Tujuan dari penelitian ini adalah untuk mengetahui karakter fisiologi dan hasil tanaman padi pada tanah yang tercemar logam berat Pb & Cd dengan aplikasi biochar.

Penelitian ini dilaksanakan di *Screen house house* Balai Benih Tanaman Pangan dan Hortikultura, Unit Pelaksana Tugas (UPT) Pertanian Kebun Benih Padi dan Palawija Desa Bojongsari, Kecamatan Kembaran, Kabupaten Banyumas, Laboratorium Agronomi & Hortikultura, serta Laboratorium Agroekologi Fakultas Pertanian, Universitas Jenderal Soedirman. Penelitian dilaksanakan pada bulan Juli – Oktober 2022. Rancangan percobaan yang digunakan yaitu Rancangan Petak Terbagi (RPT) / *Split Plot Design* dengan 2 faktor. Faktor pertama adalah asal tanah untuk media tanam yang berasal dari 3 lokasi yaitu A= Ajibarang (Asosiasi Andisol Coklat dan Regosol Coklat), P= Pesawahan (Komplek Podsolik Merah Kuning), M= Menganti (Latosol Coklat). Faktor kedua adalah biochar yang terdiri B0= Tanpa pemberian biochar (kontrol), B1= Biochar tongkol jagung 6 ton/ha, B2= Biochar tongkol jagung 3 ton/ha + biochar jerami padi 3 ton/ha, dan B3= Biochar tongkol jagung 2 ton/ha + biochar jerami padi 2 ton/ha + biochar sekam padi 2 ton/ha. Setiap perlakuan masing-masing diulang sebanyak 3 kali, sehingga secara keseluruhan menghasilkan 36 unit percobaan. Tiap unit percobaan terdiri dari 3 rumpun tanaman padi sehingga total sampel berjumlah 108 sampel.

Hasil penelitian menunjukkan perlakuan asal tanah berbeda meningkatkan variabel laju pertumbuhan tanaman (LPT) sebesar 28,57%, laju asimilasi bersih (LAB) sebesar 31,25% – 68,75%, jumlah anakan produktif sebesar 15,11% – 21,22%, jumlah gabah isi per rumpun sebesar 10,36% – 17,45%, bobot gabah per rumpun sebesar 16,01% – 24,21%, dan bobot kering tajuk fase akhir generatif sebesar 20,87% – 25,21%. Aplikasi biochar mampu meningkatkan kerapatan stomata sebesar 13,08% – 22,82% dan meningkatkan bobot 1000 biji sebesar 5,35% – 6,18%. Interaksi antara perlakuan biochar dan asal tanah dapat meningkatkan kadar klorofil b sebanyak 61,59% pada tanah Ajibarang, 24,97% pada tanah Pesawahan, dan 38% pada tanah Menganti. Selain itu, interaksi antar perlakuan juga mampu menurunkan kehampaan pada bulir tanaman padi sebesar 29,43%.

Kata Kunci: Padi, biochar, remediasi, timbal, kadmium, fisiologi, hasil.

SUMMARY

Paddy (Oryza sativa L.) is the main crop consumed by the majority of the Indonesian population. The development of food crop production in Indonesia is hindered by the problem of poor soil physical chemical properties that occur due to production factors. Biochar plays an important role for plants as a soil ameliorant. Biochar is proven to increase total organic carbon, cation exchange capacity, and reduce Cd and Pb content. The purpose of this study was to determine the physiological characteristics and yield of rice plants in soil polluted with heavy metals Pb & Cd with biochar application.

This research was conducted at the Screen house of the Food and Horticultural Plant Seed Center, the Agricultural Implementation Unit (UPT) of the Rice and Crops Seed Farm in Bojongsari Village, Kembaran District, Banyumas Regency, Agronomy & Horticulture Laboratory, and Agroecology Laboratory of the Faculty of Agriculture, Jenderal Soedirman University. The research was conducted from July to October 2022. The experimental design used was Split Plot Design with two factors. The first factor was the origin of soil for planting media from 3 locations, namely A = Ajibarang (Brown Andisol and Brown Regosol Association), P = Pesawahan (Red Yellow Podzolic Complex), M = Menganti (Brown Latosol). The second factor is biochar consisting of B0= No biochar (control), B1= Corn cob biochar 6 tons/ha, B2= Corn cob biochar 3 tons/ha + rice straw biochar 3 tons/ha, and B3= Corn cob biochar 2 tons/ha + rice straw biochar 2 tons/ha + rice husk biochar 2 tons/ha. Each treatment was repeated 3 times, resulting in a total of 36 experimental units. Each experimental unit consisted of 3 clumps of rice plants resulting in a total of 108 samples.

The results showed that different soil origin treatments increased the variable of plant growth rate (LPT) by 28.57%, net assimilation rate (LAB) by 31.25% - 68.75%, number of productive tillers by 15.11% - 21.22%, number of filled grains per clump by 10.36% - 17.45%, grain weight per clump by 16.01% - 24.21%, and crown dry weight in the late generative phase by 20.87% - 25.21%. Biochar application can increase stomatal density by 13.08% - 22.82% and increase 1000 seed weight by 5.35% - 6.18%. The interaction between biochar treatment and soil origin can increase chlorophyll b levels by 61.59% in Ajibarang soil, 24.97% in Pesawahan soil, and 38% in Menganti soil. In addition, the interaction between treatments was also able to reduce voidness in rice grains by 29.43%.

Keywords: Paddy, biochar, remediation, lead, cadmium, physiological, yield.