INVENTORS

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BIOCHAR: A GREEN PRODUCT FROM BIOMASS WASTE TO BOOST CROP GROWTH

Patent Search No.: P/UNIMAP/14MY75



PRODUCT DESCRIPTION

Biochar is solid carbonized material from biomass produced by pyrolysis. Biochar possesses soil amendment properties effecting soil fertility and enhancing mineral uptake important for crop growth and productivity. Biochar is also associated with carbon sequestration, reduce leaching in soil and increase pH of soil without addition of lime. Agricultural wastes in rice cultivation in the form of rice husk and paddy straw can be utilized for the production of biochar. The adsorption and desorption kinetics of biochar are studied in relation to nutrient uptake by crops.

PROBLEMS STATEMENT

The current practice for paddy farmers is burning the rice biomass after harvesting of paddy causing environmental pollution. The biomass can be converted into biochar, thus improving the carbon content in soil and enhancing nutrient absorption.

PRODUCT ADVANTAGES

Addition of biochar to soil improves soil structure and porosity.
 This facilitates the nutrient adsorption and nutrient desorption through ions exchange during fertilizer application.

NOVFI TIES

- Soil amendment in relation to nutrient uptake and soil fertility.
- · Green technology.
- Environmental friendly.
- · Waste to wealth. (Bio-fertilizer)

POTENTIAL APPLICATION

- Bio-fertilizer.
- Soil pH modifier without liming.
- Dye removal in industrial application.

PUBLICATION

- Zainab Hamzah et.al. 2012. Characterization of physiochemical properties of biochar from different agricultural residues. MICOTriBE, Langkawi, ST-P21-9
- Zainab Hamzah et.al. 2013. Development in biomass-based biochar research and utilization: A review. International Agriculture Congress-O47
- Zainab Hamzah et.al. 2013. Characterization of Physicochemical Properties of Biochar from Different Agricultural Residues. Advances in Environmental Biology, 7(12) October Special Issue 2013, Pages: 3752-3757

INDUSTRIAL COLLABORATION

Long Term Research Grant Scheme (LRGS) – Food Security Grant (9012-00004)

PROCESS FLOW

Sample preparation of rice husk (RH) and paddy straw (PS): drying, grinding and sieving

Pyrolysis of biochar (BC) at 450° C in 40 minutes

Adsorption and desorption kinetics study

Pot trial (chili crop with biochar and urea)

PRODUCT PERFORMANCES

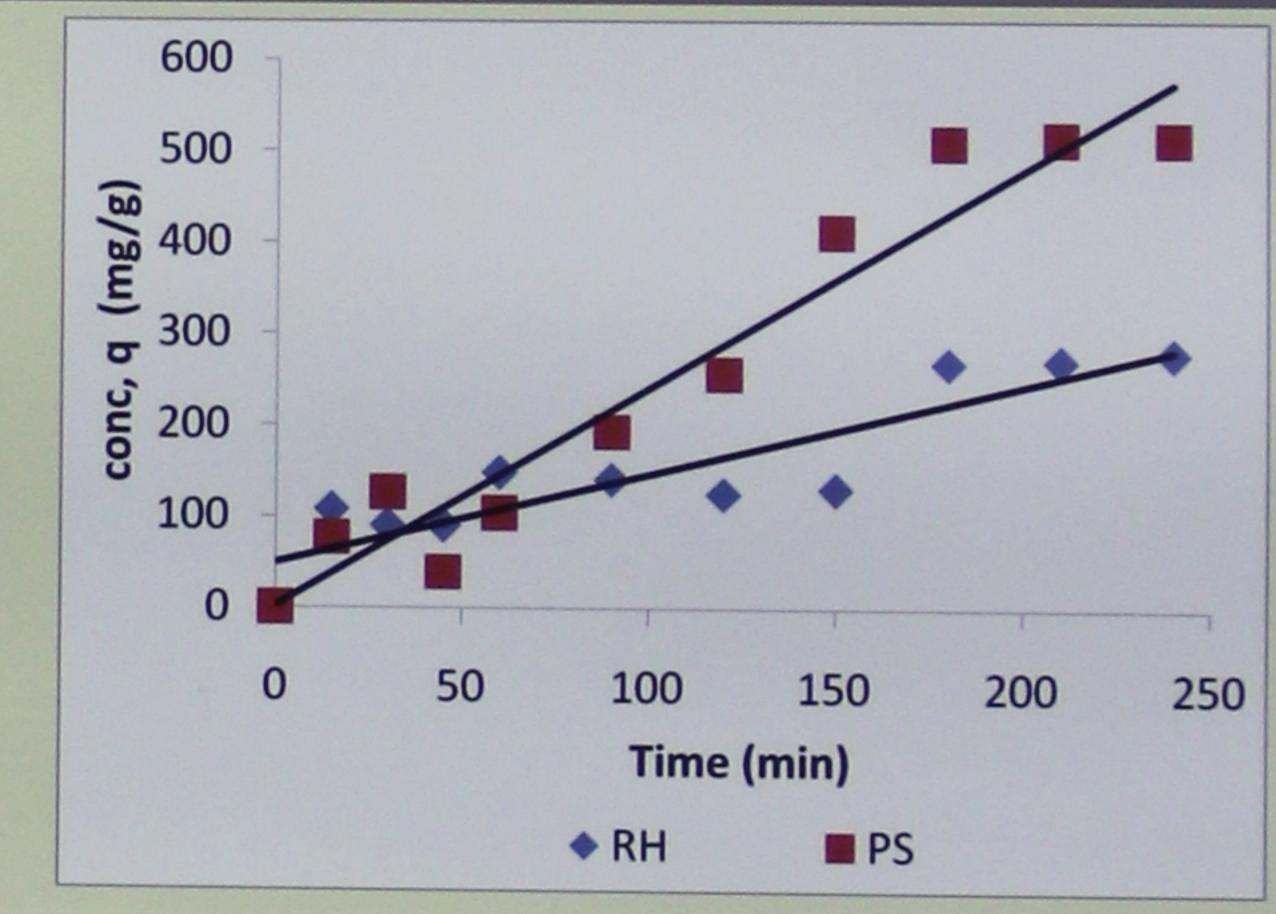


Figure 1: Adsorption kinetics of rice waste biochar

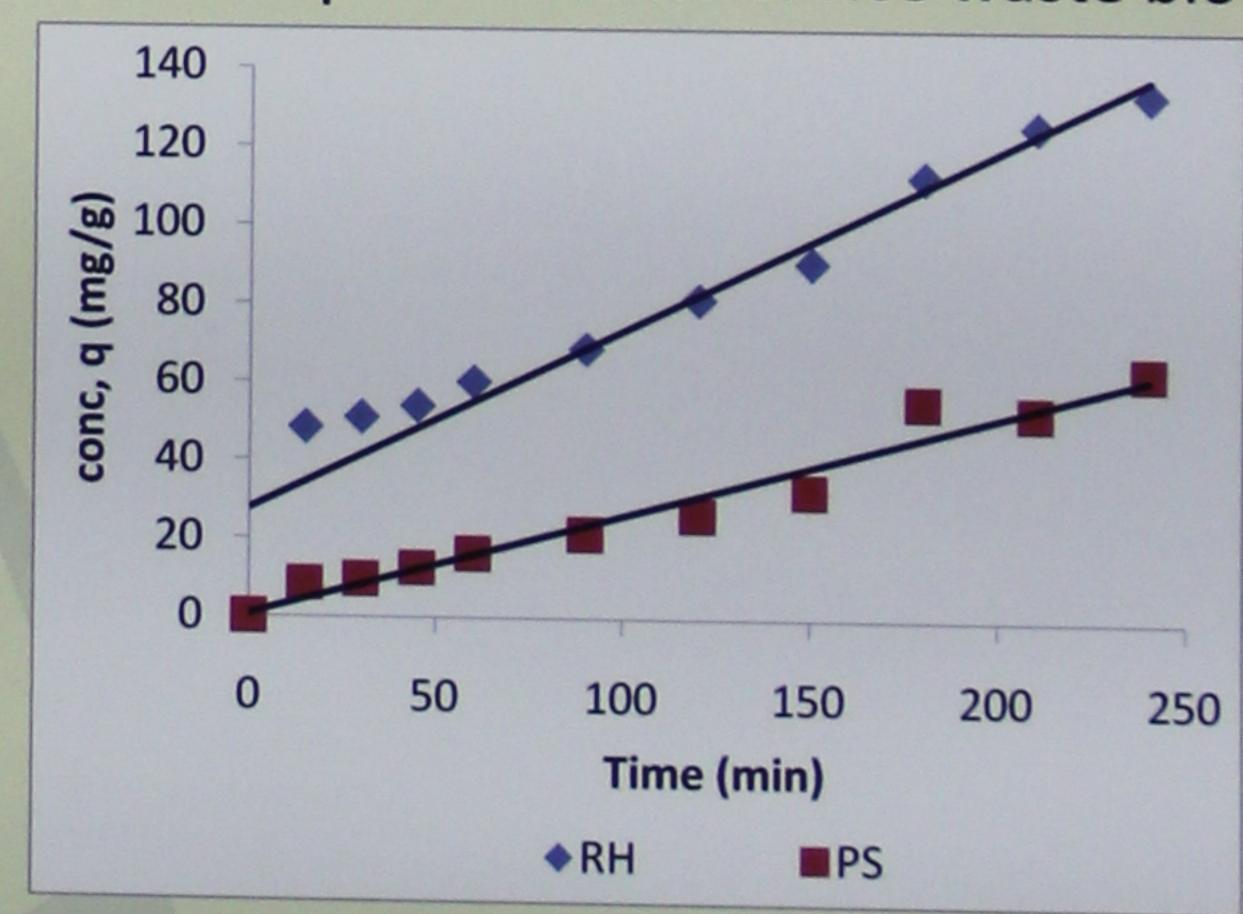


Figure 2: Desorption kinetics of rice waste biochar

Paddy straw biochar exhibits higher adsorption capacity at 46% as compared to rice husk biochar which is only 25%. Contrastingly, rice husk biochar possess higher desorption capacity of 16% as compared to paddy straw biochar which is only 11%. This shows that paddy straw biochar is capable of adsorbing more nutrients and act as slow nutrients releaser.

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