

DESIGN, MANUFACTURING AND TESTING BIOCHAR KILN FOR RICE STRAW AND HUSK BIOCHAR PRODUCTION

Do Minh Cuong, Nguyen Trung Kien, Nguyen Thi Ngoc

Summary

A biochar kiln is designed, manufactured and tested to produce rice straw and husk biochar. Effect of pyrolysis temperature (350⁰C, 400⁰C, 450⁰C), biomass type and size on the yield (%) and properties of biochar is considered. The results show that char production decreases as the pyrolysis temperature increases, the highest char yield of 28.1% for short size of rice straw and at pyrolysis temperatures of 350⁰C and lowest of 24.9% with pyrolysis temperature is 450⁰C, the char yield made from rice husk is higher than made from rice traw (60.4%). The C (%), H (%), N (%) in char decreases as the temperature and time of pyrolysis increased and there was difference when changing the size and type of biomass. The fixed carbon (FC) obtained is highest when the pyrolysis temperature reaches 400⁰C, while the pH small changes when changing the size, time and temperature of the pyrolysis process. The SEM imagery show that the biochar is material with porous, relatively uniform distribution, capillaries measure in size from 5 to 10 microns in diameter. These results may confirm that the batch kiln can be used to produce biochar from rice straw and husk, it is suitable for small-scale production and it can have used to restore the fertility of the soil, increase soil organic carbon, lead to overall higher yield, stopping the burning of rice straw and husk on the field surface and reduce the effects of climate change.

Keywords: *Biochar, pyrolysis, biochar kiln, rice straw, rice husk.*