Effectiveness of Poultry Litter Biochar on Improving Soil Quality of Vegetable Cultivating Degraded Lands in the Central Highlands of Sri Lanka

H.A.N. Upekshani[1, 2], R.S. Dharmakeerthi [3]*, P. Weerasinghe[4], W.S. Dandeniya[3]

[1]Postgraduate Institute of Agriculture University of Peradeniya, Sri Lanka
[2]Sri Lanka School of Agriculture, Department of Agriculture, Kundasale, Sri Lanka
[3]Department of Soil Science, Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka
[4]Food and Agriculture Organization of United Nations, EU project office, Colombo 10, Sri Lanka
**dharmakeerthirs@agri.pdn.ac.lk*

Frequent use of poultry litter (PL) by commercial vegetable cultivating farmers in Sri Lanka has not contributed to an increase the soil organic matter content but contributed to the build-up of excessive levels of phosphorus (P). This study aimed to assess the effectiveness of the application of PL biochar (PLB) as an alternative technology to improve soil quality in these cropping systems. A field experiment was conducted with four consecutively cultivated crops within a year in a highly degraded field at Marassana with 6 treatments, containing the same quantity of organic carbon (OC) in PL and PLB as a soil amendment and with or without recommended rates of chemical fertilizers (CF). Soil properties were analyzed at the beginning and end of the experiment. The yield and nutrient uptake were measured at the end of each crop. Changes in soil quality after the four seasons were assessed using a soil quality index (SQI) developed for these cropping systems. The PLB amended treatments increased ($p<0.05$) pH probably by reducing exchangeable acidity and increasing basic cations. Soil OC% was greater in PLB treatments and the increase was 47.3% in PLB+CF and 38.9% in PLB when compared with the control. The application of PLB improved the CEC in these soils and the increase was significant in PLB+CF treatment. Greater dry matter yield was observed in PLB+CF treatment ($p<0.05$) for all crops when compared to the currently practiced PL+CF treatment. Improvements in soil quality with PLB could be the reason for better yields. Conversion of PL into PLB and their application in degraded vegetable cultivating soils brought significant improvement in soil quality and productivity compared to the currently adopted CF+PL soil fertility management practice in Marassana.

Key words: Intensive vegetable cultivation, Poultry litter, Poultry litter biochar, degraded soil, Soil quality, Productivity

Acknowledgement: Partial funding was received from the Research Facilitation Fund (RFF 17/198), PGIA, University of Peradeniya.