

The persistence of biochar, N, and P in a vegetable-rice cropping sequence

Abstract

Vegetables and rice are grown sequentially in paddy field areas of Timor-Leste. However, the productivity and profitability are low due to low soil infertility. Rice husk biochar has been trialed, and the result has shown to be an effective fertilizer for increasing yields. However, trials conducted in the past used high rates of biochar 20-30 t ha⁻¹. Due to low rice production, this high-volume application makes widespread utilization unlikely for rice husk biomass. The current study is designed to test the effect of combined and separate biochar, N, and P applications on soil nutrients, productivity, and profitability of vegetables and rice in a vegetable-rice cropping sequence. This experiment was undertaken at Maliana Municipality in 2020-2021. The experiment used a split-plot design to test the performance of capsicum and the subsequent rice crop in response to biochar, N, and P, which were applied separately and in combination. The main plot was the application of biochar, N, and P for capsicum in the dry season and its residue for subsequent rice crops. The sub-plots were the three-way factorial designs of biochar, N and P. Results showed that an interaction between biochar, N, and P significantly increases capsicum yield, and its residue significantly increases subsequent rice yield compared to the control treatment. In addition, gross margin analysis also showed that the interaction between biochar, N, and P significantly increased the farm profitability of both capsicum and rice crops.