

Use of Biochar for Vegetable Growing

Introduction

Gasification is an efficient and clean technology to convert waste biomass (such as horticultural waste, animal manure and sewage sludge) to syngas (mainly CO and H₂), which can be utilised for chemical synthesis or power generation.

Biochar, the by-product generated through gasification, can be re-utilised in agricultural application due to its high surface area, high nutrient-retaining ability and increased water-holding capacity. In this study, the impact of biochar as basal fertiliser/soil amendment on Xiaobaicai (XBC), *Brassica rapa subsp. chinensis* growing was investigated.

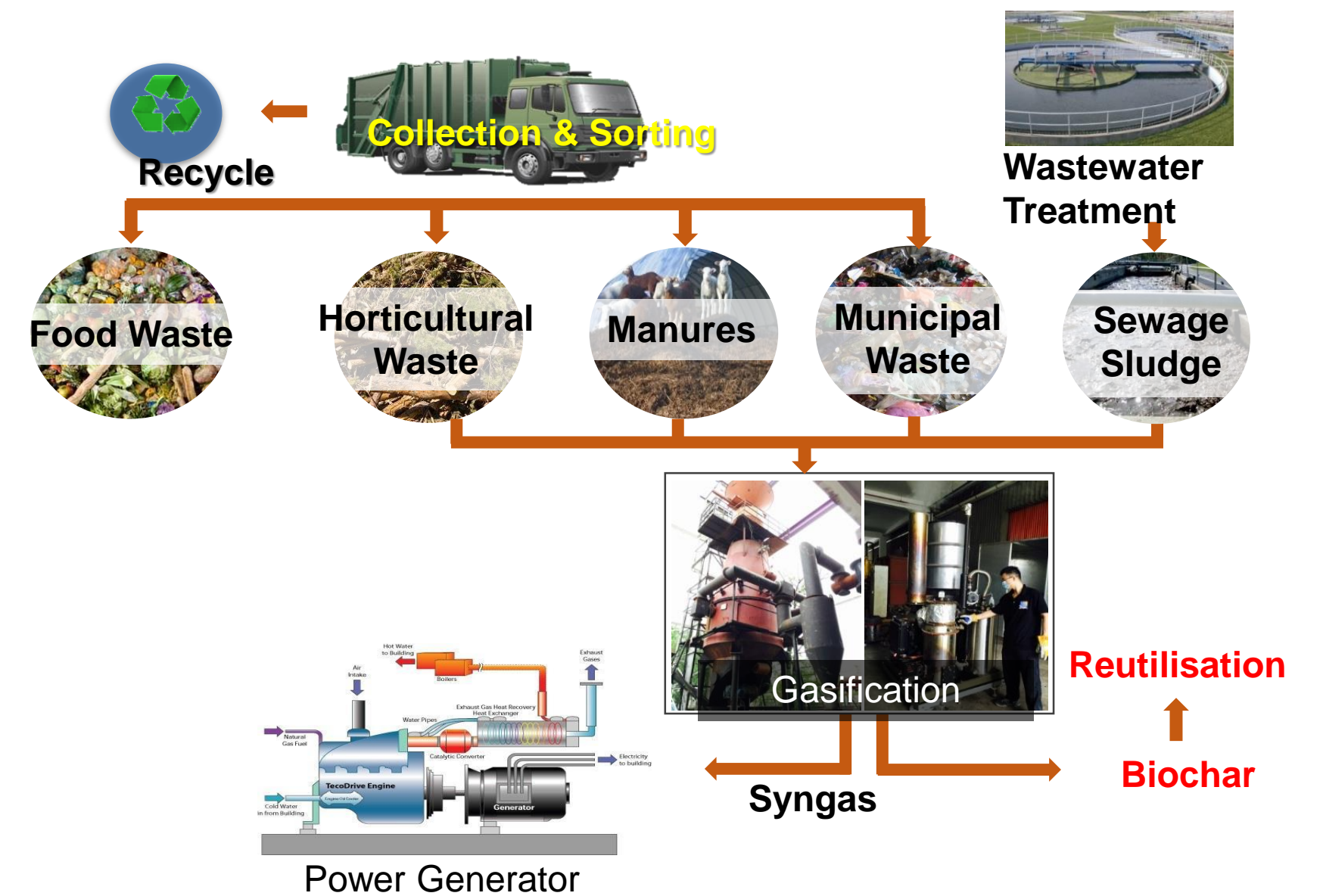


Figure 1 Solid Waste Management Concepts: Waste to Energy and Resource

Gasification Setup and Cultivation Method

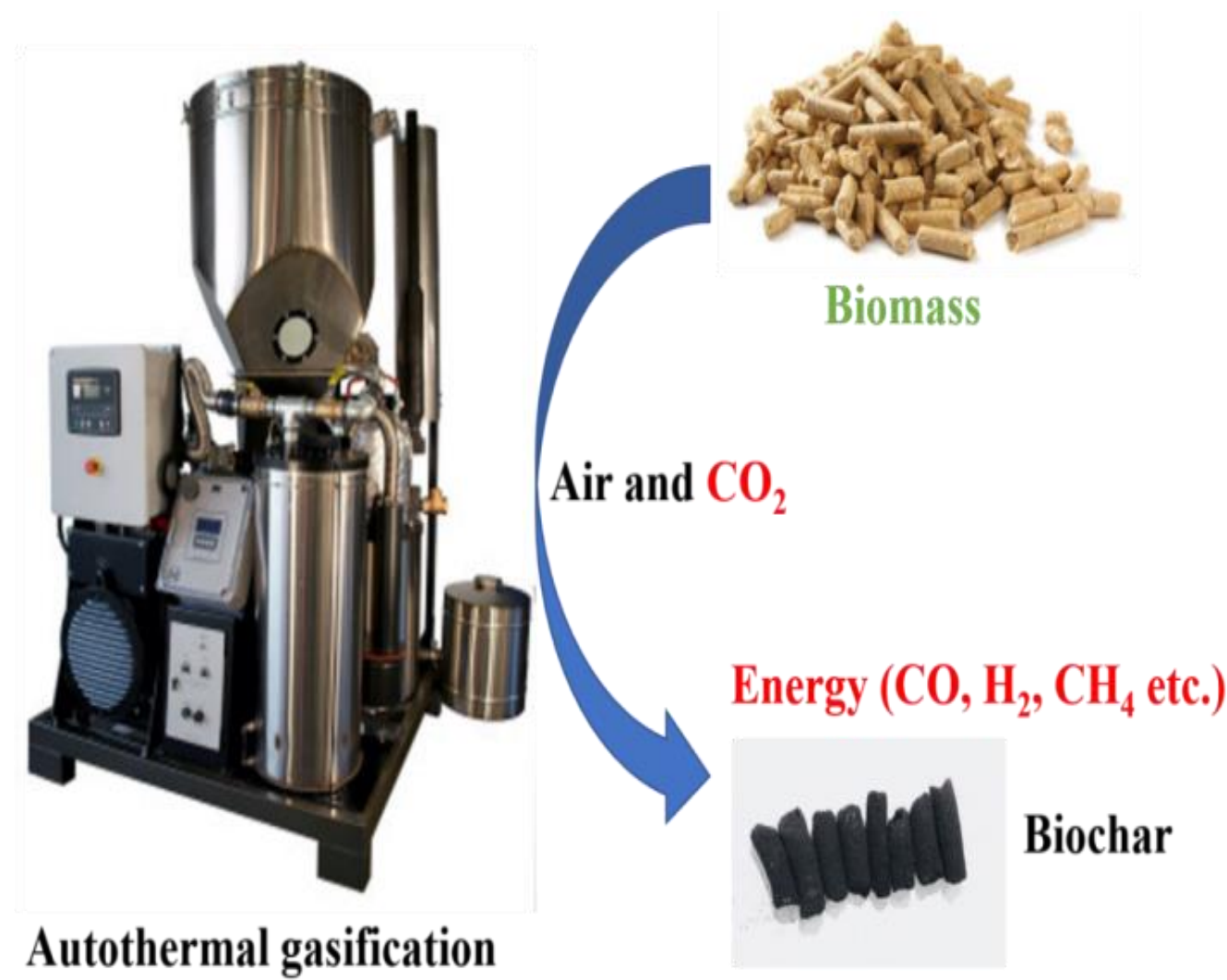


Figure 2 A 20 kW gasifier converting biomass waste to energy and biochar

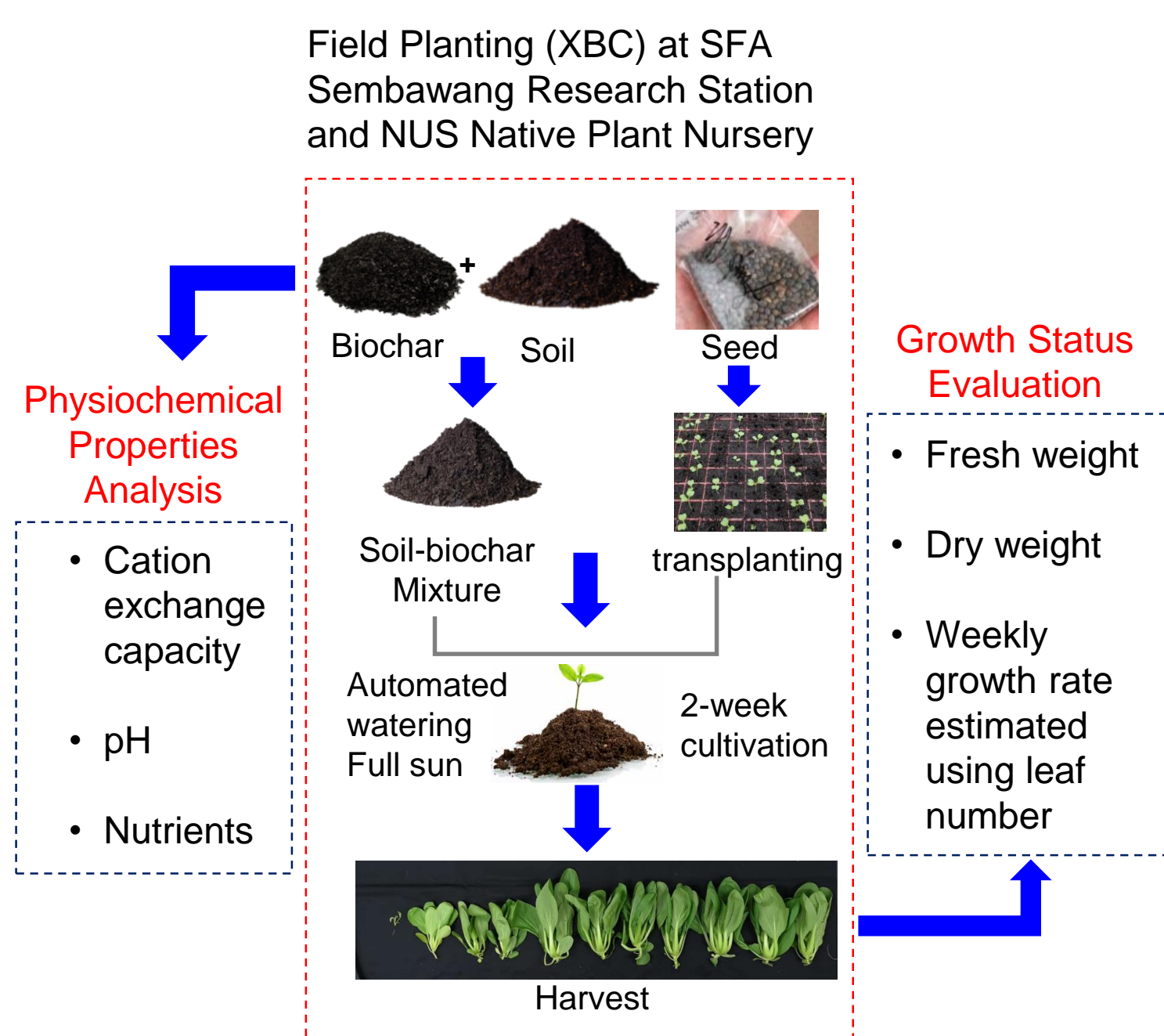


Figure 3 XBC cultivation protocol



Figure 4 XBC cultivation layout

Results and Discussion

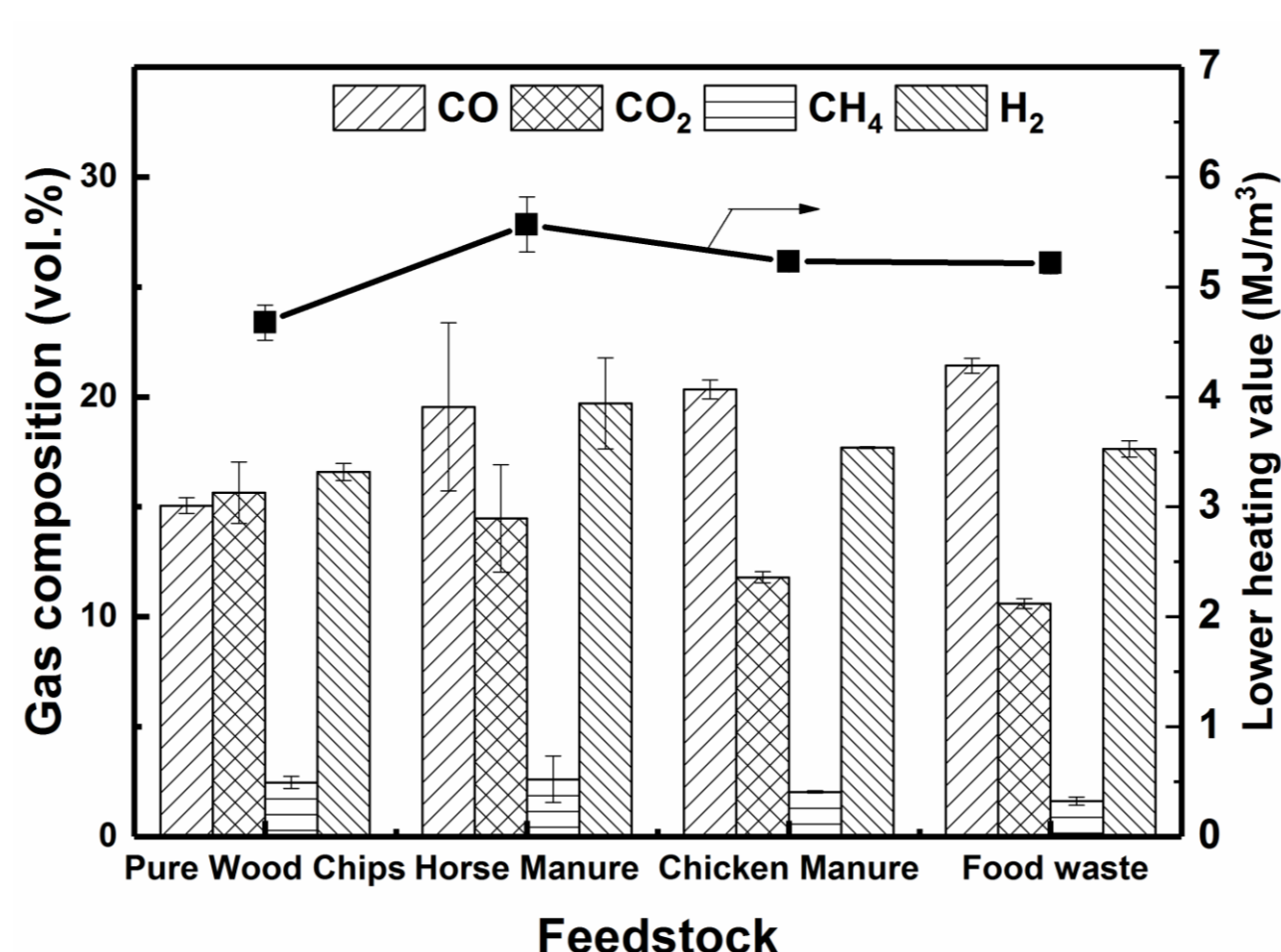


Figure 5 Energy production from solid waste gasification (P. Dong et.al, 14th International Conference on Sustainable Energy Technologies, Nottingham, UK, 25-27 August 2015)

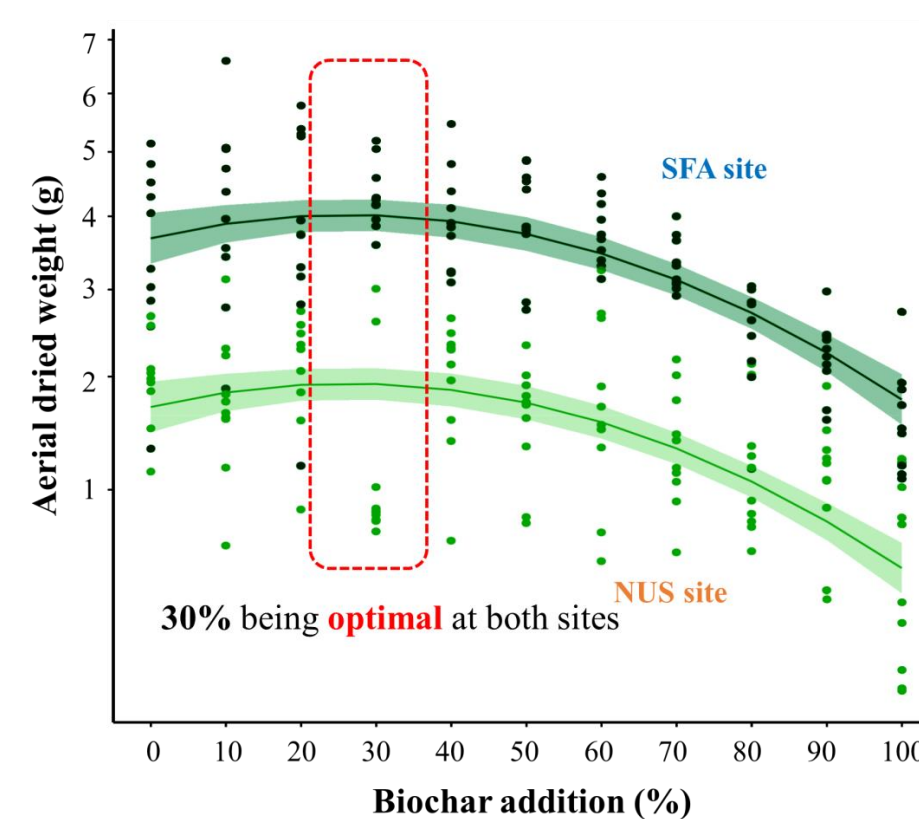


Figure 6 Dry weight of XBC and the optimal biochar percentage at both sites

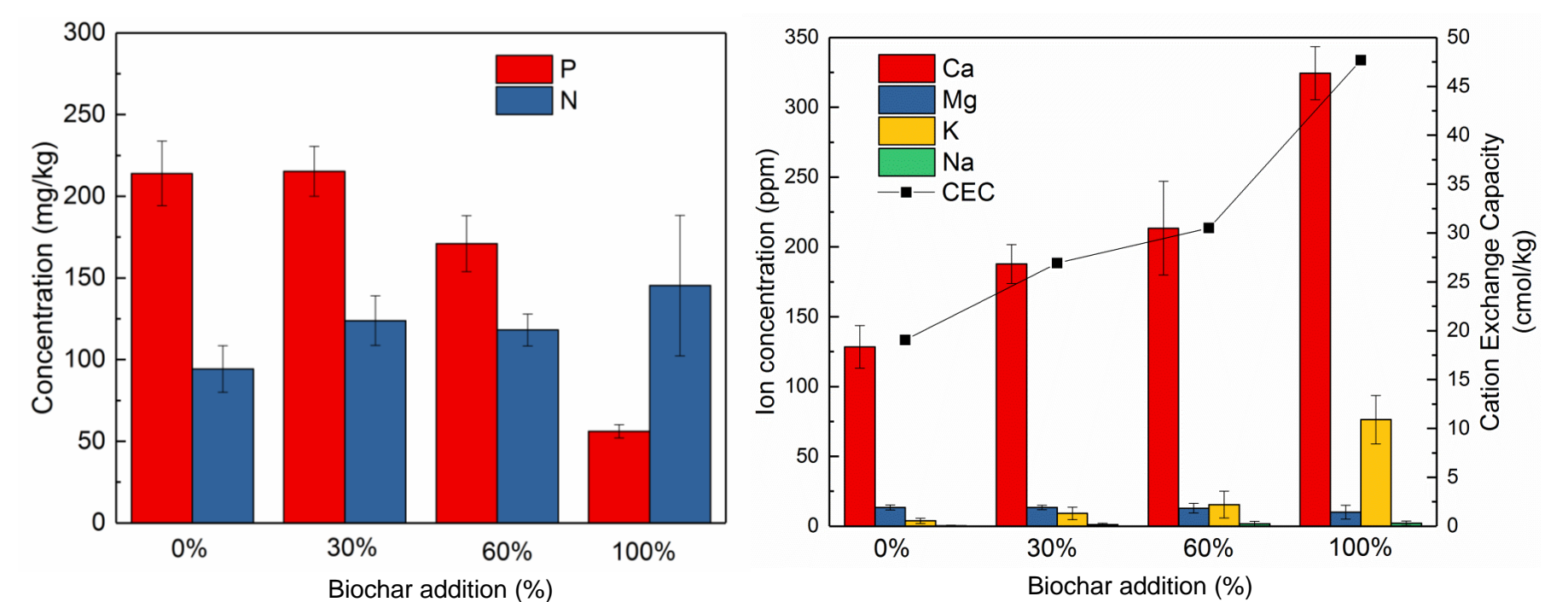


Figure 7 Nutrient analysis of soil/biochar mixture

With increasing ratio of biochar, N and K concentration and cation exchange capacity (CEC) increased, but P concentration decreased.

Summary

1. Solid waste such as wood waste, animal manure and sewage sludge can be converted to energy through gasification.
2. By-product from gasification, biochar, can be used as basal fertiliser/soil amendment for vegetables growing .
3. In this study, 30% biochar addition into the soil resulted in the best growth of XBC.

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