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Master-Thesis
Environmental protection and agricultural food production

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**Emissions and environmental impact of rice straw valorization
via carbonization and composting**

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Abstract

Massive amounts of rice straw are produced as by-product every year with a continuously increasing trend. In South-east Asia, straw usually undergoes open field-burning praxis after harvest. However, not only does this praxis pollute the environment and cause severe health hazards, it also constitutes loss of nutrients and energy. Converting rice straw into valuable commodities, such as straw-derived biochar and compost, are alternative ways to utilize rice straw and avoid potential wastes.

This study evaluates and compares the environmental impacts from three different scenarios of straw management (open-field burning, carbonization and composting) through a systematic approach - Life-cycle assessment (LCA). LCA was performed in accordance with DIN EN ISO 14040 and 14044. Related inventory data was collected from three sources: our own experiment in the Philippines, scientific literatures and database Ecoinvent 3.0. Environmental impacts were evaluated in categories of climate change, human toxicity, terrestrial acidification, photochemical oxidant formation and freshwater eutrophication.

Both straw carbonization and composting could reduce the environmental impacts from straw burning in terms of climate change, human toxicity and photochemical oxidant formation. But the effects of composting on freshwater eutrophication and terrestrial acidification were the highest while the performance of carbonization remained the best.

Key words: rice straw, burning, carbonization, composting, LCA