

Evaluate *Azolla* Replacing *Sesbania* as Green Manure for Reducing Carbon Emissions during Fallow Period in Yilan County¹

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Abstract

In Yilan County, the conventional fallow practice of cultivating *Sesbania* as green manure, which involves plowing it into the soil followed by immediate flooding results in substantial greenhouse gas (GHG) emissions. This study demonstrates that replacing *Sesbania* with *Azolla* can reduce GHG emissions by 8.9%-61.4% per hectare. Furthermore, combining *Azolla* with rice straw-decomposing bacteria further enhances this mitigation effect, achieving reductions of 19.5%-82.2% per hectare. Observations during the subsequent rice-growing season indicated that *Azolla* cultivation during the fallow period does not lead to significant methane emissions. Additionally, the incorporation of green manure allows for a reduction in synthetic nitrogen requirements, applying 30 kg N ha⁻¹ instead of 60 kg N ha⁻¹ effectively decreased methane emissions while maintaining rice yields. This three-year investigation quantifies GHG profiles under both baseline and experimental practices, establishing specific emission factors for the substitution of *Azolla* for *Sesbania* in Yilan to facilitate future carbon reduction assessments.

Keywords: *Sesbania*, *Azolla*, green manure, low-carbon cultivation, emission factor

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