

Rubber-leguminous shrub systems should be popularized to reduce greenhouse gas emissions in Xishuangbanna

October 14 2020, by Zhang Nannan



Rubber-*Flemingia macrophylla* plantation in Xishuangbanna. Credit: LIU Changan

In recent years, numerous rubber-based agroforestry systems, using a biological approach to enhance ecosystem services, have been developed. Intercropping rubber with *Flemingia macrophylla*, a

leguminous shrub, has been widely established in rubber plantations area of China.

Previous studies showed that [greenhouse gas emissions](#) in [rubber](#) and rubber-F. macrophylla systems would be affected by their [plantation](#) age. However, the effect of different-aged rubber and rubber-F. macrophylla systems on CO₂, N₂O, and CH₄ emissions from soils is unknown.

In a study published in *Forest Ecology and Management*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) investigated the effect of introducing F. macrophylla to different-aged [rubber plantations](#) on the emissions of CO₂, N₂O, and CH₄ in Xishuangbanna.

They found that the emissions of CO₂, N₂O and CH₄ decreased as the trees aged in the rubber plantations. The introduction of F. macrophylla to different-aged rubber plantations significantly decreased CO₂ and CH₄ flux but increased N₂O flux.

Furthermore, the CO₂ and N₂O fluxes were mainly affected by [soil](#) temperature at 10 cm depth, and CH₄ flux was mainly affected by both soil water content in the 0–10 cm soil layer and soil temperature at 10 cm depth.

Moreover, they found that the rubber-leguminous shrub systems significantly improved soil organic carbon sequestration rate and reduced greenhouse gas emissions, relative to the same-aged rubber plantations.



Sloping fields in the rubber–*Flemingia macrophylla* plantations. Credit: LIU Changan

Decrease of CO₂ emissions is crucial for the reduction of greenhouse gas emissions in rubber plantations worldwide.

"We therefore propose that rubber-leguminous shrub systems should be popularized in the rubber planting area for reducing greenhouse gas emissions," said Prof. Tang Jianwei, principal investigator of the study.

More information: Xin Rao et al. Rubber-leguminous shrub systems stimulate soil N₂O but reduce CO₂ and CH₄ emissions, *Forest Ecology and Management* (2020). [DOI: 10.1016/j.foreco.2020.118665](https://doi.org/10.1016/j.foreco.2020.118665)

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