



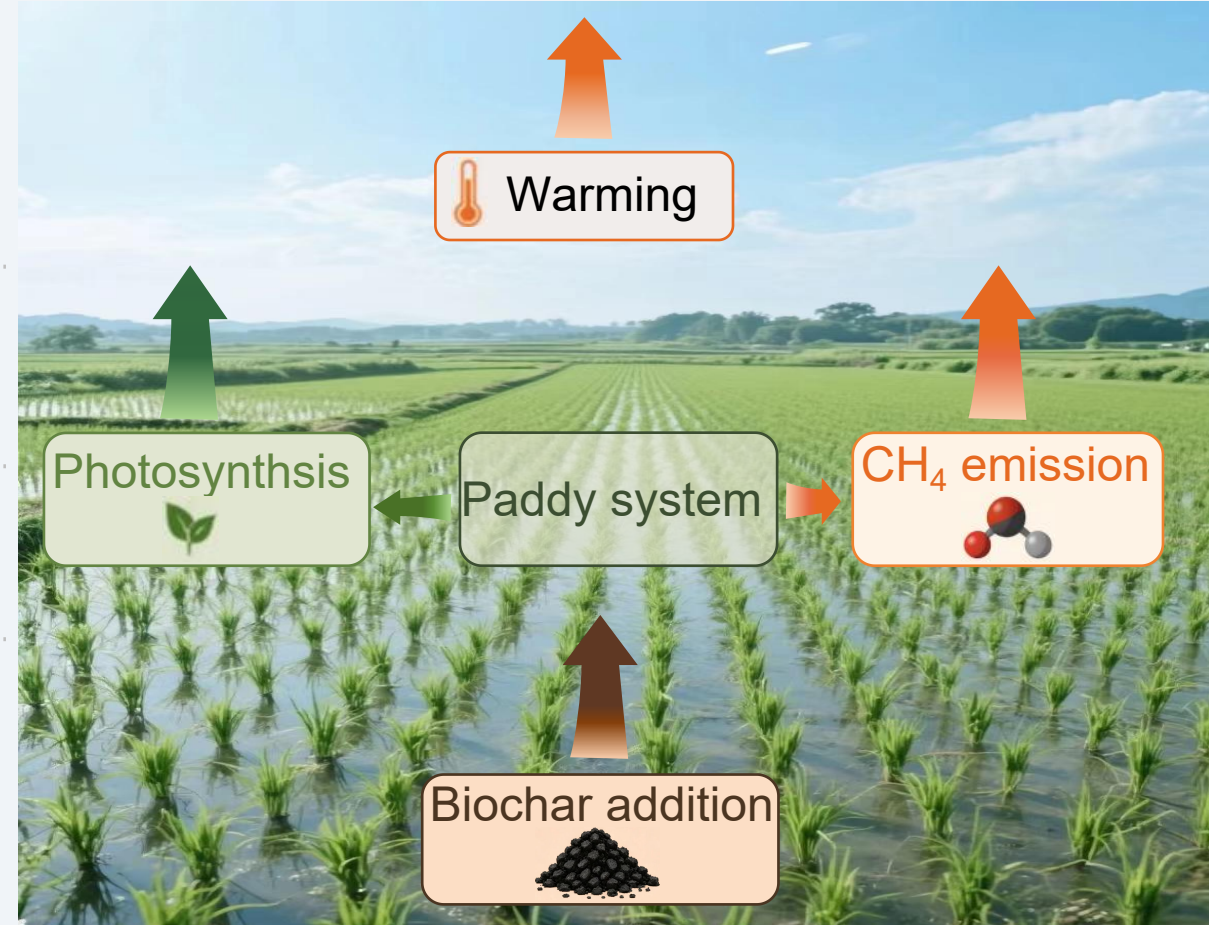



# Interactive effects of warming and biochar on paddy photosynthesis and GHG emissions





## Background

-  Paddy fields are major sources of CH<sub>4</sub>
-  Warming alters carbon cycling
-  Biochar mitigates emissions
-  However, their interactive effects remain unclear



 How do warming and biochar interact to affect photosynthesis and greenhouse gas emissions?

# Experimental design

	No Biochar	Yes Biochar
No Warming	 Control (NPK)	 Biochar (NPK+BC)
Yes Warming	 Warming (NPK+H)	 Warming + Biochar (NPK+BC+H)

## Experimental design and measurements

- A factorial experiment with **warming × biochar** addition
- Four treatments:
  - NPK, NPK+H, NPK+BC, NPK+BC+H
- Measurements include:
  - Environmental factors
  - Growth traits
  - Photosynthesis (SPAD, Pn, Tr, Gs)
  - Greenhouse gas fluxes (CH<sub>4</sub>, CO<sub>2</sub>, N<sub>2</sub>O)
- Conducted in subtropical rice system

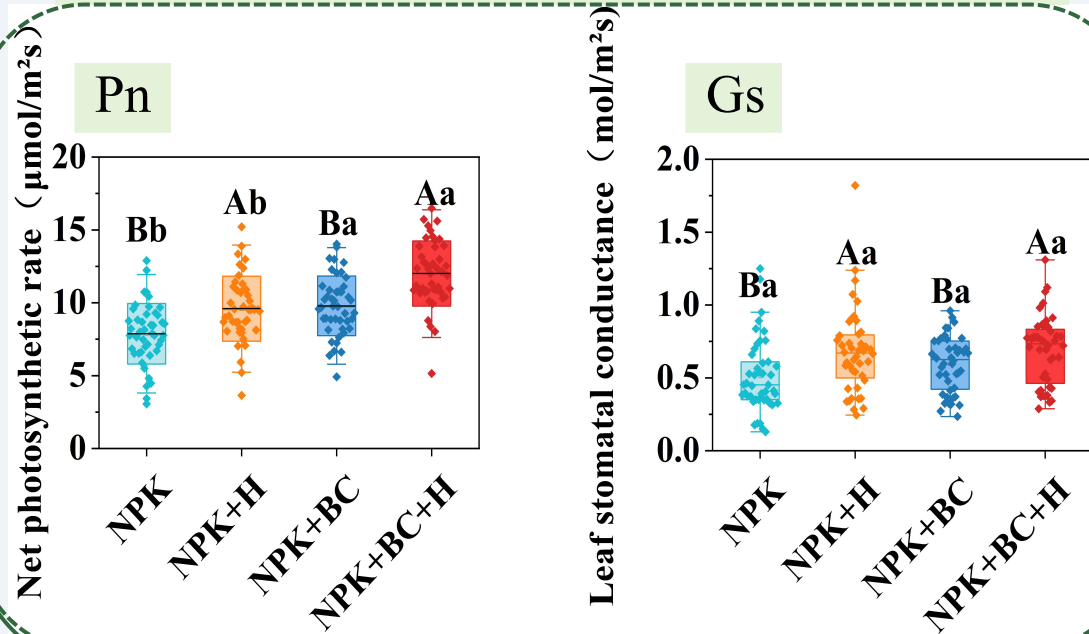
# Results

Warming and biochar interactively regulate carbon processes

- A clear **antagonistic interaction** between warming and biochar was observed

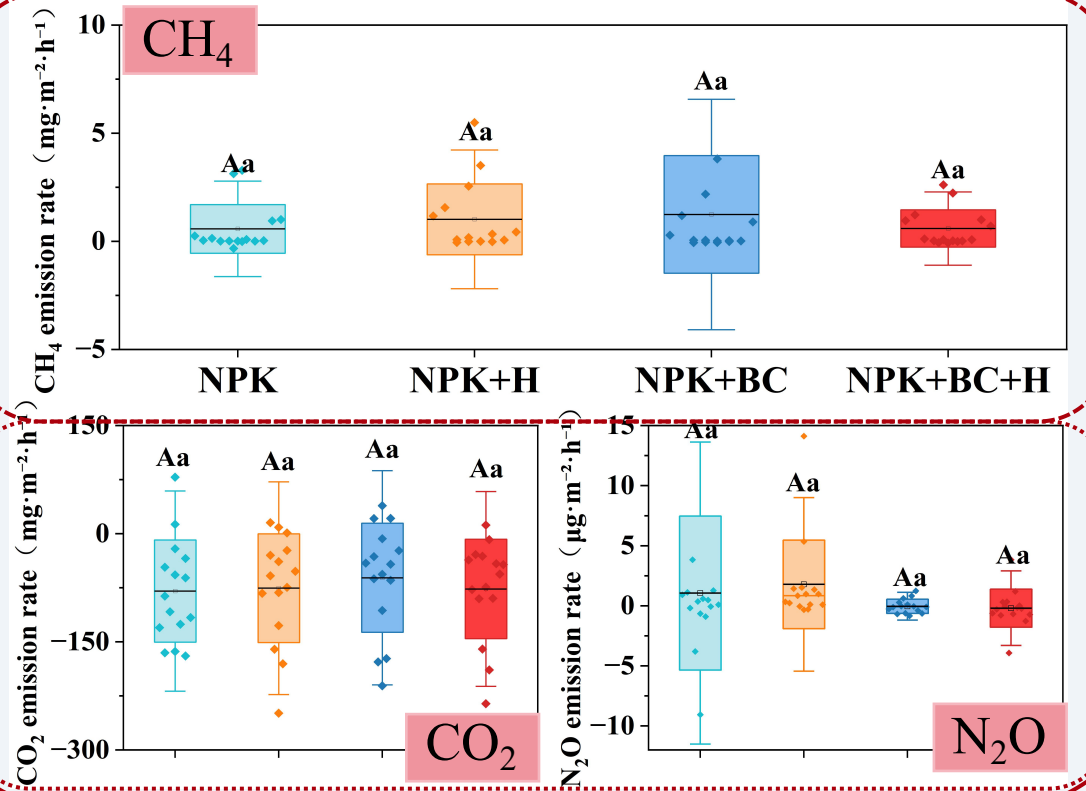
## Photosynthesis

Combined warming and biochar synergistically enhanced photosynthesis



## Greenhouse Gas Emissions

Biochar alone increased  $\text{CH}_4$  and  $\text{CO}_2$  emissions, but this effect was suppressed under warming



- Warming and biochar interactively regulate soil-plant-GHG processes through **antagonistic effects on carbon emissions** and **synergistic effects on photosynthesis**

