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Background

- Rhizosphere priming effect (RPE), termed the change of soil organic carbon (SOC) decomposition by living roots, play a key role in mediating atmosphere CO₂ and global C cycle.
- Root functional traits have been recognized as main drivers, but whether or how the coordination among root traits, exudates and mycorrhizal symbiosis affect the RPE remains unexplored.

Experimental design

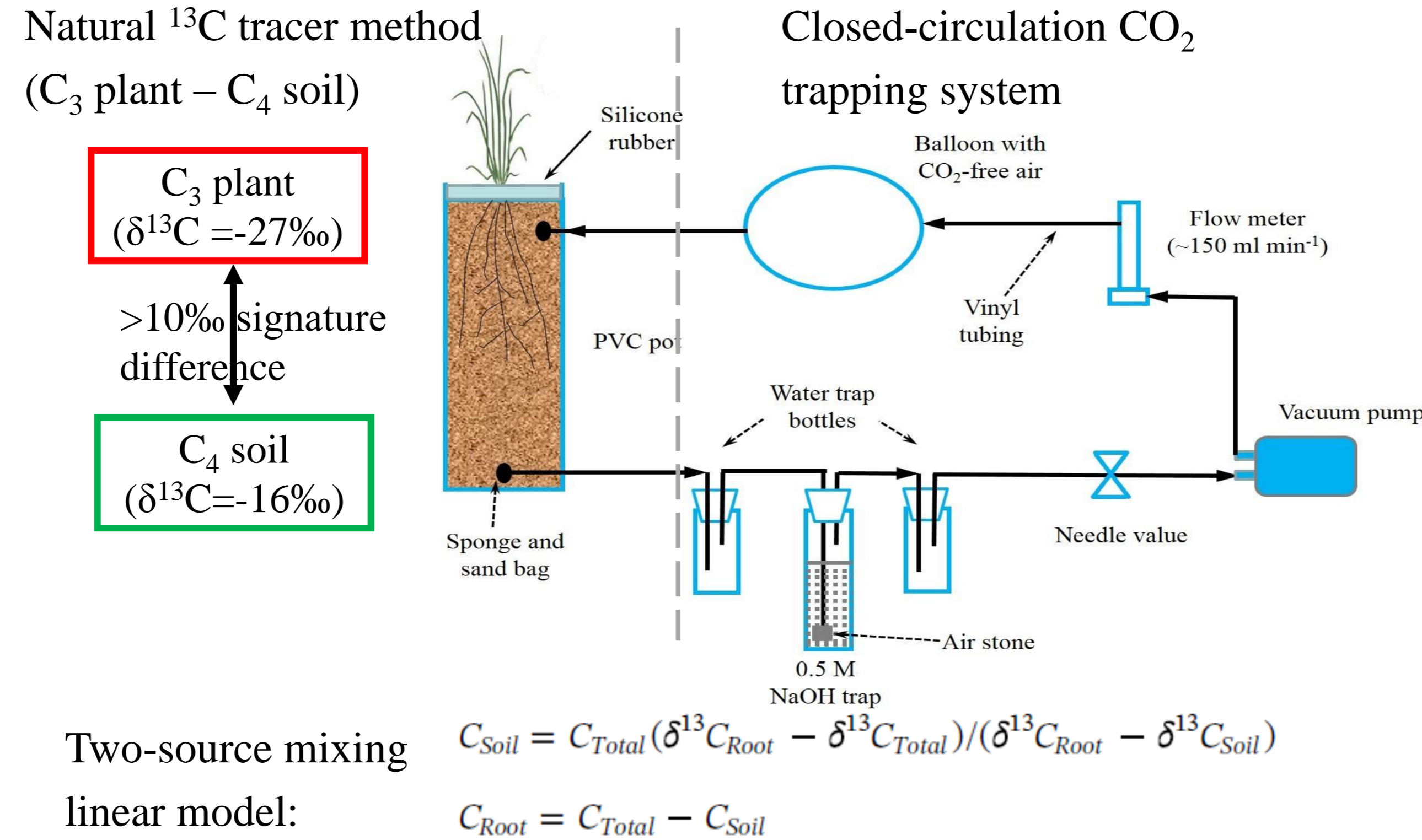
➤ Treatments
12 grassland species (4 grasses, 4 legumes, and 4 forbs) with an unplanted control

➤ RPE quantification
RPE = C_{soil} (planted) – C_{soil} (unplanted)
Specific RPE = RPE/root biomass

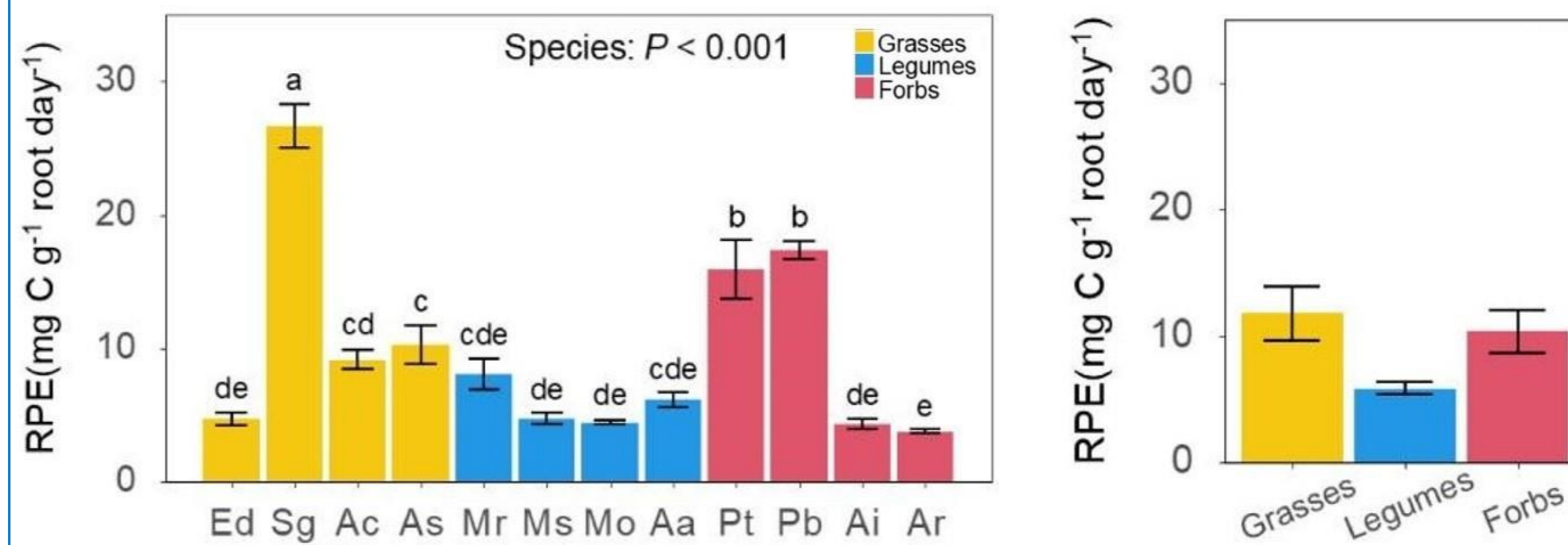
➤ Root functional traits

Root morphology	Root chemistry /exudates	Mycorrhizal symbiosis
Average diameter	Root N content	Arbuscular mycorrhizal fungi colonization
Specific root length/area	Rhizo-respiration rate	
Root tissue density	Root exudation rate	
Root branching intensity		
Root tip frequency		

Novel methods

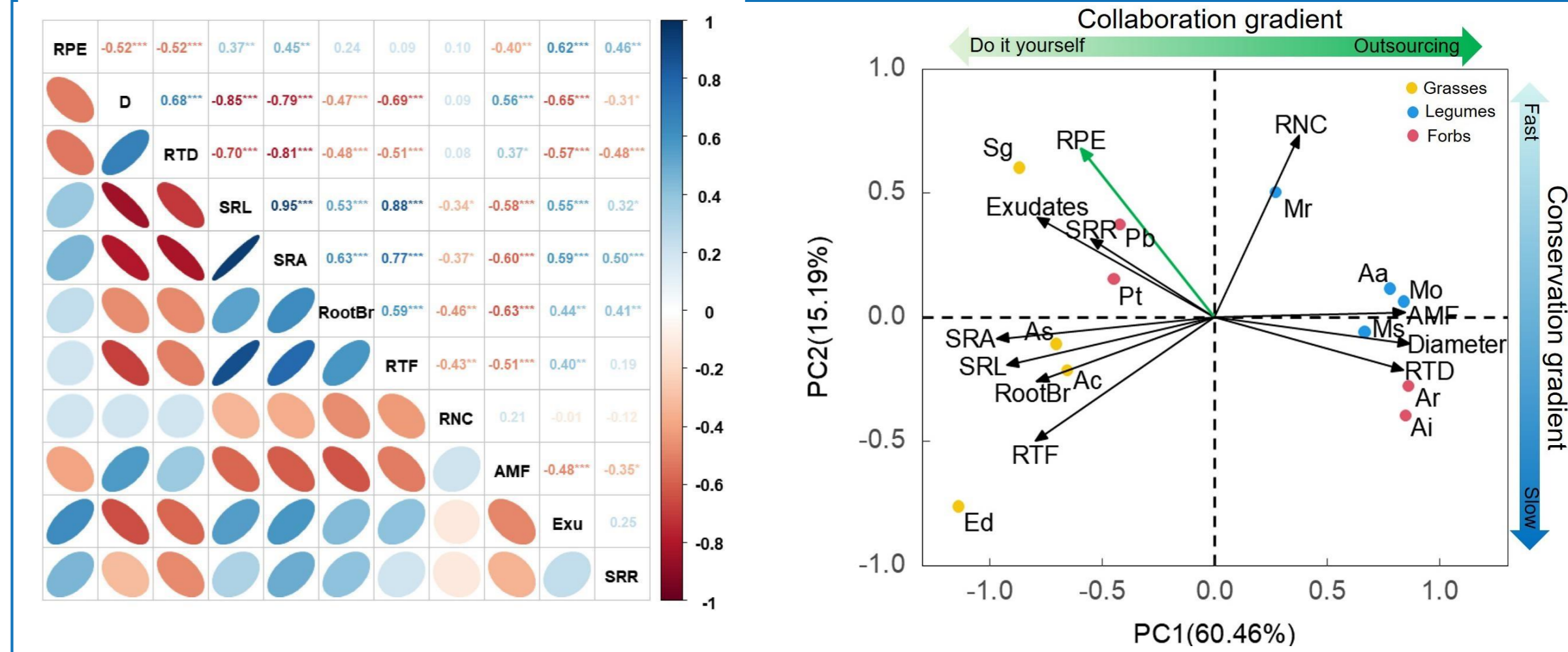


Main results



- All grassland species caused positive RPEs with the magnitude varying from 32% to 350%.
- The variation in RPEs across species was larger than across functional groups.

Main results



- The RPEs were positively related to root exudates, respiration and morphological traits, but negatively related to root diameter and AMF colonization.

Take-home messages

- ✓ Trade-offs among root functional traits exist across 12 grassland species.
- ✓ Plant species with efficient root morphology or more exudation produce greater RPEs, while plant species with thicker root diameter and higher AMF colonization cause smaller RPEs.

