



Silicon fertilizer and biochar effects on plant and soil PhytOC concentration and soil PhytOC stability and fractionation in subtropical bamboo plantations

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Introduction

The use of exogenous silicon (Si) amendments, such as Si fertilizers and biochar, can effectively increase crop Si uptake and the formation of phytoliths, which are siliceous substances that are abundant in numerous plant species. Phytolith-occluded carbon (C) (PhytOC) accumulation in soil plays an important role in long-term soil organic C storage. Nevertheless, the effects of both Si fertilizer and biochar application on PhytOC sequestration in forest plant-soil systems have not been studied.

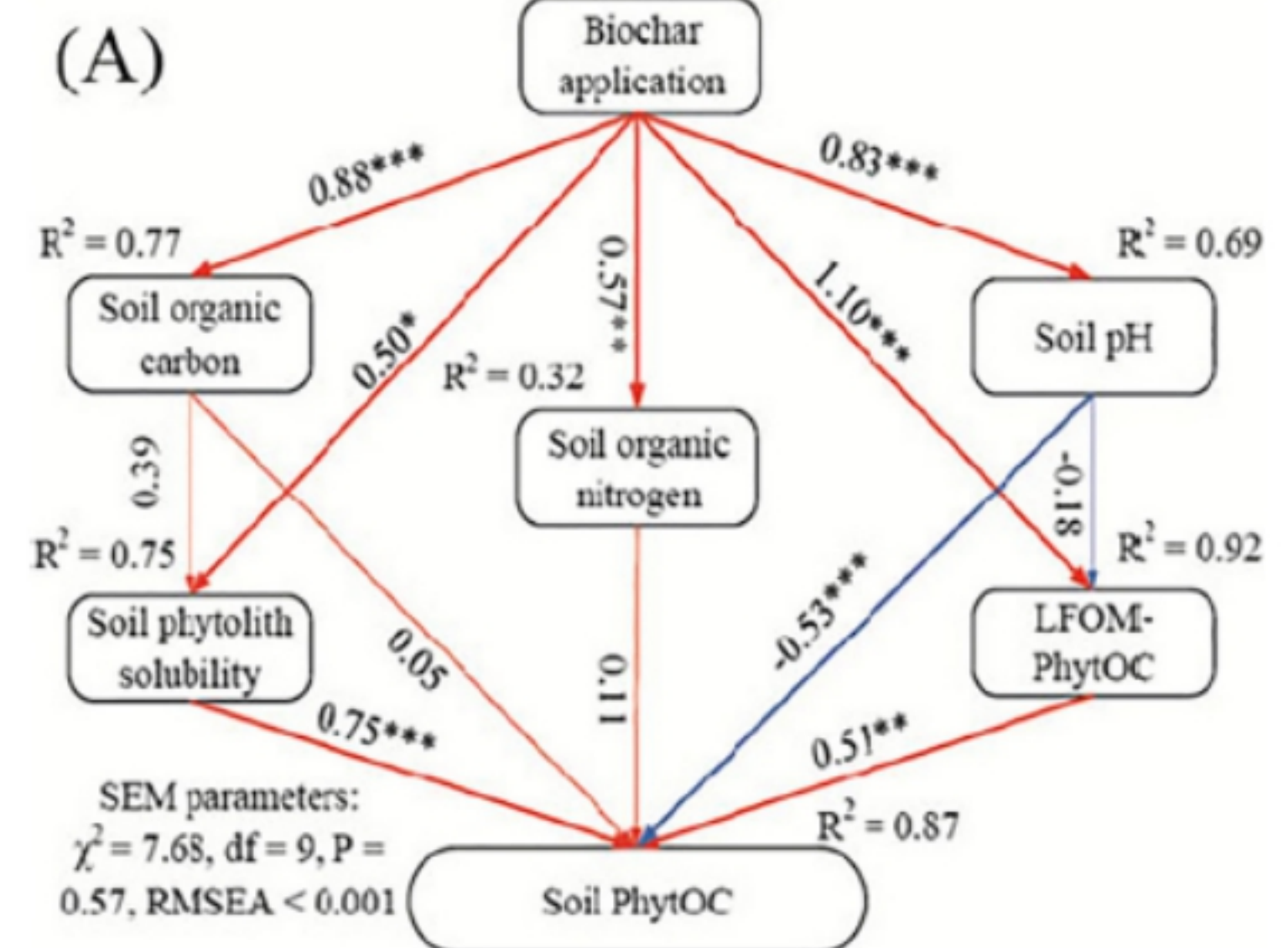
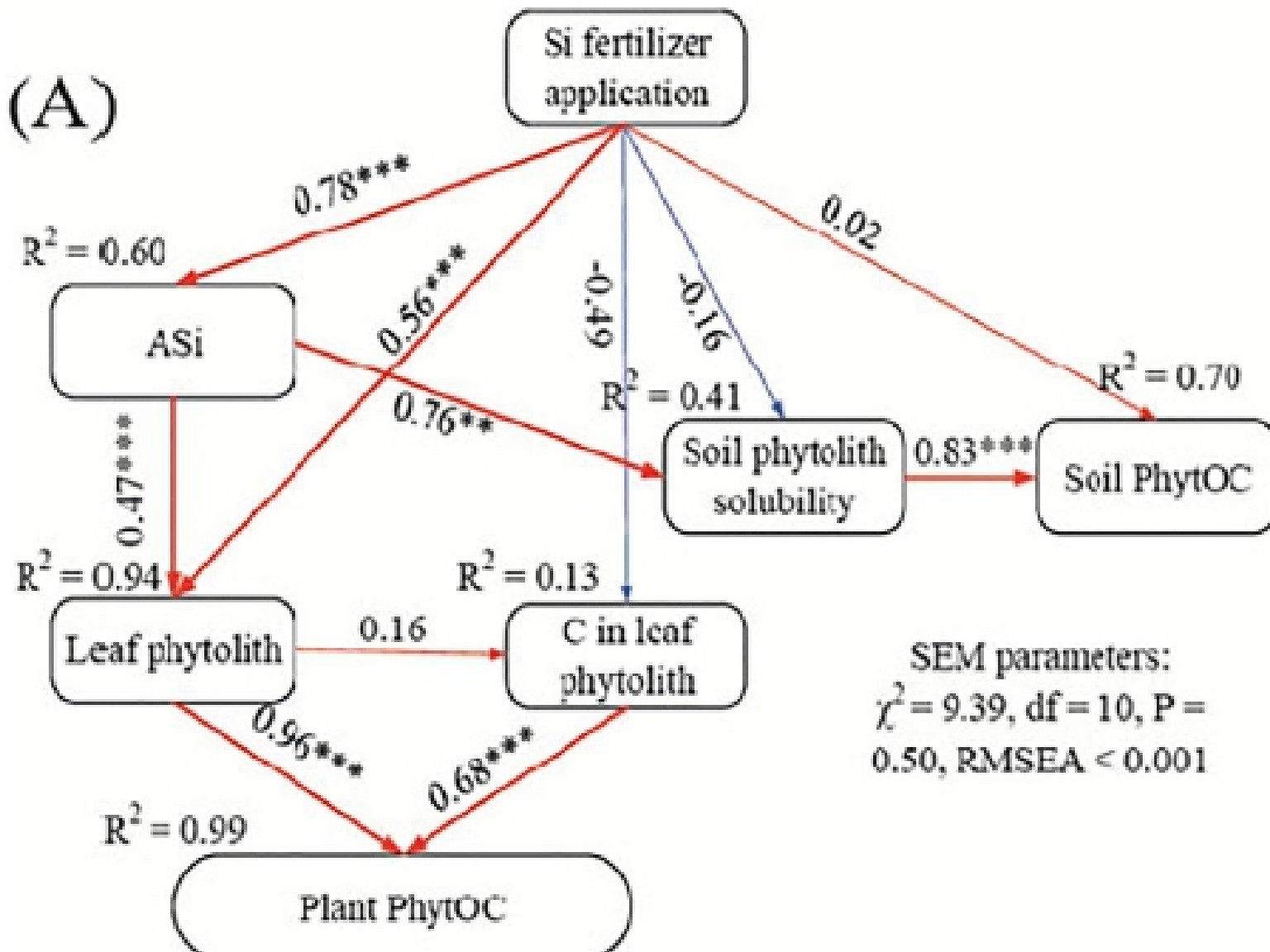
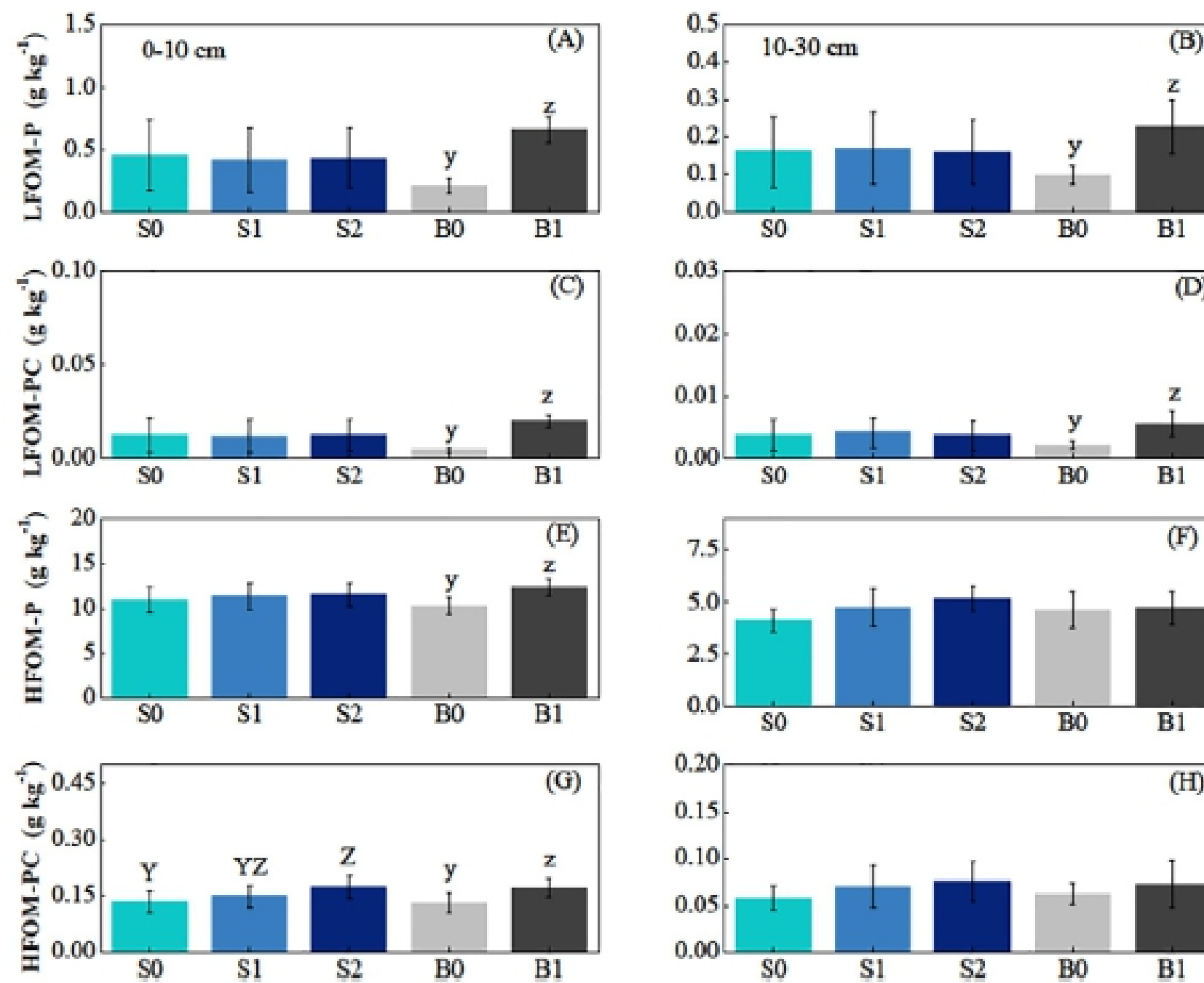
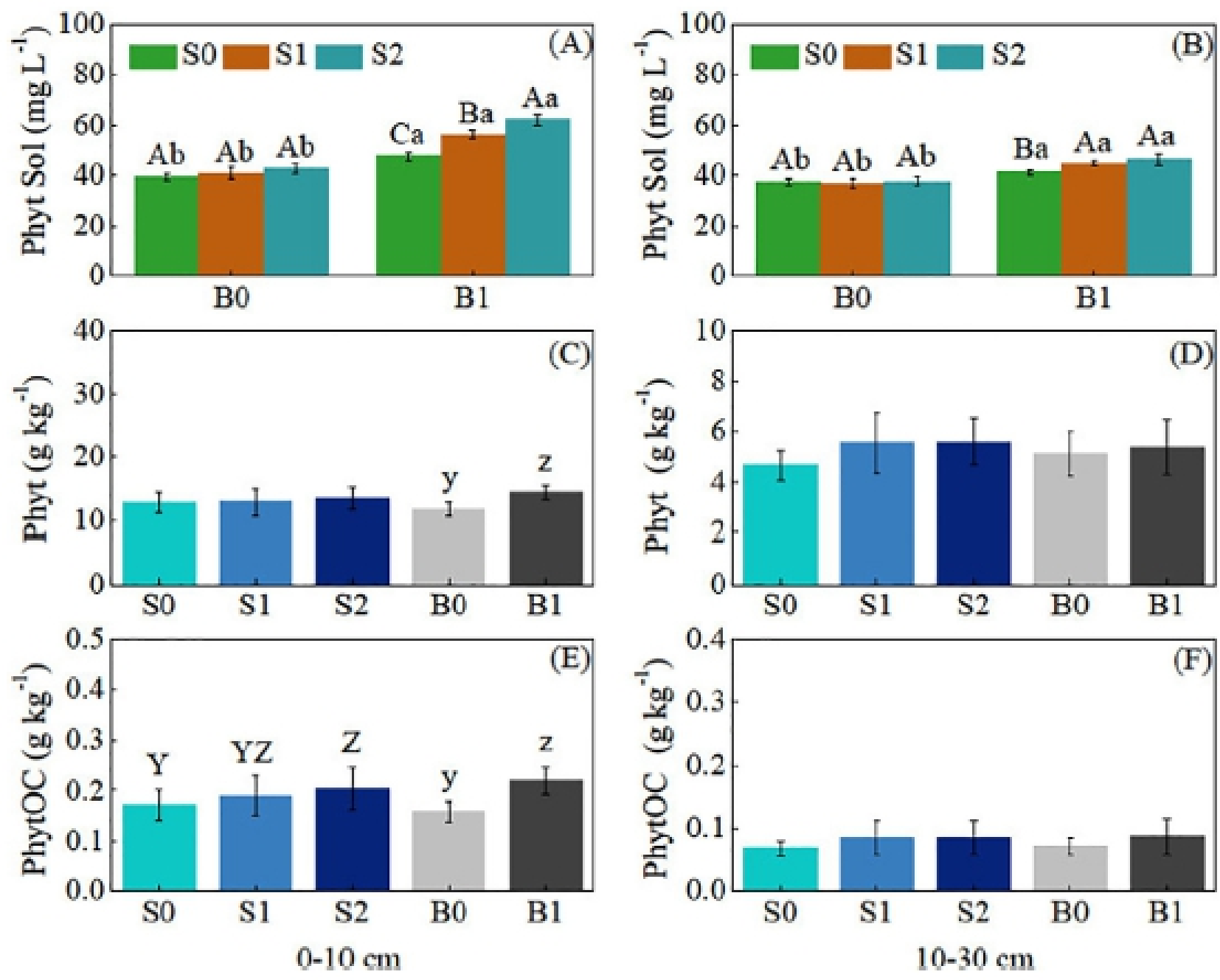
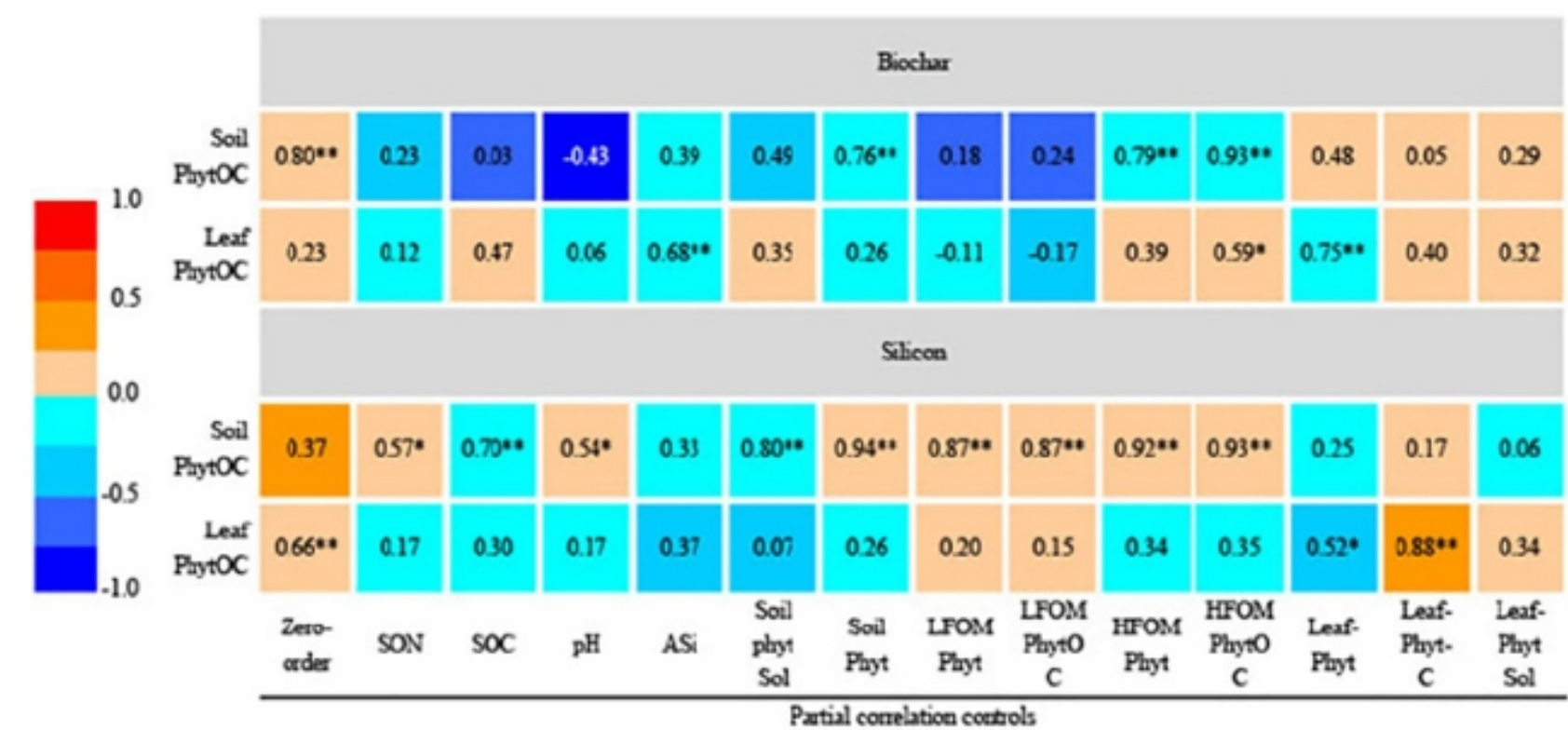
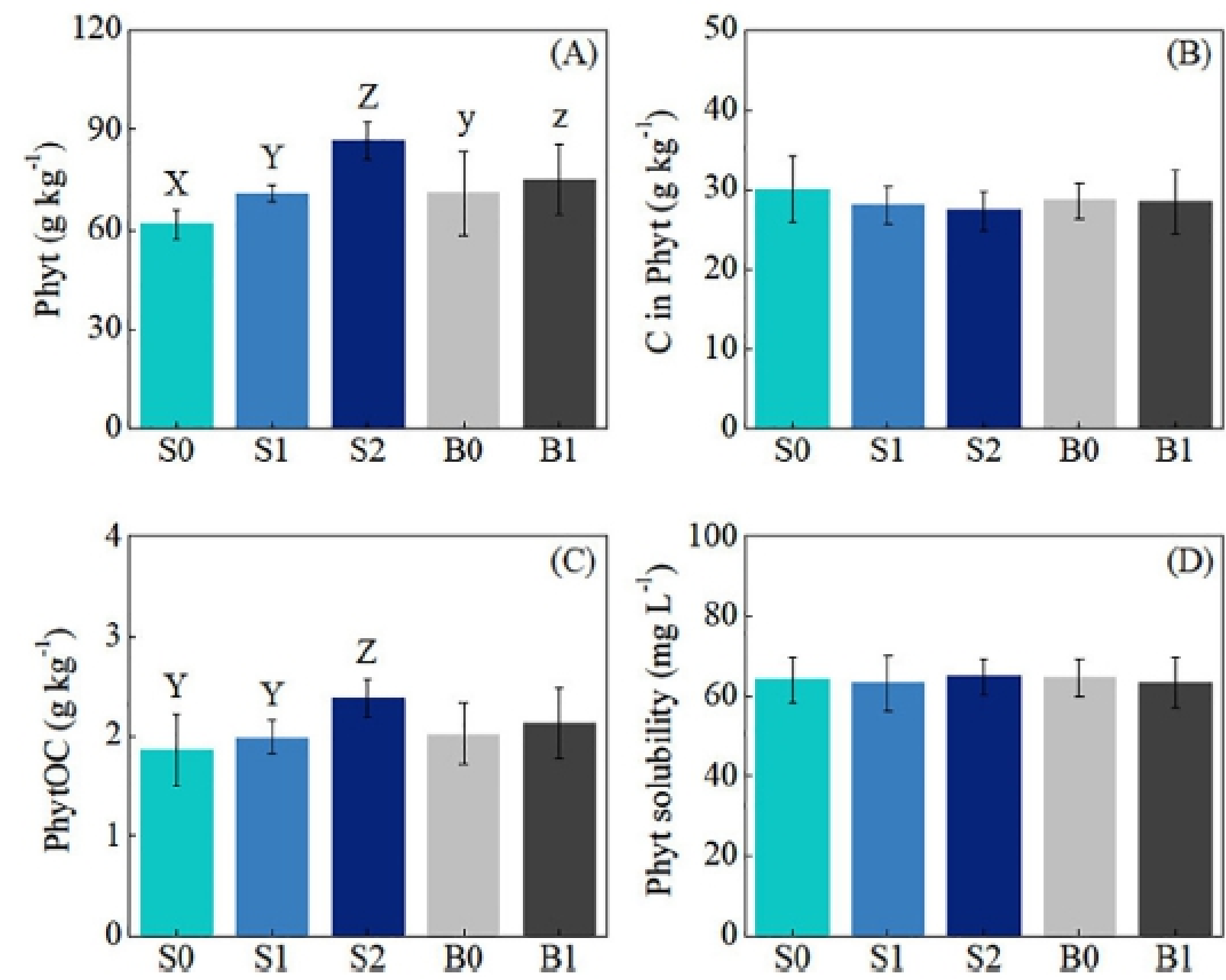
Objectives

We investigated the impact of Si fertilizer and biochar applications on 1) the PhytOC pool size, the solubility of plant and soil phytoliths, and soil PhytOC in soil physical fractions (light (LFOM) and heavy fractions of organic matter (HFOM)) in Moso bamboo forests; and 2) the relationships among plant and soil PhytOC concentrations and soil properties.

Methods

We used a factorial design with three Si fertilizer application rates: 0 (S0), 225 (S1) and 450(S2) kg Si ha⁻¹, and two biochar application rates: 0 (B0) and 10 (B1) t ha⁻¹.

Results



Conclusion

We conclude that Si fertilizer and biochar application promoted PhytOC sequestration in the plant-soil system and changed its distribution in physical fractions in the Moso bamboo plantation in subtropical China.

Acknowledgements

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