Connecting soil dissolved organic matter to soil bacteria community structure in long-term grassmulching apple orchard

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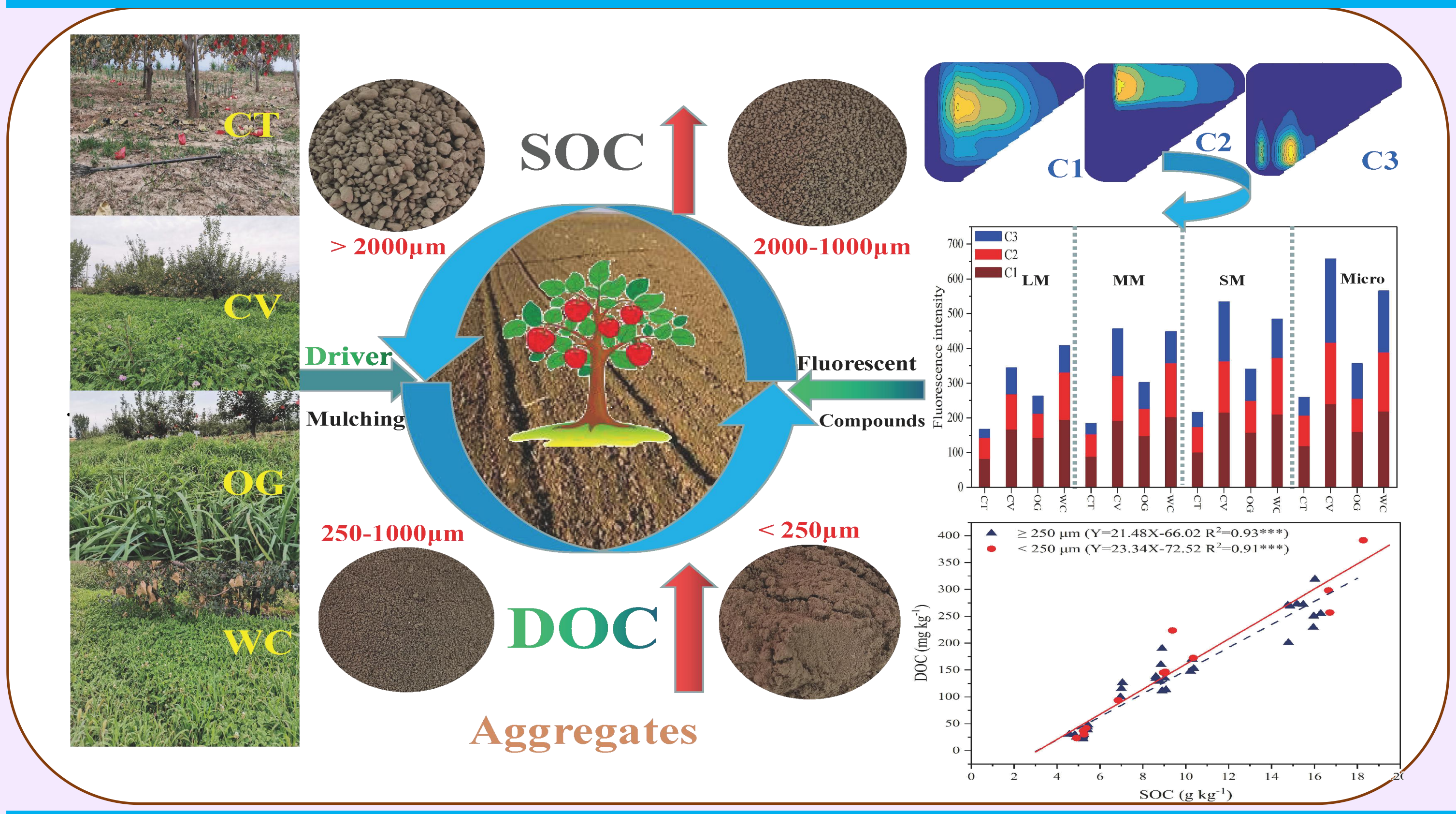
ABSTRACT



INTRODUCTION

- The aggregates associated organic carbon was physically protected various degree as sizes to prevent microbial decomposition, while the agriculture management practices (such as farming and mulching) would affect aggregates distribution.
- Nonetheless, bulk SOC concentration as an important indicator for evaluating the impact of mulch management on soil quality, active SOM components (such as dissolved organic matter DOM) were more sensitive response to agricultural management measures than bulk SOC.
- However, the knowledge of grass-mulching driver to the distribution of soil aggregates and associated DOM in apple orchards was still unclear.
- Therefore, a long-term field positioning experiment of orchard grass-mulching management was conducted on the Loess Plateau. This study combining aggregates screening and three-dimensional fluorescence excitation emission matrix (EEM) methods to clarify the influence of grass-mulching on the distribution of soil aggregates and associated with characteristics of DOM.

OBJECTIVES

This study purpose to clarify that long-term leguminous grass-mulching (crown vetch (CV) and white clover (WC) and gramineous orchardgrass (OG) drive the distribution of soil aggregates and associated with dissolved organic matter(DOM) components and content.

MATERIALS AND METHODS

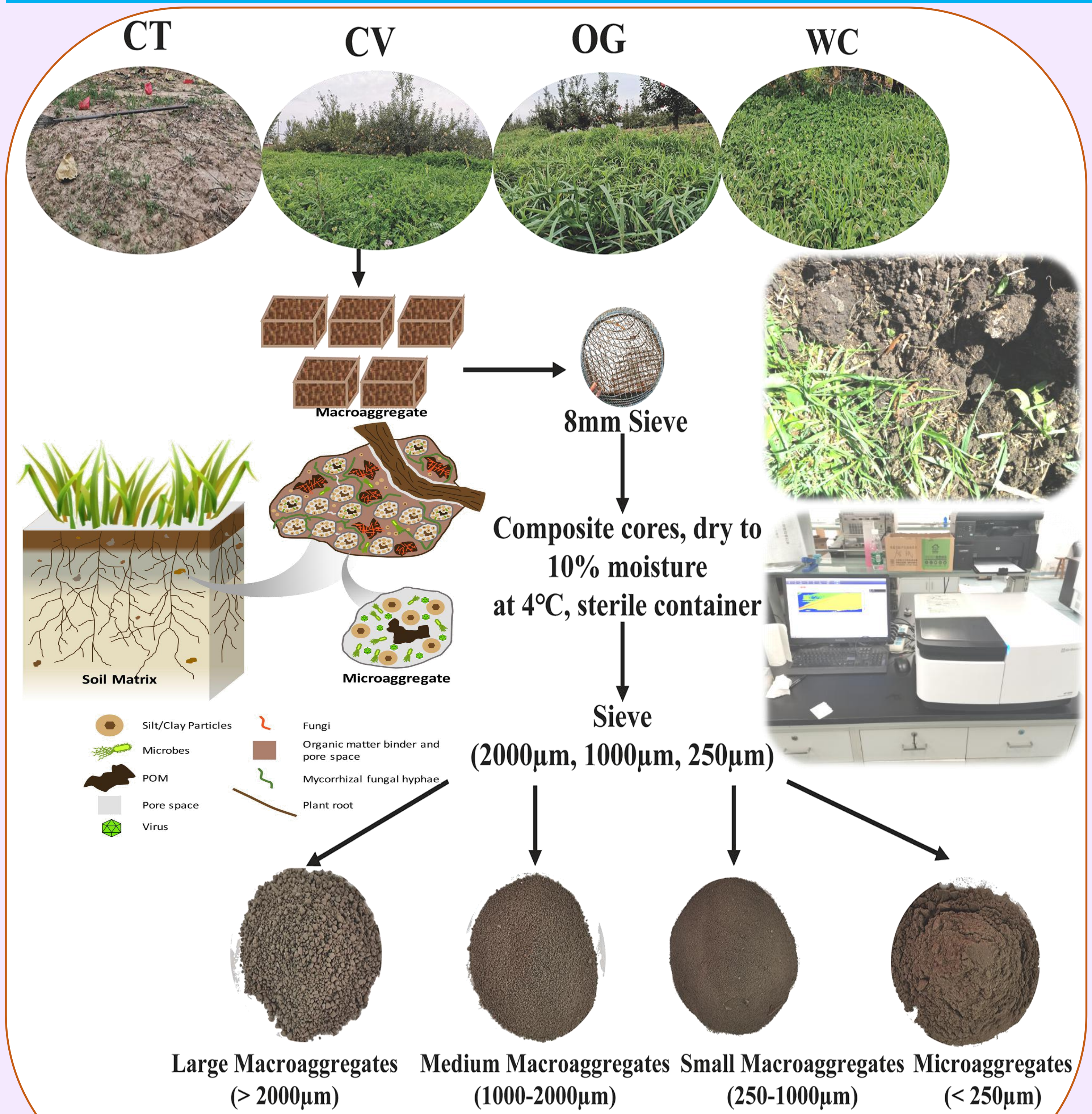


Fig. 1 Grass-mulching management practices and graphical summary of the optimal moisture soil aggregate isolation method. CT, conventional tillage; CV, crown vetch; OG, orchardgrass; WC, white clover.

RESULTS AND DISCUSSION

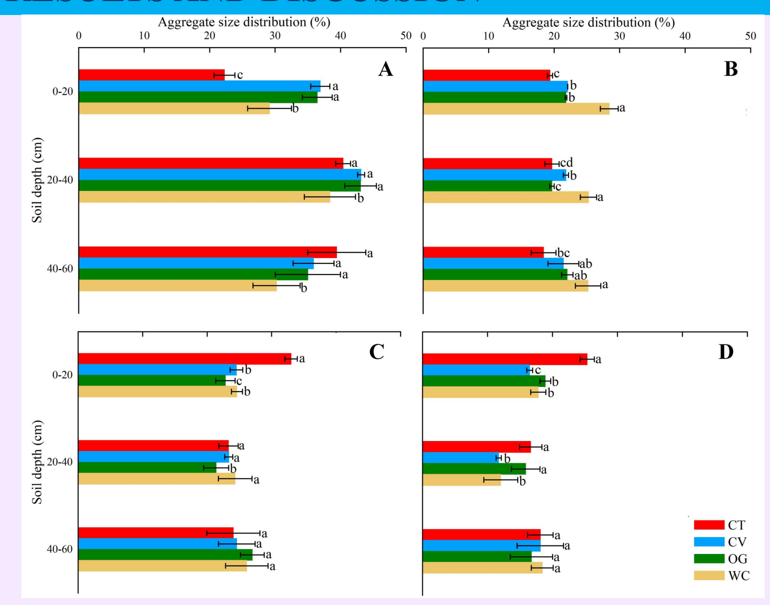


Fig. 2 Distribution of aggregate size classes (%) from 0 to 60 cm under different grass-mulching practices. **(A)** LM; **(B)** MM; **(C)** SM; **(D)** Micro.

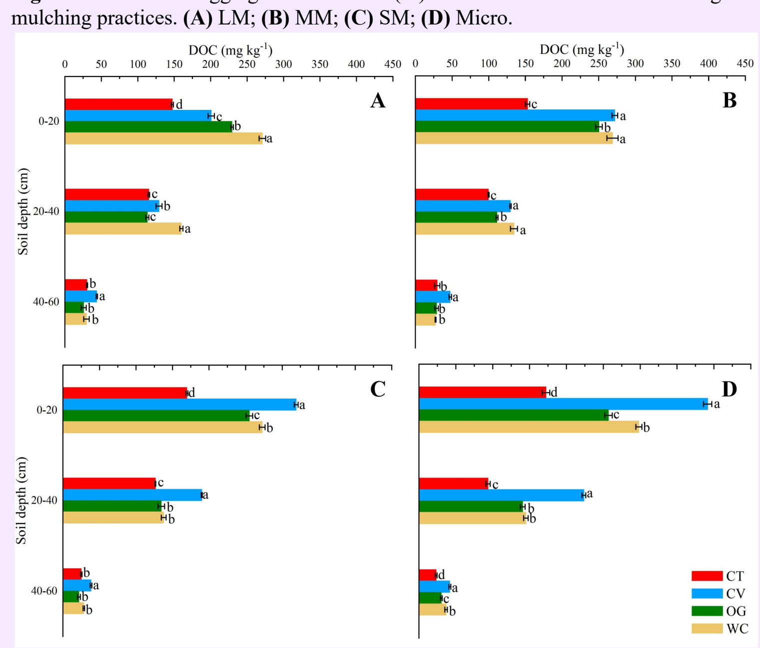


Fig. 3 DOC concentrations in different aggregate size from 0 to 60 cm under different grass-mulching practices. **(A)** LM; **(B)** MM; **(C)** SM; **(D)** Micro.

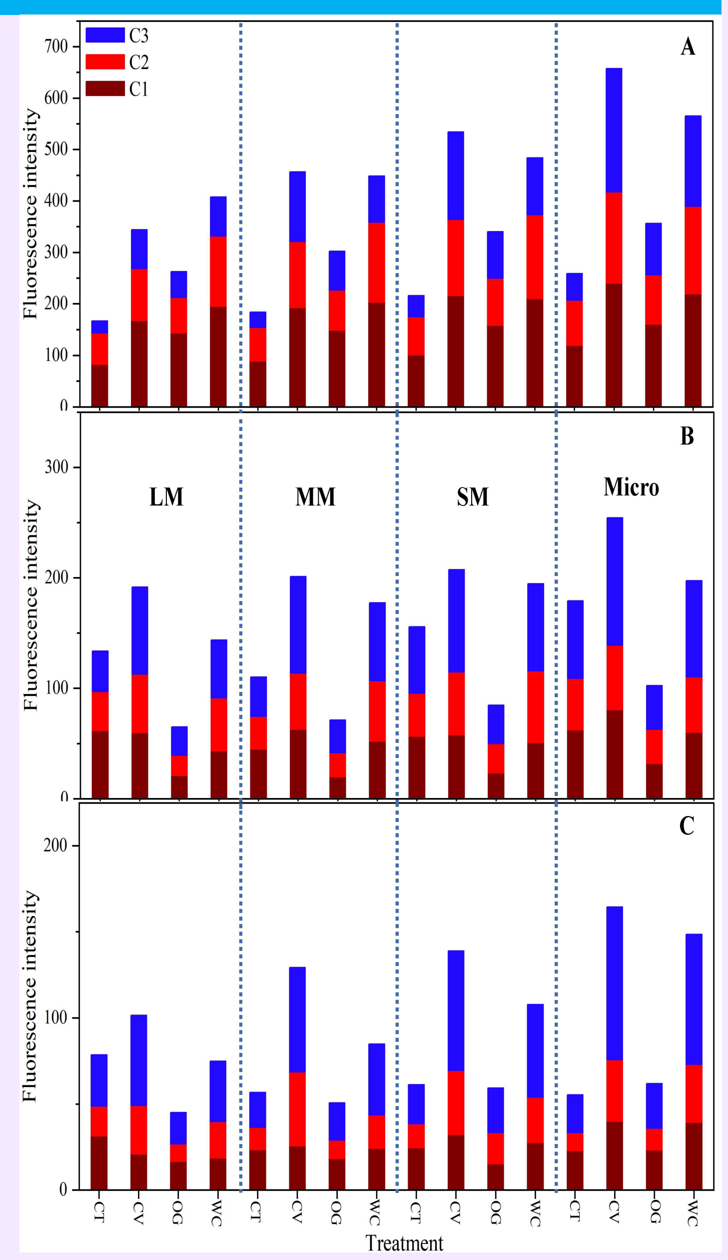


Fig. 5 Variations of fluorescence intensities of DOM three components in different aggregate size from 0 to 60 cm under different grass-mulching practices. (A) 0-20cm; (B) 20-40cm; (C) 40-60cm.

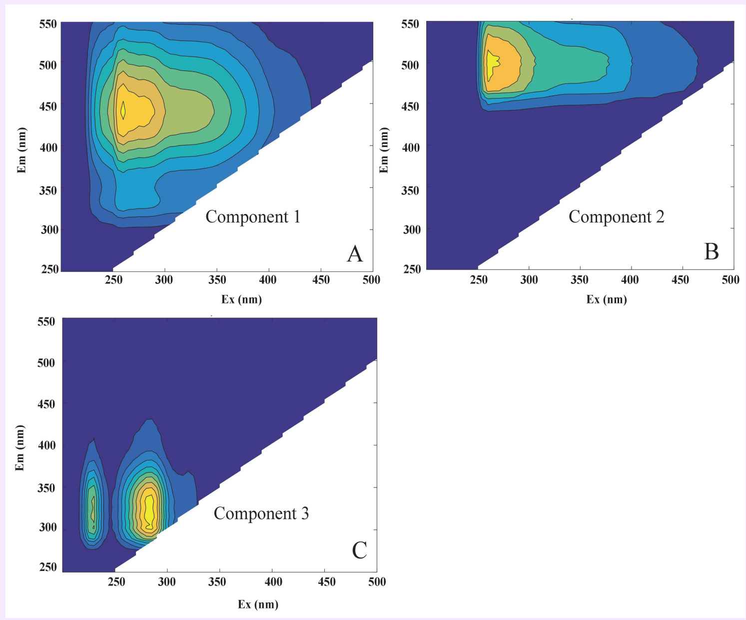


Fig. 4 Contour plots of the three components identified by EEM-PARAFAC analysis (Ex: excitation wavelength; Em: emission wavelength, (A) Component 1 (C1); (B) Component 2 (C2); (C) Component 3 (C3)).

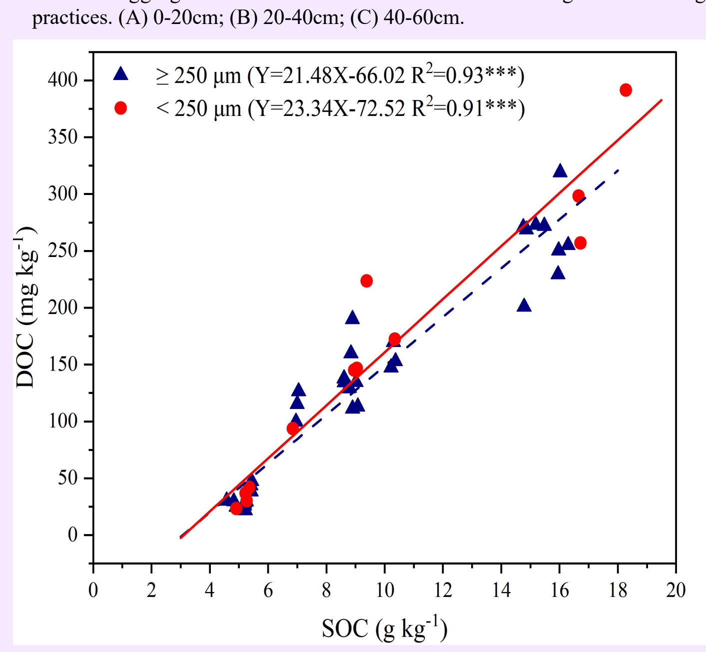
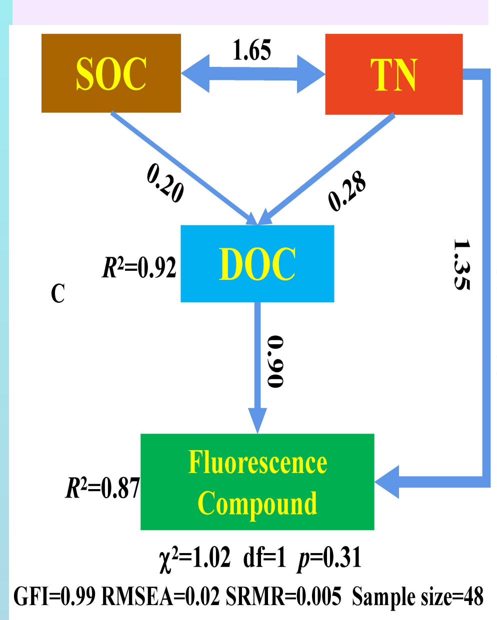
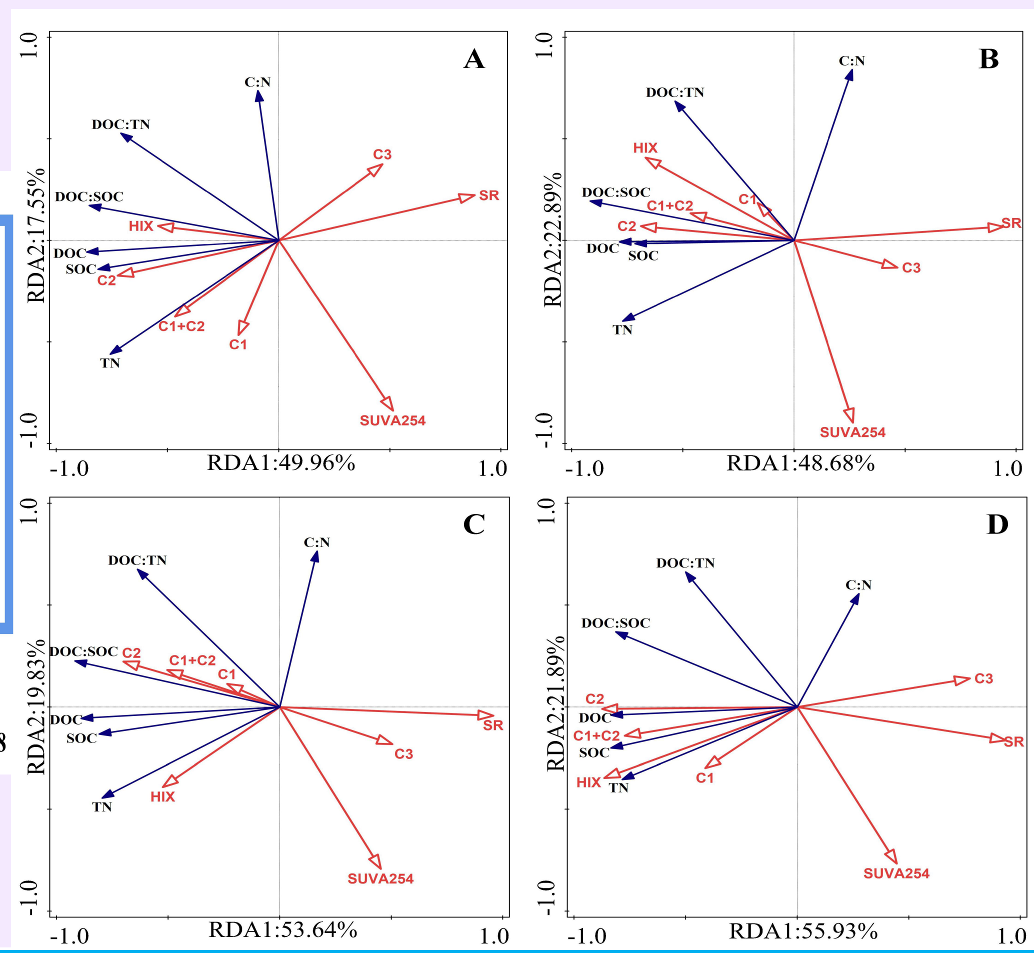


Fig. 6. SOC-DOC distribution scatter diagram in different aggregate size. blue up triangle and line represents macroaggregates (≥ 250μm); red circle and line represents microaggregates (< 250μm) ***Significant at P < 0.001.;

Correlations analysis by SEM and RDA





CONCLUSIONS

- In conclusion, grass -mulching significantly increases the proportion of LM aggregates, leguminous mulching were slightly better than gramineous, and promote SOC and TN accumulation in microaggregates. .
- Moreover, grass-mulching leguminous (CV and WC) was more contributing to the increase of protein like components, and gramineous (OG) was more beneficial to the increase of UVC humic-like. DOM of leguminous grass-mulching has stronger aromaticity and higher molecular weight than gramineous.
- Comparison of among the all treatments clearly indicated that the leguminous grass-mulching was more conducive to the accumulation of LM aggregates nitrogen and transformation of DOM.

ACKNOWLEDGEMENTS

This work was supported by the National Natural Science Foundation of China (NSFC) (31570623), the National Key Research and Development Program of China (2016YFD0201131).