Study on the Effects between Soil Trace Elements and Apple-Pear Quality

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Introduction

With a wide range of fertilizer applications in agriculture, soil trace elements are paid more and more attention in improving crop yields, especially in terms of the quality of agricultural products.

Material, Method, Results and Discussion

This study, for the first time, systematically analyzes and tests the 40 surface soil sample in the apple-pear growing areas of the total elements of Cu, Zn, B, Mo, Mn , the available elements and the corresponding quality indicators in the apple-pear samples of total sugars, total acid , soluble solids , water content and hardness in Yanbian area, Jilin (NE China). Correlation analyses are done by SPSS, calculated the correlation coefficient among the total elements of soil trace elements, the available elements and the quality indicators of the apple-pear respectively. The results show that the total sugar content of apple-pear and the total elements of soil trace elements Mn, Mo have extremely remarkable positive correlations, with the total elements of Cu, Zn exhibiting significant positive correlations, with the available Mn, Mo showing significant positive correlations. Total acid only have significantly negative correlations with the available Zn. Soluble solids, the total elements of Zn, Mn, Mo and the available Mo show extremely remarkable positive correlations, with the total elements of Cu, B having significant positive correlations. Water content and the total elements of Zn exhibit extremely remarkable negative correlations; the total elements of Cu, Mn and the available Mo show significant negative correlations. Hardness, the total elements of Mo and the available Mn, Mo indicate extremely significant negative correlations, with the total elements of Cu, Zn, Mn and the available Zn having significant negative correlations.

Conclusion

Taken together, the above analysis shows that the soil trace elements have the negative and the positive effects on the apple-pear and effects are remarkable. Therefore, it will make an important sense to combine the characteristics of the soil trace elements and fruit quality. The improving of the quality of agricultural products, reasonable landing using and scientific products program planning are of great significance.

Microscopic structures and acid chemistry of interfaces between phyllosilicates edges and water

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Knowledge on phyllosilicates (2:1- and 1:1-type)–water interfaces is critical for both understanding natural processes and guiding development of advanced hybrid materials. Due to the layered structures, their surfaces can be grouped into basal surfaces and edge surfaces (i.e. broken surfaces). Compared to basal surfaces whose properties have been well realized, chemical properties of edge surfaces are much more subtle and therefore are impossible to reveal by experimenting or force field based simulations.

With FPMD (first principles molecular dynamics) and free-energy calculation techniques [1~3], we investigated the structures and acid chemistry of these complicated interfaces [4, 5]. According to systematic simulations, the following has been achieved. (1) Through investigating the leaving processes of coordinated waters of edge cations, interfacial hydration states are revealed and thus the topologies are pictured (see Fig. 1 for 2:1-type) (2) Interfacial acidic sites have been figured out with detailed analyses of H-bonding networks. (3) Acidity constants of those acidic sites are derived by free-energy calculations for proton transfer reactions.

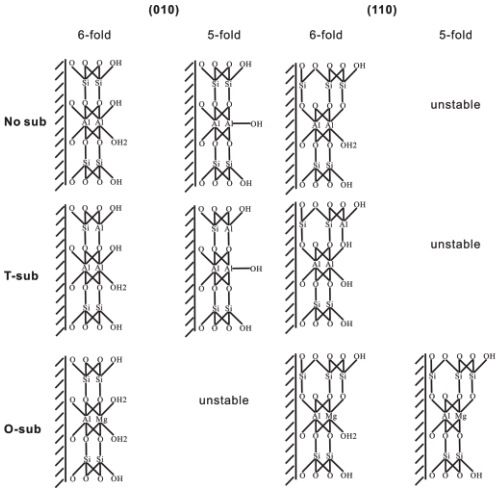

Figure 1: Topologies of edge surfaces of 2:1-type phyllosilicates.

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