The distribution characteristics of Selenium in the rice roots soil of Qinbei District in Guangxi, China

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Iron oxides are widely distributed across the surface of the Earth with the aerobic weathering of primary Fe-bearing minerals. Pedogenic Fe oxides and their related parameters have been commonly employed as favorable pedogenic and climatic indicators in soil taxonomy and paleoclimate reconstruction, especially in less to moderate rainfall regions. Magnetic susceptibility (χ) which reflect the content of maghemite in soils, were determined using a Bartington MS2 meter at 0.47 kHz (χ_{lf}) and 4.7 kHz (χ_{hf}). Frequency-dependent magnetic susceptibility, expressed as χ_{fd} and χ_{fd}% were calculated using the formulae χ_{lf}-χ_{hf} and (χ_{lf} - χ_{hf}) / χ_{lf} × 100% to determine the content of superparamagnetic ferrimagnets.

To study the accumulation of selenium with iron oxides in the soil of Qinbei district in Qinzhou city of Guangxi in China, we sampled 31 rice roots soil which were allocated with latosolic red soil or paddy soil that developed from granite weathering. The results showed that the pH of soils ranged from 4.66 to 5.36, belonging to the strong acidic soil, and the average concentration of selenium was 0.557 mg/kg, with the ration of 0.275 ~ 1.043 mg/kg and selenium-rich rate as high as 90.32%(over 0.4 mg/kg). The χ_{fd} and χ_{fd}% of 15 samples were 0.0 10^{-8} m^3/kg and 0.0%, with the maximum of the total were 0.3 10^{-8} m^3/kg and 5.9%, respectively, and these may indicate they were affected by the water reduction conditions rather than pedogenesis. The correlation analysis between soil selenium content and other indicators revealed a significant positive correlation between soil selenium and the total Fe_2O_3 content, the chemical index of alteration (CIA) and χ_{lf}, with the correlation coefficient *r* were 0.61, 0.63 and 0.26, respectively. On the contrary, the selenium content decreased with the increase of SiO_2/Al_2O_3 and χ_{fd}% in the roots soil. These results may indicate that the selenium contents of the rice roots soil in granite area were mainly dominated by the contents of Fe oxides and clay.