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Effects of the addition and aging of humic acid-based amendments on the solubility of Cd in soil solution and its accumulation in rice

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Abstract: Humic substances can reduce mobility and bio-accessibility of Cd in soil and therefore inhibit its uptake by rice, which is a major source of human Cd intake. Yet, the effects of aging humic substances are not fully understood. A rice pot experiment was conducted to evaluate the effects of humic acid-based amendments on the mobility of Cd in soil solution and its uptake by rice when amendments were freshly added or aged for 130 d. The results showed that the aged and the unaged amendments generally decreased Cd concentration in soil solution, but the effect declined with time. Unaged HA-K (humic-potassium) reduced Cd concentration by 88% for the first sampling, but this dropped to 46% for the last sampling, compared to that of the control. All amendments, whether aged or not, reduced the content of Cd in rice seedlings, as well as in mature plants. Aged and unaged woody peat reduced the Cd content in seedlings by 79% and in grains by 70%, respectively. Aging of amendments caused lower pH and higher Cd concentration in the soil solution for all

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Abbreviations: humic-ammonia (HA-AM), humic-potassium (HA-K), humic-calcium (HA-Ca), control (CK), guaranteed reagents (GR), standard errors (SE), and analysis of variance (ANOVA).