

## 河川水系における微量元素の川から水稻体内への輸送メカニズム

Transportation mechanism of trace elements from river to the inside of paddy rice in river water system

\*室田 健吾<sup>1</sup>、中屋 眞司<sup>1,2</sup>、石川 満範<sup>1</sup>、益田 晴恵<sup>3</sup>

\*kengo muroda<sup>1</sup>, Shinji Nakaya<sup>1,2</sup>, Mistunori Ishikawa<sup>1</sup>, Harue Masuda<sup>3</sup>

1.信州大学工学部土木工学科、2.信州大学工学部水環境・土木工学科、3.大阪市立大学理学研究科

1.Department of Civil Engineering, Faculty of Engineering, Shinshu University, 2.Department of Water Environment and Civil Engineering, Faculty of Engineering, Shinshu University, 3.Department of Geosciences, Faculty of Science, Osaka City University

Some toxic and nutrient trace elements are often transported to paddy field through irrigation from river water. The transportation mechanism of toxic trace elements in a local river water system is important for sustainable, environmental conservation and for risk reduction. In order to clarify the mechanism for transportation and deposition of toxic trace elements from river water to paddy rice, we analyze the concentration of trace and major elements in two river waters, paddy field waters, and paddy rice, root, shoot, leaf, and grain, separately, in headwaters, which is in volcanic rock areas near Mt. Asama and Mt. Yatsugatake in Saku, Nagano. The number of sampling are at 15 points in waters of river and of paddy field, and 2 points in paddy rice in each Asama area and Yatsugatake area.

From the correlation between major elements and toxic trace elements, it is inferred that Fe-colloid works as an attracter due to sorption to trace elements in a river. In paddy field, some trace elements are likely to precipitate with Fe-colloid, and other trace elements in water-soluble state can infiltrate into soil. The following conclusions are obtained: 1) The toxic trace elements in river waters are with compatible major attracter elements; (a) Fe-colloid for (Cr, Cu, Ga, La, Zn, Cs, U) and (Ti, Al, Mn) in Mt. Yatsugatake area, (b) Fe-colloid for (Cr, Cu, Zn) and (Al) in Mt. Asama area, 2) (a) No attracter for (Se, Rb, Sr) in river water in Mt. Yatsugatake area, (b) No attracter for (Se, V, Ga, Ge, Sr, Y, Cs, Ba, La, U) and (Mn, Ti) in river water in Mt. Asama area. And 3) (As, Cd, Mn, Ni, Sb, Sr, Zn) are transported with Fe from root to shoot in paddy rice, while (As, Co, Mn, Sr, Zn) are transported with Fe from shoot to grain in paddy rice, and (Sr, Zn) are transported with Fe from shoot to leaf in paddy rice. Especially, we conclude that As is transported with Fe from root to grain through root in paddy rice.

From the described above, it is modeled that first, Fe-colloid works as an attracter of trace elements, transporting them to paddy fields, second, Fe works as a transporter of trace elements from root to shoot, however, from shoot to leaf, and from shoot to grain, some trace elements are transported and deposited in separating from Fe.

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