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^{90}Sr uptake in the freshwater liverwort *Riccia fluitans* L.

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^{90}Sr is a radioactive isotope of strontium produced by nuclear fission, with a half-life of 28.8 years. This artificial radioisotope is present in natural ecosystems as the results of radioactive fallout from nuclear weapons or releases during nuclear power plants accidents; because of its similarity with Ca^{+2} is quickly incorporated into the biota. The high mobility of Sr^{+2} in aquatic compared with terrestrial ecosystems makes the uptake and accumulation of $^{90}Sr^{+2}$ higher in aquatic than in terrestrial plants (Kalinichenko *et al.,* 2018). Here we analyse the uptake rate, kinetics and retention, concentration factor (CF) of ^{90}Sr in the freshwater liverwort *Riccia fluiants.*

^{90}Sr uptake by *R. fluitnas* shows a bi-phasic kinetics that fits the Michaelis & Menten model in both micro and milimolar concentration ranges. Apparent semi-saturation constants (K_M) were 15 μM and 2 mM for the high and low affinity ranges, respectively. The presence of the K^+ channels blocker tetraethyamonium (10 mM TEA) inhibits ^{90}Sr uptake by only a 25%. However, the presence of 1 mM La^{+3} completely inhibits ^{90}Sr uptake in this plant. Maximum incorporation rate occurs at alkaline external pH (8.3), either in plants grown in the presence of K^+ (K^+-sufficient plants) or in the absence (K^+ -deficient plants). Finally, gradual increases of the Ca^{2+} concentration in the assay medium progressively inhibits ^{90}Sr uptake. CF values are higher in K^+ -deficient plants, with a maximum of 1500, than in K^+ -sufficient, (maximum CF of 600) and show similar responses to inhibitors, pH or Ca^{2+} than the described for uptake rates. CF values progressively decrease at increasing external Ca^{2+} concentrations, higher CF values are found at pH 8.3 but lower values are observed in the presence of TEA, being close to zero in the presence of La^{+3}. The different ^{90}Sr uptake rates in K^+-sufficient and K^+-deficient plants and TEA sensitivity indicate that one part of ^{90}Sr would be transported through non-selective cation channels. Furthermore, Ca^{2+} and La^{3+} sensitivities suggest that ^{90}Sr could be incorporated through Ca^{2+} channels.

References

Kalinichenko et al., 2018. Gupta D. K. & Walther C. (eds), Behaviour of Stronium in Plants and the Environment. Springer International Publishing AG 2018. Doi: 10.1007/978-3-319-66574-0_9

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