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◀ [1] ▶

Record 1 of 1

Title: Salt accumulation and depletion in the root-zone of the halophyte *Atriplex nummularia* Lindl.: influence of salinity, leaf area and plant water use

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Abstract: Salt is known to accumulate in the root-zone of Na⁺ excluding glycophytes under saline conditions. We examined the effect of soil salinity on Na⁺ and Cl⁻ depletion or accumulation in the root-zone of the halophyte (*Atriplex nummularia* Lindl).

A pot experiment was conducted in soil to examine Na⁺ and Cl⁻ concentrations adjacent to roots at four initial NaCl treatments (20, 50, 200 or 400 mM NaCl in the soil solution). Plant water use was manipulated by leaving plants with all leaves intact, removing approximately 50 % of leaves, or removing all leaves. Daily evapotranspiration was replaced by watering undrained pots to weight with deionised water. After 35-38 days, samples were taken of the bulk soil and of soil loosely- and closely-adhering to the roots.

In plants with leaves intact grown with 200 and 400 mM NaCl, average Na⁺ and Cl⁻ concentrations in the closely adhering soil were about twice the concentrations of the bulk soil. Ion accumulation increased with final leaf area and with cumulative transpiration over the duration of the trial. By contrast, in plants grown with the lowest salinity treatment (20 mM NaCl), Na⁺ and Cl⁻ concentrations decreased in the closely adhering soil with increasing leaf area and increasing cumulative water use.

Our data show that Na⁺ and Cl⁻ are depleted from the root-zone of *A. nummularia* at low salinity but accumulate in the root-zone at moderate to high salinity, and that the ions are drawn towards the plant in the transpiration stream.

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◀ [1] ▶