Influence of salinity on biometal content in kale

(*Brassica oleracea* var. *acephala*)

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Background

Kale (*Brassica oleracea* var. *acephala*) is a non-headed cultivar of cabbage (*Brassica oleracea*) originated in the eastern Asia Minor and Mediterranean area. Its cultivation for food is dated back to 2000 BC.

Climate changes impose severe abiotic stresses, such as soil salinity, that are seriously impairing crop yields and quality in affected areas. Over 7% of the world's total land and approx. 20% of irrigated land is affected by high salinity.

Depending on the plant species increased salinity impacts photosynthesis, various physiological and biochemical processes finally resulting in growth inhibition and decreased crop yield.

Furthermore differences in metal uptake and accumulation caused by the increased sodium impact are expected.

Experimental

Roots and leaves of hydroponically grown kale plants exposed to elevated salinity (200 mmol/L sodium chloride) alongside and corresponding controls (untreated plants) were analyzed.

All samples were washed with ultra-clean water, dried to constant weight and homogenized prior to microwave-assisted digestion using nitric acid and hydrogen peroxide. Four replicates were prepared for exposed as well as control samples.

After digestion the contents of Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, K, Li, Mg, Mn, Mo, Na, Ni, Pb, Rb, Se, Sr, Te, Tl, U, V, Zn were determined using ICP-OES and ICP-MS [inductively coupled plasma – optical emission/mass spectrometry].

All analytes present above LOQ are listed in the table, showing statistically significant differences in their contents due to increased salinity.

Results & Discussion

	roots	leaves
Al	increase	increase
B	no sign. change	decrease
Ba	increase	no sign. change
Ca	no sign. change	no sign. change
Cd	increase	decrease
Co	increase	no sign. change
Cr	increase	decrease
Cu	increase	no sign. change
Fe	increase	no sign. change
K	no sign. change	no sign. change
Li	decrease	decrease
Mg	no sign. change	no sign. change
Mn	decrease	decrease
Na	increase	increase
Ni	increase	decrease
Pb	no sign. change	decrease
Rb	no sign. change	no sign. change
Sr	no sign. change	no sign. change
V	increase	no sign. change
Zn	no sign. change	no sign. change

Salinity stress seems to increase the accumulation of potentially toxic elements in the roots.
Major elements (Ca, K, Mg) do not show a sign. change.
Li content decreases in roots and leaves, whereas Rb is not affected by the higher Na impact.