Exchangeable elements

Organic particles such as humus and mineral particles such as clay minerals, oxides and hydroxides have (mostly negatively) charged surfaces (**sorption surfaces**), they act like "magnets". These surfaces "attract" and attach positively charged particles, so called cations (e.g., Ca^{++}, Mg^{++}, K^{+}, Na^{+}, H^{+}).

By increasing the concentration of substances in the soil solution (e.g. by means of fertilization, root excretions), attached particles can be displaced, they dissolve into the soil solution and thereby become available for plant roots. An exchange has taken place.
The capacity of a soil to attach/accumulate nutrients in an exchangeable manner is called "exchange capacity" (=magnetic strength). Abbreviation: CEC (English) or KAK (German), unit: $mmol_c/kg$ or meq/100g.

Ecological importance:

The exchangeable elements are the **most important pool for plant nutrition**! The **ratios of elements** are much more important than their absolute concentration. The following ratios have proven to be favorable:

Ca : Mg : K : Na = 60-80 : 10-20 : 1,5-4 : < 5

With this composition, optimal plant nutrition, a proper supply for soil life and favorable aggregate stability can be expected.

The composition of the "magnet" is affected by:

Fertilizer input, concentration of the soil solution, mobilization of reserve substances, biological activity and management practices.

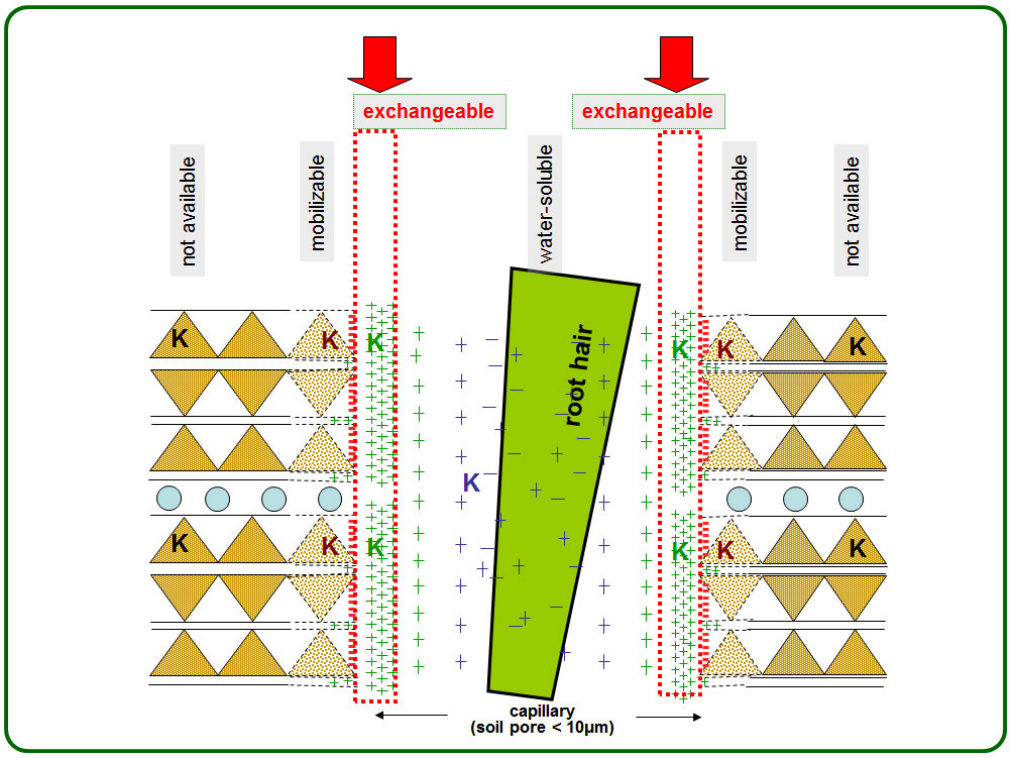

Figure: Soil pore, elements (e.g. K) in different solubilities, highlighted: exchangeable elements.