

Exchangeable Elements

Organic parts like humus and mineral parts like clay minerals, oxides, hydroxides have (generally negative) loaded surfaces (**sorption surface area**) – they act like „magnets“. These surfaces „pull“ and attach positively loaded parts, so called cations (e.g. Ca⁺⁺, Mg⁺⁺, K⁺, Na⁺, H⁺).

By increasing the concentration of substances in the soil solution (e.g. fertilizing, root excretions) attached parts are suppressed and become available for the roots. . An exchange took place.

The ability of the soil to attach exchangeable nutrients is called exchange capacity (=magnetic strength). Acronym: CEC (English) resp. KAK (German), unit: mmolc/kg.

Ecological Importance:

Exchangeable elements are the **most important pool for plant nutrition!** The **ratios of the elements** to one another are much more important than their absolute concentration. The following ratios turned out to be favourable:

$$\text{Ca} : \text{Mg} : \text{K} : \text{Na} = 60\text{-}80 : 10\text{-}20 : 1,5\text{-}4 : < 5$$

With this composition you can expect optimal nutrition supply for plants, a good supply for soil life and good aggregate stability.

The Composition of the Magnet is influenced by:

Input of fertilizers, concentration of the soil solution, mobilization of reserve substances, biological activity and type of cultivation.

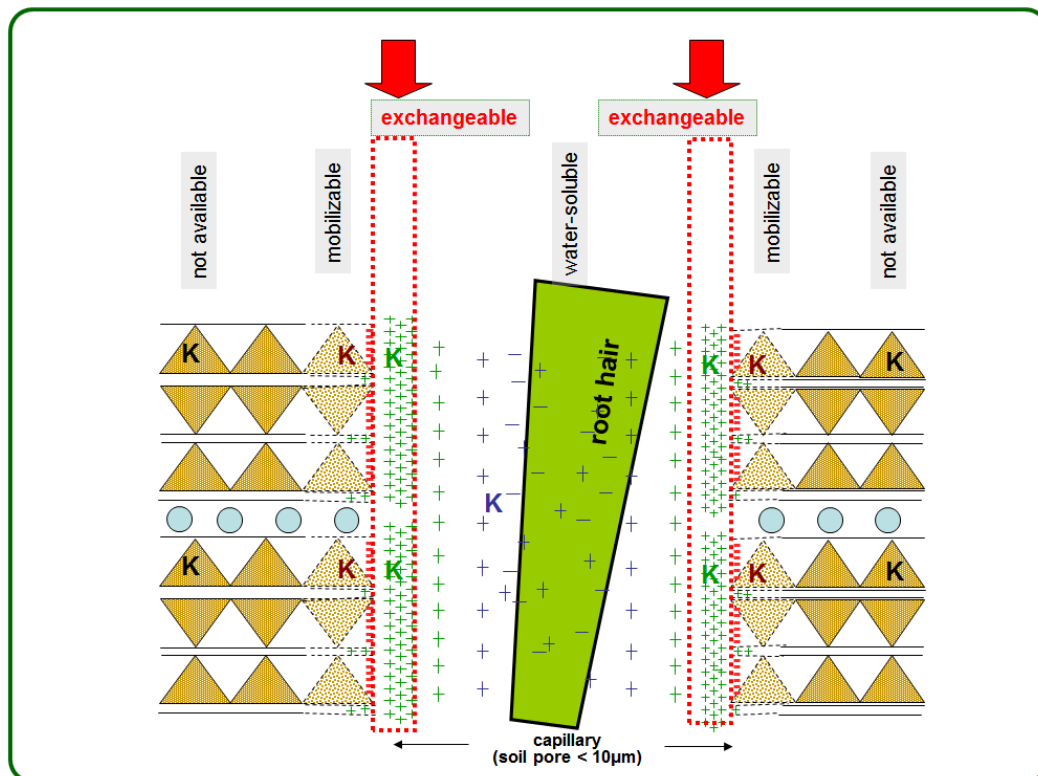


Figure: Soil pore, elements (e.g. K) in different solubilities, highlighted: exchangeable elements.