BODEN

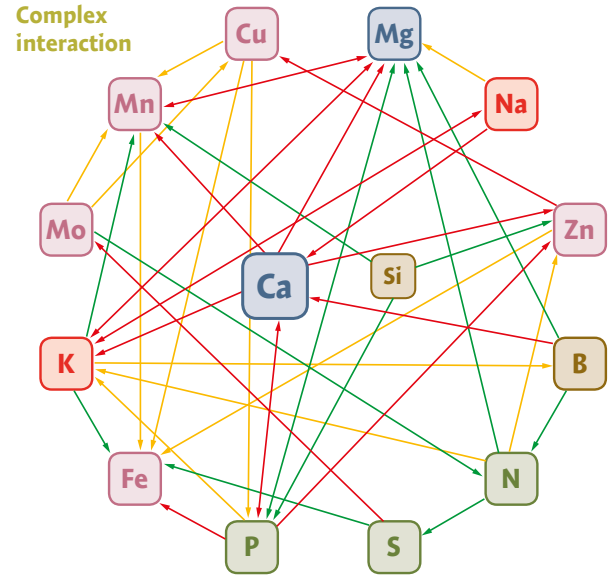
ökologie analytik landschaft

TB UNTERFRAUNER GMBH

NUTRIENTS

It all depends on the right ratio!

www.bodenoekologie.com



Ca

Atomic weight: 40.07 g/mol **Charge:** 2+
Content in soil: 0.1 % to 1,2 %
Content in plants: 0.05 % to 5 %

CALCIUM is the forgotten nutrient; it stabilizes soil aggregates by acting as a bridge between the clay particles and strengthens the cell walls.

Function: Promotes cell strength, component e.g. of phytin (= P-storage!), involved with manganese in the photosynthesis

Mobility: Immobile, only taken up in young organs, cannot be moved, continuous supply is necessary

Deficiency: Chlorosis of younger leaves, stem softness, bitter pit, apical-blossom end rot, blackheart

Antagonists: K, Mg, NH_4-N, B, Fe, Mn, Zn, P, Al, S

Mg

Atomic weight: 24.30 g/mol **Charge:** 2+
Content in soil: 0.05 % to 0.5 %
Content in plants: 0.1 % to 1 %

MAGNESIUM makes the soil plastic, responsible for the leaf green in plants and closely linked to the energy metabolism.

Function: An essential component of chlorophyll, 85% of the magnesium dissolved is responsible for the transport of starch and sugar within the plant

Mobility: Mobile, can be moved in all directions, enriched with P in grains, continuous supply is necessary

Deficiency: Chlorosis of older leaves (relocation of Mg from chlorophyll), interveinal chlorotic yellow or yellow-white marbling, stalk paralysis

Antagonists: K, Ca, NH_4-N, Mn, P, Zn, Al

K

Atomic weight: 39.09 g/mol **Charge:** 1+
Content in soil: 0.2 % to 3.3 %
Content in plants: 0.5 % to 5 %

POTASSIUM can contribute to soil crusting, is not a component of organic compounds in plants; controls the water balance.

Function: Regulation of the osmotic pressure, opening and closing of the stomata, frost protection

Mobility: Very mobile, > 95% dissolved, maximum need during the vegetative phase, relocated back into the soil from the end of flowering

Deficiency: Chlorosis of older leaves, limp plant, wilting, reduced frost resistance

Antagonists: Mg, Ca, Na, B, N, Zn, P, Mn, Fe

N

Atomic weight: 14.01 g/mol
Charge: 3-, 2+, 3+, 4+, 5+
Content in soil: 0.02 % to 0.4 %
Content in plants: 1 % to 5 %

NITROGEN is mainly organically bound in soils, a component of numerous compounds and known as the growth engine in plants.

Function: Component of proteins (ratio to sulfur important!), Enzymes, chlorophyll, vitamins

Mobility: Mobile, in case of deficiency breakdown from chlorophyll, greatest requirement for main leaf development

Deficiency: Chlorosis, reduced growth and yield, poor tillering, premature flowering, older leaves turn yellow

Antagonists: S, Zn, K, Ca, Mo, B, Mg, Cu

P

Atomic weight: 30.97 g/mol
Charge: 3-, 3+, 5+
Content in soil: 0.01 % to 0.1 %
Content in plants: 0.1 % to 0.5 %

PHOSPHORUS is often sufficiently present in soils, focus should be put on the mobilization of immobile pools. In plants responsible for the energy metabolism.

Function: Controls the energy transfer in plants and energy storage in the grain

Mobility: Medium, highest need in the youth stage (root formation) and in the generative phase (seed formation)

Deficiency: Growth retardation, weak root formation, rigid habit, older leaves turn dark green and red

Antagonists: Zn, Mg, Fe, Mn, Ca, B, Cu, Al, K, Si

S

Atomic weight: 32.06 g/mol
Charge: 2-, 2+, 4+,6+
Content in soil: 0.01 % to 0.05 %
Content in plants: 0.1 % to 0.5 %

SULFUR is mainly stored organically in soils (a lot of S is contained in humus), in plants high S contents in proteins and leek oils.

Function: Component of proteins (ratio to nitrogen important!), Ratio N to S in many cultures 8:1 to 30:1

Mobility: Medium, absorption takes place in dissolved form (SO_4) via roots or as gas (SO_2) via leaves

Deficiency: Input from the atmosphere decreased (since introduction of flue gas filter), chlorosis of younger leaves, low proteins content, susceptibility to parasites and pests increases

Antagonists: N, Mo, Ca

Mo

Atomic weight: 95.95 g/mol
Charge: 2+, 3+, 4+, 5+, 6+
Content in soil: 0.2 ppm to 5 ppm
Content in plants: 0.2 ppm to 5 ppm

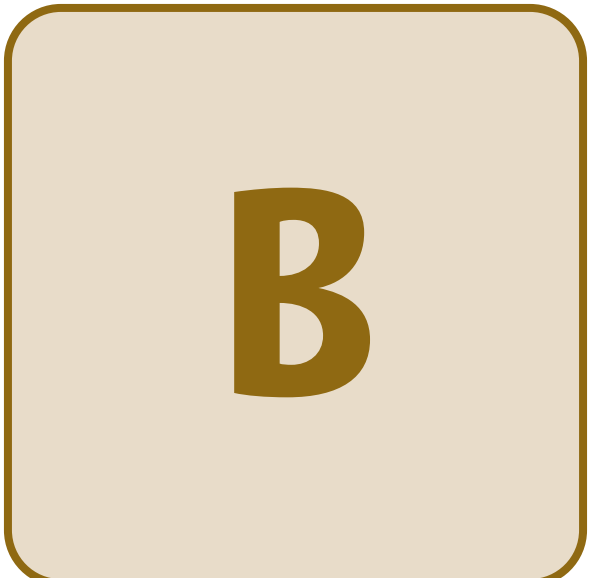
MOLYBDENUM is more readily available in soils at higher pH values and is important for nitrogen metabolism in plants.

Function: Fixation of air-nitrogen via nodule bacteria, first step to reduce nitrate (see copper)

Mobility: Immobile, bound in organic substances, concentration about 1/10 of boron

Deficiency: Chlorosis of younger leaves, nitrate poisoning, lack of nodule formation, whiptail disorder in Brassica crops

Antagonists: S, B, Mn, Cu, Zn



B

Atomic weight: 10.81 g/mol **Charge:** 3+
Content in soil: 5 ppm to 100 ppm
Content in plants: 2 ppm to 100 ppm

BORON cannot be used to fertilize in advance (immobilisation!), in plants jointly responsible for cell division and the translocation of starch.

Function: Component of cell walls, prevents the starch from clumping, promotes fruit set

Mobility: Immobile, only taken up in young organs, cannot be moved, continuous supply necessary

Deficiency: Growth and development disorders of the plants, dry rot of the heart, coulure of the flowers

Antagonists: Ca, K, Mg, N, Mo

Cu

Atomic weight: 63.54 g/mol **Charge:** 1+, 2+
Content in soil: 5 ppm to 100 ppm
Content in plants: 2 ppm to 15 ppm

COPPER is often sufficient in soils, deficiency in light humus soils, important in plants as a "redox" element for enzymes.

Function: Involved in photosynthesis, chlorophyll structure, 2nd step to reduce nitrate (see molybdenum)

Mobility: Immobile, approx. 70% bound to proteins in chloroplasts, highest need for main leaf development

Deficiency: Chlorosis and whitening of the youngest leaves, crop-specific symptoms (storage disorders)

Antagonists: P, N, Fe, Mn, Mo, Zn

Zn

Atomic weight: 65,38 g/mol **Charge:** 2+
Content in soil: 10 ppm to 300 ppm
Content in plants: 10 ppm to 100 ppm

ZINC is often sufficient in soils, deficiency at higher pH values and drought, important in plants for the activation of enzymes.

Function: Promotes the production of auxin (growth substance), which controls cell elongation in the shoot axes

Mobility: Immobile, mostly organically bound, continuous supply necessary

Deficiency: Chlorosis of younger leaves, stunted growth, deformed fruits, small leaves

Antagonists: P, N, Fe, Cu, Mn, Mo, Mg, N

Mn

Atomic weight: 54.93 g/mol
Charge: 2+, 3+, 4+, 6+, 7+
Content in soil: 40 ppm to 1000 ppm
Content in plants: 20 ppm to 200 ppm

MANGANESE is often sufficient in soils, deficiency in light soils and under drought conditions, important in plants as a "redox" element for enzymes.

Function: Supports photosynthesis (with calcium), protein and vitamin C formation through valence changes

Mobility: Mobile in grains, beets, fruit; immobile in legumes and potatoes

Deficiency: Depending on the mobility different blotchiness, grey speck disease e.g. in oats

Antagonists: Fe, Cu, Mg, Mo, Zn, Ca, Si, K

Fe

Atomic weight: 55.84 g/mol **Charge:** 2+, 3+
Content in soil: 0.2 % to 5 %
Content in plants: 30 ppm to 500 ppm

IRON is often sufficient in soils, deficiency in limestone and peat soils, in plants important „redox" element for many enzymes.

Function: Controls the construction of chlorophyll and proteins by changing the valence, high levels especially in leaves

Mobility: Immobile, approx. 80% bound to protein in chloroplasts, highest need for main leaf development

Deficiency: Chlorosis of younger leaves, leaf veins initially still green, later whitish, afterwards necrosis

Antagonists: P, Ca, Cu, Ni, Co, Zn, Cr, Mn

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When it comes to the composition of our products, the **AKRA fertilizer system** pays particular attention to the ingredient proportions and their interaction.

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Balanced plant nutrition

Generalized and imprecise fertilization in agriculture can negatively affect the proportions of nutrients and lead to yield or quality losses.
The AKRA system considers the nutrient pool content in soil so that a customized fertilization strategy can be developed for each specific site. The products do not consist of individual components, but of various nutrients in optimal concentration ratios.

Consultancy with experience

The consultants support you on-site, from the interpretation of the soil analysis to the implementation of the AKRA fertilization system.