Nutrient disorders - Cannabis plants

Plants use inorganic minerals for nutrition, whether grown in the field or in a container. Complex interactions involving weathering of rock minerals, decaying organic matter, animals, and microbes take place to form inorganic minerals in soil. Roots absorb mineral nutrients as ions in soil water. Many factors influence nutrient uptake for plants. Ions can be readily available to roots or could be "tied up" by other elements or the soil itself. Soil too high in pH (alkaline) or too low (acid) makes minerals unavailable to plants.

Nitrogen (N)

Nitrogen (N) is primary to plant growth. Plants convert nitrogen to make proteins essential to new cell growth. Nitrogen is mainly responsible for leaf and stem growth as well as overall size and vigor. Nitrogen moves easily to active young buds, shoots and leaves and slower to older leaves. Deficiency signs show first in older leaves. They turn a pale yellow and may die. New growth becomes weak and spindly. An abundance of nitrogen will cause soft, weak growth and even delay flower and fruit production if it is allowed to accumulate.

The chlorotic symptoms shown by this leaf resulted from nitrogen deficiency. A light red cast can also be seen on the veins and petioles. Under nitrogen deficiency, the older mature leaves gradually change from their normal characteristic green appearance to a much paler green. As the deficiency progresses these older leaves become uniformly yellow (chlorotic). Leaves approach a yellowish white color under extreme deficiency. The young leaves at the top of the plant maintain a green but paler color and tend to become smaller in size. Branching is reduced in nitrogen deficient plants resulting in short, spindly plants. The yellowing in nitrogen deficiency is uniform over the entire leaf including the veins. However in some instances, an interveinal necrosis replaces the chlorosis commonly found in many plants. Recovery of deficient plants to applied nitrogen is immediate (days) and spectacular.

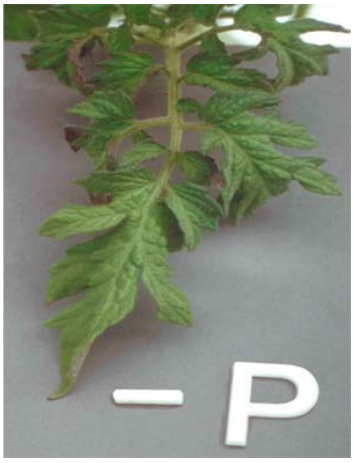
Nitrogen deficiency in Cannabis is common and the main reason for yellowing leaves. Treat with a quality brand nutrient or spray foliage with a weak nitrogen solution.

Phosphorus (P)

Phosphorus (P) is necessary for photosynthesis and works as a catalyst for energy transfer within the plant. Phosphorus helps build strong roots and is vital for flower and seed production. Highest levels of phosphorus are used during germination, seedling growth and flowering. Deficiencies will show in older leaves first. Leaves turn deep green on a uniformly smaller, stunted plant. Leaves show brown or purple spots.

Phosphorus flocculates when concentrated and combined with calcium.These phosphorus-deficient leaves show some necrotic spots. As a rule, phosphorus deficiency symptoms are not very distinct and thus difficult to identify. A major visual symptom is that the plants are dwarfed or stunted. Phosphorus deficient plants develop very slowly in relation to other plants growing under similar environmental conditions but without phosphorus deficiency. Phosphorus deficient plants are often mistaken for unstressed but much younger plants. Some species such as cannabis develop a distinct purpling of the stem, petiole and the under sides of the leaves. Under severe deficiency conditions there is also a tendency for leaves to develop a blue-gray luster. In older leaves under very severe deficiency conditions a brown netted veining of the leaves may develop.

Phosphorus is required in large amounts by Cannabis especially in the germination and flowering stages.

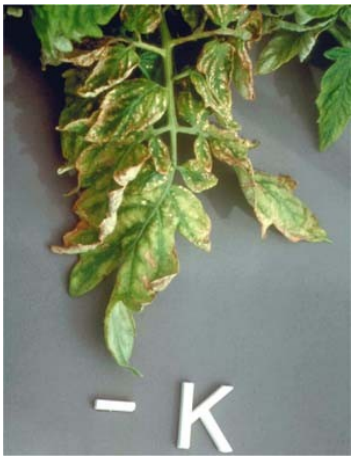


Potassium (K)

Potassium (K) activates the manufacture and movement of sugars and starches, as well as growth by cell division. Potassium increases chlorophyll in foliage and helps regulate stomata openings so plants make better use of light and air. Potassium encourages strong root growth, water uptake and triggers enzymes that fight disease. Potassium is necessary during all stages of growth. It is especially important in the development of fruit.

Deficiency signs of potassium are: plants are the tallest and appear healthy. Older leaves mottle and yellow between veins, followed by whole leaves that turn dark yellow and die. Flower and fruit drop are common problems associated with potassium deficiency. Potassium is usually locked out by high salinity. The onset of potassium deficiency is generally characterized by a marginal chlorosis progressing into a dry leathery tan scorch on recently matured leaves. This is followed by increasing interveinal scorching and/or necrosis progressing from the leaf edge to the midrib as the stress increases. As the deficiency progresses, most of the

interveinal area becomes necrotic, the veins remain green and the leaves tend to curl and crinkle. In contrast to nitrogen deficiency, chlorosis is irreversible in potassium deficiency, even if potassium is given to the plants. Because potassium is very mobile within the plant, symptoms only develop on young leaves in the case of extreme deficiency.



Sulphur (S)

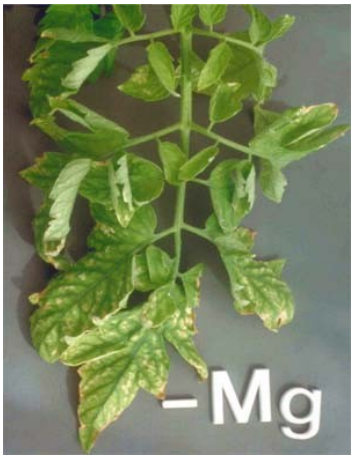
Sulphur S is a component of plant proteins and plays a role in root growth and chlorophyll supply. Distributed relatively evenly with largest amounts in leaves which affects the flavor and odor in many plants. Sulphur, like calcium, moves little within plant tissue and the first signs of a deficiency are pale young leaves. Growth is slow but leaves tend to get brittle and stay narrower than normal. This leaf shows a general overall chlorosis while still retaining some green color. The veins and petioles show a very distinct reddish color.

The visual symptoms of sulfur deficiency are very similar to the chlorosis found in nitrogen deficiency. However, in sulfur deficiency the yellowing is much more uniform over the entire plant including young leaves. The reddish color often found on the underside of the leaves and the petioles has a more pinkish tone and is much less vivid than that found in nitrogen deficiency. With advanced sulfur deficiency brown lesions and/or necrotic spots often develop along the petiole, and the leaves tend to become more erect and often twisted and brittle. Most water has plenty of **Sulphur** and deficiency is seldom a problem found in Cannabis.

Magnesium (Mg)

Magnesium (Mg) is found as a central atom in the chlorophyll molecule and is essential to the absorption of light energy. Magnesium aids in the utilization of nutrients, neutralizes acids and toxic compounds produced by the plant. Deficiency signs of magnesium are: The Mg-deficient leaves show advanced interveinal chlorosis, with necrosis developing in the highly chlorotic tissue. In its advanced form, magnesium deficiency may superficially resemble potassium deficiency. The symptoms generally start with mottled chlorotic areas developing in the interveinal tissue. Older leaves yellow from the center outward, while veins remain green on deficient plants. Leaf tips and edges may discolor and curl upward. Growing tips turn lime green if the deficiency progresses to the top of the plant. In some plants tints of orange, yellow, and purple may also develop.

Magnesium deficiency is one of the most commonest seen in Cannabis. A teaspoon or two of Epsom salts dissolved in a litre or water and sprayed over foliage should correct this problem. Most commercial nutrients already contain alot of Mg so if you are using a quality mineral nutrient and are experience Mg deficiency, then it may be something else causing it such as a high PH.



Calcium (C)

Calcium (Ca) is fundamental to cell manufacture and growth. Soil gardeners use dolomite lime, which contains calcium and magnesium, to keep the soil sweet or buffered. Rockwool gardeners use calcium to buffer excess nutrients. Calcium moves slowly within the plant and tends to concentrate in roots and older growth. Consequently young growth shows deficiency signs first. Deficient leaf tips, edges and new growth will turn brown and die back. If too much calcium is applied early in life, it will stunt growth as well. It will also flocculate when a concentrated form is combined with potassium. Very slow growing plants with a deficient supply of calcium may re-translocate sufficient calcium from older leaves to maintain growth with only a marginal chlorosis of the leaves. This ultimately results in the margins of the leaves growing more slowly than the rest of the leaf, causing the leaf to cup downward. This symptom often progresses to the point where the petioles develop but the leaves do not, leaving only a dark bit of necrotic tissue at the top of each petiole. Plants under chronic calcium deficiency have a much greater tendency to wilt than non-stressed plants.

Calcium deficiency in cannabis isn't common when using good a quality potting medium, and/or a complete mineral fertilizer.

Manganese (Mn)

Manganese (Mn) works with plant enzymes to reduce nitrates before producing proteins. A lack of manganese turns young leaves a mottled yellow or brown.

These leaves show a light interveinal chlorosis developed under a limited supply of Mn. The early stages of the chlorosis induced by manganese deficiency are somewhat similar to iron deficiency. They begin with a light chlorosis of the young leaves and netted veins of the mature leaves especially when they are viewed through transmitted light. As the stress increases, the leaves take on a gray metallic sheen and develop dark freckled and necrotic areas along the veins. A purplish luster may also develop on the upper surface of the leaves.

Manganese is seldom deficient in Cannabis.

Molybdenum (Mo)

Molybdenum (Mo) helps form proteins and aids the plant's ability to fix nitrogen from the air. A deficiency causes leaves to turn pale and fringes to appear scorched. Irregular leaf growth may also result. These leaves show some mottled spotting along with some interveinal chlorosis. An early symptom for molybdenum deficiency is a general overall chlorosis, similar to the symptom for nitrogen deficiency but generally without the reddish coloration on the undersides of the leaves. This results from the requirement for

molybdenum in the reduction of nitrate, which needs to be reduced prior to its assimilation by the plant. Thus, the initial symptoms of molybdenum deficiency are in fact those of nitrogen deficiency. However, molybdenum has other metabolic functions within the plant, and hence there are deficiency symptoms even when reduced nitrogen is available. In many plants there is an upward cupping of the leaves and mottled spots developing into large interveinal chlorotic areas under severe deficiency. At high concentrations, molybdenum has a very distinctive toxicity symptom in that the leaves turn a very brilliant orange.

Zinc (Zn)

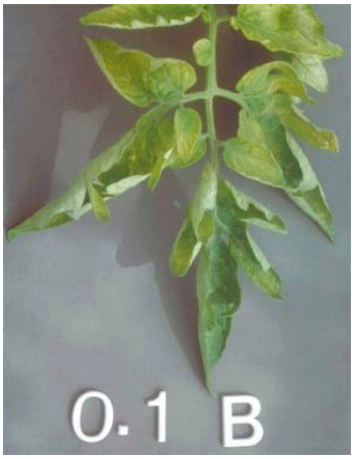
Zinc (Zn) is a catalyst and must be present in minute amounts for plant growth. A lack of zinc results in stunting, yellowing and curling of small leaves. An excess of zinc is uncommon but very toxic and causes wilting or death.

This leaf shows an advanced case of interveinal necrosis. In the early stages of zinc deficiency the younger leaves become yellow and pitting develops in the interveinal upper surfaces of the mature leaves. As the deficiency progress these symptoms develop into an intense interveinal necrosis but the main veins remain green, as in the symptoms of recovering iron deficiency.

Boron (B)

Boron (B is necessary for cells to divide and protein formation. It also plays an active role in pollination and seed production.

These boron-deficient leaves show a light general chlorosis. The tolerance of plants to boron varies greatly, to the extent that the boron concentrations necessary for the growth of plants having a high boron requirement may be toxic to plants sensitive to boron. Boron is poorly transported in the phloem of most plants, with the exception of those plants that utilize complex sugars, such as sorbitol, as transport metabolites. In a recent study, tobacco plants engineered to synthesize sorbitol were shown to have increased boron mobility, and to better tolerate boron deficiency in the soil.



Iron (Fe)

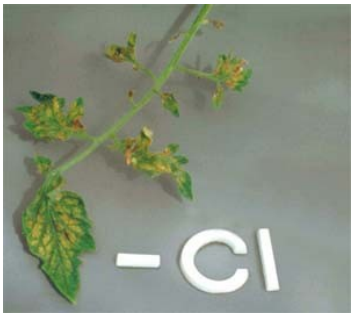
Iron (Fe) is a key catalyst in chlorophyll production and is used in photosynthesis. A lack of iron turns leaves pale yellow or white while the veins remain green. Iron is difficult for plants to absorb and moves slowly within the plant. Always use chelated (immediately available to the plant) iron in nutrient mixes.

Deficiency: The most common symptom for iron deficiency starts out as an interveinal chlorosis of the youngest leaves, evolves into an overall chlorosis, and ends as a totally bleached leaf. The bleached areas often develop necrotic spots. Up until the time the leaves become almost completely white they will recover upon application of iron. In the recovery phase the veins are the first to recover as indicated by their bright green color. This distinct venial re-greening observed during iron recovery is probably the most recognizable symptom in all of classical plant nutrition. Because iron has a low mobility, iron deficiency symptoms appear first on the youngest leaves. Deficiency shows as a distinct yellowing between the leaf veins, which stay green, on the new growth and younger leaves (this distinguishes it from magnesium deficiency which shows first on the older leaves).

Chlorine (Cl)

Chlorine (Cl): Required for photosynthesis where it acts as an enzyme activator during the production of oxygen from water. Additional functions are suggested by effects of deficiency on roots.

Deficiency: Plants require relatively high chlorine concentration in their tissues. Chlorine is very abundant in soils, and reaches high concentrations in saline areas, but it can be deficient in highly leached inland areas. The most common symptoms of chlorine deficiency are chlorosis and wilting of the young leaves. The chlorosis occurs on smooth flat depressions in the interveinal area of the leaf blade. In more advanced cases there often appears a characteristic bronzing on the upper side of the mature leaves. Plants are generally tolerant of chloride, but some species such as avocados, stone fruits, and grapevines are sensitive to chlorine and can show toxicity even at low chloride concentrations in the soil. Roots become stunted and thickened near tips.



Problems at a glance

There are actually 20 mineral elements necessary or beneficial for plant growth. Carbon (C.), hydrogen (H.), and oxygen (O.) are supplied by air and water. The six macronutrients, nitrogen (N.), phosphorus (P.), potassium (K.), calcium (Ca.), magnesium (Mg.), and sulfur (S.) are required by plants in large amounts. The rest of the elements are required in trace amounts (micronutrients). Essential trace elements include boron (B.), chlorine (Cl.), copper (Cu.), iron (Fe.), manganese (Mn.), sodium (Na.), zinc (Zn.), molybdenum (Mo.), and nickel (Ni.). Beneficial mineral elements include silicon (Si.) and cobalt (Co.). The beneficial elements have not been deemed essential for all plants but may be essential for some.

The term pH refers to the alkalinity or acidity of a growing media water solution. This solution consists of mineral elements dissolved in ionic form in water. The reaction of this solution whether it is acid, neutral or alkaline will have a marked effect on the availability of mineral elements to plant roots. When there is a greater amount of hydrogen H+ ions the solution will be acid (<7.0.). If there is more hydroxyl OH- ions the solution will be alkaline (>7.0.). A balance of hydrogen to hydroxyl ions yields a pH neutral soil (=7.0.). The range for most crops is 5.5 to 6.2 or slightly acidic. This creates the greatest average level for availability for all essential plant nutrients. Extreme fluctuations of higher or lower pH can cause deficiency or toxicity of nutrients.