



FIRST AID FOR DEFICIENCIES

CANNA Info Courier

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Calcium

What is it and what does it do?

- Is important to the growth process.
- Has a regulating effect in the cells and contributes to the stability of the plant.

What can you see?

Yellow/brown spots, surrounded by a sharp brown outlined edge.

What can you do?

Add calcium by applying a liquid lime fertiliser such as a calcium nitrate solution.

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Phosphorus

What is it and what does it do?

- Holds key position in both cell processes and total energy transfer of the plant.
- Also a "building block" of - amongst others - cell walls and DNA.

What can you see?

- Small plant with purple/black necrotic leaf parts.
- Leafs become malformed and shrivelled.

What can you do?

Mix inorganic phosphate fertiliser THOROUGHLY through the potting mix or add extra liquid phosphate when growing in hydroponics.

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Magnesium

What is it and what does it do?

- Magnesium is indispensable to plants as it is essential for photosynthesis.
- Represents a building block for chlorophyll.

What can you see?

- Rusty brown spots.
- Cloudy, vague yellow spots between the veins.

What can you do?

Spray with a 2% solution of Epsom salts every 4-5 days during about a week.

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Iron

What is it and what does it do?

Iron has a number of important functions in the plant's overall metabolism and is essential for the synthesis of chlorophyll.

What can you see?

- Strong yellowing of especially the young leaves.
- Growth shoots between the veins.

What can you do?

The best thing is to spray the plants with a watery solution of EDDHA or EDTA chelates.

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Nitrogen

What is it and what does it do?

Nitrogen is a component of enzymes and is therefore involved in all enzyme reactions and plays an active role in the plant's metabolism.

What can you see?

- Purple stalks.
- Yellowing leaves.
- Leaves falls of.

What can you do?

Raise EC of the feeding or add extra nitrogen.

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Potassium

What is it and what does it do?

- Potassium takes care of the strength and the quality of the plant.
- Controls countless other processes such as the carbohydrate system.

What can you see?

Dead edges on the leaves.

What can you do?

- In case the EC in the substrate or potting mix is high, you can rinse it with clean water.
- Add potassium yourself.

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Manganese

What is it and what does it do?

The metal manganese is an essential trace nutrient and acts as an activator for different enzyme reactions in the plant.

What can you see?

Yellow stripes appear between the leaf's side veins.

What can you do?

Using products that contain trace elements (Tracemix).

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We have used high-quality paper for this “First Aid Guide for your Plants”, so that you can keep it for more than one growing season. The guide describes the causes and symptoms of a too little or too much nutrient elements for your plants, the consequences of these problems, and of course some solutions too. We have produced this guide in collaboration with our research department. Of course, we hope that you won't have a reason to use it too often, but we also hope that it will prove useful if you are ever in need of assistance.

CANNA Research

CANNA has its own internal research facility - CANNA Research. Because the daily work of this department involves cultivating plants, they know all about the difficult problems that can occur and what can be done about them. Of course, they also work on developing new, innovative products to help do this. We have 22 years of growing experience and close cooperation with other pioneers, and this has resulted in a huge body of knowledge, which actually knows no equal in the world of growing, let alone outside it. This exceptional combination of specialist expertise and enthusiasm has, over the years, led to the development of an outstanding range of products. For CANNA, the research we do is crucially important. After all, our end users depend on it for great results. So we take our time when we are developing new products – an average of two years in fact. During this time, a team of highly trained specialists will explore every aspect of a new product. Standards are extremely important for CANNA, and because we set them so high, we are able to have 100% confidence in our products.

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Calcium

About calcium in short

Calcium occurs throughout the entire plant. It is used for many processes in the plant, however, calcium is most important for the growth process. It has a regulating effect in the cells and contributes to the stability of the plant. Plants have two transportation systems at their disposal: the xylem vessels and the sieve vessels. Most nutrients can be transported via both systems, however, for calcium this is not possible. Since calcium can be transported almost exclusively via the xylem vessels, it is an element that deposits of little mobility within the plant. It is, therefore, important that a sufficient amount of calcium is always available in the root environment, so that it will be continuously available for absorption by the plant.

A lag in development is often already noticeable within a week. Sometimes the growing points will wrinkle up and around the fruits you will find thin, small leaves that are not spotted. The older leaves die off slowly and yellowish cloudy spots may appear around the necrotic spots. The older the leaf is, the more serious the symptoms are.

The flowering is also hindered and slowed down. Fruits stay small.

Reasons for a deficiency

- Culture on calcium fixing potting mix.
- An excessive amount of ammonium, potassium, magnesium and/or sodium in the root environment. The absorption is curbed mostly by ammonium and least by sodium.
- Problems with the evaporation caused by an excessively high EC value, or by excessively high or low relative humidity.

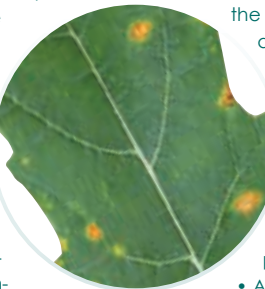
Symptoms of a deficiency

The older, larger leaves just above the bottommost ones will show the first symptoms. Yellow/brown spots occur, which are often surrounded by a sharp brown outlined edge. In addition, the growth is curbed and in serious cases the tops are smaller than normal and do not close.

Solutions to a deficiency

- If the EC value of the substrate or the potting mix is too high, it can be easily rinsed out with pure and if necessary acidified water.
- Additional calcium can be applied through the nutrient solution by means of liquid lime fertilisers such as a calcium nitrate solution. With an excessively acidic potting mix, lime milk can be used to increase the pH. Use the appropriate potting mix that is not too acidic. Acid potting mix often contains insufficient amounts of lime. Good potting mix and Coco substrates are already limed.

For your information: Be careful with fertilisers containing chloride.



Phosphorus

About phosphorus in short

Phosphorus plays an important role for all living organisms and is an essential nutrient element for plants and animals. It has a key position in the combustion processes of the cell, and in the total energy transfer of the plant. It is also a “building block” of the cell walls, the DNA, and all sorts of proteins and enzymes. For young plants, the presence of phosphate is indispensable; about 3/4 of the phosphorus consumed during a plant's life cycle is absorbed in the first quarter of its life. The largest concentrations of phosphorus are found in the developing parts of the plant: the roots, the growth shoots and the vascular tissue.

Reasons for a deficiency

Due to the low concentrations in which phosphate appears in nature, the affinity of plant cells for phosphorus allows easy absorption through the whole root. Therefore, shortages do not happen very often, except when:

- The growing medium has a too high pH (higher than pH 7). In such cases the plant can not absorb phosphorus due to the fact that insoluble phosphorus compounds develop.
- The ground is too acidic, or too rich in iron and zinc. This hinders the absorption of phosphate.
- The potting mix has become fixated. Phosphate can not be absorbed any more.

Symptoms of a deficiency

Plants remain rather small with purple/black necrotic leaf parts, which later on become malformed and shrivelled.

Solutions to a deficiency

Always use inorganic phosphates as these are easy to absorb. Also always mix the phosphate fertiliser THOROUGHLY through the potting mix.

- When pH is too high, acidify the medium by using a thinned solution of phosphoric acid.
- Choose products that have a guaranteed phosphate percentage on the packaging instead of alternative phosphate-containing products like guano or manure.

Development of a deficiency

- At first, the plant becomes dark green - a different sort of dark green (blue/green) as appears when there is a shortage of potassium.
- The growth in height, and the development of the plant's side shoots are inhibited.
- After 2 to 3 weeks, dark purple/black necrotic spots appear on the old and medium-old leaves, making the leaves malformed.
- The purple/black necroses expand to the leaf's stem. The leaf turns, curls considerably and dies off.
- The dead leaves are curled and shrivelled, have a typical ochre purple colour, and fall off.
- The plant flowers fully, but the yield will be minimal.

Recovery

Rectify the possible causes: In potting mixes, when the pH is too low (less than 5), use magnesium containing calcium fertilisers. On hydro, temporarily apply a nutrient solution with a higher pH (6.5). When the EC is too high, rinse and/or temporarily feed with drinking water only. When growing indoors, keep the root temperature between 20 - 25 degrees Celsius. A little extra magnesium is not particularly harmful. When growing in potting mixes, excessive quantities of magnesium do not appear quickly. Too much magnesium inhibits the uptake of calcium, and the plant displays general symptoms of an excess of salts; stunted growth, and dark-coloured vegetation.



Magnesium

About magnesium in short

Magnesium is an indispensable element for - amongst others - plants. In plants, it represents a building block for chlorophyll (leaf green), and therefore, it is essential for photosynthesis. At the same time, magnesium plays an important role in the energy transfer. Together with calcium, it is also a component of tap water, influencing water hardness. Inorganic magnesium fertilisers are produced using the same bases that are used to produce potassium fertilisers.

Reasons for a deficiency

The magnesium deficiency can occur because uptake is inhibited because of:

- A very wet, cold and/or acidic root environment.
- A high quantity of potassium, ammonia and/or calcium (for instance high concentrations of calcium carbonate in drinking water, or clay potting mixes rich in calcium) in comparison with the quantity of magnesium.
- A limited root system and heavy plant demands.
- A high EC in the growing medium, which hinders evaporation.

Symptoms of a deficiency

When there is a shortage, the leaf green in the medium-old leaves under the flowering top will be broken up, and the magnesium will be transported into the young parts of the plant. This breakdown is visible as rusty brown spots and/or vague, cloudy, yellow spots between the veins. A slight shortage of magnesium hardly affects flowering, although the development of the flowers make the deficiency symptoms worse.

Development of a deficiency

- Signs of a deficiency first appear around the 4th-6th week. Small, rusty brown spots and/or cloudy yellow flecks appear in the middle-aged leaves (under the top of the plant).
- The colour of the young leaves and the fruit development are not affected.
- The size and number of rust-brown spots on the leaves increase.
- The symptoms spread out over the whole plant, which looks ill. When the shortage becomes acute, the younger leaves are also affected and the flower production will be reduced.



Iron

About iron in short

Iron is a vital element for plant life. Iron has a number of important functions in the overall metabolism of the plant and is essential for the synthesis of chlorophyll. In general, iron is poorly absorbed by the plant. It can only be sufficiently taken up by the roots in certain forms and under proper conditions. Potting mixes seldom contains too little iron, but it is possible that forms of iron that can be absorbed by the plant are lacking. The absorbency of iron is strongly dependent on the pH. Ordinarily, there is sufficient iron present in absorbable form in acidic potting mixes.

Reasons for a deficiency

- The pH in the root environment is too high (pH > 6.5).
- The root environment contains a lot of zinc and/or manganese.
- The concentration of iron is too low in the root environment.
- The root temperature is low.

Symptoms of a deficiency

Iron deficiency can occur during periods of heavy growth or high plant stress and is characterised by a strong yellowing of the young leaves and the growth shoots between the veins. This occurs chiefly because iron is not mobile in the plant. The young leaves can't draw any iron from the older leaves. With a serious iron shortage, the older leaves and the smaller veins in the leaf can also turn yellow.

Solutions to resolve a deficiency

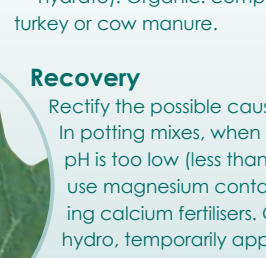
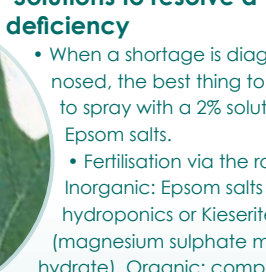
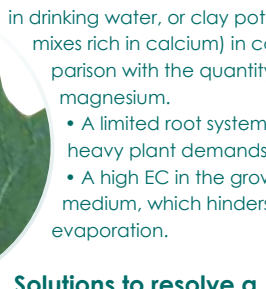
- When a shortage is diagnosed, the best thing to do is to spray with a 2% solution of Epsom salts.
- Fertilisation via the roots: Inorganic: Epsom salts on hydroponics or Kieserite (magnesium sulphate mono hydrate). Organic: composted turkey or cow manure.

Development of a deficiency

- Green/yellow chlorosis, from inside to the outside in the younger leaves and in the growth shoots. The veins remain mostly green.
- Continued yellowing of the leaves to sometimes almost white. Also, large leaves turn yellow. This inhibits growth.
- In serious cases the leaves show necrosis, and the plant's growth and flowering are inhibited.

Recovery

Rectify the possible causes: In potting mixes, when the pH is too low (less than 5), use magnesium containing calcium fertilisers. On hydro, temporarily apply a nutrient solution with a higher pH (6.5). When the EC is too high, rinse and/or temporarily feed with drinking water only. When growing indoors, keep the root temperature between 20 - 25 degrees Celsius. A little extra magnesium is not particularly harmful. When growing in potting mixes, excessive quantities of magnesium do not appear quickly. Too much magnesium inhibits the uptake of calcium, and the plant displays general symptoms of an excess of salts; stunted growth, and dark-coloured vegetation.



Nitrogen

About nitrogen in short

Nitrogen is one of the important elements a plant needs. It is an important part of proteins, chlorophyll, vitamins, hormones and DNA. Because it is a component of enzymes, nitrogen is involved in all enzyme reactions and plays an active role in the plant's metabolism. Nitrogen is mainly absorbed by the plant in the form of nitrate and ammonium. It can also be absorbed via small organic molecules. It is important that the balance between nitrate and ammonium is correct in the feeding otherwise the pH in the rhizosphere (environment immediately surrounding the roots) will become too high or too low. Plants with nitrate as their source of nitrogen have a higher organic acid content. This has an influence on the taste and storage life of the harvest among other things. Nitrate is converted into ammonium in the plant by the nitroreductase enzyme. Ammonium is then assimilated into organic molecules. Nitrogen has a positive influence on the plant's growth. The plant gets bigger leaves, more branches and the vegetative period is extended.

Reasons for a deficiency

Deficiency can be caused by incorrect feeding or giving feeding that contains insufficient nutrient elements. Substrates that contain a lot of fresh organic material can cause nitrogen deficiency because micro-organisms bind the nitrogen. A lot of nitrogen can be bound, particularly in the first weeks; this is released later but it is generally too late.

Symptoms of a deficiency

Evaporation is reduced if there is a shortage of potassium. A consequence is that the temperature in the leaves will increase and the cells will burn. This occurs mostly on the edges of the leaves, where normally, evaporation is highest.

Development of a deficiency

- Quickly followed by larger leaves in the middle and top parts of the plant.
- The plant is a lighter colour as a whole.
- Larger leaves in the lower part of the plant turn light green. The leaf stalks of the smaller leaves now also turn purple. Typical vertical purple stripes appear in the stem.

Solutions to resolve a deficiency

- Iron chelates can be added to the substrate.
- Drainage can be improved, or the ground temperature can be increased.
- A leaf nutrient with iron chelates can possibly be applied. If a good fertiliser is used with hydroponic growing, an iron deficiency is almost out of the question.
- The best thing you can do is to spray the plants with a watery solution of EDDHA.
- (max. 0.1 grams per litre) or EDTA chelates (max. 0.5 grams per litre).

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Potassium

About potassium in short

It is necessary for all activities having to do with water transport and the opening and closing of the stomas. Potassium takes care of the strength and the quality of the plant and controls countless other processes such as the carbohydrate system.

Solutions for a deficiency

- In case the EC in the substrate or potting mix is high, you can rinse with water.
- Add potassium yourself, either in inorganic form: Dissolve 5 – 10 grams of potassium nitrate in 10 litres of water. In acidic potting mixes, you can add potassium bicarbonate or potassium hydroxide (5ml in 10 litres of water).
- Add potassium in organic form:
- Add a water solution of wood ash, chicken manure or slurry of manure (be careful not to burn the roots). Extracts of the grape family also contain a lot of potassium.

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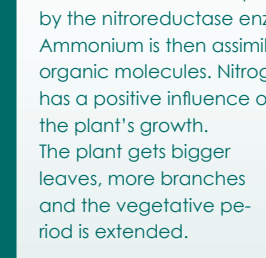
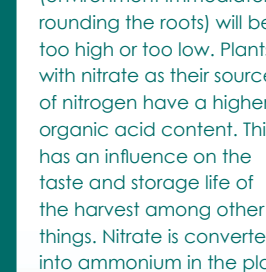
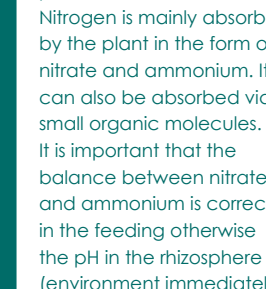
- Tips of the younger leaves show grey edges.
- Leaves turn yellow from the edge in the direction of the veins and rusty-coloured dead spots appear in the leaves.
- The tips of the leaves curl up radically and whole sections of the leaves begin to rot. The leaves keep on curling and ultimately fall off.
- An extreme shortage produces meagre, unhealthy-looking plants with strongly reduced flowering.

Reasons for a deficiency

- Too little, or the wrong type of fertiliser.
- Growing in potassium-fixed potting mixes.
- An excess of sodium (kitchen salt) in the root environment, as sodium slows down potassium intake.

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Manganese

About manganese in short

Manganese is an essential trace element for all plants. Manganese acts as an activator for different enzyme reactions in the plant, for example in water-splitting during photosynthesis, the synthesis of amino acids and proteins and the build up of plant cell membranes and chloroplasts. Manganese is generally taken up via the roots. Once inside the plant it is difficult to transport but not as difficult as calcium or iron for example. Silicon and molybdenum improve the transport possibilities for manganese in the plant.

Solutions to resolve a deficiency

- Check the medium's pH when the first symptoms are noticed. High pH values mean that there is less manganese available for the plant. By lowering the pH of the nutrition (pH min (down)) the medium's pH can be lowered to 5.0-5.5.
- Low substrate temperature can be the cause of reduced manganese absorption. If a deficiency is noticed, check that the substrate temperature is sufficiently high (20-25 °C) during the day.
- Using products that contain trace elements (Tracemix) may also help. A manganese deficiency is usually not a problem on its own. To facilitate manganese transportation in the plant, molybdenum is needed. Thus, the problem may well be a molybdenum deficiency. High levels of phosphorus may also result in a reduced availability of trace elements like zinc, copper and (of course) manganese. CANNA advises to use a mix of all needed trace elements. Trace elements can be given to the plant both in the feeding and by spraying the leaves. Spray the plant at the end of the day and spray daily with water after spraying to prevent burning.

Symptoms of a deficiency

A manganese deficiency causes different physiological changes in the plant due to a decrease in protein production. Amongst others, this causes less nitrate to be fixed in the plant, which can lead to dangerously high levels of nitrate. Additionally, a lot of chemical reactions in plant cells slow down which may result in a build up of organic acids.

Development of a deficiency

The progression in chronological order:

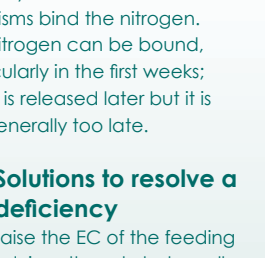
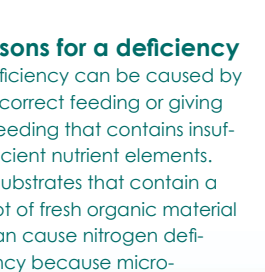
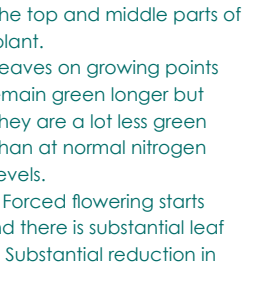
- Yellow stripes appear between the leaf's side veins on the larger leaves at the top of the plant.
- The yellowing between the side veins spreads further over the leaf and small, yellow/brown necrotic spots can form.
- The final result is a small plant (-10%) with minimum fruit/flower production.

Reasons for a deficiency

- Too little, or the wrong type of fertiliser.
- Growing in potassium-fixed potting mixes.
- An excess of sodium (kitchen salt) in the root environment, as sodium slows down potassium intake.

Development of a deficiency

- Quickly followed by larger leaves in the middle and top parts of the plant.
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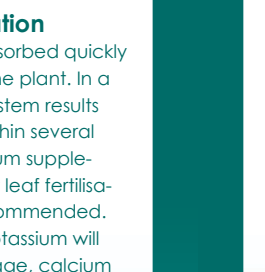
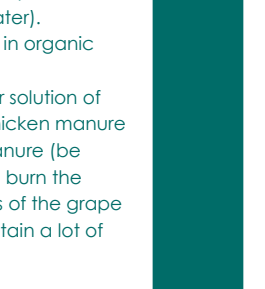
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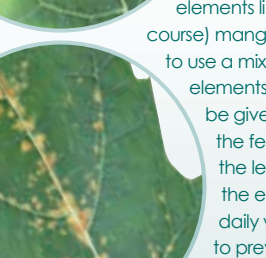
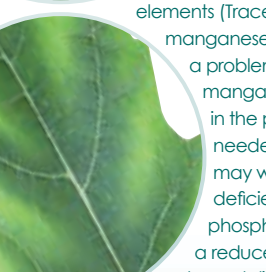
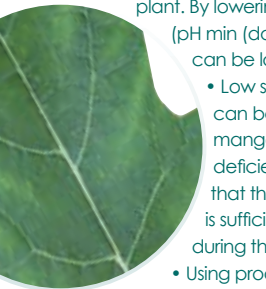
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- Growing in potassium-fixed potting mixes.
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- Quickly followed by larger leaves in the middle and top parts of the plant.
- The plant is a lighter colour as a whole.
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It is necessary for all activities having to do with water transport and the opening and closing of the stomas. Potassium takes care of the strength and the quality of the plant and controls countless other processes such as the carbohydrate system.

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