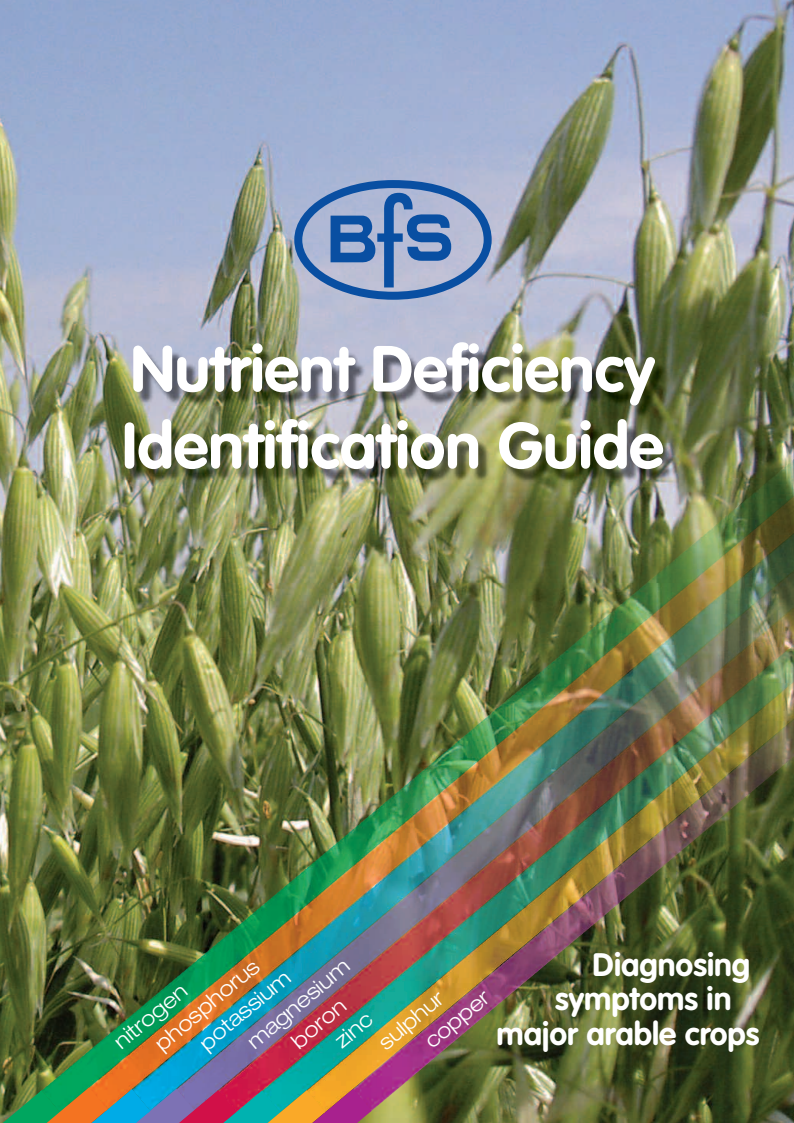

BfS
Nutrient Deficiency Identification Guide
nitrogen
phosphorus
potassium
magnesium
boron
zinc
sulphur
copper
Diagnosing symptoms in major arable crops

For over sixty years Billericay Fertiliser Services has been one of the UK's leading manufacturers of suspension, clear solution, liquid fertilisers and trace elements.

BFS has built its business on product quality, innovation and customer service and this has been recognised with the company being awarded the Fertiliser Assurance Scheme (FIAS) accreditation.

The company's nutritional specialists and agronomist work with customers to plan specific fertiliser programmes for both conventional and organic crops.

This pocket booklet has been designed to provide a quick reference to the most common nutrients affecting plant growth and a visual identification guide to those deficiency symptoms that commonly occur on the major arable crops.

Section 1 Introduction

Section 2 The Nutrients

Section 3 Nutrient Deficiency Identification

Section 1

All plants need essential nutrients to live and grow healthily. Just as the human body needs vitamins and minerals, plants need macronutrients and micronutrients.

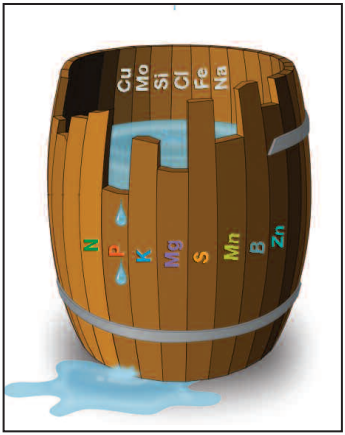
Reliable nutrient recommendations are dependent upon accurate soil tests and crop nutrient calibrations based on extensive field research. Soil fertility is one of several factors, including light, moisture, weeds, insects and diseases that affect crop yield.

An important part of crop production is being able to identify and prevent plant nutrient deficiencies and toxicities. This publication is a guide to identifying crop nutrient problems through observable symptoms on crop plants.

Nutrient deficiency in crops

Crop success (yield/quality) is controlled not by the total amount of nutrients available to the plant, but by the nutrient in limited supply. A simple *'law of the minimum'* is illustrated here by Liebigs Barrel.

Just as the capacity of a barrel with staves of unequal length is limited by the shortest stave (in this example Phosphate is the limiting factor), so a plant's growth is limited by the nutrient in shortest supply.



Understanding how to recognize nutrient deficiencies will allow corrective action to be taken to lessen the effect and prevent a similar situation arising in the future.

A question of balance

When plants suffer from lack of nutrients, they show symptoms of being unhealthy.

To allow plant roots to obtain these nutrients from the soil firstly it must be sufficiently **moist** to allow root uptake.

Second, the **pH** of the soil must be within a certain range for nutrients to be released (see chart on page 6).

Third, the **soil temperature** must be within a certain range for nutrient uptake to occur. The optimum balance of temperature, pH and moisture will differ from one species of plants to another so nutrients may be physically present in the soil, but will not be available to plants.

Understanding pH

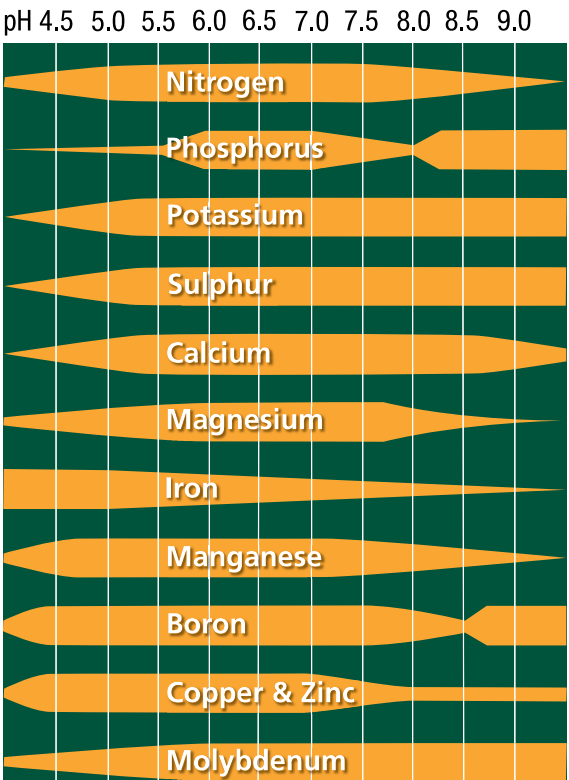
Soil pH* is measured on a scale of 0-14 with 7.0 representing 'neutral'. A measurement below 7 is considered to be acidic while above 7 is alkaline.

Incorrect soil pH can cause many problems. One of the more important problems is the blocking of essential nutrients. In alkaline soils, Iron (Fe) becomes bound up in a form that roots cannot take up. Other nutrients such as Manganese, Copper and Zinc can be hindered as well.

In low pH soils, Phosphorus (P) and Magnesium (Mg) will be bound up. Magnesium is essential for chlorophyll production and photosynthesis that is necessary for carbohydrate production (see chart on page 6).

** The letters pH stand for 'potential hydrogen' and represents the measure of hydrogen ions in the soil.*

The influence of pH on nutrient availability



Prevention

Soil fertility is just one of several factors – including sunlight, moisture, weeds, diseases and insects – that affect crop yield. Some of these are controllable, others are out of your hands. What is manageable and a vital part of crop management is to be able to identify and prevent nutrient deficiencies and toxicities.

The following pages provide background information on a number of important nutrients and an illustrated guide to identifying deficiencies through observable symptoms on a range of arable crop plants.

Technical Help

Billericay Fertiliser Services will be pleased to answer questions relating to nutrient deficiencies and disorders and provide information on the use of any products from our range of clear liquid solutions, suspensions and foliar fertilisers.

Tel: 01268 710237
or visit our website: www.bfs.uk.com

How to use this guide

1. In the **Index** select the crop that you are concerned about from **Section 3.**
2. Study the nutrient deficiency information applicable to that crop in **Section 3** to check if they have similarities with what you have observed in the field.
3. If you are satisfied you have correctly identified a deficiency, turn to **Section 2** where advice will be found on what product is recommended to help improve the effects of the that particular deficiency in the crop.

It is important to note that this handbook can only provide a guide to a visual indication to deficiencies as individual crop symptoms can vary significantly. Also a number of deficiency symptoms can look very similar. If in doubt, always get a deficiency verified by soil and/or foliar analysis.

Section 2
THE NUTRIENTS

N Nitrogen

The availability and supply of Nitrogen plays a key role in the production of chlorophyll and the stimulus for photosynthesis. Its presence in the soil is often required in the greatest quantity by crops, primarily for vigour and yield.

High risk situations

Light, sandy soils ❖ Low organic matter
❖ High winter rainfall ❖ Milling wheat.

Prevention

➜ Accurate assessment of soil N supply

➜ Implementation of a well timed fertiliser programme before the onset of the main growth period.

➜ Provision of a sufficient supply of all other nutrients, particularly S, K and Mg is crucial

Deficiency

Visual symptoms seen first on older leaves as a yellowing from the leaf tip and, along the midrib whilst the edges remain green. The growth becomes stunted with spindly stalks.
(Note: On younger leaves this could be confused with Sulphur deficiency).

Treatment

Apply a BFS liquid N product to treat acute deficiency (e.g. 28N or 30N).

P Phosphorus

The supply of Phosphorus is also crucial for managing the energy processes within the plant. Plants do not react to this element as they do with nitrogen but its presence is particularly important at the early growth stages to ensure strong rooting and a good establishment.

High risk situations

Heavier soils ❖ Acid soils ❖ High pH soils
❖ Early growth stages with poor root mass.

Prevention

➜ Maintenance of soil target index 2 for arable and 3 for horticultural crops

➜ Soil should be tested every 3-4 years to monitor phosphate levels

Deficiency

Symptoms seen as reddening of stems, stunted growth and poor rooting.

Treatment

Prevention, by ensuring adequate supplies of soil P is essential as a of deficiency is difficult to treat on curative basis. A number of foliar fertilisers containing P may help e.g. potassium phosphite.

K Potassium

Potash is required by most crops, in greater quantities than either N or P. The main function of this nutrient is to impart additional plant strength and provide plants with the ability to regulate its water content and provide greater resistance to stress.

Soil analysis evaluation is important, however care should be taken to also check for excessive Ca or Mg, which can disguise the availability of K.

High risk situations

Light, sandy soil ❖ Organic soils ❖ Excessive levels of Mg or Ca ❖ K fixing soils.

Prevention

- ➜ Maintenance of soil index 2- for arable and 2+ for potatoes and horticultural crops
- ➜ Soils should be tested every 3-4 years to monitor levels of K

Deficiency

Symptoms, first seen on older leaves as a drying of leaf tips and along the leaf margins (older leaves first). An increase in the plants susceptibility to drought, lodging and plant pathogens is also seen. Sufficient K in the soil is essential for the efficient plant use of N.

Treatment

Application of K as foliar treatments, are effective at providing nutrient supply during peak demand and to offset temporary deficiency. Foliar applications by themselves however are not a substitute for ensuring adequate soil K for field grown crops.

Mg Magnesium

This important nutrient is present in chlorophyll and a prime mover in stimulating photosynthesis. Magnesium is responsible for activating a greater amount of plant enzymes than any other plant nutrient. Soil analysis should check for excessive K or Ca which can disguise the availability of Mg.

High risk situations

High or low pH ❖ High potash or calcium soil levels ❖ Sandy soils ❖ Poor root development.

Prevention

- ➜ Ensure adequate Mg levels in soils by replacing nutrient off-take
- ➜ Avoid over-liming
- ➜ Use readily available Mg sources

Deficiency

Normally seen as a yellowing of the tissue between the leaf veins. This shows up as a marbled effect in broad-leaved crops and a speckling in cereals. Deficiency always appears first on older leaves and this eventually leads to a shedding of leaves.

Treatment

Application of a foliar Magnesium is highly effective at providing the nutrient during peak demands, and to alleviate a temporary deficiency. Foliar treatments are not a substitute for adequate soil Mg. Products to consider are Bittersalz, eg. BFS LiquiTec Magnesium.

S Sulphur

An essential component of many amino acids and plant proteins. Sulphur is particularly important for such protein crops as milling wheat and oil seeds. Soil analysis important but malate/sulphate foliage test evaluation is steadily becoming the industry standard.

High risk situations

Sandy soils ❖ Low organic matter ❖ High winter rainfall ❖ Milling wheat.

Prevention

➜ Ensure full S demand is met through timely applications of water-soluble sulphur in fertilisers and/or manures

Deficiency

Symptoms usually observed first on younger leaves as a yellowing.

(Note: Not to be confused with N deficiency appearing first on older leaves and then spreading to the whole plant).

Treatment

Foliar applications of BFS LiquiTec Sulphol has the effect of boosting sulphur content in the crop which can help to alleviate a temporary demand/deficiency.

Mn Manganese

An important trace element for stimulating enzyme activity, the uptake of N and also promoting the energy cycle. A deficiency of Manganese is widespread throughout the UK and leaf analysis provides a reliable means of diagnosis of Manganese deficiency but soil analysis is of little value.

High risk situations

Loose, puffy seedbeds ❖ Organic soils
❖ High pH.

Prevention

- ➜ Rolling of seedbeds
- ➜ Regular applications of foliar Mn on high risk fields
- ➜ Avoidance of over-liming

Deficiency

Symptoms typically appear as a speckling and mottled appearance, usually seen on the younger (upper) leaves, which then develop into necrosis.

Treatment

Foliar sprays containing Mn are the only effective way of remedying the deficiency and the element can be applied after the symptoms appear.

The foliar treatment of BFS LiquiTec Manganese will rapidly correct an Mn deficiency.

B Boron

A vital trace element for the development of roots and shoots and is essential during flowering/fruiting stage. Oilseeds and root crops in particular have a high requirement. Soil analysis prior to sowing can be used to predict the risk of Boron deficiency. Leaf analysis is also a useful diagnostic guide.

High risk situations

Sandy soils ❖ High pH ❖ Dry conditions.

Prevention

- ➜ Use fertilisers containing Boron to boost soil content
- ➜ Preventative treatment with BFS LiquiTec Boron applied regularly to the crop
- ➜ Soil analysis prior to sowing to predict risk

Deficiency

Symptoms are seen as death of the growing points, a rotting and hollowing of roots, and misshapen leaves.

Treatment

If treatment is suggested as a result of soil analysis, apply a boronated compound or a foliar spray such as BFS LiquiTec Boron spray in the early stages of growth.

Foliar application of BFS LiquiTec Boron.

Zn Zinc

Zinc is an important element for the production of important plant hormones, seed production and root growth. It also assists the plants ability to resist disease and has become of increasing importance in the UK.

High risk situations

High pH ❖ Sandy and shale soils ❖ High soil levels of Mg, K and Ca.

Prevention

➜ Preventative treatments of Zinc Sulphate or Zinc Oxide applied regularly to the crop

Deficiency

Symptoms seen as stunted plants showing a bleaching that can spread to the veins but the mid rib and leaf edges remain green. Symptoms appear on older leaves first .

(Note: Not to be confused with symptoms of Sulphur deficiency on younger leaves).

Treatment

Foliar application of BFS LiquiTec Zinc.

Cu Copper

A Copper deficiency can result in early ageing or lowered levels of chlorophyll, which leads to yield reductions that go unnoticed if the deficiency is not too severe. Early visual symptoms should be verified by a tissue test. Even small amounts of copper applied at this stage can have a huge influence on yields.

High risk situations

Deep, sandy & light soils ❖ High organic soils ❖ Livestock manure residues ❖ High pH ❖ High N levels.

Prevention

- ➜ Soil dressing of copper oxychloride or copper sulphate. prior to sowing. deficiency already identified
- ➜ Foliar treatments with LiquiTec Copper at mid-late tillering stage
- ➜ Soil and plant tissue analysis may be used to predict a deficiency

Deficiency

Cereals show whitening of young leaf tip with the leaves twisting in spirals and bent over at right angles to the stem. Ears may be malformed and underdeveloped and appear white at harvest; sometimes trapped within the leaf sheath.

Conditions affecting nutrient deficiency

Conditions	Nutrients likely to be deficient
Cold Soils	N P S Fe Zn
Saturated Soils	N P K Fe Zn
High pH	Cu Fe Mn Zn
Low pH	S Ca Mg Mo
Compacted Soils	P K Mg
Dry Soils	P K S B
High OM*	K Cu Mn
Sandy Soils	S Mg K B Mn
High Calcium	P Fe
Low OM*	S K P B Zn
High Magnesium	Ca
Low Magnesium	Ca Mg

*OM = Organic Matter

Section 3

NUTRIENT DEFICIENCY IDENTIFICATION

Cereals

Nitrogen deficiency

Nitrogen

Symptoms are a universal pale green/yellow tinting of entire leaves (not to be confused with Sulphur deficiency).

Indicators include reduced plant height and fewer tiller compared to healthy plants.

Plants quickly become severely stunted with drastic affects on yield.

Treatment

Foliar application of BFS liquid N fertilisers (e.g: 28N or 30N).

Note: Where milling wheat may be deficient in protein N, apply BFS Profol at milky white.

Cereals

Phosphorus deficiency

Symptoms appear as hues of red or purple colours at the base of cereals, together with thin leaves.

Symptoms tend to show up at a very early stage of the plants development and those with poor root structures are the most severely effected.

Mild Phosphorus deficiency in wheat can only be characterised by stunted growth with no obvious leaf symptoms.

Treatment

As a P deficiency is difficult to treat curatively, importance should be placed on ensuring adequate soil P is available.

Foliar application of Potassium Phosphite may help to alleviate temporary demand.

Cereals

Potassium deficiency

Specific Potassium deficiency symptoms always appear in the oldest leaves of wheat, although growth of the whole plant can be affected prior to symptoms with all leaves having a spindly appearance.

Symptoms are seen as yellow or brown leaves that spread to the tips that appear scorched.

Plants appear to have dried prematurely and are at a more significant risk of lodging.

Treatment

Potassium deficiency can be difficult to diagnose and yield losses can occur long before visual symptoms appear.

Emphasis should be placed prevention – ensure adequate soil K is always available.

There are some foliar applied K products that can help temporarily to ease a spike in demand and/or a soil deficiency.

Cereals

Mg Magnesium deficiency

Symptoms seen on new leaves that are pale in contrast to the older leaves.

The new leaves soon become chlorotic and remain unopened, resulting in a twisted appearance that give the impression of drought stress.

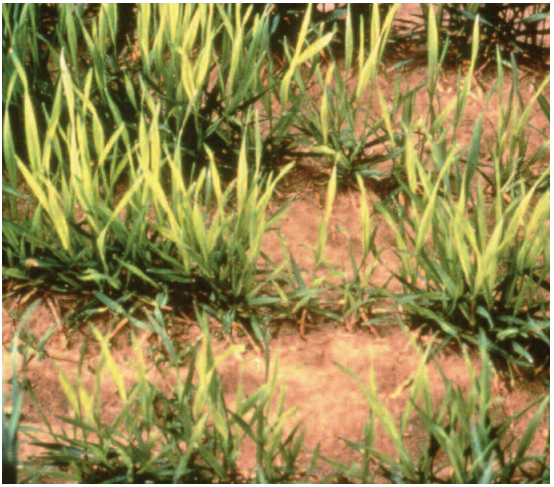
If Magnesium deficiency is severe enough, the entire length of the leaf will remain folded or rolled.

The symptoms of Magnesium (Mg) deficiency resemble those of Potassium (K). However, unlike K deficiency, the new leaves of Mg-deficient wheat plants are pale in contrast to the old leaves.

Treatment

Foliar application of BFS LiquiTec Magnesium – see Section 2, page 14 for details.

Cereals



Sulphur deficiency

Sulphur

Plants deficient in Sulphur will have pale green leaves that fail to 'green-up' when more N is applied.

In wheat, Sulphur usually occurs on sandy soil low in organic matter.

(Note: Not to be confused with an N deficiency starting on older leaves).

Treatment

Foliar application of BFS Nitrogen and Sulphur formulations, or LiquiTec Sulphol. – see Section 2, page 15 for details.

For improved spraying accuracy, fit Billericay Air Bubble Jets.

Cereals

Mn Manganese deficiency

Manganese

Symptoms appear first in new leaves, which become pale and limp in contrast to the old leaves.

Light grey flecking and striping then appear at the base of the youngest fully opened leaf.

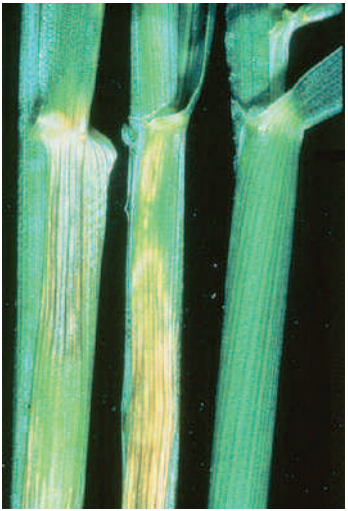
Under severe deficiency, new growth may emerge with this flecking and striping over the entire length of the leaf.

A further sign to watch out for are the 'wheelings', which often remain green due to soil compaction.

Treatment

Foliar application of BFS LiquiTec Manganese – see Section 2, page 16 for details.

Cereals



Zinc deficiency

In a mild deficiency, symptoms first appear as pale green stripes on either side of the leaf's mid-rib whilst margins often remain green.

On older leaves, these stripes become necrotic and the colour of the leaf centre changes to a muddy grey/green.

In severe cases, leaves turn yellow, 'cup' upwards and plants become stunted.

Zinc deficiency is usually very irregular in fields.

Treatment

Foliar application of BFS LiquiTec Zinc – see Section 2, page 18 for details.

Cereals

Cu Copper deficiency

Visual symptoms of Copper deficiency are commonly when tip whitening is observed on young leaves, together with typical spiral twisting and bending over at right angles to the stem.

Ears may be malformed and underdeveloped and sometimes trapped within the leaf sheath. Crop maturity can also be delayed by 7-14 days.

Herbicides are commonly blamed for yield losses because Cu deficiency symptoms usually show up about the same time that post-emergent herbicides are applied.

Treatment

Foliar applications of LiquiTec Copper – see Section 2, page 19 for details.

Oilseed Rape

Nitrogen deficiency

Symptoms are a universal yellow/orange tinting of entire leaves beginning on older leaves, showing up first in the early spring.

Leaf number is reduced and plants become stunted.

Further later signs show us a small pods.

Treatment

Foliar applications of BFS clear liquid 28N or 30N solution fertilisers.

Oilseed Rape

Phosphorus deficiency

Classic signs of Phosphorus deficiency are seen as shades of red or purple on the older leaves and at the base of plants.

Symptoms tend to show very early on. Plants affected have thin stems with few branches and small narrow leaves.

Plants with poor root structures, resulting from min-till techniques or soil consolidation, are most severely affected.

Treatment

Early detection is important. Once symptoms are recognised and an early diagnosis made, water-soluble P fertilisers can be applied post-emergence.

It is more practical however to maintain adequate soil reserves.

Oilseed Rape

Potassium deficiency

Potassium

Symptoms are first seen as a purpling and later necrosis of leaf margins in particular.

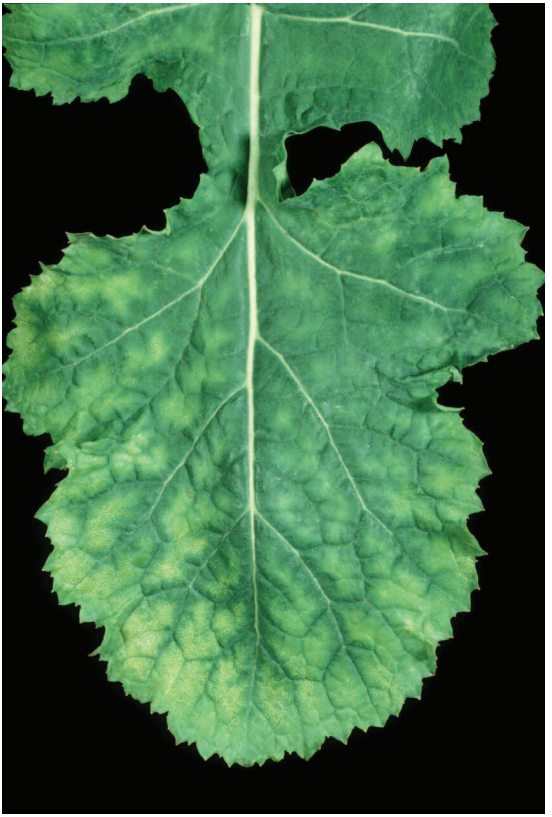
Plants are more susceptible to lodging and tend to senesce earlier.

Treatment

The deficiency is difficult to treat curatively and the emphasis should be on achieving and maintaining an adequate supply of Potassium from the soil.

Note: The amount for K removed is quite modest at around 40-50kg K_2O/ha, however, the crop itself takes up over 200kg/ha and this must be accounted for.

Oilseed Rape



Mg Magnesium deficiency

Symptoms show up as interveinal chlorosis on older leaves with a marbling effect.

In the early stages the leaf veins remain green but as the deficiency progresses a total whitening of leaves occurs, followed by leaf fall. It is currently seen that modern, high yielding cultivars appear to have an increasing Magnesium requirement.

Treatment

Foliar application of Bitterzaltz or BFS LiquiTec Magnesium – see Section 2, page 14 for details.

Oilseed Rape

Sulphur deficiency

Symptoms first show as a diffuse yellowing on the youngest leaves and sometimes this becomes marbled.

The affected leaves form spoon shapes and then curl upwards and may become brittle.

Further signs show up as reduced number of flowers, which are markedly pale.

Autumn sown crops are more susceptible than spring sown crops.

Treatment

Foliar application of BFS Nitrogen and Sulphur formulations or LiquiTec Sulphol – see Section 2, page 15 for details.

For improved spraying accuracy, fit Billericay Air Bubble Jets.

Oilseed Rape

Boron deficiency

Boron

Symptoms are seen as the death of growing points and leaf axils (where leaf stalk meets main stem).

Lower stems in particular may blacken and become hollow (rarely seen). Later, pods can be pale or white.

Boron deficiency symptoms are rarely seen in oilseed rape even when the crop is grown in soils with low Boron levels.

Treatment

Foliar application of BFS LiquiTec Boron – see Section 2, page 17 for details.

Potatoes

Potassium deficiency

Potassium

Symptoms include a bronzing of the leaves and necrosis of leaf margins and tips.

Other indicators include stunted bushy plants with small leaves and very premature senescence before adequate tuber bulking.

A further indicator of Potassium deficiency is increased black spot in the tubers.

Treatment

Major emphasis should be placed on providing adequate reserves of K in the soil (index 2+).

Foliar applications of potassium sulphate are also effective in boosting K levels, and treatments are particularly useful for crops grown in very light soils.

Potatoes

Mg Magnesium deficiency

Symptoms include interveinal chlorosis on the older lower leaves, together with a marbling effect where the leaf veins remain green.

As chlorophyll breaks down in the leaf, various shades of red/purple can appear which lead eventually to leaf necrosis.

On determinate cultivars the effect on yield may be severe.

Treatment

Foliar applications of BFS LiquiTec Magnesium – see Section 2, page 14 for details.

Potatoes

Mn Manganese deficiency

Symptoms include an initial paleness in the younger, upper leaves, followed by the appearance of blackish/brown spots along the veins; these are best seen on the underside of the leaves.

Manganese deficiency usually occurs in high-pH soils and those with a high organic content.

The effect on yield may be severe if left untreated.

Over-liming can induce the problem.

Treatment

Foliar applications of BFS LiquiTec Manganese – see Section 2, page 16 for details.

Sugar Beet

Sugar Beet

Nitrogen deficiency

Symptoms are seen when the older leaves first turn pale yellow and die, and new leaves become thinner and longer.

Plants often display erect growth habit and fail to achieve adequate yield.

Treatment

In a semi-mature crop applications of Nitrogen are not recommended for reason of quality. The crops total N requirement should be applied at the established seedling stage.

Sugar Beet

Phosphorus deficiency

Symptoms indicating Phosphorus deficiency are recognised from a very early stage with the plants displaying stunted dark leaves with a purple/red tinge.

Treatment

Early detection is important as a water-soluble P fertiliser can be applied post-emergence.

Emphasis however should be on achieving and maintaining adequate soil P.

Sugar Beet

K Potassium deficiency

Potassium

Symptoms show up as lacklustre leaves with a mild chlorosis on leaf margins.

If deficiency is not corrected, distortion of leaves takes place with spreading necrosis from the leaf margins inwards. Older more mature foliage is affected first.

Treatment

To maximise yield, emphasis here should be on providing and maintaining adequate levels of Potassium in the soil (index 2).

Sugar Beet

Mg Magnesium deficiency

Symptoms are seen first on the older leaves as interveinal chlorosis.

This is followed by the reddening of leaves and leaf death occurs from the margins inwards.

Treatment

Foliar application of BFS LiquiTec Magnesium – see Section 2, page 14 for details.

For improved spraying accuracy, fit Billericay Air Bubble Jets.

Sugar Beet

Mn Manganese deficiency

Symptoms show up as patchy, chlorotic areas that first appear early in spring and later become speckled – hence the term 'speckled yellows'.

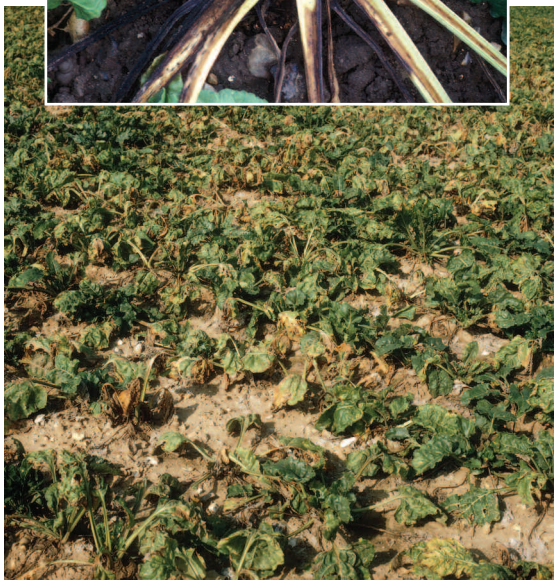
Leaves may curl inwards and display an upright habit.

Leaf spots may become translucent and in severe cases holes in the leaves are commonly formed .

Treatment

Foliar application of BFS LiquiTec Manganese – see Section 2, page 16 for details.

Sugar Beet



Boron deficiency

Symptoms on the foliage are seen as the death of the growing points in the centre of the plant together with brown fibrous patches on leaf stems.

A severe, diffuse leaf yellowing is seen which is often very patchy in the field.

The roots are often brown/black at the top with a corky growth.

Treatment

Foliar application of BFS LiquiTec Boron – see Section 2, page 17 for details.

Peas & Beans

Potassium deficiency

Potassium

Symptoms show up as a yellowing or scorching of leaf margins, the inward curling of leaves and, in beans, shortening of internodes.

The Nitrogen fixing ability of legumes, deficient in Potassium, is also compromised and therefore N deficiency symptoms may also be indicative of K deficiency.

Treatment

Emphasis should be on achieving and maintaining adequate soil K.

Peas & Beans

Mn Manganese deficiency

Symptoms develop during the early stages of crop growth and show up during the flowering, vegetative stage.

Where a deficiency occurs early on, seed can develop a necrotic spot in the centre of the cotyledons.

In peas, this spot is known as Marsh Spot and can affect the germination and give rise to abnormal seedlings.

The main effect of Marsh Spot is reducing its harvested value.

Treatment

Foliar applications of BFS LiquiTec Manganese during flowering and pod development stages – see Section 2, page 16 for details.

Maize

Phosphorus deficiency

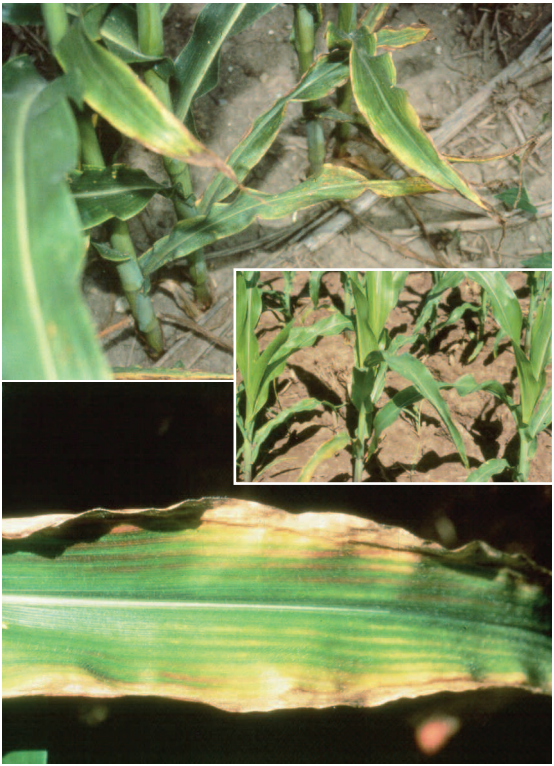
Slow early growth, stunted with purplish/reddish stems and leaf tips are characteristic indicators.

Symptoms tend to show up at a very early stage of the plants development, followed by shallow root systems and retarded maturity.

Treatment

If Phosphorus deficiency is identified at an early stage, a liquid foliar P fertiliser can be applied post emergence.

Maize



Potassium deficiency

Symptoms are seen as drying along the leaf margins that become ragged. Older leaves are the first to be affected.

Other symptoms include stunted weak stalks, excessive lodging and short internodes.

Treatment

A deficiency of Potassiumis difficult to treat curatively and therefore emphasis should be placed on ensuring adequate soil K is always available.

There are some foliar applied K products that can help temporarily to ease a spike in demand and/or a soil deficiency.

Maize

Mg Magnesium deficiency

Symptoms seen as white or yellowish streaking between leaf veins, mainly on the lower leaves (not to be confused with Zinc deficiency where the stripping is more defined).

Later symptoms will be seen as leaf curling and a severe necrosis starting at the leaf tips.

Treatment

Foliar application of BFS LiquiTec Magnesium – see Section 2, page 14 for details.

For improved spraying accuracy, fit Billericay Air Bubble Jets.

Maize

Zinc deficiency

Symptoms first appear as narrow yellow or white stripes on the upper leaves between the veins.

These stripes may join together to form a bleached area between the midrib and leaf margins, which remain green.

In severe cases the plants become stunted due to shortened internodes.

Treatment

Foliar application of BFS LiquiTec Zinc – see Section 2, page 18 for details.

Quick guide to symptoms of plant nutrient deficiency or excess

Nutrient	Type	Visual symptoms
Nitrogen	Deficiency	Light green to yellow appearance of leaves, especially older leaves; stunted growth; poor fruit development.
	Excess	Dark green foliage, which may be susceptible to lodging, drought, disease and insect invasion.
Phosphorous	Deficiency	Leaves may develop purple coloration; stunted plant growth and delay in plant development.
	Excess	Excess phosphorus may cause micronutrient deficiencies, especially iron or zinc.
Potassium	Deficiency	Older leaves turn yellow initially around margins and die; irregular fruit development.
	Excess	Excess may cause deficiencies in magnesium and possibly calcium.
Calcium	Deficiency	Reduced growth or death of growing tips; blossom-end rot of tomato; poor fruit development and appearance.
	Excess	Excess calcium may cause either magnesium or potassium deficiency
Magnesium	Deficiency	Initial yellowing of older leaves between veins spreading to younger leaves; poor fruit development and production.

Nutrient	Type	Visual symptoms
Magnesium	Excess	High concentration tolerated; however, imbalance with calcium and potassium may reduce growth.
Sulphur	Deficiency	Initial yellowing of young leaves spreading to whole plant; similar symptoms to nitrogen deficiency but occurs on new growth.
	Excess	Excess of sulfur may cause premature dropping of leaves.
Iron	Deficiency	Initial distinct yellow or white areas between veins of young leaves leading to spots of dead leaf tissue.
	Excess	Possible bronzing of leaves with tiny brown spots.
Manganese	Deficiency	Interveinal yellowing or mottling of young leaves.
	Excess	Older leaves have brown spots surrounded by a chlorotic area.
Zinc	Deficiency	Interveinal yellowing on young leaves; reduced leaf size.
	Excess	Excess zinc may cause iron deficiency in some plants.
Boron	Deficiency	Death of growing points and deformation of leaves with areas of discoloration.
	Excess	Leaf tips become yellow followed by necrosis. Leaves get a scorched appearance and later fall off.

LiquiTec product application rates

LiquiTec Product	Maintenance Dressing	Deficiency Dressing	Water Rate	Crops	Timing
LiquiTec Manganese *Contains: Mn 15% w/v* SO_3 *22% w/v*	2 litres/ha	4 litres/ha	100-200 litres/ha	Cereals Oilseed rape Peas Vegetables Top fruit Root crops	Autumn/ Spring
LiquiTec Magnesium *Contains: Mg 9% w/v* SO_3 *17% w/v*	3 litres/ha	7 litres/ha	100-200 litres/ha	Cereals Potatoes Sugar beet Grassland Vegetables Top fruit	Spring/ Summer
LiquiTec Copper *Contains: Cu 15% w/v* SO_3 *9% w/v*	2 litres/ha	4 litres/ha	100-200 litres/ha	Cereals Sugar beet Onions Leeks	Spring
LiquiTec Boron *Contains: B 15% w/v N 6.5% w/v*	3 litres/ha	4 litres/ha	100-200 litres/ha	Oilseed rape Sugar beet Carrots Parsnips Brassicas Top Fruit	Pre-sowing/ Spring
LiquiTec Zinc *Contains: Zn 15% w/v* SO_3 *19% w/v*	2 litres/ha	3 litres/ha	100-200 litres/ha	Cereals Maize Oilseed rape Sugar beet Carrots Brassicas Top Fruit	Pre-sowing/ Spring

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Liquid fertilisers for better health and bigger harvests

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