



Oilseed rape

Managing crop nutrition for success with oilseed rape



The Authority in Potassium and Magnesium



Oilseed rape – the perfect break crop?

The oilseed rape crop has a particularly important place in UK farming. With a favourable temperate climate, suitable cereal based rotations and the possibility of growing higher yielding winter types, oilseed rape has long been the most popular break crop in the arable regions of the UK. Add to this an ever-increasing demand for the end-products (i.e. oil for both consumption and as a fuel) and the fact that oilseed rape provides a perfect break from cereals to interrupt the pest and disease cycle of many common pathogens it is no wonder that the oilseed rape area has reached almost 600,000 ha in the UK in 2009.

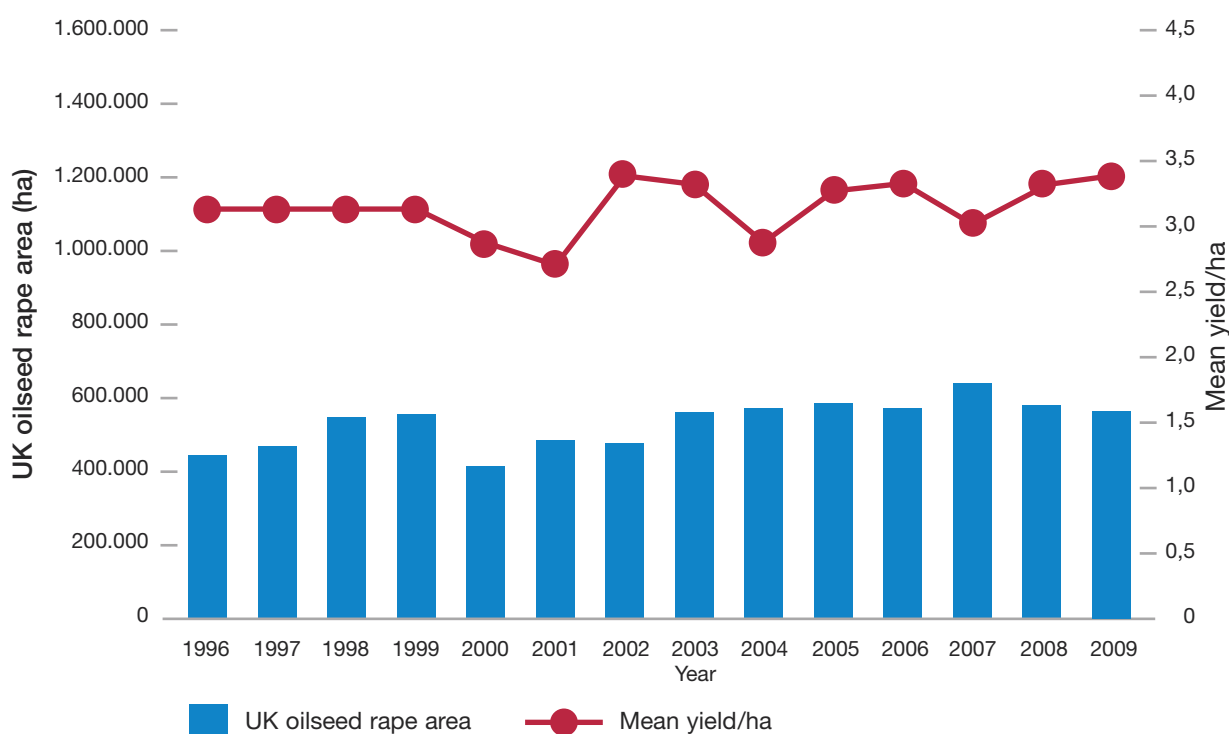
We now have the opportunity to consider oilseed rape less as a 'break crop' within a cereal rotation and more as the principal 'cash crop' it should be. Certainly the economics of the crop suggest that this is the right approach and one which Germany has adopted with a

focus on feeding and nurturing the crops every need to really maximise yield which hasn't significantly increased in the UK for the past 10 years (see figures below).

Key facts

- Highest Gross Margin of any combinable break crops from 2005 – 2010 (except peas in 2009).
- Ideal crop for minimum tillage systems systems.
- Early harvesting for a choice of autumn cropping options.
- Perfect cereal break with a strong armoury of crop protection products.
- Increases the yield potential of the following cereal.

Production area and yield of OSR, UK 1996 – 2009



Source: DEFRA 2009

Oilseed rape needs **potash**



Potash is particularly important for oilseed rape both to help build a dense green canopy in a short time window and to help to process all of the energy into the valuable oil that is found in the seed pods. In fact, oilseed rape requires potash in greater quantities than any other nutrient, including nitrogen.

Key functions of potash

- Nitrogen efficiency: N is the key driver of yield but is only taken up and used efficiently in the presence of adequate potash.
- Oil production: Potash is involved in the transport of the products of photosynthesis to the pods and the transformation into oil.
- Water management: Potassium supply is crucial for a plant to maintain adequate water status under conditions of drought stress.
- Resistance to pathogens: A plant with sufficient potassium is stronger, stands better and is less prone to attack from both pests and diseases.



Typical potash deficiency in oilseed rape

Success with oilseed rape depends on the crop being able to take up a sufficient quantity of potash in a very short time period.

A 4 tonne/ha oilseed rape crop in June typically contains around 350–400 kg/ha of potash (K_2O) and the crop needs to take up around 60% of this in a period of just 6–8 weeks. Consequently, it is of great importance that oilseed rape is grown on soils with a minimum of index 2- (120 mg/l–180 mg/l K) for potash. Where yields greater than the average are being targeted then additional potash will be required.

Key point:

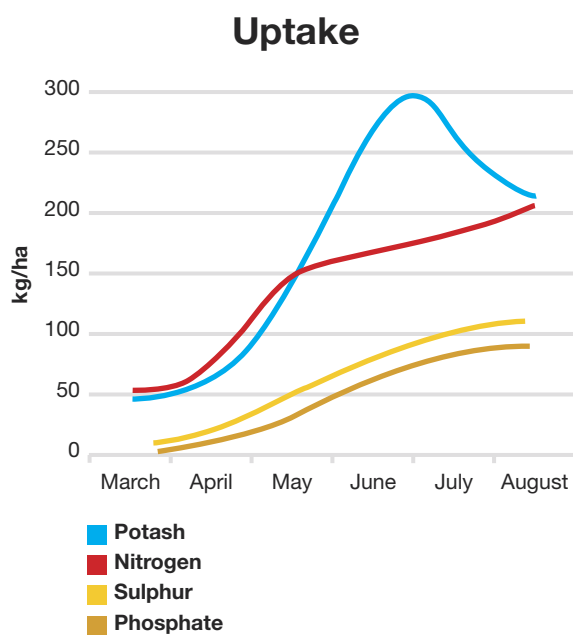
The difference between offtake and uptake
Uptake is the quantity of nutrient that a crop takes up from the soil during the growth period.

Offtake is the quantity of nutrient that is removed in the final harvested product which needs to be replaced.

The uptake of potash by a 4 tonne/ha crop is around 350–400 kg/ha K_2O but the offtake is just around 50 kg/ha K_2O . This is because the seed yield of oilseed rape is relatively small compared to the vast amount of green biomass it produces in order to feed and fill the seed pods.

Practical advice point:

Ensure that oilseed rape is going into a soil with a minimum of index 2- for K and preferably 2+ or higher if you are targeting high yielding crops (over 4t/ha). Evidence has shown that a crops response to fresh potash fertiliser on a low index soil is never as good as those crops which are going into a soil with an adequate K index.



Typical nutrient uptake by OSR (source PDA)



Optimum timing for potash application to oilseed rape in the Autumn

The 'German' system

A widely known and much debated fact is that the National average oilseed rape yield in Germany is around 0.5t/ha greater than in the UK. Many theories abound as to the reasons why but one point is key and that is the different approach to potash application to oilseed rape in Germany. German farmers recognise the quantity of potash that the crop takes up and therefore potash is commonly applied rotationally before oilseed rape in the rotation which then feeds enough potash for the following one or more cereal crops. The following experiments show that even where potash levels in soils appear to be adequate, useful responses can be found where additional 'rotational' potash is applied allowing the crop to reach its full potential.



Potash deficiency in oilseed rape

Potash response trials in winter oilseed rape on a range of soil types in Germany

	K ₂ O (kg/ha)	Yield (t/ha)	rel. (%)
Koselau, Germany 150 mg/l (K Index 2-)	0	4.62	100
	60	4.49	97
	120	4.76	103
	240	4.87	105
	300	4.97	108
Hohenlieth, Germany 230 mg/l (K Index 2+)	210	4.15	100
	400	4.51	109
Bovenau, Germany 120 mg/l (K Index 1)	0	4.23	100
	160	4.39	104
	240	4.44	105
	320	4.61	109
Altheim, Germany 340 mg/l (K Index 3)	0	3.89	100
	180	4.05	104
	360	4.17	107
Laupheim, Germany 280 mg/l (K Index 3)	0	2.97	100
	50	3.56	120
	100	3.99	134
	200	3.79	128

Magnesium – Without magnesium there are no green leaves!

Magnesium is the central building block in green leaves and is therefore vital for photosynthesis. The magnesium requirement for oilseed rape peaks at the pod setting stage and the total requirement by a 4t/ha crop is around 40–60 kg MgO/ha.

The oilseed rape pods play a very important role in the oil development, and therefore sufficient magnesium must be available just prior to pod setting so that solar energy can be efficiently converted into oil.

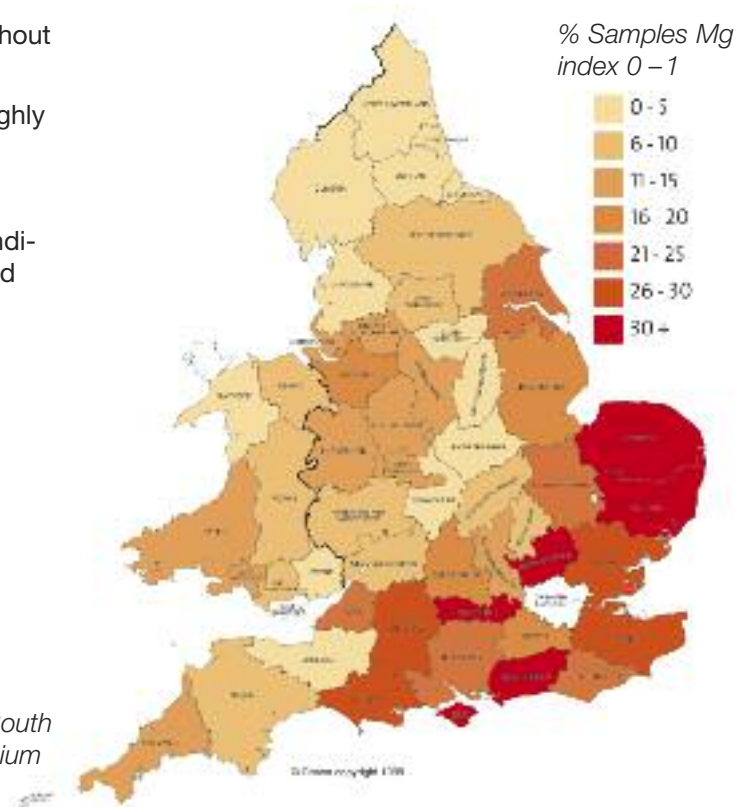
Magnesium supply to crops largely depends on the soil type. Clays and silty clays and soils in areas where the parent material is dolomite (magnesian limestone) tend to be higher in background magnesium whereas lighter soils and calcareous soils tend to be poorer in magnesium.

Quite frequently however, even on soils with a good magnesium level, the supply to the crop can be impaired. Many factors can negatively affect the potential supply of magnesium:

- Use of ammonium based fertilisers (ammonium nitrate, urea, slurry).
- Continued use of pure NPK fertilisers without magnesium.
- Use of magnesian lime (dolomite) with highly insoluble magnesium at pH > 6.
- Chalky soil types with a high pH value.
- Stress through unfavourable weather conditions (particularly cold, dry or waterlogged conditions).



Classic magnesium deficiency, appearing first on the older leaves and with the characteristic yellowing (chlorosis) between the leaf veins which themselves remain green



Map of England and Wales highlighting the South East as the most critical area for soil magnesium levels

Magnesium – the form is crucial for success

Magnesium is particularly important for oilseed rape and an adequate supply from the soil is essential if high yields from modern cultivars are to be achieved. When deciding on a magnesium fertiliser the single most important factor to be considered is water solubility. Several forms of magnesium are used in commercial fertilisers but ESTA® Kieserit is fully water soluble and therefore available to crops to take up. The following table highlights the differences in water solubility between some commonly used magnesium sources.

Therefore the products ESTA® Kieserit, Korn-Kali and Patentkali, all of which contain crop available magnesium in the kieserite form are highly effective at ensuring a reliable and immediate source of available magnesium to oilseed rape regardless of pH or soil conditions.

Magnesium soil index

The target magnesium index for growing oilseed rape is 2- (51 – 100 mg/l). Recent evidence comparing Korn-Kali with straight muriate of potash (MOP) has shown a useful yield advantage with Korn-Kali on soils at index 0 and 1 for Magnesium.

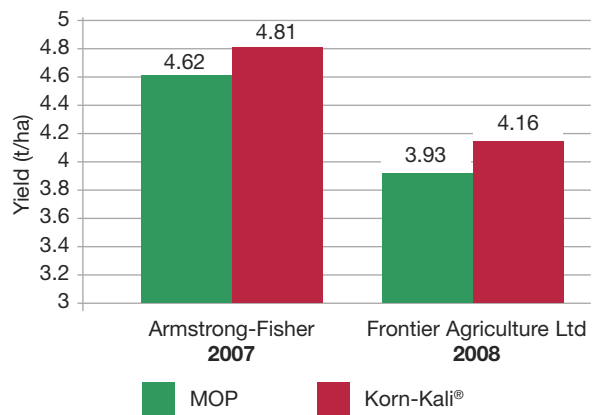
Magnesium deficiency

Magnesium deficiency symptoms are very similar for most broad-leaved crops including oilseed rape. The early symptoms appear as yellowish mottling between leaf veins, which typically remain green. Discolouration worsens with time until almost white interveinal areas appear followed by gradual death of the leaf. Deficiency can be confirmed by leaf analysis; a test result of less than 0.2 % Mg (by dry matter) would indicate a problem.

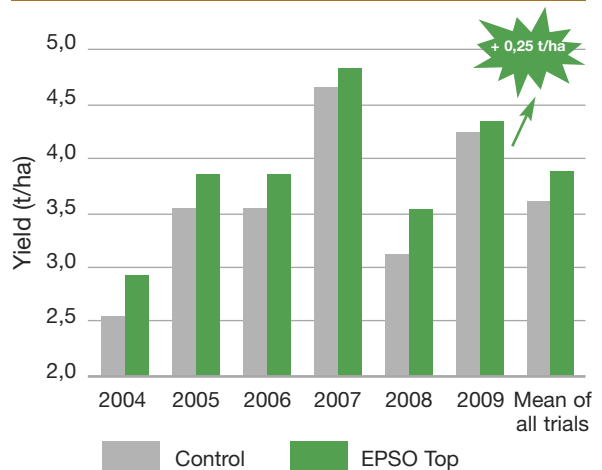
Deficiency can be temporary due to a lack of available water or a cold snap but can also be more serious due to a poor rooting structure or a lack of magnesium in the soil. Either way, a foliar application of available magnesium (either EPSO Top or EPSO Microtop) will ensure that magnesium gets quickly and efficiently directly into the plants.

Mg Source	Solubility g/l water
ESTA® Kieserit	417
Magnesite (MgCO ₃)	0,034
Calcined magnesite	0,0062
Magnesium hydroxide	0,009

Korn-Kali trials UK 2007 – 2008



Mean data for all EPSO Top trials UK 2004 – 2009





Sulphur – the indispensable nutrient for oilseed rape

For many years, sufficient quantities of sulphur for agricultural crops were deposited from the air from emissions from coal-fired power stations. In more recent times the great advances in clean air technology have drastically reduced the quantity of sulphur. The requirement therefore for all crops is increasing and oilseed rape is no exception.

Predicting S requirements of OSR

Of all arable crops, oilseed rape is the most responsive to sulphur and in 2008, 70% of crops received a fertiliser dressing of sulphur.

It is clear now that all oilseed rape crops should receive an application of sulphur but predicting actual rates can be a little more difficult.

The sulphur demand for oilseed rape is around 50–70 kg S/ha (125–175 kg SO₃/ha). Given that some of this requirement will come from the soil supply, the remainder must be applied to the crop by way of fertilisers or manures. This quantity amounts to around 30–50 kg S/ha typically (75–125 kg SO₃) and is best applied in the form of sulphate based fertilisers which deliver the nutrient in the form that plants use it in.



Typical spoon-like development of younger leaves and interveinal yellowing at the leaf margins as seen here are typical symptoms of S deficiency in OSR

Sulphur deficiency symptoms

- Spoon-like shaped leaves with turned up edges (particularly younger leaves)
- Yellow marbling starting with the youngest leaves
- Red/brown discolouration of the petioles and leaves in the nodule stage
- Pale flower petals, often stunted also
- Fewer, randomly set pods with fewer seeds per pod



Sulphur deficiencies symptoms on the leaves, flowers and pods of oilseed rape

Factors which increase the requirement for fertiliser sulphur applications:

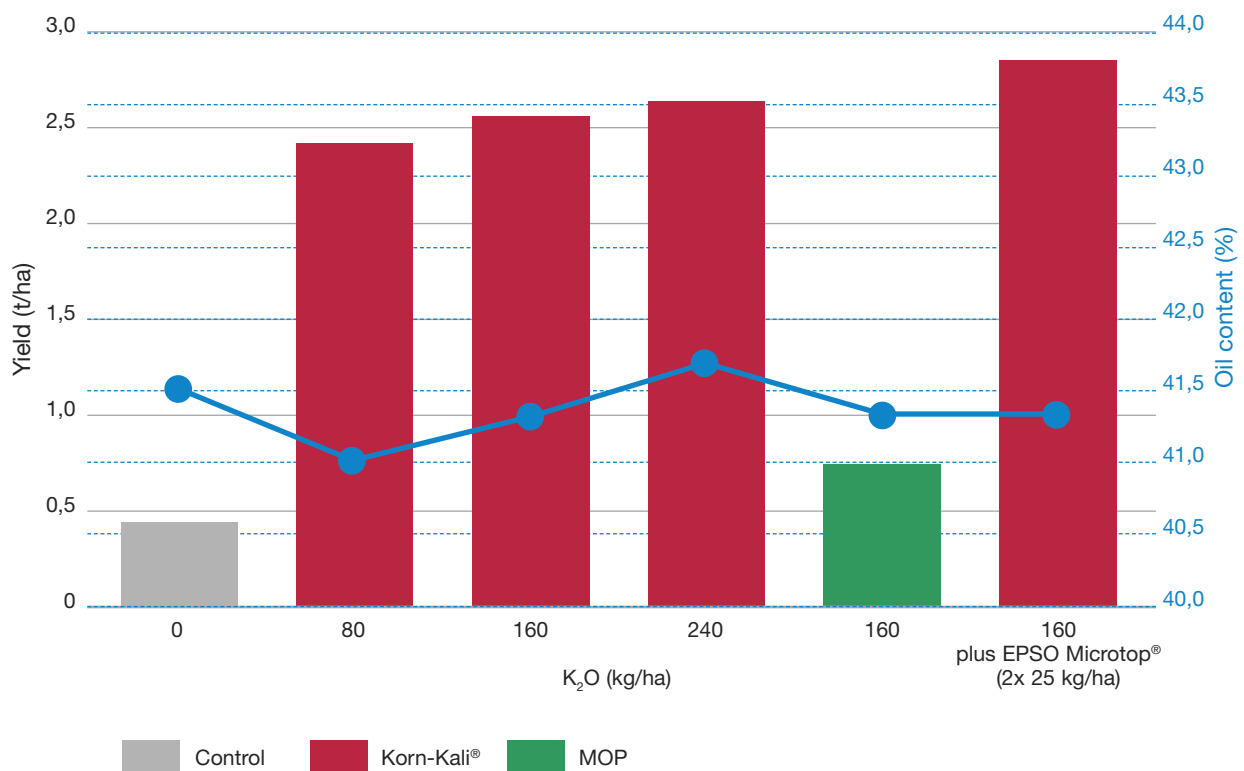
- Light textured soils
- Soils with low organic matter
- Sites with a high yield target (above 4t/ha) and where N rates are approaching the highest permissible levels
- Soils with structural problems
- Minimum tillage systems
- Rural sites far from major industrial areas



Poorly filled pods are one sign that S supply was insufficient

Dramatic yield responses to sulphur in oilseed rape

K+S KALI GmbH trials, 2006



Sulphur timing

The main quantity of sulphur is best applied in the early Spring just prior to the onset of the main growth period. As with nitrogen however, applying a little in the autumn can be useful and an autumn dressing of Korn-Kali at 250 kg/ha provides a useful quantity of sulphur for the autumn/winter period (30 kg SO₃/ha) whilst also containing potash and magnesium in a ratio which is suited to the crop.

Forms of sulphur

Plants take up sulphur exclusively in the sulphate form and therefore the most effective fertilisers contain sulphur in this form. K+S KALI products Korn-Kali, Patentkali and ESTA® Kieserit all contain sulphur in this crop-available 100% water soluble form and no transformation in the soil is necessary. Sulphate based fertilisers can be used on any soil type regardless of pH.



The importance of magnesium and sulphur is evident on this control strip in a field trial which did not receive an application of EPSO Top foliar fertiliser

ESTA® Kieserit offers sulphur as well as magnesium

In areas where soil magnesium is low, ESTA® Kieserit offers a perfect solution to the magnesium and sulphur demand for oilseed rape. There is growing evidence that oilseed rape is responsive to magnesium at both Mg index 0,1 and in some cases 2.

An application in the Spring of 100–200 kg/ha ESTA® Kieserit delivers the total magnesium and sulphur demand for the crop. By applying the sulphur independently of the nitrogen, there is a further benefit as flexibility in the timing and product choice is greater for the farmer.



Applying the total magnesium and sulphur demand of an oilseed rape crop in spring with ESTA® Kieserit

Boron – essential for the Brassicas

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Being a Brassica species closely related to cabbage, oilseed rape has a particular affinity for Boron and reacts sensitively to a deficiency. The basic boron requirement by oilseed rape is similar to that of sugar beet which is around 350–450 g B/ha.

Boron supply can be limited particularly in dry conditions, where pH is high, immediately after liming and on sandy soils where boron is more mobile.

Boron plays a key role both in the division of new cells and the most common deficiency symptoms are a direct result of these functions working inefficiently. Misshapen roots, stems and petioles all arise as a result of cells dividing uncontrollably and not differentiating, leading frequently to cavities in the roots and blackened growing points. Internodes are frequently shortened too giving a somewhat bushy, compact rosette-like appearance. Because boron is involved with flowering and pod forming, poor pod set and misshapen pods can also indicate an insufficient supply of boron. Deficiency can be recognised by reddening of the older leaves and petioles (leaf stalks) and by the formation of a compact rosette-like growth habit.



Boron deficiency in oilseed rape

In addition to identifying factors which may increase the risk from boron deficiency in an area, the ultimate step is to analyse the soil for boron levels. Boron is one of the micronutrients which can be reliably tested for and the potential supply from the soil can be accurately determined.

Boron level	Advice
Less than 0.5 mg/l	Severely deficient
0.5 – 1.0 mg/l	Moderately deficient
1.0 – 2.0 mg/l	Level satisfactory, treat with Boron if there are risk factors

Boron levels can be accurately evaluated in the growing crop. A boron content of below 30 mg B/kg dry matter indicates a deficient situation.

The deficiency can be rapidly and effectively treated with the use of a cost-effective foliar fertiliser such as EPSO Microtop. For insurance against boron deficiency, EPSO Microtop should be applied in several treatments between the rosette stage and early flowering at an annual total of up to 25 kg/ha applied in 2 or 3 applications at not more than 5% w/v concentration in the sprayer.



Compacted growth and thickening of the lower stem area are typical symptoms for Boron deficiency in oilseed rape

Manganese

for oilseed rape

Manganese is the most limiting trace element in the UK. Soils with high organic matter and/or high pH are problematic for this vital micronutrient as are light soil types and unconsolidated seedbeds.

Although manganese problems are most often associated with cereals, oilseed rape is classified as a crop with a medium demand and manganese deficiency is not uncommon.

Deficiency symptoms can be recognised by:

- Pale spots which form first in the middle of the leaf and not from the edge
- A mottled greenish yellow-colouration of the middle and younger leaves (cf. magnesium deficiency which starts on older leaves)
- Retarded pod development
- Delayed onset of flowering, ripening and harvesting

One sure sign of manganese deficiency is the appearance of less affected healthier plants along tractor wheelings where soil is more compacted and manganese availability is therefore improved.

Because the potential supply of manganese to the crop depends largely on the soil pH, regular use of foliar fertilisers such as EPSO Microtop is the preferred method of supplying manganese. In this way, the nutrient is absorbed directly by leaves before it gets chance to be 'locked-up' in the soil.



Typical mottled appearance of manganese deficient oilseed rape with middle leaves affected



Manganese deficiency is common on peaty and sandy soils. In the advanced stages, leaves begin to die between the veins

Fertiliser options for success with oilseed rape

Recommendations

Korn-Kali®

250–500 kg/ha to satisfy the high demand for potash, to supply the right quantity of magnesium and a significant proportion of the sulphur demand.

Patentkali®

300–600 kg/ha to satisfy the high demand for potash whilst supplying the complete requirement for sulphur.

ESTA® Kieserit gran.

200–300 kg/ha to supply sufficient magnesium for Mg deficient sites as well as the full sulphur requirement.

EPSO Microtop®

To insure against temporary shortfalls in magnesium and sulphur and also to satisfy the basic requirement of boron and manganese, apply at a total annual rate of upto 25 kg/ha (ideally in 2–3 applications) at a maximum w/v concentration of 5% (5 kg product per 100 l/water) from early stem extension until flowering.

EPSO Top®

To insure against, and to effectively treat temporary shortfalls in magnesium and sulphur, apply at a total annual rate of upto 25 kg/ha (ideally in 2–3 applications) at a maximum w/v concentration of 5% (5 kg product per 100 l/water) from early stem extension until flowering.



All in one hand

Korn-Kali®

EC-FERTILISER

Potassium chloride containing magnesium salts
40 (+6+4+12)

40% K₂O water-soluble potassium oxide
6% MgO water-soluble Magnesium oxide
4% Na₂O water-soluble sodium (3% Na)
12% SO₃ water-soluble sulphur trioxide (4% S)

Korn-Kali is a balanced potash fertiliser containing the correct quantity of magnesium for most situations and a useful quantity of crop-available sulphur. With all nutrients in every granule and upto 36 m spreading, Korn-Kali is highly suitable for arable crops and grass.

Patentkali®

EC-FERTILISER

Potassium sulphate with magnesium (30+10+42)

30% K₂O water-soluble potassium oxide
10% MgO water-soluble Magnesium oxide
42% SO₃ water-soluble sulphur trioxide (17% S)

Patentkali is a special sulphate based potash fertiliser with a higher magnesium content. All nutrients are in the water-soluble sulphate form and are present in every granule. Patentkali is suitable for lower magnesium soils and / or where sulphur demand is high and can be spread at upto 36 m bout widths.

ESTA® Kieserit

EC-FERTILISER

Kieserite 25+50

25% MgO water-soluble Magnesium oxide
50% SO₃ water-soluble sulphur trioxide (20% S)

ESTA® Kieserit is a unique magnesium and sulphur fertilizer of the highest quality. All nutrients are water soluble and therefore immediately available to crops grown in any soil type or situation. Tested to spread at bout widths of upto 36 m.

EPSO[®]Top

EC-FERTILISER

Magnesium sulphate 16+32

16% MgO water-soluble magnesium oxide
32% SO₃ water-soluble sulphur trioxide (13% S)

EPSO Top is fast acting, cost-effective foliar fertiliser designed to effectively treat and insure against magnesium and sulphur deficiency in all crops including oilseed rape.

EPSO[®]Microtop

EC-FERTILISER

Magnesium sulphate with micronutrients 15+31

15% MgO water-soluble magnesium oxide
31% SO₃ water-soluble sulphur trioxide (12% S)
0,9% B water-soluble Boron
1% Mn water-soluble Manganese

EPSO Microtop is a specialist foliar fertiliser which effectively prevents and treats magnesium and sulphur deficiency and supplies a maintenance requirement of the essential trace elements boron and manganese.

K+S UK & Eire Ltd. ensure the highest quality of products and service with commitment to helping growers obtain the optimum benefits from the complete product range. To this end, a FACTS qualified agronomic specialist is on hand to deal with questions of how best to integrate K+S KALI GmbH products into your nutrient management program and maximise returns.

All information contained with this leaflet was correct at time of printing. Information on the use of fertilisers given in this document does not constitute a specific fertiliser recommendation and we advise that you consult a FACTS qualified adviser for such advice.



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