KALI
FERTILIZER
PAKISTAN

KALISOP®

Premium Quality –
For all Special Crops

FOR ORGANIC FARMING
acc. to
(EU) 2018/848
(EC) No 889/2008

KALISOP®

EC FERTILISER
Potassium sulphate 50 (+44) gran.

50 % K2O water-soluble potassium oxide
44% SO$_3$ water-soluble sulphur trioxide (= 17,6 % S)

KALISOP®

- is a highly concentrated potassium sulphate fertiliser with 50 % K2O and 44 % SO3 in sulphate form.
- is water-soluble, so that the nutrients potassium and sulphur are immediately available to the plant.
- is nearly chloride-free and is therefore the ideal potassium source for chloride-sensitive crops.
- has, in compared to other potash fertilisers, a lower salt index and is therefore especially suited for the fertilisation of valuable special crops in intensive cultivation systems.
- is the ideal fertiliser for crops with a high sulphur requirement. Sulphur improves the efficiency of the nitrogen fertilisation and has a positive impact on yield and quality.
- is not hygroscopic and therefore has a good storage stability.
- is certified for organic farming according to the regulations (EU) 2018/848 and (EC) No. 889/2008.

KALISOP® for top quality in the cultivation of fruits, vegetables and tobacco. The nutrients potassium and sulphur contained in KALISOP are decisive quality-enhancing factors. They play a key role in plant metabolism such as sugar and starch synthesis, protein production, transport of assimilates and activation of enzymes.

Improved appearance and taste

With KALISOP, fruits and vegetables have a more beautiful colouring. Sugar and acid content is increased and aroma intensified. Cash crops thus become more attractive to the consumer.

Increased storage and processing quality

KALISOP increases the firmness of plant tissue in fruits and vegetables, thus improving the storage life and transportability of the harvested products as well as their suitability for pro- cessing and preservation.

Top quality in tobacco cultivation

KALISOP improves the external properties like leaf size, specific leaf weight, leaf colour and increases disease resistance. The low chloride content ensures a long burn time in tobacco. In addition, KALISOP enables the optimal adjustment of potassium and nitrogen supplies in combination with singenutrient nitrogen fertilisers.

KALISOP® as sulphur fertiliser

• Reduced sulphur emissions from the atmosphere and the continued use of highly concentrated fertilisers with a low sulphur content lead in many regions to a sulphur deficiency in plants.

• Sulphur deficiency causes symptoms, mainly pale leaves, which are very similar to those with nitrogen deficiency. Depending on the nitrogen supply, chlorosis increasingly occurs in older leaves (in case of an inadequate nitrogen supply) or in younger leaves (in case of good nitrogen supply).

• Due to its high sulphur content (44 % SO 3), KALISOP is especially suited for plants with a higher sulphur requirement (oil seed rape, sunflowers, different kinds of cabbage, onions, leeks, etc.). In addition, good sulphur supply increases the utilisation of nitrogen in plants.

• KALISOP contains sulphur in the watersoluble and immediately plant available sulphate form. The soil pH is not altered by KALISOP application.

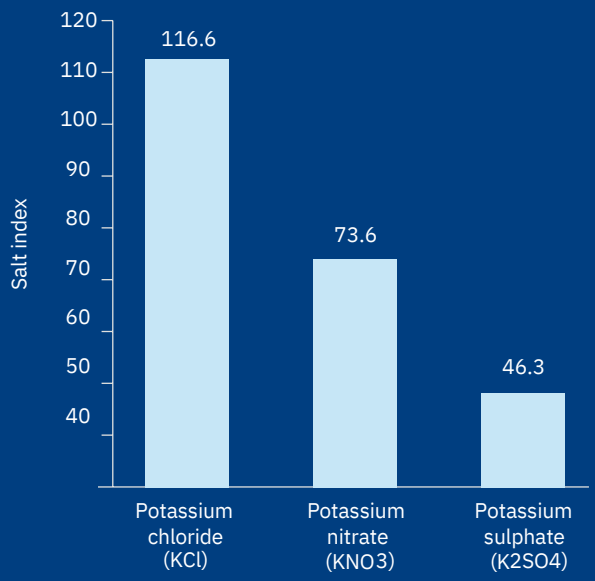
KALISOP® –
For Crops Sensitive to Chloride and Salt

- Most fruit and vegetable crops are sensitive to chloride and are particularly sensitive to a high chloride supply during germination and early growth. The most important chloridesensitive crops include: Tobacco, soft fruits, stone fruits, grape vines, beans, potatoes, cucumbers, melons, onions, lettuce, early vegetables, greenhouse crops, conifers, flowers and ornamental plants. KALISOP is in principle chloride-free.

- KALISOP has been particularly successful in starch potato cultivation. The assimilate transport from the leaves to the tubers can take place undisturbed, because KALISOP has only a very low chloride content. Therefore, the yield potential of the potato can be fully exploited with concurrent high starch contents.

- The salt concentrations in the soil solution in intensive cultivation systems under glass and in the field can vary depending on the water balance. Growth disorders and lower yields are often the result. Under these conditions, KALISOP is the ideal potash fertiliser due to its low salt index.

Salt index of different potash fertilisers



Potato crisps made from potatoes fertilised without KALISOP: dark spots reduce quality

Potato crisps made from potatoes fertilised with KALISOP: perfect quality

Fertilisation recommendations

• KALISOP enables a precise automatic application with the fertiliser spreader and is also suited for mechanical mixes (bulk blends).

• KALISOP is suitable for basic fertilisation as well as the top dressing of the crops. Potassium sulphate should be applied in spring to soils that are at risk for leaching to prevent losses.

• The optimal fertiliser amount depends on the potassium content in the soil, cultivation intensity and yield expectations. The following recommendations serve as general guidelines for the calculation of the fertilisation of soils with a good potassium supply and medium to high yield expectations. Regional experiences should always be considered when calculating the fertiliser application.

Crop	K2O (kg/ha)	KALISOP (kg/ha)
Potatoes	100 – 300	200 – 400
Oil plants	100 – 200	200 – 400
Tobacco	100 – 200	200 – 400
Vegetables	100 – 300	200 – 600
Tomatoes	150 – 300	300 – 600
Paprika	100 – 150	200 – 300
Cucumbers/Melons	100 – 200	200 – 400
Cabbage	200 – 400	400 – 800
Hop	100 – 150	200 – 300
Fruit, Soft fruits	150 – 250	300 – 500
Vines	50 – 150	100 – 300

Patentkali®

The Formula for Success –
For Highest Quality

FOR ORGANIC FARMING
acc. to
(EU) 2018/848
(EC) No 889/2008

Patentkali®

EC FERTILISER
Potassium sulphate with magnesium 30 (+10+42.5)
20 water-soluble potassium oxide
30 % K
10 % MgO water-soluble magnesium oxide
42.5 % SO3 water-soluble sulphur trioxide (= 17 % S)

Patentkali®

• is a special potash fertiliser with a high content of magnesium and sulphur. The nutrients are present in the form of sulphate, are water-soluble and therefore immediately available to the plants. In contrast to many other magnesium fertilisers, the magnesium content in Patentkali is 100 % derived from the natural mineral kieserite (MgSO4 × H2O).

• is effective regardless of the soil pH and can therefore be used at all locations.

• ensures good spreading quality. The uniform particle size spectrum enables precise distribution even at wide spreading widths.

• is especially suited for plants with a high sulphur requirement (rape, sunflowers, different kinds of cabbage, onions, leeks, etc.) due to its high sulphur content (42.5 % SO3). A good sulphur supply also improves nitrogen utilisation in plants.

• is certified for organic farming according to the regulations (EU) 2018/848 and (EC) No. 889/2008.

Harvest quality with Patentkali®

• The nutrients potassium, magnesium and sulphur have a significant effect on the quality of the harvested crops. They control important enzyme functions and especially aid protein synthesis and production of carbohydrates and vitamin A.

• The sufficient supply with these nutrients ensures high yields and is at the same time an essential requirement for achieving product qualities fit for the market.

• Drastically reduced sulphur emissions from the atmosphere have already led to sulphur deficiency symptoms in several crops that can only be prevented by relevant sulphur fertilisation. Patentkali with a guaranteed sulphur content of 17 % in immediately plant-available form prevents this deficiency.

• Due to the extremely low chloride content of max. 3 % Cl and the low salt index, Patentkali is especially suitable for the nutrient supply of chloride-sensitive crops in agriculture, horticulture and forestry.

Usage of Patentkali®

• Patentkali is especially suitable for the fertilisation of starch potatoes, potatoes for processing, vegetables, fruits, vines, sunflowers and other special purpose crops.

• The use for processing potatoes and table potatoes leads to improved quality (low blackspot bruising, good storage properties, good taste) and for starch potatoes to an increase in the economically crucial starch yield.

• The quality-enhancing effect of Patenkali is preferably used in the cultivation of fruits and vegetables (many vegetable plants are chloride-sensitive) as well as in viniculture.

• Patenkali is well suitable for the revitalisation of damaged forests with proven K and Mg deficiency.

• The application of Patentkali significantly improves the green colouring of Christmas tree crops and greenery.

• In viniculture to ensure a sufficient potassium and magnesium supply.

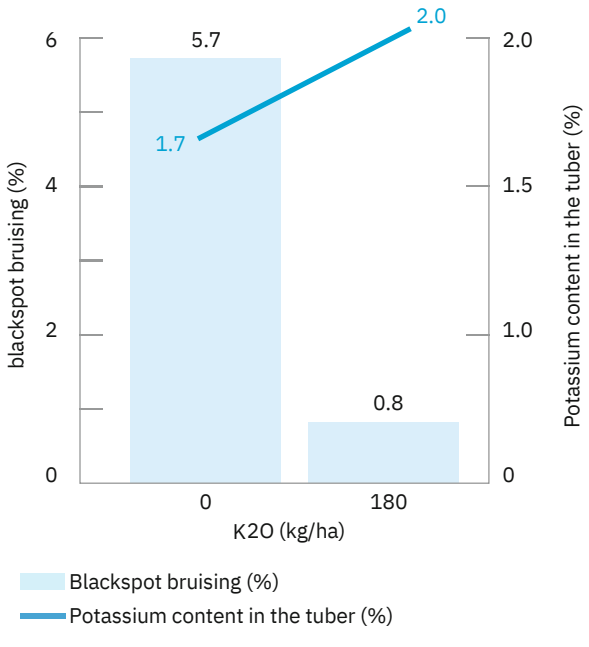
The potassium fertilisation via Patentkali® increases the tuber and starch yield of potatoes.

Potassium fertilisation K_2O (kg/ha)	Tuber yield (t/ha)	Starch yield (t/ha)
0	29.6	6.
100	41.0	8
200	44.5	8.
300	47.0	4
		9.
		0
		9.
		1

without Patentkali *with Patentkali*

A demand-oriented potassium fertilisation significantly reduces blackspot bruising.

Blackspot bruising drastically decreases with increasing potassium content in the tuber



Time of application

• Patentkali can be applied to all crops until shortly prior to sowing or planting. Top dressing is also possible without any problem.

• On light soils, Patentkali should be applied in spring.

Fertilisation recommendations

The following factors have to be considered when calculating the amount of Patenkali that should be applied:

• the potassium and magnesium requirement of the crop or the crop rotation,

• the potassium and magnesium supply and dynamic of the soil,

• the requirements of different crops regarding the macronutrients (for example magnesium requirement for potatoes, sulphur requirement for different kinds cabbage),

• the amounts of nutrients supplied by organic fertilisation.

The following recommendations serve as general guidelines for the fertilisation of soils with medium potassium contents, not taking organic fertilisation into account.

With Patentkali® the tuber and starch yield of potatoes is much higher because of the nutrients potassium, magnesium and sulphur

Crop	Patentkali (kg/ha)
Potatoes	600 – 1200
Cabbage and root vegetables	800 – 1200
Orchards	400 – 600
Vines	300 – 400
Soft fruits	600 – 800
Leafy vegetables	600 – 800
Forestry	300 – 500

EPSOTop®

Magnesium & Sulphur –
to Close Nutrient Gaps

FOR ORGANIC FARMING
acc. to
(EU) 2018/848
(EC) No 889/2008

EPSOTop®

EC FERTILISER
Magnesium sulphate 16+32.5

16 % MgO	water-soluble magnesium oxide
32.5 % SO^3	water-soluble sulphur trioxide (= 13 % S)

EPSO Top

- is an immediately effective magnesium and sulphur fertiliser for foliar fertilisation. The nutrients are fully water-soluble and are present in sulphate form (MgSO 4 × 7 H2O).
- dissolves immediately in water without any residues and is therefore especially suitable for the application as foliar fertiliser via crop protection sprayers or it can be injected into irrigation systems (fertigation).
- can be used as a supplement to soil applications in particular in case of magnesium deficiency and to meet peak requirements. There is no risk of damage to the plant, as long as it is properly used and the recommended concentrations are complied with.
- can be mixed with most plant protection products and liquid fertilisers. However, manufacturer information must be followed.
- is very effective, as it is common for foliar fertilisation, due to the loss-free magnesium and sulphur absorption via the leaf.
- is certified for organic farming according to the regulations (EU) 2018/848 and (EC) No. 889/2008.

Magnesium deficiency in winter wheat

Sulphur deficiency in oil seed rape

Magnesium deficiency in sugar beets

Magnesium deficiency in potatoes

Sulphur deficiency in oil seed rape

Magnesium

- plays an important role in the yield and quality formation of the plants,
- is involved in the efficiency of photosynthesis as the central atom in chlorophyll,
- plays an important role in the energy, protein and carbohydrate metabolism for the growth and storage of assimilates,
- deficiency often occurs during the intensive growth period of the crops. This temporary magnesium deficiency will be quickly and successfully remedied with EPSO Top foliar fertilisation.

Sulphur

- must be increasingly considered in fertilisation, as emissions have been significantly reduced,
- is directly absorbed as sulphate via the leaf,
- is of importance especially for the protein metabolism and increases the nitrogen efficiency during the yield formation.

EPSO Top®: Versatile Foliar Fertiliser – Suitable for all Crops

Cereals

Two critical phases during cereal growth determine the application period of EPSO Top. Visible magnesium deficiency symptoms often occur at the start of stem elongation. The ripening and grain formation period is also critical. A high magnesium and sulphur content is essential to keeping the flag leaf long in the green phase and thus to ensure photosynthesis.

Oil seed rape

The cruciferous plants react most severely and visibly to magnesium and also sulphur deficiency. EPSO Top should be applied as foliar fertiliser repeatedly during stem elongation until the flowering phase to meet the magnesium and sulphur requirement of the rape plants.

Sugar beets

Foliar fertilisation with EPSO Top during row closure has a significant effect on the yield formation as well as the quality of the beets. This leads to an optimised nitrogen metabolism and thus to an improved quality of the sugar beets.

Potatoes

The magnesium and sulphur requirement of the potato plant peaks during tuber initiation and the tuberisation phase – parallel to the flowering phase. The supply via the leaf keeps the photosynthesis rate stable so that deficiencies are prevented during tuberisation.

Hops

EPSO Top is applied shortly prior to or directly during flowering in combination with crop protection treatments. The application is repeated during the cone development (3 – 4 weeks after flowering), because the magnesium and sulphur requirements then reach their peak.

Asparagus

The green asparagus leaves produce the reserve substances for the coming spring and thus determine the yield the following year. Magnesium deficiency quickly leads to yellow and consequently dead asparagus leaves and thus to a shortened storage phase. A single or multiple EPSO Top application can counteract this effect. Application rate: 50 kg EPSO Top per hectare and year.

Due to the small green mass of asparagus leaves, the EPSO Top concentration can be increased up to 10 % (10 kg EPSO Top per 100 l water) for small spraying volumes.

Conifers

Conifers – firs, spruces, etc. – often exhibit discoloured needles. These discolorations – magnesium deficiency – change from light green to yellow and brown. A repeated treatment with EPSO Top can quickly and successfully counteract this phenomenon.

EPSO Top® foliar fertilisation method

- A single or multiple application with 25 kg/ha in 5 % concentration (5 kg/100 l water) is recommended to meet the peak requirement and to counteract latent deficiency. In case of severe deficiency and/or visible deficiency symptoms, up to 50 kg/ha, split into two to four partial applications should be applied.
- EPSO Top can be mixed with most insecticides and fungicides as well as with growth regulators and herbicides so that combined use is possible. However, the manufacturer's recommendation for mixtures should be followed. EPSO Top should be dissolved before the plant protection product is added.
- Miscibility can be tested by mixing and dissolving a sample of EPSO Top with the respective plant protection product in a test vessel. If the mix fully dissolves, then the products can be safely applied together.
- EPSO Top can also be applied in an aqueous solution in combination with other liquid fertilisers, ammonium nitrate-urea solutions as well as NP and urea solutions. Therefore EPSO Top has to be dissolved in water first.

Crops	Application time	BBCH state	Concentration (in %)
Cereals	from the end of tillering until the fruit development	29 – 71	5 *
Rape	rosette stage until flowering	30 – 57	5
Peas, beans	prior to flowering	up to 59	5
Potatoes	prior to and during flowering	51 – 69	3 – 5
Beets	at row closure	31 – 39	5
Maize	with corn borer treatment	up to 59	5
Fruit	at fruit formation, with scab treatment, repeatedly	71 – 79	2 – 3
Hops	one to two times until flowering	60 – 69	2 – 5
Vine	until early August at the latest, one to two times	9 – 17 and 25	3 – 5
Asparagus	with sufficient leaf mass		3 – 10
Vegetables	with fungicide / insecticide treatment	up to 59	2 – 3
Conifers	repeatedly in case of yellowing or browning		3 – 5
Greenhouse crops	drip irrigation	up to 59	2 – 3

**equivalent to 5 kg EPSO Top/100 l water*

Korn-Kali®

The All-rounder –
Extremely Versatile

Korn-Kali®

EC FERTILISER
Potassium chloride with magnesium 40 (+6+4+12.5)

40 % K 2O water-soluble potassium oxide
6 % MgO water-soluble magnesium oxide
4 % Na2O water-soluble sodium oxide (= 3 % Na)
3 water-soluble sulphur trioxide (= 5 % S) **12.5 % SO**

Kor n-Kali®

- is a combined potash and magnesium fertiliser with 40 % K 2O in the form of potassium chloride and 6 % MgO in the form of magnesium sulphate (Kieserite). Further important constituents are 4 % Sodium as sodium chloride (Na 2O) and 12.5 % Sulphur as sulphate (SO 3).
- contains all nutrients in fully water-soluble form. They can therefore be directly absorbed by the plant.
- ensures the basic supply of the crops amongst others during the autumn application with a sulphur content of 5 %.
- has a narrow particle size spectrum ensuring a high spreading quality and enabling a constant distribution at large spreading widths.
- is effective regardless of the soil pH and is therefore suitable for all sites.
- is a valuable partner even in bulk blending.

Korn-Kali increases the sugar-content.

Kor n-Kali® has many benefits

Significant amounts of potassium and magnesium are taken from the soil with each harvest. They have to be replenished with adequate fertilisation. Korn-Kali contains both nutrients in a ratio favourable for the plant.

Regularly used in the crop rotation, Korn-Kali meets the specific nutrient requirements of agricultural crops for potassium, magnesium, sulphur and sodium.

Sugar beets are particularly sensitive to potassium deficiency with losses in yield and quality. Korn-Kali promotes the favourable sugar content and the sugar yield even if the soil is adequately supplied with nutrients.

Due to a reduced atmospheric deposition and the use of low-sulphur fertilisers, symptoms of sulphur deficiency can be observed in many regions. The regular use of Korn-Kali forms the basis for the sufficient sulphur nutrition of the plant.

Korn-Kali is the ideal potash fertiliser for stubble and autumn fertilisation and ensures an application in a soil-conserving manner and a good nutrient distribution in the topsoil.

Korn-Kali®: All-round Potassium Fertiliser – Application in Crops

Fields of application for Korn-Kali

Due to its optimal nutrient composition, Korn-Kali is the most used single-nutrient potash fertiliser in Germany and very common in many other countries of Europe and the world as well. An economic application is possible on all soil types and for almost all crops (plants sensitive to chloride require sulphate-based fertilisers).

Within crop rotation, Korn-Kali should be applied to crops that have high demands on a good potassium supply (for example sugar beets, rape, maize) and that have special requirements regarding specific macronutrients (for example sulphur requirement of rape, magnesium or sodium requirement of sugar beets).

Fertilisation with Korn-Kali is recommended for soils with optimal magnesium contents in order to maintain magnesium levels and to prevent deficiencies (maintenance fertilisation).

Fertilisation with Korn-Kali is especially important for the magnesium supply of the plants, if nitrogen fertilisation occurs in form of amide (urea) or ammonium (for example liquid manure).

Fertilisation recommendations

The amount of Korn-Kali that has to be applied depends on

- the potassium requirement of the crop or the crop rotation,
- the potassium or magnesium supply and dynamic of the soil (site conditions),
- the various requirements of different crops regarding the macronutrients like magnesium, sulphur and sodium,
- the nutrients provided by organic fertilisation.

Autumn fertilisation with Korn-Kali®

Korn-Kali is applied to medium and heavy soils in autumn (stubble fertilisation) and is incorporated into the topsoil layer during tilling. That way, the nutrients are unrestrictedly available at the beginning of the vegetation period.

On light soils, Korn-Kali should be applied in early spring to prevent nutrient loss at these locations.

Korn-Kali is the ideal partner for fertilisation systems with single-nutrient or NP fertilisers and also serves as supplement for the application of compound fertilisers.

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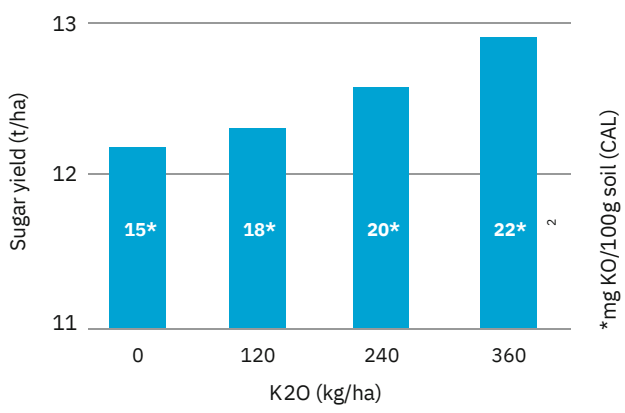
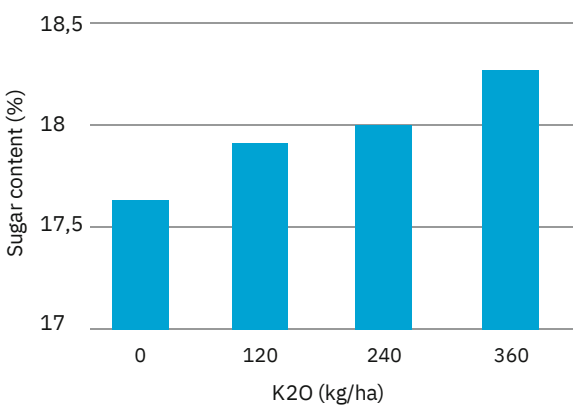
For some crops, the specifications in the table below serve as reference for the fertilisation of soils with medium potassium content, regardless of the organic fertilisation.

Potassium requirement of several crops (in kg K 2O/ha)

Crop	Yield level medium	high
Cereals	100 –	140 –
Oil seed rape	140	180
Sugar beets	200 –	240 –
Forage/grain maize	240 360	280 400
Forage crops	– 400	– 480
	200 –	240 –
	240 180	280 240
	– 240	– 340

Impact of a different K-supply of sugar beets on sugar yield and content
K+S Minerals and Agriculture GmbH – experiments, 1985 –1997





KALISOLU

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