Water-Soluble Fertilizer
Fertigation and Foliar Application

The Authority in Potassium and Magnesium
In modern agriculture great improvements can be made in terms of productivity and environmental protection by efficient use of water and nutrients. Fertigation and foliar application techniques are most suitable to provide nutrients at the right time and in the specific situation required quantity according to crop demand. K+S KALI GmbH products are highly water-soluble and perfect for use in fertigation systems or in sprayers for foliar application. They provide K, Mg, S and micronutrients in the most plant available form and ensure an optimal supply to the plant during the entire growth cycle. They mix well with a wide range of other fertilizer components as well as with plant protection chemicals.
**Fertigation**

Fertigation is the supply of nutrients through irrigation systems either in the field or in protected crops. There are two principal systems (soil based and soilless) to which fertigation is applied and each requires different optimum concentrations of the product. Our products are compatible for tank mixing with most fertilizer components. Care should be taken in case of potassium sulfate and magnesium sulfate. These fertilizers are to be dissolved in tanks separate from products containing calcium due to the possible precipitation of CaSO₄, which is insoluble in water. If both stock solutions are injected into the fertigation system simultaneously, then pipes and drippers should be cleaned regularly with nitric acid.

**Foliar application**

For optimum results recommended EPSO product doses should be applied as a split dose of 10 to 15 kg/ha in tank mixture with the normal spray program. For each treatment 2 – 5 kg of EPSO product, depending on the crop type, should be used per 100 litres of water, giving a final concentration of 2 – 5% w/v. In sensitive crops at high temperatures and when the air is dry, lower concentrations (2%) are recommended. EPSO products should be applied either in the early morning or late afternoon. A total of 25 kg/ha per season generally secures the peak magnesium and sulphur demands of most crops although up to 50 kg/ha may be used in highly deficient situations or where visible symptoms are present.
EC FERTILISER

Muriate of potash 60

\( \text{60\% K}_2\text{O} \) water-soluble potassium oxide (= 49.8\% K)

SOLUMOP...

... is a fully water-soluble potassium chloride fertilizer
for use in fertigation

... is applicable to all chloride tolerant crops

... can be applied through fertigation systems
(sprinkler, drip or trickle irrigation systems)
in open field as well as protected crops
(soil based or soilless cultures)

... mixes well with other fertilizer components

... is suitable with care for foliar application
in chloride tolerant crops

... concentration in solutions for foliar application
should not exceed 5\%

... should not be applied to the leaves in direct sunlight

Solubility:

\[ w (\text{KCl}) = 23.8\% \quad \text{at } 10\degree\text{C (50\degree F)} \]
\[ w (\text{KCl}) = 25.5\% \quad \text{at } 20\degree\text{C (68\degree F)} \]
\[ w (\text{KCl}) = 28.7\% \quad \text{at } 40\degree\text{C (104\degree F)} \]

Electrical conductivity (EC) in solution:

- 1\%: 17 mS/cm
- 5\%: 79 mS/cm
- 10\%: 151 mS/cm

Bulk density (w/v): 1.08 to 1.2 kg/l

pH in 5\% solution (distilled water): 8.5

Salt index: 114
EC FERTILISER
Sulphate of potash 52 (+45)
52% K₂O  water-soluble potassium oxide
45% SO₃  water-soluble sulphur trioxide (= 18% S)

HORTISUL …
… is a good water-soluble fertilizer designated for fertigation (preferable sprinkler application, insolubles < 1 %)
… is virtually free of chloride (max. 0.5% Cl) making it particularly suitable for chloride sensitive crops
… has, compared to other potassium sources, a very low salt index (46)
… provides K and S in a direct plant available form
… is ideal for open field cropping systems and under conditions prone to salinity
… mixes well with other fertilizer components (except Ca containing products, risk of gypsum precipitate)
… helps to maintain a suitable pH in stock solutions if very acid components are mixed
… is permitted for use in organic farming according to the regulations (EC) No 834/2007 and (EC) No 889/2008

Solubility:
\[ w (\text{K}_2\text{SO}_4) = 8.4\% \text{ at } 10\,^\circ\text{C (50 }{^\circ}\text{F}) \]
\[ w (\text{K}_2\text{SO}_4) = 10.0\% \text{ at } 20\,^\circ\text{C (68 }{^\circ}\text{F}) \]
\[ w (\text{K}_2\text{SO}_4) = 11.5\% \text{ at } 30\,^\circ\text{C (86 }{^\circ}\text{F}) \]

Electrical conductivity (EC) in solution:
1 % 10.9 mS/cm
4 % 38.2 mS/cm
8 % 70.9 mS/cm

Bulk density (w/v): 1.56 to 1.74 kg/l
pH in 5% solution (distilled water): 7.5 – 8.3
Salt index: 46
EC FERTILISER
Sulphate of potash 52 (+45)
52 % K₂O water-soluble potassium oxide (= 43.2 % K)
45 % SO₃ water-soluble sulphur trioxide (= 18 % S)

soluSOP 52 …
… is an excellent water-soluble fertilizer designated for fertigation and foliar application (insolubles < 0.05 %)
… is ideal for open field as well as protected crops
… is virtually free of chloride (<0.5 % Cl) making it particularly suitable for chloride sensitive crops
… has compared to other potassium sources a very low salt index (46)
… provides K and S in a direct plant available form
… is excellent for use under conditions prone to salinity
… mixes well with other fertilizer components (except Ca containing products, risk of gypsum precipitate)
… helps to maintain a suitable pH in stock solutions if very acid components are mixed
… is permitted for use in organic farming according to the regulations (EC) No 834/2007 and (EC) No 889/2008

Solubility:
w (K₂SO₄) = 8.5 % at 10 °C (50 °F)
w (K₂SO₄) = 10.0 % at 20 °C (68 °F)

Electrical conductivity (EC) in solution:
1 %  11.2 mS/cm
4 %  38.6 mS/cm
8 %  72.2 mS/cm

Bulk density (w/v): 1.55 to 1.75 kg/l
pH in 5 % solution (distilled water): 9.7
Salt index: 46
EC FERTILISER

Sulphate of potash 50 (+42.5)
- 50 % $K_2O$ water-soluble potassium oxide (= 41.5 % K)
- 42.5 % $SO_3$ water-soluble sulphur trioxide (= 17 % S)

soluSOP 50 ...

...is an excellent water-soluble fertilizer designated for fertigation and foliar application (insolubles < 0.2 %)
...is ideal for open field as well as protected crops
...is virtually free of chloride (<1.5 % Cl) making it particularly suitable for chloride sensitive crops
...has compared to other potassium sources a very low salt index (46)
...provides K and S in a direct plant available form
...is excellent for use under conditions prone to salinity
...mixes well with other fertilizer components (except Ca containing products, risk of gypsum precipitate)

Solubility:

\[ w(K_2SO_4) = 8.5 \% \quad \text{at } 10^\circ C (50^\circ F) \]
\[ w(K_2SO_4) = 10.0 \% \quad \text{at } 20^\circ C (68^\circ F) \]

Electrical conductivity (EC) in solution:

<table>
<thead>
<tr>
<th>%</th>
<th>mS/cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.2</td>
</tr>
<tr>
<td>4</td>
<td>38.6</td>
</tr>
<tr>
<td>8</td>
<td>72.2</td>
</tr>
</tbody>
</table>

Bulk density (w/v): 1.55 to 1.75 kg/l
pH in 5 % solution (distilled water): 1 – 4
Salt index: 46
EC FERTILISER
Magnesium sulphate 16+32.5
16 % MgO water-soluble magnesium oxide
  (= 9.6 % Mg)
32.5 % SO₃ water-soluble sulphur trioxide (= 13 % S)

EPSO Top …
… is an epsom salt fertilizer containing Mg and S
… is ideal for fertigation and foliar application
… is well suited for use in all crops and all cultivation systems (soil based and soil less cultures)
… has a very low salt index (44)
… dissolves quickly and completely without any residues
… mixes well with other fertilizer components (except Ca containing products, risk of gypsum precipitate) and most plant protection chemicals
… is permitted for use in organic farming according to the regulations (EC) No 834/2007 and (EC) No 889/2008

Solubility:
w (MgSO₄) = 26.3 % 20 °C (68 °F)

Electrical conductivity (EC) in solution:
1 % 5 mS/cm
5 % 18 mS/cm
10 % 30 mS/cm

Bulk density (w/v): 0.98 to 1.10 kg/l
pH in 5% solution (distilled water): 7.8 – 8.1
Salt index: 44
EC FERTILISER
Magnesium sulphate with micro-nutrients 15+31
15 % MgO  water-soluble magnesium oxide (= 9 % Mg)
31 % SO3  water-soluble sulphur trioxide (= 12.4 % S)
0.9 % B  water-soluble boron
1 % Mn  water-soluble manganese

EPSO Microtop...
... is a fast acting and effective foliar fertilizer based on epsom salt containing Mg, S, B and Mn
... is ideal for all B and Mn demanding crops such as potatoes, sugar beets, oil seed rape, vegetables, fruits etc.
... dissolves quickly and completely without any residues
... is particularly useful as a preventative treatment to treat crops before yield penalties occur
... is fully effective for use on all soil types and pH values due to direct foliar absorption
... is permitted for use in organic farming according to the regulations (EC) No 834/2007 and (EC) No 889/2008

Solubility:
w (Microtop) = 42.9 % 20 °C (68 °F)

Electrical conductivity (EC) in solution:
1 % 5 mS/cm
5 % 17 mS/cm
10 % 29 mS/cm

Bulk density (w/v): 1.00 to 1.10 kg/l
pH in 5 % solution (distilled water): 4.2
Salt index: 44
EC FERTILISER
Magnesium sulphate with micro-nutrients 13+34
13 % MgO  water-soluble magnesium oxide (=7.8 % Mg)
34 % SO₃  water-soluble sulphur trioxide (=13.6 % S)
4 % Mn  water-soluble manganese
1 % Zn  water-soluble zinc

EPSO Combitop …
… is a fast acting and effective foliar fertilizer based on epsom salt containing Mg, S, Mn and Zn
… is ideal for all Mn and Zn demanding crops such as cereals, maize, oil seed rape etc.
… dissolves quickly and completely without any residues
… is particularly useful as a preventative treatment to treat crops before yield penalties occur
… is fully effective for use on all soil types and pH values due to direct foliar absorption
… is permitted for use in organic farming according to the regulations (EC) No 834/2007 and (EC) No 889/2008

Solubility:
w (Combitop) = 50 % 20 °C (68 °F)

Electrical conductivity (EC) in solution:
1 % 5 mS/cm
5 % 18 mS/cm
10 % 31 mS/cm

Bulk density (w/v): 1.05 to 1.20 kg/l
pH in 5 % solution (distilled water): 3.7 – 3.8.7
Salt index: 44
## Dosage and application periods for foliar fertilisation

<table>
<thead>
<tr>
<th>Crop</th>
<th>Recommended dosage</th>
<th>Stage of application (5% concentration)</th>
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<tbody>
<tr>
<td><strong>EPSO Top® or EPSO Combitop®</strong></td>
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<tr>
<td>Cereals</td>
<td>10–15 kg/ha</td>
<td>- for autumn application DC 15*) onwards</td>
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<td></td>
<td>10–15 kg/ha</td>
<td>- beginning of stem extension (DC 30)</td>
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<tr>
<td></td>
<td>15–25 kg/ha</td>
<td>- beginning of ear emergence (DC 50)</td>
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<tr>
<td>Maize</td>
<td>25–40 kg/ha</td>
<td>- four-leaf stage</td>
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<tr>
<td></td>
<td>(2–3 x 15 kg/ha)</td>
<td>- eight-leaf stage</td>
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<tr>
<td></td>
<td></td>
<td>- ten-leaf stage</td>
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<tr>
<td><strong>EPSO Top® or EPSO Microtop®</strong></td>
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<tr>
<td>Sugar beet</td>
<td>25–40 kg/ha</td>
<td>- eight-leaf stage (DC 18) (2–3 x 15 kg/ha)</td>
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<td></td>
<td></td>
<td>- row closure (DC 39)</td>
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<td></td>
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<td>- end of July or beginning of August with fungicide</td>
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<tr>
<td>Oilseed rape</td>
<td>25–40 kg/ha</td>
<td>- end of leaf development (2–3 x 15 kg/ha) (DC 20)</td>
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<td></td>
<td></td>
<td>- beginning of visible internodes (DC 30)</td>
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<td></td>
<td></td>
<td>- appearance of flower buds (DC 50)</td>
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<tr>
<td>Sunflower</td>
<td>15–30 kg/ha</td>
<td>- eight-leaf stage (DC 18)</td>
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<tr>
<td></td>
<td>(2 x 15 kg/ha)</td>
<td>- appearance of flower buds (DC 50)</td>
</tr>
<tr>
<td>Potato</td>
<td>50 kg/ha</td>
<td>- row closure (DC 39)</td>
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<tr>
<td></td>
<td>(5 x 10 kg)</td>
<td>- afterwards every 7–10 days with fungicide</td>
</tr>
<tr>
<td>Open-field vegetables</td>
<td>25–40 kg/ha</td>
<td>- beginning of active growth (6–8 leaves)</td>
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<td>(2–3 x 10 kg/ha, 2–3 % concentration)</td>
<td>- afterwards two applications every fortnight</td>
</tr>
<tr>
<td>Fruit trees</td>
<td>25–50 kg/ha</td>
<td>- before flowering till beginning of fruit formation</td>
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<td>(2–3 x 15 kg/ha, 2–5 % concentration)</td>
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<tr>
<td>Grape wine</td>
<td>25–40 kg/ha</td>
<td>- flower cluster visible (DC 53) (2–3 x 15 kg/ha)</td>
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<td></td>
<td></td>
<td>- end of flowering (DC 69)</td>
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<tr>
<td></td>
<td></td>
<td>- fruit setting (DC 79)</td>
</tr>
</tbody>
</table>

*) Development stage according to BBCH