



Magnisal[®]

Magnesium Nitrate for Healthy Crops



Haifa Chemicals Ltd.
Pioneering the Future





Magnisal® for healthy crops

Magnisal® magnesium nitrate fertilizer provides plants with readily-available magnesium, which is essential for their healthy growth. The nitrate in magnisal® facilitates the uptake of magnesium by the plant, thus improving its efficiency. It also enriches plant nutrition with readily available, easily absorbed nitrogen.

The benefits of Magnisal®

- Prevents and cures magnesium deficiencies
- Consists of 100% plants nutrients
- Free of chloride, sodium and other detrimental elements
- Dissolves quickly and completely in water
- Ideal for efficient applications by Nutrigation™ and foliar spray

Magnisal® magnesium nitrate formula

Product analysis

Total nitrogen (N)	11.0%
Nitrate-nitrogen (N-NO ₃)	11.0%
Magnesium oxide (MgO)	16.0%
Magnesium (Mg)	9.6%
Insoluble matter	200 ppm
Bulk density	0.7 g/cm ³ 0.4 Oz/In. ³

Water solubility

Magnisal® is extremely soluble in water. It dissolves quickly and does not form precipitates, even at low temperatures.

Water temperature (°C)	0	10	20	30	40
Grams Magnisal /liter	1730	2000	2250	2560	2890
Water temperature (°F)	32	50	68	86	104
Lbs Magnisal/gallon	14.4	16.7	18.8	21.4	24.1



pH and EC

Magnisal® is slightly acidic, which improves its absorption by leaf surface when sprayed, and enables tank-mixing with chelated nutrients and pesticides. The electrical conductivity (EC) of Magnisal® solution is low, compared to other fertilizers.

Concentration (%)	Lbs/100 gal	pH	EC (mS/cm)
0.1	1.2	5.6	0.88
0.2	2.2	5.5	1.69
0.3	3.6	5.4	2.52
1.0	12	4.8	7.58
5.0	60	4.1	29.9

Magnisal® is a superior source of magnesium

Magnesium nitrate is superior to magnesium sulfate fertilizers. It possesses higher nutritional value and better physical properties that make it more convenient for handling and application.

Plant nutritional value

Plants absorb the magnesium from Magnisal® more readily, due to the interaction between the magnesium and the nitrate anion. Magnisal® is up to three-fold more effective than magnesium sulfate in preventing and curing magnesium deficiencies, and therefore enables considerably lower application rates.

Physical and chemical properties

Magnisal® is fully soluble in water. It is approximately ten-fold more soluble than Magnesium Sulfate:

	Magnisal®	Magnesium sulfate (Epsom Salt)
Solubility at 20°C	2250 g/l	252 g/l
68°F	18.8 lbs/gal	2.1 lbs/gal
Insoluble matter	300 ppm	3000-5000 ppm
Compatibility with calcium fertilizers	Compatible	Incompatible



Nutrigation™ with Magnisal®

Nutrigation™ (fertigation), delivery of pure plant nutrients through the irrigation system, is a highly efficient application method, enabling full control over rates, composition, timing and placement of plant nutrition. Magnisal® is ideal for Nutrigation™ of crops in both soil and soilless media. Pure and highly soluble, Magnisal® is safe for use with all types of irrigation equipment. It is compatible with all water-soluble fertilizers, except concentrated phosphate solutions.

Magnisal®, unlike magnesium sulfate, can be used with water of poor quality, hence recommended when the irrigation water contains high levels of sulfates or salts. In most irrigation practices, magnesium concentration in the water should range between 20-60 ppm. The following table shows stock-solution levels and injection ratios needed to obtain specified magnesium concentrations in the irrigation water.

	Mg concentration in the irrigation water					
	20 ppm	40 ppm	60 ppm	80 ppm	100 ppm	
Stock solution	Injection ratio					
25 kg / 1000 liter	8.3	16.7	25.0	33.3	41.7	Liter/m ³
50 kg / 1000 liter	4.2	8.4	12.5	16.8	21	
50 Lbs / 200 gallon	1.0	2.0	3.0	4.0	5.0	Oz./gallon
100 Lbs / 200 gallon	0.5	1.0	1.5	2.0	2.5	

When the injection ratio is preset, change the concentration of the stock solution to determine the concentration in the irrigation water (ppm Mg):

Target conc.	20 ppm		40 ppm		60 ppm		80 ppm	
	kg/l	Oz/gal	kg/l	Oz/gal	kg/l	Oz/gal	kg/l	Oz/gal
Injection ratio								
1:16	3.3	0.45	6.6	0.89	10.0	1.34	13.3	1.78
1:100	20.8	2.78	41.5	5.56	62.3	8.35	83.0	11.13
1:128	26.6	3.56	53.1	7.12	79.7	10.68	106.3	14.24
1:150	31.1	4.17	62.3	8.35	93.4	12.52	124.5	16.69
1:200	41.5	5.56	83.0	11.13	124.5	16.69	166.0	22.25

Note: data refer to magnesium (Mg) levels in the irrigation water, not to magnesium oxide (MgO)



Nutrigation™ of soil-grown crops

Determine Mg requirements according to soil and water analyses. If additional magnesium is required, apply 0.1-0.3 grams Magnisal® per liter of irrigation water (1.3-4 Oz./100 gallon) per application.

Nutrigation™ in soilless media

For most crops, recommended magnesium concentration in the nutrient solution is 50-70 ppm MgO (30-40 ppm Mg). The magnesium level in the irrigation water should be taken into account. When the Two-Tank method is employed, dissolve Magnisal® in the tank that does not contain phosphorus (P).

The given recommendations should be regarded as a general guide only.

The exact fertilization program should be determined according to the specific crop needs, soil and water conditions, and the grower's experience. For best results, follow the recommendation of a local crop consultant.

Magnisal® for Foliar Applications

Foliar spray is an efficient tool to supplement and to enrich plant nutrition.

When absorption of nutrients from the soil is disturbed, foliar application of Magnisal® provides the magnesium needed for normal development of crops.

When prompt correction of magnesium deficiency is required, foliar application is recommended, as uptake of magnesium by the leaves is very fast.

Preparation of tank-mix

Dissolve Magnisal® in a small amount of water and add to the spray tank. When applying with crop-protecting agents, addition of wetting agent is not necessary. To ensure compatibility of tank-mix components, perform a small-scale test prior to actual application.

Foliar spray

To verify safety of suggested rates under local conditions and for specific varieties, it is recommended to spray on a few branches or plants. After 3-4 days check the tested plot for scorching symptoms.



Crop	When to Apply	Spray conc. (%)	Lbs. Magnisal®/ 100 gal water
Citrus	1- 4 applications, when spring flush leaves are about 2/3 of final size and not yet hardened	1-1.5	8-12
Deciduous fruit- trees	3-4 applications at 14-day intervals, starting at bloom	0.5-1.5	4-12
Grapes	To prevent "Dry Stalk": 1-3 applications at 10-day intervals, starting after bunches have formed	0.5-1	4-8
	To prevent and cure chlorosis: 1-3 applications at 10-day intervals, starting after berry setting	0.5-1	4-8
Mango	1-2 applications when young leaves are about 2/3 of final size	0.5-1	4-8
Olive	<ul style="list-style-type: none"> • One week before anthesis • Three weeks after bloom 	0.5	6-12
Potato	3 applications at 2, 3 & 4 weeks after emergence	0.7-1.5	4-12
Tomato	At the beginning of fruiting	0.5-1.5	4-12
Cucumber	At the beginning of fruiting	0.5	4
Barley	Beginning of shooting	0.5-4	4-30
Winter wheat	<ul style="list-style-type: none"> • Beginning of stem elongation • Node formation • Flag leaf sheet opening • Anthesis complete 	0.5	4

The given recommendations should be regarded as a general guide only. The exact fertilization program should be determined according to the specific crop needs, soil and water conditions, and the grower's experience. For best results, follow the recommendation of a local crop consultant.



Magnesium is essential for the plant

Magnesium is a vital nutrient for healthy plant growth. It is a key component of the chlorophyll molecule, hence essential for photosynthesis and formation of carbohydrates. Magnesium is involved in enzymatic reactions and assists in generation of energy. Magnesium deficiency retards plants development, resulting in decreased yields and poor quality.

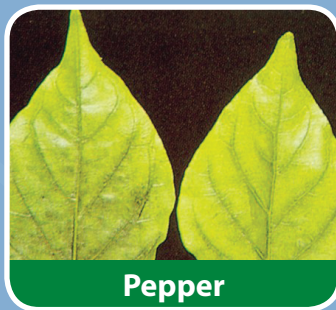
Deficiency symptoms

Magnesium deficiency is manifested by yellow bands between leaf veins. The symptoms show first on older leaves, and move towards young leaves as deficiency worsens. In severe cases, necrosis may appear.

Magnesium deficiencies



Pea



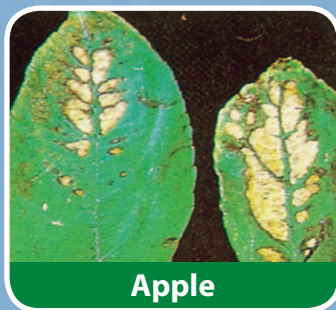
Pepper



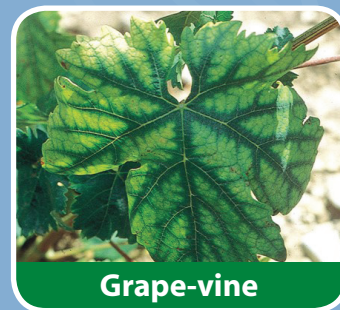
Wheat



Citrus



Apple



Grape-vine

Haifa A Pioneering Spirit

Haifa is an Israel-based multinational corporation and a global leading supplier of Potassium Nitrate, Specialty Plant Nutrients and Industrial Chemicals. Renowned for its pioneering spirit and innovative solutions, Haifa is finely attuned to market trends and customer needs. A stable, well-established company, Haifa offers faultless yet flexible performance with customized products, solutions and services. Haifa's worldwide presence enables it to keep in close contact with customers and end-users.

Our key mission is to create highly effective solutions for farmers worldwide by leveraging a keen familiarity with their lives and needs. This attitude, together with a profound knowledge of the markets, is what shapes all Haifa's activities in making a difference to the customer.

Haifa's pioneering roots drives it to pioneer in every field it is active in. Thus, we continuously introduce inspirational solutions for meeting the growing challenges of a changing world.

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