Precision Nutrition with Foliar Fertilizers

www.icl-sf.com
Advanced Foliar Fertilizer Technologies ensure your success

Foliar feeding provides an excellent solution when the plant root system is not functioning optimally or when nutrient-provision via the soil is malfunctioning. This form of feeding is ideal when root uptake is disturbed by factors such as overly cold or warm soils, high soil pH, high weed competition, or nematode infestation. Foliar fertilizers are also perfect for use as a preventive tool to avoid and reduce stress situations.

Foliar fertilizer technology is a unique, dynamic, and effective form of crop nutrition. ICL Specialty Fertilizers’ research and development team have developed some of the world’s leading and most innovative foliar nutritional solutions. These state-of-the-art solutions focus on applications for both curative and preventive actions.

M-77 Technology

M-77 is an exclusive package of compounds that have a defined purpose. This package includes ingredients that enhance the delivery of the spray solution, speedy uptake and effectiveness of the nutrients. Included within M-77 is our innovative, patented plant booster that takes plant nutrition one step further and results in healthier and more productive crops.

The M-77 formula contains

1. Compounds extending the effectiveness of the chelates supplied by the foliar spray
2. Vitamins that improve the metabolic activity of the plant tissues absorbing the spray
3. Functional elements that improve the utilization of the nutrients
4. Stress-reducing compounds that enhance the plant’s resistance to abiotic stresses, thereby maintaining its productive capacity

DPI Technology

ICL’s Double Power Impact (DPI) technology complex provides an extra stimulant creating highly efficient photosynthetic reactions – the process by which plants use light as an energy source to make glucose from carbon dioxide and water. This is achieved by boosting transpiration rates and chlorophyll levels.

With a natural origin, the DPI bio-stimulant has been proven to improve transpiration levels leading to higher CO2 assimilation rates. The DPI complex also improves chlorophyll levels in treated leaves, as well as leaf weight and size. Improvements in the availability of applied nutrients have also been demonstrated – particularly nitrogen and phosphate in the plant. In addition, DPI also boosts the availability of the applied nutrients. Independent work has shown a 200 hour (10 day) improvement compared with other fertilizers.
A unique water-soluble foliar fertilizer

Agroleaf Power delivers proven results at critical stages of the crop.

It boasts outstanding purity (zero chlorides) and a high nutrient content. Its exclusive M-77 technology and Double Power Impact (DPI) complex guarantees good uptake and prolonged availability of micro-nutrients. With all macro and micro-nutrients covered in the Agroleaf Power range, there is a product for every need. It can target every growth stage and correct nutrient imbalances as well as minor deficiencies. Thanks to the purity and high quality of the raw materials, Agroleaf Power products dissolve quickly and completely, making application easy.

Benefits of Agroleaf Power

1. Foliar feeding with Agroleaf Power enables fast absorption by the plants
2. Very quick response time, so ideal as a curative foliar feed
3. M-77 and DPI technology provide improved photosynthesis
4. Highly concentrated foliar feed, meaning less product to handle
5. Superior delivery and uptake of nutrients from M-77

“I have been using ICL Specialty Fertilizers full portfolio of products including Agroleaf, Agromaster, and Solinure for some years now. What drew me to this partnership is not only the excellent products but the full support in form of recommendations and the follow up field visits by their agronomist”.

Mr. Aleksandar Stambolića
OSR, cabbage and pepper grower
Donji Miholjac, Croatia

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Agroleaf® Special

The premium fertilizer that boosts crop productivity

Agroleaf Special is a premium, fully water-soluble foliar feed, widely used in agriculture and horticulture to prevent and control deficiencies in a wide variety of crops such as cereals, vegetables, flowers, and fruit-trees.

Agroleaf Special includes X3-Active technology which enhances nutrient uptake.

Benefits of Agroleaf Special

1. Foliar feeding with Agroleaf Special enables fast absorption by the plant. Already within 24 hours the plant will be able to withstand physiological stress situations

2. Agroleaf Special boosts the plant’s metabolism

3. X3 facilitates the absorption of the trace element into the plant’s leaves and therefor results in effective uptake

4. Agroleaf Special dissolves quickly and completely, making solution preparation easy and trouble-free

5. Agroleaf Special can be tank-mixed with a wide range of other fertilizers and crop-protection compounds

X3-Active Technology

X3-Active is a specific, selected biostimulant which is designed to facilitate the absorption of trace-element compounds into plant leaves and optimizes the trace elements by a large variety of crops. X3-Active is used in various trace element products in the ICL portfolio.

X3 plant growth enhancer gives:

- Better plant growth
- Better plant quality
- More vigorous plant
Trial case, Agroleaf Power

Objective: Compare the efficiency of Agroleaf Power foliar fertilizer with the grower’s practice in Chips potato.

Where: Färlöv, Sweden
Crop: Chips potato, Saturna

Treatments: Both treatments received:
- Liquid Pig Manure 20 Mt/ha
- Concentrated fruit juice 1.9 Mt/ha
- Axan 27-3 300 Kg/ha
- Kalimagnesia 150 Kg/ha
- Manganese Nitrate 4x1 l/ha

ICL treatment:
- Agroleaf Power High P 4+4 Kg/ha
- Agroleaf Power High K 4+4 Kg/ha

Economic evaluation

<table>
<thead>
<tr>
<th>Economic evaluation</th>
<th>Agroleaf Power High P + High K</th>
<th>Grower practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat 1: High quality, &gt; 40 mm (Kg/ha)</td>
<td>47.873</td>
<td>42.629</td>
</tr>
<tr>
<td>Cat 2: Medium quality, 30-40 mm (Kg/ha)</td>
<td>2.936</td>
<td>3.389</td>
</tr>
<tr>
<td>Gross income / ha</td>
<td>7.219 €</td>
<td>6.538 €</td>
</tr>
<tr>
<td>Extra costs of ICL treatment (vs grower practice)</td>
<td>77 €/ha</td>
<td>-</td>
</tr>
<tr>
<td>Extra income / ha (vs grower practice)</td>
<td>604 €/ha</td>
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</table>

Why Agroleaf Power?
- Agroleaf Power will minimize the effects of stress caused by weather, pesticides and heavy production
- Agroleaf Power will quickly correct nutritional deficiencies

Conclusion
The application of Agroleaf Power increased the gross income per hectare with 9% due to better potato quality.
### Breakdown Tables (in %)

#### Agroleaf® Power

<table>
<thead>
<tr>
<th>Product</th>
<th>Formulation</th>
<th>Product Name</th>
<th>Item code</th>
<th>N-total</th>
<th>NO₃-N</th>
<th>NH₄-N</th>
<th>Urea-N</th>
<th>P₂O₅</th>
<th>K₂O</th>
<th>CaO</th>
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<tbody>
<tr>
<td>Agroleaf Power</td>
<td>20-20-20</td>
<td>Total</td>
<td>2096</td>
<td>20</td>
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<td>13.5</td>
<td>20</td>
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<tr>
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<td>52</td>
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<tr>
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<td>High K</td>
<td>2097</td>
<td>15</td>
<td>9.0</td>
<td>4.3</td>
<td>10</td>
<td>31</td>
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<td>Agroleaf Power</td>
<td>11-5-19+9CaO+2.5MgO+TE</td>
<td>Calcium</td>
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<td>8.0</td>
<td>5</td>
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* EDTA chelated  ** DTPA chelated  *** Measured in soft water (comparable to rainwater)

#### Agroleaf® Special

<table>
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<th>Product</th>
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<th>NH₄-N</th>
<th>Urea-N</th>
<th>P₂O₅</th>
<th>K₂O</th>
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<tr>
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<td>Agroleaf Special</td>
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Foliar application methods

Foliar fertilization means the spray application of nutrients to the plant leaves and stems and their absorption. The observed effects of foliar fertilization include yield increases, better resistance to diseases and pests, improved drought tolerance, and enhanced crop quality. The plant's response is dependent on species, fertilizer form, concentration, and frequency of application, as well as the stage of plant growth. Foliar applications are often timed to coincide with specific vegetative or fruiting stages of growth, and the fertilizer formula is adjusted accordingly. The amount of nutrients that plants can absorb via foliar application is limited, and generally much less than their total nutrient requirements. Foliar application should therefore be used as a supplementary form of fertilization. It cannot replace basal fertilization.
<table>
<thead>
<tr>
<th>MgO</th>
<th>SO₃</th>
<th>B</th>
<th>Cu</th>
<th>Fe</th>
<th>Mn</th>
<th>Mo</th>
<th>Zn</th>
<th>EC at 1g/l (mS/cm)</th>
<th>Max. solubility (kg/100 l)</th>
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<tbody>
<tr>
<td>0.8</td>
<td>0.03</td>
<td>0.070*</td>
<td>0.14**</td>
<td>0.07*</td>
<td>0.001</td>
<td>0.070*</td>
<td>0.8</td>
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<tr>
<td>0.8</td>
<td>0.03</td>
<td>0.070*</td>
<td>0.14**</td>
<td>0.07*</td>
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<td>0.14**</td>
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<tr>
<td>2.5</td>
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<tr>
<td>16.0</td>
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<td>0.070*</td>
<td>0.14**</td>
<td>0.25*</td>
<td>0.001</td>
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<td>1.1</td>
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<table>
<thead>
<tr>
<th>MgO</th>
<th>SO₃</th>
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<td>12.00*</td>
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<td>0.4</td>
<td>6.5</td>
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</table>

Overview is subject to formulation changes and misprints.

Recommendations for efficient foliar application

- The best times for foliar spraying are early morning and late afternoon, when humidity is higher and the leaves are in a state of full turgor, with their cells full of water.
- Avoid foliar spraying during the warmer hours of the day; absorption at high temperatures is very poor and plants may be exposed to stress and suffer scorching.
- Dew formation after foliar application is an important aid to prolonged penetration, because of resolubilization of the fertilizers in the dew collected on the leaves.
- Spraying should take place under minimal wind conditions. This is especially important with finely atomized sprays, as they drift readily.
- Always spray when soil moisture is sufficient. Leaves will then be turgid and not susceptible to water stress. Consider irrigating on the day prior to spraying.
- Avoid foliar spraying just before rainfall or overhead irrigation in order to prevent the sprayed material being washed off.
- The optimum pH for a foliar spray is slightly acidic (5 ± 0.5).
- The use of a suitable wetting agent or surfactant decreases the surface tension of the spray droplets, which improves the distribution of the droplets, increases the wetted surface area, reduces burning/scorching of the leaves, and improves the uptake of the product. Always check the compatibility of the surfactant with the foliar fertilizer.
- Ensure that the fertilizer is fully soluble. No special equipment is required – foliar solutions can be applied with the aid of conventional spray equipment, e.g. a fan sprayer, a backpack sprayer, a sleeve sprayer, an aerial sprayer, etc.
- Select the appropriate sprayer volume and pressure for each crop. Using the correct volume of spray is essential to achieve full coverage of the plant canopy.
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