

Nutrient	Affect on yield	Symptoms	AgroLiquid Products
<p>Boron</p> <p><i>Boron is a micronutrient necessary for cell division and differentiation. It is also important for early growth and aids in pollen tube formation, making it essential for reproduction. Boron helps to maintain a balance between sugar and starch in the fruit, and it aids in the translocation of calcium.</i></p>	<p>Boron is needed continuously in the growing points of all plants. Because it aids in the movement of calcium to these points, affecting the strength of the cell walls, it is important for high-quality fruit production. Boron is also essential for the germination of the pollen grains and pollen tubes in plants and has a direct affect on yield. No pollination, no crop.</p>	<ul style="list-style-type: none"> • Shortened plant nodes • Leaves are sometimes thickened, brittle, and curled • Terminal growth dies, young meristematic tissue deteriorates • Reduced flowering and fruit set, poor seed set • Malformed or small fruits and physiological disorders associated with root & tuber crops 	<p>microLink™ Boron Micro 500™</p>
<p>Calcium</p> <p><i>Calcium is a secondary plant nutrient. It is required for the formation of new cells and is present in cell walls and membranes. Calcium stimulates root and leaf development and helps to reduce nitrate-N within plants. Calcium is needed to activate several plant enzymes and is required by nitrogen-fixing bacteria.</i></p>	<p>In the soil, calcium indirectly influences yield by reducing soil acidity — lowering solubility and toxicity of manganese, copper, and aluminum. It also indirectly helps by improving root growth conditions, molybdenum availability, and uptake of other nutrients. In the plant, it improves fruit quality by strengthening cell walls, reducing bruising in shipping, and increasing storage life. Calcium is most readily available in soils with a pH of 7.0 - 8.5.</p>	<ul style="list-style-type: none"> • Death of growing points • Abnormal dark green foliage • Premature shedding of blossoms and buds • Weakened stems • Tip burn of young leaves in some vegetables • Water-soaked, discolored areas on fruits 	<p>Liberate Ca™ S-Calate™ microLink™ Calcium</p>
<p>Copper</p> <p><i>Copper catalyzes several plant reactions and is essential to chlorophyll formation and seed production. It is required for electron transfer during photosynthesis. Copper is also an enzyme activator in plant respiration and a component of numerous enzymes.</i></p>	<p>Copper aids in root metabolism and the utilization of proteins. Although copper deficiencies are not common, they can occur in western soils and will normally be more visible in cereal crops. Elemental copper can be toxic at low levels and application is rarely recommended as a nutritional supplement. Copper is most readily available on soils with a pH of 6.5 or lower.</p>	<ul style="list-style-type: none"> • Mild deficiency shows reduced plant growth • An upward cupping of leaves • Leaves generally remain green, however, some marginal chlorosis may occur if deficiency is severe enough • Shoot die back may occur • Poor pigmentation 	<p>microLink™ Copper Micro 500™ FASE1™</p>
<p>Iron</p> <p><i>Iron is a micronutrient required for the formation of chlorophyll in plant cells. It activates respiration, photosynthesis, and symbiotic nitrogen fixation. Iron is required for energy transfer and also promotes flowering and fruit sets.</i></p>	<p>Deficiency is common where manganese concentration is high or excess free lime exists. Poorly aerated soils and sometimes high zinc levels will also increase deficiency. Low iron levels in the plant result in poor energy transfer from leaves to growing points or fruiting structures, thus slowing growth and lowering yields. Iron is most readily available in soils with a pH of 6.5 or lower.</p>	<ul style="list-style-type: none"> • Early symptoms are a general paling of leaves • Young leaves begin to show interveinal chlorosis without becoming necrotic • Leaf blade tips remain green longer than the rest of the blade • Older leaves usually remain greener • Stunted growth, reduced yields 	<p>Micro 500™ microLink™ Iron Pro-Germinator® GrowRight™ FASE1™ accessS™ FertiRain™ Fase2™</p>
<p>Magnesium</p> <p><i>Magnesium is a secondary plant nutrient. It serves as an activator of many plant enzymes required in growth. It's the central atom in chlorophyll. It also aids in phosphate and nitrogen metabolism. Magnesium is necessary for the formation of oils, fats, amino acids, and sugars, and it promotes early growth and uniform crop maturity.</i></p>	<p>Magnesium (Mg) is often more deficient than calcium (Ca). It is usually more available in western soils but plants growing in sandy conditions may show deficiency. Magnesium balance with Ca must be maintained. When the ratio of Ca to Mg is too high (<8:1), plants will take up less Mg. Magnesium deficiency can also be accentuated by high rates of potassium. Magnesium is most readily available in soils with a pH of 7.0—8.5.</p>	<ul style="list-style-type: none"> • Symptoms occur on young leaves first as slight interveinal chlorosis with some necrotic spots • Chlorosis appears on the tips of the leaves first and moves inward • Spots develop into larger interveinal necrotic areas • Leaves droop, and premature fruit drop may occur 	<p>microLink™ Magnesium</p>
<p>Manganese</p> <p><i>Manganese serves mainly as an activator for enzymes involved in plant growth processes. It is needed for phosphorus and magnesium uptake and aids in the utilization of nitrogen. Manganese also aids in the production of chlorophyll for photosynthesis.</i></p>	<p>Manganese increases the availability of phosphorus and calcium to plants, accelerating seed germination and maturity. Because it plays a major role in the production of chlorophyll, it directly affects the health of the crop and influences whether or not a plant reaches maturity. In fruiting crops, it would have an indirect effect on the size, quality, and sugar content of the fruit. Manganese is most readily available in soils with a pH of 6.5 or less.</p>	<ul style="list-style-type: none"> • Chlorosis occurs in new leaves first • Young leaves begin to turn yellow and cup upward • Dark spotting develops between the veins, often more dense along the midrib • Crop often appears stunted 	<p>microLink™ Manganese Micro500™ eNhan™ acesS™ FertiRian™ FASE1™</p>
<p>Molybdenum</p> <p><i>Molybdenum is a micronutrient essential for symbiotic nitrogen fixation in legumes and is needed in very small amounts by most crops. It acts as a catalyst in nitrate reduction and in nitrogen transport and utilization within the plant. Molybdenum may also be associated with disease resistance in plants.</i></p>	<p>Deficiency is often observed as nitrogen starvation. It differs from other micronutrients in that its availability decreases with increased soil acidity and increases with soil basicity. Deficiency is most likely on a sandy or peat soil with a low pH. It is possible that heavy applications of sulfur may induce a deficiency.</p>	<ul style="list-style-type: none"> • Plants show a stunted appearance and pale-yellow foliage • Broadleaf plants exhibit a leaf cupping and marginal chlorosis • Older leaves are mottled, with veins remaining green; leaves curl inward and die along the tips and margins • Older leaves show symptoms first often mistaken for moisture stress 	<p>microLink™ Moly</p>
<p>Nitrogen</p> <p><i>Nitrogen is a primary plant nutrient. It is one of the more mobile nutrients, being moved throughout the plant to areas where it is most needed. Nitrogen is taken up by plants mainly in the nitrate (NO₃-) or ammonium (NH₄⁺) forms and is used to synthesize amino acids. These make up the proteins contained in the protoplasm of all cells within the plant. Nitrogen is also vital to chlorophyll and enzymes.</i></p>	<p>Nitrogen plays a major role in increasing yields. There is a direct correlation between the amount of available nitrogen and a crop's yield. Nitrogen is required in large amounts during periods of rapid vegetative growth or regrowth. It is a building block for amino acids and proteins and acts as a catalyst for other nutrients. When applied early, nitrogen also increases the size and quality of fruit.</p>	<ul style="list-style-type: none"> • Stunted growth • Small fruit size • Lower yields • Light green to yellow leaves; older leaves will show symptoms first; yellow starts mid-rib and moves outward to leaf margin 	<p>High NRG-N™ N-Response™ ferti-Rain™ FASE1™ Fase2™ NutriRain™ 20-0-2 NutriRain™ 17-3-2 Pro-Germinator® Sure-K® Kalibrate™ S-Calate™ GrowRight™</p>
<p>Phosphorous</p> <p><i>Phosphorus is a primary plant nutrient. It stimulates root, flower, and fruit development and overall crop maturity. Phosphorus is necessary for energy transfer and the formation of RNA and DNA. Most plants require additional phosphorus during cold weather, in areas of limited root growth, during rapid vegetative growth, and in highly calcareous or acidic soils. The higher the clay content in a soil the more immobile it becomes.</i></p>	<p>Phosphorus speeds up plant maturity and promotes seed production. It also increases water use efficiency and contributes to disease resistance. Phosphorus is most readily available in soils with a pH of 6.5–7.0. At higher pH's it becomes fixed (tied up) by calcium and at lower pHs it is tied up by aluminum and iron.</p>	<ul style="list-style-type: none"> • Plants are generally stunted and darker green • Some plants may show a purpling of leaves and stems • As deficiency increases, leaves may curl upward • Maturity may be delayed 	<p>Pro-Germinator® Sure-K® FertiRain™ FASE1™ FASE2™ GrowRight™ NutriRain™ 17-3-2</p>
<p>Potassium</p> <p><i>Potassium is a primary plant nutrient. It is essential for the transport of sugars and the formation of starches and oils. Potassium helps to regulate the opening and closing of a leaf's stoma, which are important for the efficient use of water by a crop.</i></p>	<p>Potassium promotes root growth and, increases a plant's resistance to disease and cold temperatures. It also improves the size and quality of fruits, nuts, and grains, and it is essential for high-quality forage. Crops that produce large amounts of carbohydrates (sugars) require large amounts of potassium for example, cotton, almonds, alfalfa, grapes, cherries, and peaches. Typically, only 1–2% conventional potassium fertilizers applied to the soil is available at one time. Multiple applications of potassium during a season are often beneficial.</p>	<ul style="list-style-type: none"> • Slow growth, tip & marginal leaf burning • Burning of older leaves, weak stems & stalks causing lodging • Low fruit sugar content & shriveled seeds • Yellow starts mid-rib and moves outward to leaf margin 	<p>Sure-K® Kalibrate™ Pro-Germinator® FertiRain™ Fase2™ GrowRight™ NutriRain™ 20-0-2 NutriRain™ 17-3-2</p>
<p>Sulfur</p> <p><i>Sulfur is a secondary element crucial to healthy crop development. It is found in amino acids that make up plant proteins. Sulfur fertilization has also been shown to increase the seed oil content of crops such as soybeans and flax. Plant and animal scientists have shown that plant tissue should contain one part sulfur for every 15 to 20 parts nitrogen for optimum growth and production of high-quality animal feeds.</i></p>	<p>Sulfur aids in seed production and promotes nodule formation in legumes. In addition, sulfur helps to develop vitamins and enzymes. A lack of sulfur results in small, slow growing plants. In most fruits it is a major component of flavor. Sulfur is most readily available in soils with a pH of 6.0 or greater.</p>	<ul style="list-style-type: none"> • Slow growth rate and delayed maturity • Young leaves light green to yellowish in color • Small and spindly plants 	<p>eNhan™ acesS™ S-Calate™ Kalibrate™ High NRG-N™ FertiRain™ FASE1™</p>
<p>Zinc</p> <p><i>Zinc is a micronutrient that is important in several enzymatic systems within a plant. It is necessary for chlorophyll and carbohydrate production. Zinc controls the production of the plant growth regulator indoleacetic acid (IAA).</i></p>	<p>Zinc affects the terminal growth areas of a plant, and these are the first areas of the plant to show deficiency. High yields are impossible without zinc due to its importance in growth, metabolism, and photosynthesis. Zinc is most readily available in soils with a pH of 6.5 or lower, but this is only one factor that affects availability. High soil phosphorus, soil organic matter, biological activity, irrigation, and leaching also play a role in zinc's availability.</p>	<ul style="list-style-type: none"> • Decrease in stem length • Rosetting of terminal leaves • Reduced fruit bud formation • Mottled young leaves • Die-back of twigs after first year • Striping or banding on leaves 	<p>Micro 500™ MicroLink Zinc eNhan™ acesS™ FertiRain™ FASE1™</p>