MAGNIFICENT MICRONUTRIENTS

These seven micronutrients can do wonders for plant growth, as long as they exist in sufficient quantities. Here's how to detect - and correct - deficiencies.

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Of the 16 elements considered to be essential for plants to complete their life cycle, seven are know as micronutrients. They're called micronutrients only because they're needed in small amounts to do their job — mostly as catalysts and regulators of biological reactions in plant growth.

It's important to know how each micronutrient works, what symptoms are exhibited when there's a deficiency, and how to correct that deficiency. For guides on your specific soils and crops, check with your local extension agent or other qualified advisors.

In the meantime, here's an element-by-element look at each of the "magnificent seven" micronutrients:

Boron (B)

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Adequate concentration: Plant analysis levels of 20 to 100 ppm are sufficient for many vegetables.

Deficiency symptoms: B is probably the most widely needed micronutrient around the country, with more than 40 states reporting B deficiencies in one or more crops. When B is lacking, plants usually take on a yellowing appearance with chlorotic newer leaves. Since B is not readily translocated in the plant, the new growth — such as the growing points, including flower buds — are first affected with eventual dying back of the tissue.

Deficiencies of B are more apt to occur in coarse-textured, low-organic-matter soils, which are very leachable. Some factors affecting B concentration are the amount of soil-available B in the plant root area, soil moisture, soil levels of available calcium and potassium and soil pH.

Prescription: Depending on the vegetable being grown, 1 to 4 pounds of actual B per acre are soil-applied as a borate fertilizer. On very coarse-textured irrigated soil, a split application of B may be advisable. Sidedressing or topdressing B on B-sensitive vegetables, such as snap beans, is not advisable because of possible yield reduction due to a B toxicity. Incremental rates of 1/4 to 1/2 pound per acre B may be applied periodically through the irrigation system or as a foliar spray using a soluble form of B.

Chlorine (Cl)

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Adequate concentration: 3200 ppm in New Jersey sweet corn.

Deficiency symptoms: Deficiencies seldom occur in the field because Cl is usually applied seasonally as muriate of potash — potassium chloride (KCl). Some plant symptoms which may indicate Cl deficiencies are lower yields, usually due to higher disease pressure and wilting of the older leaflets with eventual chlorosis.

Prescription: If a deficiency is suspected, 30 to 60 pounds per acre of Cl may be preplant incorporated. Banding and topdressing Cl can also be helpful on low-testing Cl soils.

Copper (Cu)

Copper is important in plant respiration and photosynthesis.

Adequate concentration: 6 to 20 ppm in many vegetables.

Deficiency symptoms: Deficiencies of Cu in such crops as carrots and onions have been noted, particularly when the vegetable is grown on muck soil. Very sandy soils with a high pH may also be Cu deficient. Visual Cu deficiency symptom appears on the youngest leaves as a permanent wilt, becoming curled and chlorotic.

Prescription: If Cu is deficient, a preplant application of 5 to 8 pounds per acre of Cu may be applied on the lighter-textured soils. On organic soils, apply at least twice that amount, usually in sulfate form.

A soil broadcast application may correct a Cu deficiency for at least a 5-year period. A foliar application of 1/4 to 1/2 pounds of Cu per acre can be effective on some crops.

Iron (Fe)

Iron is also important in photosynthesis and plant respiration.

Adequate concentration: 50 to 300 ppm in many vegetables.

Deficiency symptoms: A deficiency may occur more frequently on a coarse-textured, low-organic-matter soil with high pH. Visual symptoms usually appear as a yellowing between the veins of the youngest leaves while the veins remain green. As the deficiency becomes more severe, the young leaves become more yellow to white with possible necrotic spots.

Prescription: Typically, soil applications of Fe are not very effective; therefore, Fe-deficient plants are usually foliar-treated with about 1/2 to 1 1/2 pounds of Fe per acre per application when using the sulfate form of the nutrient carrier.

Manganese (Mn)

Manganese is important in chlorophyll formation, nitrate assimilation and Fe metabolism.

Adequate concentration: 30 to 200 ppm for many vegetables.

Deficiency symptoms: Deficiencies usually occur on heavily limed soils, with the younger leaves looking similar to Fe-deficient leaves except that the veins remain green and the chlorosis may move to other leaves with time.

Prescription: Deficiency in vegetables may be corrected by a broadcast-incorporated application of 20 to 30 pounds of Mn per acre, usually in the sulfate form, just before planting. If Mn is properly placed (2 inches to the side and 2 inches below the seed), a band application of 4 to 8 pounds of Mn per acre may by used at seeding. Another method of application is foliar at 3/4 to 1 pound of Mn per acre.

Molybdenum (Mo)

Molybdenum is essential in protein synthesis and nitrogen metabolism.

Adequate concentration: 0.3 to 5 ppm.

Deficiency symptoms: Vegetables deficient in Mo may have interveinal chlorosis, with pale green, curled older leaves and a breakdown of the tissue along the leaf margin.

Prescription: Mo deficiency usually occurs on low pH soils. Normally it can be corrected by raising the soil pH by liming or applying 0.2 to 0.6 pounds of Mo per acre to the soil as sodium or ammonium molybdate — or by treating the seeds before planing with an Mo fertilizer. Applying 1 pound of sodium molybdate in 100 gallons of water per acre may be helpful as a foliar spray.

Zinc (Zn)

Zn plays a large role in protein synthesis and starch formation.

Adequate concentration: 20 to 60 ppm in most vegetables.

Deficiency symptoms: Plants may show interveinal chlorosis as partially striped yellow or whitish bands emerging from the lower half of the young leaves.

Prescription: Vegetables growing in soils that are cold and wet — or that have a high pH, low levels of organic matter, and high levels of available phosphorus — may become Zn deficient.

A broadcast application, usually in the sulfate form, of 10 to 25 pounds of Zn per acre — lower rates on lighter-textured soils — usually will help correct a Zn deficiency for a 3- to 5-year period. If banding at seeding, apply 4 to 8 pounds of Zn per acre 2 inches to the side and 2 inches below the seed. Also, a pound of Zn per acre may be applied as a foliar spray.

Editors Note: The information in this article could be applied to field grown cut flowers. Field grown cut flowers have potential for growers looking to expand into alternative crops in conjunction with their greenhouse operation.

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