GROWERTALKS

Features

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Don’t Forget About Magnesium

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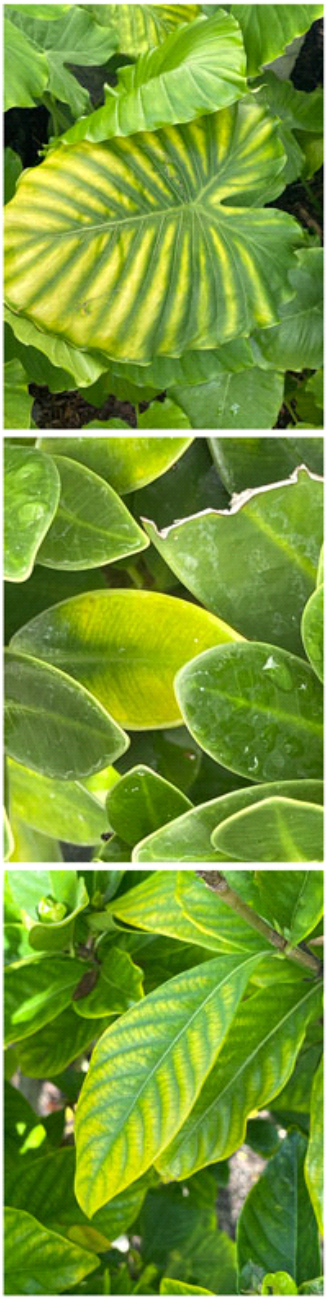

Magnesium. It sounds like a trace element right? Well, not exactly. The average ornamental plant contains between 0.3% and 0.5% in the leaf tissue. That’s 3,000 to 5,000 ppm or about 50 times the typical amount of iron in plant tissue. Plants need about the same amount of magnesium that they do phosphorus and we call phosphorus a macronutrient.

The role of magnesium

Magnesium has numerous functions in plants, primarily as an enzyme activator. An enzyme is a protein that has a metabolic function. However, for growers, the take-home message is that magnesium is in the middle of the chlorophyll molecule. If you look at the molecular structure of hemoglobin and chlorophyll, they are IDENTICAL. The only difference is that iron is in the middle of hemoglobin. That’s why your blood is red. Magnesium is in the middle of chlorophyll, which is why plants are green.

You may have heard of blue-green algae. Any idea what might be in the middle of the chlorophyll in blue-green algae? Copper. Ever seen a corroded penny? It’s blue green. Sometimes complicated science can be made simple.

Plants can vary greatly in their magnesium requirements. I would say that magnesium deficiency is one of the more common nutritional disorders in ornamental plants. Some plants—such as buddleia, vinca, poinsettia and many palms—have high magnesium requirements. With others—such as oaks, conifers and hibiscus—you very rarely see magnesium deficiency.

Pictured, top to bottom: Magnesium deficiency symptoms in alocasia. • Magnesium deficiency in ficus. • Magnesium deficiency in gardenia.

Magnesium is a mobile element, meaning the plant can move it around. When plants are running low on magnesium, they steal it from the older leaves and move it to the new leaves. You therefore see a lack of magnesium and thus a lack of chlorophyll in the older leaves. The new leaves will usually show normal color. Magnesium deficiency virtually always occurs in older leaves. Deficiencies such as iron and manganese will occur in new leaves.

The typical symptom of magnesium deficiency in most plants is marginal yellowing

of the older leaves. Because of this mobility, stock plants of any type will always need more magnesium than production plants. With the stock plant, what do you do? You come and take cuttings. This removes a lot of magnesium from the upper part of the plant. As you continue to take cuttings, foliar magnesium levels are depleted. You often see this in stock plant production such as poinsettia, hydrangea or cannabis. Therefore, stock plants should always get more magnesium than production plants.

Correcting magnesium deficiency

Okay, a quick chemistry lesson. Calcium and magnesium both have a double positive charge. They're about the same sized atom. Stated more simply, calcium and magnesium are very similar chemically. Soils or media with high calcium levels will tend to result in magnesium deficiency in crops. Nutrient ratios matter. An ideal ratio in media of calcium to magnesium is about 6 to 1. It depends on the plant, but if the calcium to magnesium ratio is greater than 10:1, magnesium deficiency is likely to occur. If the ratio is 4:1 or less, calcium deficiency tends to happen.

While soluble 20-20-20 and 20-10-20 fertilizers are excellent for ornamental plant production, they usually don't have enough magnesium for many ornamental and flowering crops. The reason is that magnesium tends to precipitate with phosphorus, forming insoluble compounds. They therefore include low amounts of magnesium. Growers producing crops with high magnesium requirements may benefit from cal-mag formulas such as 17-3-17 or 15-5-15. Such fertilizers will contain several times more magnesium than 20-20-20 or 20-10-20.

Much of the magnesium in ornamental plant production comes from the dolomite in the potting media. Dolomitic limestone by definition contains at least 12% magnesium. We "lime" potting soil partly for pH adjustment, but also to apply calcium and magnesium, essential nutrients. There's generally no calcium in 20-20-20 formulations and not enough magnesium to matter.

Correcting magnesium deficiency symptoms is usually not difficult, though they're best prevented. If, like many growers, you produce a number of different crops, think about the relative magnesium requirements of the varieties you grow. Try to provide adequate magnesium in order to avoid deficiencies. In 45 years of horticultural consulting all over the world, I've never once encountered magnesium toxicity. If a grower applies excessive amounts of magnesium, soluble salt injury will likely occur before any magnesium toxicity.

There are a number of magnesium sources available to growers. Obviously, dolomite in the potting mix is primary. Additionally, Epsom salts or magnesium sulfate is readily available, cheap and soluble. This can be sprayed at 2 lbs. per hundred gallons or drenched at 2 to 4 lbs. per 100 gallons. It can also be included in injector systems. Magnesium sulfate isn't acidic and won't alter media pH.

Other options include magnesium nitrate, which is a direct precursor of chlorophyll. There's no sulfur in chlorophyll, but there's a substantial amount of nitrogen. I often recommend foliar sprays of magnesium nitrate for crops that have a little bit of cold damage, resulting in color loss. In cold weather, the chloroplasts can get damaged and plants take on a yellow or reddish appearance. Magnesium nitrate sprays can reverse that. It may take several sprays, but you can bring back "winter color" by spraying 2 quarts per 100 gallons. Magnesium nitrate is cheap and very compatible with insecticides, fungicides, etc.

There are magnesium chelates available, most commonly glucoheptonate chelates. They're also available as cal-mag chelates, containing chelated versions of both elements. These work fine, though in my experience Epsom salts or magnesium nitrate work just as well. Understand that magnesium deficiency occurs in older leaves and older leaves don't absorb foliar nutrients as well as newer leaves. With severe deficiencies, an Epsom salt drench at 3 to 4 lbs. per 100 gallons will probably correct the situation faster than numerous sprays.

As growers, we live and die with NPK levels, but don't forget magnesium. Chlorophyll is the key to color and growth. We all thrive from the marvelous vitality of these plants. **GT**

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