

BY DANIELLE CLADE AND BRIAN WHIPKER

Nutrient disorders of spearmint

Improve your understanding of common culinary herb deficiencies to better diagnose problems and prevent yield loss.

Spearmint (*Mentha spicata* L.) is a popular perennial herb known for its unique flavor and aroma, making it a staple in many culinary applications as well as a source of mint essential oil. While often grown as a row crop, growing mint in a controlled environment, such as greenhouses, has many benefits, including improved quality and increased yield year-round. However, growing spearmint in a controlled environment also requires careful maintenance of nutrient levels to maintain healthy plants and high yields.

Nutrient deficiencies in mint can be problematic, especially if not corrected early and quickly. Common problems that result from inadequate nutrient supply or uptake include stunted growth, discoloration and even plant death. These symptoms can

This article is the **third** of an **eight-part series** focused on nutrient deficiencies, post-harvest shelf life, disease management, food safety and marketing of culinary herbs produced in controlled environments.

Review the first two nutrient deficiency articles from the January/February and the March/April issues here: [producegrower.com/magazine](https://www.producegrower.com/magazine)



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range in severity, but recognizing the early symptoms is critical for early correction. By better understanding the symptoms of common deficiencies, growers can better monitor and diagnose problems with their spearmint crops and prevent yield loss.

Nitrogen (N) is an essential macronutrient that is vital for chlorophyll production and healthy plant growth. Due to N being required in large quantities, deficiency is one of the most common nutritional disorders encountered by growers. Nitrogen is a mobile element,

Figure 1. Nitrogen deficiency in spearmint causes stunted growth and overall light green foliage.



Figure 2. Chlorosis of the newest growth while the lower leaves remain green is a symptom of sulfur deficiency.



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meaning that under deficient conditions, it can be relocated within the plant from the older tissue to the newer tissue in order to support new growth.

Because of this, an initial sign of N deficiency in spearmint is chlorosis of the older leaves. The growth of N-deficient mint plants will also stall, sometimes stopping altogether. Additionally, spearmint plants will rapidly deplete their N reserves, and the newest growth, and sometimes the entire plant, will quickly become chlorotic, taking on a light green color (**Figure 1**).

Sulfur (S) deficiency in spearmint plants, upon first glance, can look very similar to N deficiency. Unlike N, S is partially mobile within the plant tissue, resulting in deficiency symptoms appearing first on the midsection and newest growth rather than the lower leaves. Under S deficiency, spearmint plants develop a light green coloration that resembles the coloration seen in N-deficient plants (**Figure 2**). Because S is partially mobile, the older foliage will remain green, while the new foliage is symptomatic. This can be distinguished from N deficiency, which causes chlorosis of the older leaves and eventually the entire plant.

Phosphorus (P) deficiency in spearmint plants, like N deficiency, can greatly stall or halt plant growth. Phosphorus-deficient plants are greatly stunted, and due to the mobility of P within the tissue, the lower leaves are the first to develop deficiency symptoms. The lower and middle foliage will begin to develop interveinal chlorosis and faint purpling of the leaf margins (**Figure 3**). As symptoms progress, necrotic patches begin forming on the lower leaves, which will eventually abscise.

Potassium (K), another mobile macronutrient, is also needed in the plant in high quantities. Under a K deficiency, spearmint plants will initially experience stunted growth followed by symptomology on the older foliage. Lower leaves will develop a faint interveinal chlorosis, quickly followed by necrosis around the leaf margin. Leaves also develop a curled, downward growth pattern, which is typical of K deficiency (**Figure 4**). Under severely deficient conditions, the lower foliage will eventually become entirely necrotic, and leaves will begin abscising.

Calcium (Ca) deficiency in spearmint presents unique symptoms that aren't typically caused by other nutritional disorders. Due to the role Ca has in cell wall and membrane development, a lack of Ca results in inadequate development of new growth and leaf expansion. These symptoms include chlorosis and necrotic speckling of the upper and middle foliage, and, most notably, the newest growth develops cupped margins due to being unable to fully expand (**Figure 5**). Eventually, complete death of the growing tips occurs, and upper stems become entirely necrotic.



Figure 3. Phosphorus deficiency in spearmint causes interveinal chlorosis of the lower and middle foliage, faint purpling of the leaf margins and necrosis of the oldest leaves.



Figure 4. Potassium deficiency causes interveinal chlorosis and necrotic margins on the lower leaves, as well as an overall curled, downward growth pattern.

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Boron (B), like Ca, is essential for cell wall formation and healthy growth, though it is needed in smaller quantities. In spearmint, a B deficiency will cause marginal necrosis and distorted upper growth, with leaves curling downward (**Figure 6**). The upper foliage will also feel thick and brittle to the touch, which can differentiate B deficiency from Ca deficiency. If B deficiency persists, the upper foliage will become entirely chlorotic, and subtle marginal necrosis begins to develop.

When monitoring spearmint, it is important to consider the appearance of healthy plants. New growth on healthy spearmint plants often appears to be a lighter green color, which could easily be mistaken for chlorosis. This lighter coloration is normal as new leaves initially expand. As the new growth matures, chlorophyll content increases, and leaves develop into a deeper green color. It is important to differentiate this natural coloration from nutrient deficiency symptoms to avoid unnecessary interventions.




Figure 5. Curled margins, upper necrosis and death of the growing points are symptoms of calcium deficiency in spearmint.

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Figure 6. Symptoms of boron deficiency in spearmint are distorted upper growth, marginal necrosis, downward curling leaves and thick, brittle foliage.

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While visually monitoring plants is essential in maintaining a healthy crop, other environmental and management factors should also be considered. Irrigation frequency, temperature and light levels are all examples of environmental factors that, if not properly managed, could negatively impact plant health. Additionally, nutrient disorders can often be caused by inhibited uptake of nutrients, despite adequate supply in the fertilizer solution. For example, an excess of K application can antagonize Ca uptake, leading to a deficiency despite sufficient Ca in the fertilizer solution.

To avoid these issues, routine sampling of the fertilizer solution is recommended to ensure nutrient levels are balanced. Likewise, tissue testing is a reliable method for confirming suspected nutrient disorders. By combining visual monitoring with regular testing, growers can effectively manage their spearmint crops and minimize nutrient-related problems. **pg**

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