CALCIUM

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Calcium, an important element in plant mineral nutrition, is necessary for the structure, stability and formation of membranes. It plays an important role in cell wall structure. Calcium is also of importance in some enzyme systems and at the nuclei, where a lack of calcium would result in improper cell division. Early symptoms of calcium deficiency in general is evident in the younger growing tips of the plants (i.e., growing points of stems and roots and younger leaves).

SYMPTOMS

Tomatoes

Marginal yellowing/chlorosis with slight interveinal chlorosis.

Leaflets remain small and curl upwards.

As symptoms progress, leaf tips and margins wither.

Growing point dies.

Cucumbers

Younger leaf margin yellowing and turn upwards and short internodes.

Interveinal chlorosis and necrosis (white spots).

Older leaves downward cupping with puckered interveinal areas.

Growing point dies.

Peppers

Stunted growth and dark green leaves.

Fruit smaller and darker green.

As symptoms progress, leaves are smaller, yellow and margins upturned.

Growing point dies.

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Calcium uptake into the plant is determined by root activity. Factors such as root temperature, moisture and oxygen availability in the rooting media, the electrical conductivity (EC) and the supply of calcium strongly influence absorption. The movement of calcium in the plant is mainly via the xylem vessels as well as cell to cell movement. Factors that influence water absorption and movement directly influence the movement of calcium within the plant. Blossom end rot (BER) occurs when there is calcium deficiency at the distal end of the fruit.

In numerous cases, BER may be prevalent where there is an adequate supply of calcium in the media and leaf tissue tests indicate good to excellent levels. This is the result of too high a transpiration pull caused by low relative humidity and/or too high venting. Too vegetative a plant also causes a similar situation as the transpiration pull is too high to allow for adequate calcium movement to the fruit. Fruit is most sensitive to BER 1.5 to 3 weeks after flowering. During this period cell division and expansion is high and more sensitive to calcium. Xylem vessels must be established adequately to ensure proper calcium distribution. Cultivar sensitivity to BER can now be explained as the ability of the fruit to develop xylem vessels at the distal end of the fruit. The more sensitive cultivars do not establish adequate xylem tissues.

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Too dramatic a change in fruit growth rate also increases sensitivity to BER. The supply of calcium is unable to keep up with the demand resulting in internal BER that manifests into common BER as the fruit expands.

This may be caused by dramatic light change (Extended cloudy period followed by very sunny conditions), too large a drop in root zone EC over a short time period. In all cases, rapid changes in fruit expansion rates influence the incidence, severity and frequency of BER. Recommended strategies for optimum use of calcium include:

Proper greenhouse environment
Proper feed program
Balanced plant (fruit load)
Maintenance of steady fruit growth

MEDIA TEST REVIEW

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Crop	pH	SS	NO_3	NH_4	P	K	Ca	Mg	Na	Fe	Mn	Zn	B
Poinsettia	6.6	109	109	10	9	60	156	29	13	.09	.24	.06	.06

The pH in this test is within the normal range. The grower needs to maintain the pH in the 6.2 to 6.8 range to avoid problems caused by a high pH. By acidifying water and monitoring media pH throughout the growing season, this should not be any problem.

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The soluble salts are getting high. A general rule is to maintain the salts level below 125. In the case of this crop, leach once to lower the salts. The ammonium levels are approaching toxic levels. While the ammonium level is within the acceptable limits now, if an ammonium based fertilizer is being used as we move into a time of year when the temperatures and light levels are decreasing, problems could arise. Be sure to be aware of the ammonium levels in your media to avoid burn problems later in the season. Do not use ammonium based fertilizers after October 1 in Minnesota!

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The nitrate level in this test is on the low side. Nitrogen levels will decrease further if you leach to remove total soluble salts and/or ammonium. Following leaching a single fertilizer application of double strength nitrogen source (400-600 ppm) should be applied. Following this regular applications of 200-300 ppm nitrogen should keep the nitrate level up in the acceptable range (150-250).

It is common to have low magnesium levels on early media tests of a crop. Low magnesium levels are often accompanied by lower micronutrient levels. This is the case in this media test. This generally indicates that the grower has not applied magnesium sulfate (epsom salts) or micronutrients. Application of these items can be done approximately once a month through the growing season, and they can be applied together. Apply epsom salts at a rate of 8 ounces per 100 gallons of water. Apply micronutrients as a 1/2 rate application once a month. Do not mix with calcium nitrate in a stock tank, they will react and fall out of solution. You can mix magnesium sulfate with micronutrients, and this is a good way to ensure that micronutrient needs are being met, especially in a soilless mix.

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