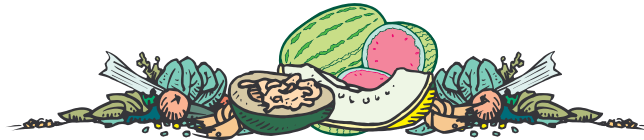


VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the
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NUTRIENT CONCENTRATION IN PLANT TISSUE - (Chris Gunter) - Each nutrient needed by a plant, has a general concentration range in healthy plant tissue. The range in which this concentration is high enough to support normal growth and development is called the *adequate* or *sufficient range*. Plant growth should remain constant if the concentration of a nutrient is in that range. When plants are in the sufficient range, there is little gain to be had by applying additional fertilizer. The sufficient range for cantaloupe, watermelon and tomato are presented for various nutrients in Table 1 and Table 2.

When a plant tissue has reached the *critical concentration range* for a nutrient element, it means that plant growth has been reduced (usually by 10%), because the element is not present in a high enough concentration. Usually at this critical concentration, there are very few visual signs of nutrient deficiency. The critical concentration is different for different vegetables and can change depending on the stage of growth of the plant and what plant part is sampled. It is

when plants reach this critical stage, that we have the best chance of correcting nutrient problems without significant loss to production.

This should not be confused with plants showing deficiency symptoms for a particular nutrient. Plants which are deficient in a nutrient will show visual symptoms of deficiency and will have dramatic reductions in growth. By the time visual deficiency symptoms are present it may not be possible for the crop to recover and reach maximum yields, even if corrective fertility applications are made.

Results of plant and soil analysis can be useful for vegetable growers to manage fertility rates and timing, but it's important to remember each has limitations and should not be used for purposes they were not intended. Also, plant tissue testing is not recommended if the crop has received foliar sprays containing nutrients. The residue that the foliar spray leaves behind may lead to higher values of nutrient concentrations than are actually present within the leaf tissue.

Extension publications describing when and how to sample different plants for their nutrient content are available for most vegetables. A list of links to some of these publications will appear at the end of this article. Generally speaking the "most recently matured leaf" (MRML) provides the most sensitive indicator of plant nutrient status, in some cases only the leaf petiole is used. Sampling the most recently mature leaf is not always the best idea, for example when sampling for calcium, copper, boron and sulfur the most recently mature leaf is not the plant part to sample. These

Table 1. Adequate or sufficient range for various nutrients in cantaloupe, watermelon and tomato. The concentrations of nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg), and sulfur (S) values are given as a percent (%).

Vegetable	Part Sampled	Growth Stage	N	P	K	Ca	Mg	S
Cantaloupe	MRML	12 Inch Vines	4.0-5.0	0.4-0.7	5.0-7.0	3.0-5.0	0.35-0.45	0.2
		Early Fruit Set	3.5-4.5	0.3-0.4	1.8-4.0	1.8-5.0	0.3-0.4	0.2
Watermelon	MRML	Layby (Last Cultivation)	3.0-4.0	0.3-0.5	3.0-4.0	1.0-2.0	0.25-0.5	0.2-0.4
		First Fruit	2.0-3.0	0.3-0.5	2.3-3.5	1.0-2.0	0.25-0.5	0.2-0.4
Tomato	MRML	First Flower	2.8-4.0	0.2-0.4	2.5-4.0	1.0-2.0	0.3-0.5	0.3-0.8
		First Ripe Fruit	2.0-3.5	0.2-0.4	2.0-4.0	1.0-2.0	0.25-0.5	0.3-0.6

Information presented was excerpted from G. Hochmuth, *et al.*, 2004. Plant tissue analysis and interpretation (HS964). Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, University of Florida, Gainesville, FL.

Septoria leaf spot - Spots on leaves are circular with chocolate brown margins and gray centers. As the spots enlarge (up to 1/8 inch in diameter), small dark spots may be observed within each lesion. These are the reproductive structures of the causal fungus. As in early blight, the spots start on the older leaves first.

Manage Septoria leaf spot in the same fashion as early blight.

Bacterial spot (Figure 2) - Leaf spots are usually 1/16 inch, black and angular. Spots are more often found on young than old plant tissue. Spots are usually surrounded by yellow plant tissue. Spots on fruit are black, raised and up to 1/3 inch in diameter. The disease prefers warm wet weather.



Figure 2. Bacterial spot - Bacterial spot often causes small 1/16th inch lesions on tomato leaves surrounded by chlorotic tissue. (Photo by Dan Egel)

Bacterial spot may be seed borne; greenhouse grown transplants should be carefully monitored. Tomatoes should be rotated 2 to 3 years away from peppers or tomatoes. Treatment with copper hydroxide may reduce spread in the field. However, copper products will have little affect on tomato diseases such as early blight and septoria leaf spot.

Bacterial Canker (Figure 3) - Older leaves are often affected first. Leaves may turn downwards and eventually curl. The most characteristic symptom on leaves is the brown necrotic area along the margin of the leaves. Inside the brown area, the leaves are frequently yellow, giving the leaves a scorched appearance. However, other environmental factors can give the leaves a similar scorched appearance. Spots on fruit are usually less than 1/4 inch in diameter and have a characteristic "birdseye" appearance; that is, they are light colored with a dark center.

Bacterial canker is another disease that may be seed borne. Rotations of 2 to 3 years and fall tillage are important in managing this disease. The use of copper products to control the disease in the field has had mixed results. Remember to use good sanitation. For example, use only clean stakes. Reduce the spread of bacterial canker by working the field when the plants are dry.



Figure 3. Bacterial canker - Necrotic and chlorotic margins, often called firing, on the leaves is a common symptom of bacterial canker of tomato. (Photo by Dan Egel)

Other diseases - The above list accounts for about 80% of the tomato disease I see each year. Other diseases include **bacterial speck** of tomato. This disease looks similar to bacterial spot but occurs in cooler weather. Thus bacterial speck is often found earlier in the year.

Circular sunken spots of about 1/2 inch in diameter on ripe to over ripe fruit may be caused by **anthracnose fruit rot**. A gray-green water-soaked spot that may cover half the fruit or more could be **buckeye rot**. A dark rot starting at the blossom end of the tomato fruit is most likely **blossom end rot**. The latter disorder is not a disease at all, but a calcium imbalance, frequently corrected by avoiding wide swings in soil water availability.

Many other diseases and disorders may occur. This list is just a start. Find someone who knows tomato disorders and diseases to know for sure.



INSECT PESTS ON CUCURBITS IN SOUTHERN INDIANA DURING THE EARLY SEASON OF 2004 - (Frankie Lam) -

Seedcorn maggots, striped and spotted cucumber beetles, aphids, spider mites, and squash bugs were found in cucurbit fields during the early-season of 2004. The insect numbers were not relatively high in southern Indiana. However, the striped cucumber beetle numbers observed in fields were above the economic threshold.

During late April, relatively high numbers of seedcorn maggot adults (Figure 1) were found in muskmelon fields; however, the number of the flies declined in the second week of May. In the first week of May, the striped cucumber beetles (Figure 2) on muskmelons reached the economic threshold, which is one beetle per plant. The number of the beetles in muskmelon fields averaged about two beetles per plant

among those fields that I sampled during the past three weeks. Spotted cucumber beetles (Figure 3) were also observed on melons after the middle of May.

In this early season, both aphids (Figures 4-5) and spider mites (Figures 6-7) were found in melon fields. Usually aphids prefer cool, dry weather and appear on muskmelons after early-June; whereas spider mites favor hot, dry climate and often appear on watermelons after mid-July. However, both pests were observed on melon fields before the end of May in southern Indiana. The symptoms of aphid infestation on melons were clubbed appearance (Figure 8) and spider mite infestation symptoms were a yellowish color near the mid-rib (Figure 9) of melon leaves. In addition, squash bug (Figure 10) was discovered in melon fields during the last week of May.

Since most of the prominent insect pests on melons were observed in fields, sampling for the pest and making early decisions on managing the pest can preserve yield potential. Insecticides applied for the control of insect pests on cucurbits are listed in the Midwest Vegetable Production Guide for Commercial Grower 2004 (ID-56). Follow insecticide label directions carefully before using any pesticides.



Figure 1. Seedcorn maggot adult. (Photo by Frankie Lam)

Figure 2. Striped cucumber beetle. (Photo by Frankie Lam)



Figure 3. Spotted cucumber beetle. (Photo by Frankie Lam)

Figure 4. Aphids on the underside of a melon leaf. (Photo by Frankie Lam)



Fig. 5. Aphid under the microscope. (Photo by Frankie Lam)

Figure 6. Twospotted spider mite under the microscope. (Photo by Frankie Lam)



Figure 7. Spider mite eggs under the microscope. (Photo by Frankie Lam)

Figure 8. Early symptom of aphid infestation on a muskmelon leaf. (Photo by Frankie Lam)



Figure 9. Early symptom of twospotted spider mite infestation on watermelon. (Photo by Frankie Lam)

Figure 10. Squash bug. (Photo by Frankie Lam)



STRIPED CUCUMBER BEETLE INJURY ON MUSKMELON AND CUCUMBER - (Frankie Lam) - The overwintered striped cucumber beetles (Figure 1) feed on the cotyledons (Figure 2), leaves (Figure 3), and stems of seedlings or transplants (Figsures 4-6). The pest is a vector of the bacterium that causes bacterial wilt of muskmelons and cucumbers. The symptoms of bacterial wilt (Figsures 7-8) appear 2-6 weeks after the plant is infected. Once a plant is infected with the bacterium, nothing can be done to save the plant. The management tactic for the disease is to avoid the beetle feeding on the plants especially during the early-season. For muskmelons and cucumbers, the economic threshold is 1 beetle/plant, whereas for watermelons, squash, and pumpkin, the economic threshold is 5 beetles/plant. The foliar insecticides recommended for the control of cucumber beetles are Adios, Ambush, Asana, Capture, Pounce, Sevin, and Thiodan. Check the list in the Midwest Vegetable Production Guide for Commercial Grower 2003 (ID-56) for the insecticidal management of striped cucumber beetles. Read the labels carefully before applying any pesticides.

(All photos by Frankie Lam.)



Figure 1. Striped cucumber beetles.



Figure 2. Injury of cotyledon by the striped cucumber beetle.



Figure 3. A striped cucumber beetle feeding on the muskmelon leaf.



Figure 4. Striped cucumber beetles feeding on the stem and leaf stalk of a cucumber plant.



Figure 5. Feeding scars on the stem of a cucumber plant by the striped cucumber beetle.



Figure 6. Injury on the stem of a cucumber plant by the striped cucumber beetle.



Figure 7. Early symptom of bacterial wilt on muskmelon.



Figure 8. Early symptom of bacterial wilt on cucumber.

HAYGROVE HIGH TUNNEL TOUR, SEPTEMBER 2004 -

(Announcement) - Due to numerous requests from interested growers, Haygrove Tunnels has rescheduled their second annual North American grower tour of England's high tunnels. The new dates are September 25 - October 2 and will feature Haygrove's home farm with 220 acres of strawberries, raspberries, cherries and lilies produced under tunnels. The latest developments in Haygrove's multi-bay tunnels, season extension, mechanization and spectral filter horticultural films will be showcased.

The grower tour will visit other growers using Haygrove tunnels. At present, these include Hillier's Nursery, Intercrop Farms (leading salad/vegetable producer), Edward Vinson Plants Ltd. (plant breeder/small fruit grower) and Hurst Farm (direct marketer/table top strawberry producer). Additional visits will include the city of Oxford, Windsor Castle (home of Queen Elizabeth II), Canterbury Cathedral, Chartwell House (Winston Churchill's home) and an open day to visit London.

The tour will depart from the headquarters hotel near Heathrow airport at 8:00 A.M. September 26 and return to the same hotel September 30 and October 1. The price of \$799 is based on double occupancy (\$1199 single) and includes 7 nights lodging, coach transportation in England, and two dinners sponsored by Haygrove. Airfare is not included. Sign up deadline is July 15, 2004 and space is limited. To join this informative, educational tour, call 866-HAYGROVE.

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