

Deficiency Symptoms in Vegetable Plants

(Corrective Treatments – Per 30'-long Row)

BORON – (1-2 ounces Borax)

General Symptoms – “Rosette Crown” terminal buds; Death of terminal buds; leaves are an off-green color; leaves are distorted; leaves are brittle, stiff, along margins; flowers and pods fail to mature. Cotyledons enlarged and true leaves of young plants turn purple; terminal shoots curl upward and die; blossom end rot of fruit. Black Heart in tubers.

Variety	Specific Symptoms
Bean	Death of terminal buds; leaves are an off-green color; flowers and pods fail to grow.
Beet	Rosette terminal buds; leaves die in crown; roots show heart-rot and dry-rot; leaves are red, small and deformed.
Broccoli	Head and margins of leaves are rust-brown discoloration; leaves become necrotic; stems of curds are hollow.
Cabbage	Stems are hollow in the head region; leaves are distorted; leaves are brittle, stiff, along margins; leaves making up the head are unattached.
Cantaloupe	Rosette terminal bud; and death of terminal buds.
Carrot	Margins of leaves yellow, followed by red; roots split long and wide.
Cauliflower	Same as broccoli.
Celery	Crosswise cracks in the petioles; small center leaves turn brown.
Corn	Growing point dies; no silk and no ears develop.
Lettuce	Distorted terminal leaves; death of growing point.
Onion	Leaves are deep bluish-green color; basal leaves develop transverse cracks on upper side.
Pea	Yellow or white veins in leaves; terminal bud dies; blossoms shed; pods are poorly shaped and empty.
Potato	Older leaves curl upward at margins; bushy appearance of plant; foliage thick and brittle; older leaf stalks break off easily
Radish	Terminal bud dies; tubers crack and become hollow.

Variety	Specific Symptoms
Tomato	Cotyledons and true leaves of young plants turn purple; terminal shoots curl upward and die; blossom end rot of fruit.

CALCIUM – (16 ounces lime or gypsum)

General Symptoms - Margins of leaves are light colored; leaves of terminal buds have dead tips; plant growth is stunted. Leaves roll up at margins with necrotic edges. Death of terminal bud; older leaves - small to large portions of the leaf collapse, brown and die. Condition moves up the plant to younger leaves; warty appearance of leaves; stubby roots; death of plant. Quick and severe wilting, scorching, and death of large areas of a leaf or leaves; poor plant color and growth; enlarged leaves; poor flower set and poor fruit set.

Variety	Specific Symptoms
Bean	Death of terminal bud; death of plant.
Broccoli	Leaves roll up at margins with necrotic edges.
Brussels Sprouts	Same as broccoli.
Cabbage	Same as broccoli.
Cantaloupe	Small to large portions of the leaf collapse and die; older leaves brown and die.
Carrot	Leaves show chlorosis, later scorching and die; poor foliage.
Cauliflower	Same as broccoli.
Celery	Young leaves of center hearts die; pale green color; growing point dies.
Corn	Youngest unfolding leaves gelatinize and later stick together; weak stalks.
Cucumber	Margins of leaves are light colored; leaves of terminal buds have dead tips; plants are stunted.
Lettuce	Young leaves pale and distorted; rosette crown.
Pea	Chlorosis on lower leaves; plants are short and die; root tips die.
Potato	Young leaves roll upward with marginal scorching; buds die; crops fail; young leaves are pale green and small.
Radish	Narrow white bands on margins of leaves; marginal leaf wilting.
Tomato	Terminal flowers die; plants are weak and flabby; roots are brown; blossom end of fruit rots.

CHLORIDE – (Very rare no corrective treatment given)

General Symptoms - Unnatural wilting of the plants. Resembles the symptoms of excess nitrogen and excess salt.

COPPER – (1 ounce copper sulfate)

General Symptoms - Copper deficiency is rare. Narrowing of broad leaves; characteristic brownish yellow, or pale yellow color or stripes, and curled leaves. In severe cases the color is gray. Poor root system; greatly reduced yield or none at all.

Variety	Specific Symptoms
Beet	Bluish-green color of younger leaves; older leaves become chlorotic beginning first at the tips; leaf veins remain green.
Cabbage	Heads fail to form; leaves become chlorotic, poor growth.
Carrot	Poor tuber development; leaf growth is stunted but no chlorosis appears.
Corn	Leaf tips wither and appear grayish; tips of newest leaves die; leaves become chlorotic.
Lettuce	Leaves become chlorotic, starting at the margins; leaves become cupped; heads are not firm.
Onion	Bulbs are not solid; leaves are chlorotic.
Pea	Tips of terminal buds wilt; flowers abort and no pods form.
Potato	Young leaves remain permanently wilted; terminal buds die when flower buds are developing; almost no chlorosis appears.
Tomato	Growth of shoots severely stunted; very poor root growth; foliage dark bluish-green color; flowers fail to form; chlorosis appears.

IRON – (1 ounce chelated iron)

General Symptoms - Bleached yellow color between the veins of young leaves; leaf veins remain green ; yellow and green intermixed in interveinal tissue; older leaves turn yellow, dry out, and fall off; stunted plant growth; leaves and flowers shed prematurely.

MAGNESIUM - (8 ounces magnesium sulfate)

General Symptoms - Chlorosis in the older leaves, with multiple colors between the veins. Older leaves show patches of orange, red and purple; later the chlorotic patches coalesce, brown and drop out. Older leaves show interveinal chlorosis and necrosis; leaf margins turn up; stems are slender; interveinal light green or yellow patches on maturing leaves; later these patches dry up; flower set turns yellow and drops off; fruits are poorly shaped and poorly developed; bright colors of reds, yellows, oranges, and purples appear on maturing leaves. Because magnesium moves within the plant, older leaves show deficiency.

Variety	Specific Symptoms
Bean	Older leaves show reddish-brown mottling; later the spots become necrotic.
Beet	Chlorosis in the older leaves, with reddish shading between the veins.
Broccoli	Older leaves show patches of orange, red and purple; later the chlorotic patches brown and drop out.
Brussels Sprouts	Same as broccoli.
Cabbage	Same as broccoli.
Cantaloupe	Necrotic spots develop in older leaves; later the spots coalesce.
Carrot	Leaves are colored with yellow, reds, and purplish; older leaves are very chlorotic; poor tuber development; poor growth.
Cauliflower	Same as broccoli.
Celery	Leaf tips and margins are chlorotic with reddish blotches; later entire leaves become necrotic.
Corn	Older lowest leaves turn bright red color; later leaves become necrotic.
Cucumber	Leaf veins remain green; chlorosis develops between veins; leaf edges become brittle.
Lettuce	Older leaves show chlorosis and later complete yellowing.
Onion	Tips of leaves die; foliage dies prematurely; growth is retarded.
Pea	Leaf-tips are brown and dry; leaves die prematurely.
Potato	Older leaf margins and centers show mottling and chlorosis; later these leaves become necrotic; leaves turn up at margins.
Radish	Older leaves become chlorotic between the veins.
Tomato	Older leaves show interveinal chlorosis and necrosis; leaf margins turn up; stems are slender.

MANGANESE (2 ounces manganese sulfate)

General Symptoms - Predominant symptoms of manganese deficiency include uniform yellowing (brighter than nitrogen) over the entire leaf surface, including veins – not the entire plant, only some leaves. Symptoms can appear on mature leaves or terminal bud. Often they are more clearly identified by their descriptive names, such as gray speck, white streak, dry spot, and yellow disease in spinach and beans.

Variety	Specific Symptoms
Bean	Young leaves become chlorotic, increasing in severity; later leaves turn yellow, drop and the plant dies.
Beet	Chlorosis between leaf veins; growth is erect; red and purple tinting appears on leaves.
Cabbage	Leaves are usually small and yellow.
Celery	Chlorotic marginal bands on leaflets; leaves have olive-green coloring.
Corn	Yellow and green striping the full length of the leaf.
Cucumber	Between leaf veins the color is pale green to yellowish white; veins remain green; leaves are small; blossom buds turn yellow.
Lettuce	Leaves turn pale and become chlorotic, then necrotic.
Potato	Leaves are rolled forward and are chlorotic.
Tomato	Sometimes growth severely stunted; leaves near terminal bud are small, rolled forward; dark-brown spots appear along leaf veins.

MOLYBDENUM (1 ounce sodium molybdate)

General Symptoms - “Whiptail disease” (narrow long leaves with twisted patterns) in cabbage, broccoli, and cauliflower; cracked stem of celery; ruptured cells in leaves of affected plants; missing portions of leaves, either inside or on the edges; loss of living green color; flower drop, and poor fruit crop; death of the terminal bud.

NITROGEN (16 ounces ammonium nitrate or urea)

General Symptoms - Growth erect, becoming stunted; young leaves become a light green color later turning to light yellow; lower leaves turn yellow, scorch and die. Plants are weak, stems are thin & woody. Fruit pointed on blossom end. Yellowing over entire plant, including the leaf veins; weak, spindly plant stems and leaves; death of the older leaves; failure to fruit.

Variety	Specific Symptoms
Red Beets	Growth is erect; older leaves a dark reddish color; young leaves pale green color.
Broccoli	Pale green color, particularly on young leaves; older leaves may show reddish to purple colors and will shed prematurely.
Cabbage	Same as broccoli.
Carrot	Leaves light green color, later turning to yellow.
Cauliflower	Same as broccoli.
Celery	Yellowing of older leaves; later they will wilt.
Corn	Older leaves dry (scorch) at the tips; death of the leaf follows; plants are weak with thin stalks.
Cucumber	Leaves are light yellow to pale yellow; thin woody stems; fruit yellow-green color; fruit pointed blossom end.
Lettuce	Pale green color on leaves; older leaves show "firing" and die.
Onion	Young leaves light-green color; older leaves die; growth pattern upright.
Potato	Young leaves light-green color; leaves yellowish color, later drying up; leaf veins deep purple color.
Radish	Stunted growth; bulbs small, poorly developed; stems weak.
Sweet Potato	Defoliation of lower leaves; leaf color yellowish green with purplish areas; stunted growth.
Tomato	Growth upright; lower leaves turn yellow and die; young leaves light green color; purple veins on under-side; stems are slender.

PHOSPHORUS (8 ounces triple super phosphate or comparable)

General Symptoms - Poor foliage; leaves dull green to purple color; weak slender stems. Leaves small; dark purple color; short leaf stock (petiole). marginal scorch on leaves. red and purple blotches; missing kernels on ears & in pods. Thin, weak, spindly plants; red and purple colors on tops of leaves; purplish blotches on underside of tomato leaves between the leaf veins; poor fruit set and poor fruit quality.

Variety	Specific Symptoms
Beet Leaves	Small; dark purple color; short leaf stock (petiole).

Variety	Specific Symptoms
Broccoli	Underside of leaves show purple near veins; leaves have dull purple color; margins of leaves die.
Cabbage	Same as broccoli.
Carrot	Leaf stalk upright; older leaves die; small leaves are dull-green color with purple.
Celery	Slender leaf stocks; plants hardly grow; rosette crown.
Corn	Tops of mature leaves red and purple blotches; slender stalks; missing kernels on ears.
Cucumber	Thin stems; older leaves dull-green color.
Lettuce	Late maturing; leaves dark green with purple shading.
Onion	Tips of leaves die back; older leaves wilt and die.
Pea	Weak stunted shoots; reduction in leaves with bluish-green color.
Potato	Older leaves fall off; upright spindly growth; tubers may have internal cracks; marginal scorch on leaves.
Radish	Underside of leaves reddish-purple color; stunted growth; poor bulb development.
Tomato	Poor foliage; undersides of leaves purple color; weak slender stems.

POTASSIUM (16 ounces potassium chloride)

General Symptoms – Yellowing then firing (scorching) of leaf edges (ratty-looking appearance); brown, dry blotches within the leaf and between the leaf veins; ragged tears within the leaf; poor quality fruit set; poor root growth; grain stems weaken and filled heads bend downward and later fall to the ground.

Variety	Specific Symptoms
Bean	Leaf margins develop necrotic-brown areas between the veins; leaflets turn downward.
Beet	Leaf surface crinkled and edges turn downward; stems of older leaves have brown spots; roots poorly developed and tend to rot.
Broccoli	Browning of leaf margins, and browning between the leaf veins; curds are soft and poorly developed.
Brussels Sprouts	Same as broccoli.

Variety	Specific Symptoms
Cabbage	Same as broccoli.
Cantaloupe	Lower leaves turn brown and die; fruits split at blossom-end; leaves have yellow necrotic spots near edges.
Carrot	Roots are spindly; growth is poor; leaves are chlorotic and brown.
Cauliflower	Same as broccoli.
Celery	Leaflets curl, turn brown with necrosis; leaf stems are short.
Corn	Leaf tip and marginal scorch; tip end of ears filled with shriveled kernels; weak short stocks; lodging.
Cucumber	Necrosis on leaf margins; young leaves crinkled; fruit very small at stem end.
Lettuce	Dark green leaves; marginal scorch and interveinal scorch on leaves.
Onion	Older leaves turn a slight yellow, wilt, and die; leaf tips die and dry; poor bulbs.
Pea	Firing of margins of older leaves; pods poorly filled and hollow; poor spindly growth.
Potato	Yellowish color on older leaves; later necrosis and browning of leaf-tips and leaf margins; slender stalks with short internodes.
Radish	Center of leaves bluish-green color; leathery leaves and they curl downward.
Tomato	Leaves scorch along margins, later become necrotic; stems are thin; fruit is ill-shaped; fruit ripens unevenly.

SULFUR (8 ounces agriculture-grade sulfur)

General Symptoms – Bleached - creamy white to light yellow color of entire leaf or leaves, including the terminal buds; creamy white color of older leaves; dying terminal buds; older leaves die and fall off.

ZINC (4 ounces zinc sulfate)

General Symptoms - Slow early growth; leaves thicken; leaves tend to curl downward. Flower buds and leaves drop off. Small terminal leaves referred to as "little leaf" in fruit trees; severely reduced fruit-bud formation; small, seedless pods in some vegetable crops; streaks of yellow and long bands of yellow in the leaves of some crops; red firing on orange-yellow leaves with green veins – can be fairly bright colors. Affects younger leaves first.

Variety	Specific Symptoms
Bean	Flower buds and leaves drop off.
Corn	Older leaves have light-yellow streaks or chlorotic stripes between veins; sometimes appearing as broad bands of yellow or white tissue, occurring mainly on the lower half of the leaf and seen when the young leaf comes out of the whirl; tasseling and silking are late.
Pea	Margins of lower leaves become necrotic; stems are erect; no flowers form.
Potato	Grayish-brown spots develop on leaves half-way up the plant.
Tomato	Slow early growth; leaves thicken; leaves tend to curl downward.

Quiz:

For which nutrients does yellow color show if deficiency exists – describe symptom.

Nitrogen	Overall yellowing
Manganese	Yellow, including veins – brighter than nitrogen
Molybdenum	Yellow edges on small leaflets
Zinc	Yellow and orange with green veins
Potassium	Yellowing, followed by scorching or firing of leaf edges
Iron	Yellow with green veins
Magnesium	Bright yellow and/or red, and/or purple, and/or orange