

# Boron Deficiency Symptoms

- Plants initially may not exhibit obvious symptoms of nutrient deficiencies other than a slower growth rate, which may be due to other factors.
- When moderate or severe nutrient deficiencies occur, most crops exhibit visible symptoms which are typical for deficiencies of a particular nutrient.
- Knowledge of boron-deficiency symptoms can help in diagnosing deficiencies.
- Symptoms should be confirmed with results of soil tests and plant analyses, and appropriate corrective action taken.

Visible boron (B) deficiency symptoms for many crops are listed below. Such symptoms become clearly visible when the deficiency is acute. At this point growth and yield may be severely limited. For crops not listed, general B deficiency symptoms include chlorosis, necrosis, and deformations on young leaves and at growing points.

Boron sufficiency ranges in upper mature leaves before flowering or fruiting are provided for many crops. Plant tissue samples with B levels in these ranges are not likely to exhibit visual symptoms. However, tissue levels in this range may not be adequate for maximum yield and quality.

Diagnoses from visible symptoms should be confirmed with results of soil tests and plant tissue analyses.

Vegetable Crops	Visible Symptoms	Boron Sufficiency Range (ppm)
Beet (Red)	External spotting, cracking and canker.	30 - 80
Broccoli	Hollow stems, internal discoloration, brown curds.	25 - 50
Cabbage	Hollow stem, watery areas, heads hollow, plants stunted.	25 - 40
Carrot	Reddening of leaves and root splitting.	32 - 200
Cauliflower	Leaves curled, hollow stem, curds dwarfed, brown.	25 - 50
Celery	Stem cracked and striped brown, heart blackened.	25 - 50
Lettuce	Stunted growth, discoloration of leaves, brittle.	27 - 43
Radish	Pale roots, brittle stems, watery flesh and flecked coloration.	20 - 195
Rutabaga	Roots are tough, fibrous and bitter. Upon cutting, they have soft, watery areas, often called "brown-heart."	38 - 140
Sweet Corn	Short, bent cobs, barren ears, blank stalks, poor kernel development, elongated, watery or transparent stripes later becoming white on newly formed leaves, dead growing points.	10 - 25
Tomato	Thickened leaves, brittle leaves, fruit fails to set.	30 - 100
Turnip	Hollow center or brown heart, watery areas.	25 - 50

Fruit and Nut Crops	Visible Symptoms	Boron Sufficiency Range (ppm)
Almond	Flowers fall and nuts abort or are gummy.	80 - 150
Apple	Pitting, skin discolored, cracking and corking.	25 - 50
Apricot	Twigs die back and fruit fails to set.	20 - 70
Citrus	Thickened ring, gum pockets near axis, discolored patches.	30 - 100
Grape	"Hen & Chick" symptom, dead main shoots.	30 - 50
Pear	Blossom blast, pitting, internal corking and bark cankers.	30 - 50
Pistachio	Fruit set decreases, and blanks and non-split nuts increase.	150 - 190
Strawberry	Pale chlorotic skin of fruit, cracking and dieback.	25 - 50
Walnut	Dieback from shoot tips, leaf fall.	40 - 400

Field Crops	Visible Symptoms	Boron Sufficiency Range (ppm)
Alfalfa	Death of terminal bud, rosetting, yellow top, little flowering and poor pod set.	30 - 80
Canola	Leaves distorted. Blank or partially filled seed heads.	15 - 50
Clover	Poor stands, growth and color. Reduced flowering and seed set. Leaves cupped and shriveled, and become brittle.	20 - 45
Corn (Field and Sweet)	Short, bent cobs, barren ears, blank stalks, poor kernel development, elongated, watery or transparent stripes later becoming white on newly formed leaves, dead growing points.	10 - 25
Cotton	Shedding of squares and young bolls, ruptures at base of squares, dark fluid exuding from ruptures, internal discoloration at base of boll, half-opened bolls, green leaves until frost.	30 - 80
Dry Bean	Interveinal chlorosis of leaves. Bushy appearance.	15 - 50
Peanut	Dark, hollow area in center of nut, called "hollow heart."	25 - 50
Potatoes	Plants have a bushy appearance. Leaves thicken and margins curl upward.	20 - 50
Sorghum	Leaves are narrow and have a gray appearance with watery, transparent stripes. Seed heads are not filled.	7 - 35
Soybean	Yellow leaves, chlorotic between veins, downward curling of leaf tips, crinkling of leaves, dieback of tips, no flowering, roots stunted.	20 - 60
Sugar Beet	Yellowing or drying of leaves, cracking of leaf midrib, brown discoloration of internal tissue, rotting of crown.	30 - 50
Sunflower	Leaves appear wilted. Abnormal head fall due to weak peduncles.	30 - 100
Tobacco	Leaf puckering and deformed buds.	20 - 100
Wheat	Distorted heads and chlorosis of leaves.	10 - 20

For more information:

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