



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 boron 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 boron 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.

Knowledge of boron-deficiency symptoms can help in diagnosing deficiencies

Fruit and Nut Crops	Visible Symptoms	Boron Sufficiency Range (ppm)
Almond	Flowers fall and nuts abort or are gummy	30 - 50
Apple	Pitting, skin discolored, cracking, and corking	28 - 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 and chick” symptom, dead main shoots	25 - 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	20 - 50
Walnut	Dieback from shoot tips, leaf fall	40 - 200

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Crop	Visible Symptoms	Boron Sufficiency Range (ppm)
Field crops		
Alfalfa	Death of terminal bud, rosetting, yellow top, little flowering and poor pod set	30 - 80
Clover	Poor stands, growth, and color; reduced flowering and seed set; cupped, shriveled, brittle leaves	20 - 45
Dry bean	Plants have a bushy appearance, leaves thicken and margins curl upward	15 - 50
Potatoes	Dark, hollow area in center of nut, called "hollow heart"	40 - 70
Sugar beet	Yellowing or drying leaves, cracking leaf midrib, brown discolored internal tissue, rotting crown	25 - 50
Tobacco	Leaf puckering and deformed buds	40 - 100
Grain, fiber, and oilseed crops		
Canola	Leaves distorted, blank or partially filled seed heads	30 - 50
Corn (field and sweet)	Short, bent cobs; barren ears; blank stalks; poor kernel development; elongated, watery, or transparent stripes later become white on newly formed leaves; dead growing points	5 - 25
Cotton	Shedding 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	21 - 80
Peanut	Interveinal chlorosis of leaves, bushy appearance	25 - 50
Sorghum	Narrow, gray leaves with watery, transparent stripes; seed heads are not filled	16 - 140
Soybean	Yellow, crinkled leaves with downward curled tips; chlorotic between veins; no flowering; stunted roots	20 - 50
Sunflower	Leaves appear wilted, abnormal head fall due to weak peduncles	50 - 150
Wheat	Distorted heads and chlorosis of leaves	5 - 20
Vegetable crops		
Beet (red)	External spotting, cracking, and canker	30 - 70
Broccoli	Hollow stems, internal discoloration, brown curds	25 - 50
Cabbage	Hollow stem, watery areas, heads hollow, plants stunted	25 - 50
Carrot	Reddening of leaves and root splitting	25 - 50
Cauliflower	Leaves curled, hollow stem, curds dwarfed, brown	30 - 60
Celery	Stem cracked and striped brown, heart blackened	25 - 50
Lettuce	Stunted growth, discoloration of leaves, brittle	25 - 50
Radish	Pale roots, brittle stems, watery flesh, and flecked coloration	20 - 50
Rutabaga	Tough, fibrous, bitter roots; soft, watery areas, often called "brown-heart" when cut	38 - 140
Corn (sweet)	Short, bent cobs; barren ears; blank stalks; poor kernel development; elongated, watery, or transparent stripes later become white on newly formed leaves, dead growing points	5 - 25
Tomato	Thickened, brittle leaves; fruit fails to set	30 - 100
Turnip	Hollow center or brown heart, watery areas	25 - 50