



## Master Gardeners of Ontario

### DIAGNOSTIC KEY FOR ABIOTIC (CULTURAL/ ENVIRONMENTAL) PROBLEMS OF HERBACEOUS ORNAMENTALS AND VEGETABLES

SYMPTOMS	POSSIBLE CAUSES	CONTROLS/COMMENTS
<b>LEAVES/STEMS</b>		
<b>Leaf Yellowing (Chlorosis)</b>	<p>Normal loss of older leaves (senescence)</p> <p>Nutrient deficiency: potassium, iron, magnesium</p> <p>Early heat and drought</p> <p>Insufficient sunlight and/or excess nitrogen</p> <p>High pH level</p> <p>Early stage of poor soil drainage, excess moisture</p> <p>Soil compacted</p> <p>Damaged roots</p> <p>Air pollution</p>	<p>Normal for bottom leaves to yellow and drop as plant ages.</p> <p>May lead to interveinal leaf yellowing making veins appear greener.</p> <p>Monitor soil moisture level and water deeply when dry.</p> <p>May lead to elongated spindly growth. Do not plant sun loving plants in the shade.</p> <p>Test soil and amend as indicated.</p> <p>Amend soil and/or grading for proper water absorption and run off.</p> <p>May lead to oxygen starvation. Amend and loosen soil.</p> <p>Practice careful cultivation.</p> <p>Speckled upper leaf surfaces and undersides may appear silver.</p>
<b>Pale foliage, yellow and reddish discolouration may occur, oldest leaves affected first, growth stunted</b>	<b>Nitrogen and /or zinc deficiency</b>	<b>Test soil and amend as indicated.</b>

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Leaf yellowing of young terminal leaves that works its way inward	Iron deficiency	Test soil and amend as indicated.
Lower leaf drop, leaves are usually yellow or necrotic (dead), leaf loss noticeable from inside of plant out and bottom up	Over watering Soil compaction Planting too deep Too much mulch	May lead to oxygen starvation. Allow soil to dry out between watering, water less frequently but longer each time. May lead to oxygen starvation. Amend and loosen soil. May lead to oxygen starvation. Raise plant or remove soil from around top of plant. May lead to oxygen starvation. Maximum mulch level is 8 cm.
Foliage appears water soaked and dark green, turning black over time	Frost damage	Cover plants to protect from late frosts when indicated.
Numerous small bumps (blisters) on under sides of leaves or on stems (greenish white swellings or galls)	Oedema: (plant taking up more water than the leaves can lose through evaporation) Excessive humidity, high nutrient regime and low light levels can increase the problem.	Maintain even soil moisture and increase air circulation around plants. Problem usually found on houseplants and in greenhouses.
Tip-necrosis (dead tip) or burn	High temperatures Late frost	Shade plants where possible during extreme heat. Protect tender plants with coverings from frost when indicated.
Lower leaf curling, upward cupping, followed by inward roll	Tomato leaf curl brought on by: Excess moisture Heat stress Excess Nitrogen Transplant shock	Apply mulch to keep even moisture level, do not over water. Can be coping method to conserve water. Test soil and amend as indicated.

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<p>Leaf scorch, browning of leaf edges and/or between the veins</p>	<p>Heat and drought stress</p> <p>Soluble salt damage i.e. de-icing salt, pool draining (chloride)</p> <p>Excessive fertilizer</p> <p>Calcium deficiency</p> <p>Frost damage</p> <p>Compacted soil</p> <p>Roots damaged</p> <p>Planting too deep</p> <p>Too much mulch</p>	<p>Monitor soil moisture level and water deeply when soil is dry.</p> <p>Divert swimming pool water and ice melt runoff away from root zones. Irrigate to reduce salt levels.</p> <p>Irrigate to dilute fertilizer.</p> <p>Especially on lettuce, cabbage, and Brussels sprouts. Have soil tested and amend as indicated. If problem persists, mix small handful of dolomitic limestone with soil under plant at planting time.</p> <p>Cover plants to protect from frost when indicated.</p> <p>May lead to oxygen starvation. Amend and loosen soil carefully around roots.</p> <p>Practice careful planting and cultivation.</p> <p>May lead to oxygen starvation. Raise plants where feasible or remove soil from around top of plants.</p> <p>Maximum mulch height is 8 cm.</p>
<p>Entire plant wilts</p>	<p>Walnut wilt: walnut tree (<i>Juglans</i> spp.) roots contain a chemical that will kill the roots or stunt growth of other plants that come in contact with the walnut tree roots.</p> <p>Severe drought</p> <p>Soil compaction</p>	<p>Do not plant within range of walnut tree roots.</p> <p>Monitor soil moisture and water deeply when soil is dry.</p> <p>May lead to oxygen starvation. Amend and loosen soil.</p>
<p>Plants fall over/ branches break/ stems split</p>	<p>Species characteristic</p> <p>Wind, rain and hail damage</p> <p>Mature plants, heavy fruit load</p> <p>Excessive water</p>	<p>Stake and support tall plants. Peppers are especially prone to branch-breaking. Keep plants picked, pruned and supported.</p> <p>Plants take up more water than the leaves can lose through evaporation.</p>
<p>Foliage of tender perennials blackened and stems usually collapsed</p>	<p>First frost of autumn</p>	<p>Cover plants to protect from frost when indicated to prolong fall flowering plants.</p>
<p><b>FLOWERS AND FRUITS</b></p>		

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<p>Flower stalk forms/ plant "goes to seed"</p>	<p><b>Drought stress</b>  <b>Heat stress</b>  <b>Cold temperatures:</b>  exposure of spring-planted biennials (broccoli, lettuce, parsley) to environmental stress.</p> <p><b>Excessive sunlight:</b> short day plants (spinach) "bolt" when days get longer.</p>	<p>Use mulches to maintain even soil moisture.</p> <p>Fall-planted broccoli often yields better results.  Use a floating row cover over early biennial crops. Remember to remove floating row cover when plants flower to enable pollination.  Select short season, stress tolerant cultivars. Use "slow bolting" varieties.  Plant earlier in the spring. Use a shade cloth.</p>
<p>Failure to flower, blossom drop</p>	<p><b>Winter damage to perennials</b>  <b>Planted too late:</b> season insufficiently long.  <b>High and low temperatures:</b> continuous cloudy weather.  <b>Drought stress or excessive water</b></p> <p><b>Insufficient sunlight:</b> plants spaced too closely.  <b>Excessive nitrogen</b></p> <p><b>Insufficient pollination:</b> due to lack of insect pollinators (especially on plants with separate male and female flowers).</p>	<p>Protect overwintering crowns with thick mulch.  Plant earlier to ensure establishment.  Overhead watering, shading may help on very hot days.  Monitor soil moisture, water evenly as needed; apply mulch to maintain even moisture levels.  Maintain proper plant spacing.</p> <p>Unusually tall, lush plants. Test soil and amend as indicated.  Avoid spraying any kind of insecticide, particularly in the morning when bees are active.</p>
<p>Failure to fruit, fruit drop</p>	<p><b>High and low temperatures:</b> kills pollen, inhibits fertilization, and causes flowers to abort.  <b>Drought stress or excessive water</b></p> <p><b>Insufficient sunlight:</b> plants spaced too closely.  <b>Excessive nitrogen</b></p> <p><b>Insufficient pollination:</b> due to lack of insect pollinators (especially on plants with separate male and female flowers).</p>	<p>Overhead watering, shading may help on very hot days.</p> <p>Monitor soil moisture, water evenly as needed, apply mulch to maintain even moisture levels.</p> <p>Unusually tall, lush plants. Test soil and amend as indicated.  Avoid spraying any kind of insecticide, particularly when plants are blooming.</p>

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Spots/rots on fruit	Frost or freeze damage Heat stress	Fruit becomes soft. Due to high summer temperatures during fruit growth and harvest.
Large discoloured areas on fruit skin	<b>Blossom-end rot:</b> dark, leathery, sunken areas on blossom-end of peppers, tomatoes, squash, etc. caused by a temporary calcium deficiency, and uneven soil moisture. <b>Sunscald:</b> yellow or pale, wrinkled, sunken areas on fruit exposed to full sun.	Keep plants well-watered and mulched. Check soil pH and amend as indicated. Mix a handful of dolomitic limestone into each planting hole in spring. Avoid high Nitrogen fertilizers. Occurs when plants become defoliated.
Internal dis-colouration of edible plant parts	<b>Calcium, magnesium and boron deficiencies:</b> promotes grey wall in tomato, hollow heart of celery, broccoli and cauliflower, head breakdown of broccoli.  <b>Extreme heat and/or high humidity</b> <b>Fluctuating temperatures</b> <b>Shade: overcast skies during hot weather/ overly wet soil</b>  <b>Excessive foliage on tomato</b>  <b>Excess nitrogen on tomato</b>	Test soil for these nutrients and amend as indicated. Boron is less available in sandy, acidic soils. Incorporate 90-105 ml of borax each year per 100 m <sup>2</sup> of garden area. Test and amend soil to maintain proper pH level. Occurs more frequently on light soils. Physiological responses to unfavourable weather conditions.  Remove leaves above tomato, careful to avoid sunscald. Use balanced tomato fertilizer.
Green areas on edible plant parts	<b>Green shoulder on tomato</b>  <b>Green shoulder of carrot, potato and onion:</b> due to sun exposure (chlorophyll production).	Varietal problem that occurs on large-fruited varieties in dense plantings. Keep soil hilled over edible plant parts.
Failure to ripen, uneven ripening	Cold temperatures, insufficient ripening time. Different variety characteristics.	Late season problem. Associated with short days, low sunlight, and crowded plants. More severe on large-fruited tomato varieties.
Seeds germinating inside fruit	<b>Precocious germination:</b> breakdown or absence of germination inhibitors in fleshy fruits.	May occur in late season fruit.

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Cracking	<p><b>Excessive nitrogen</b></p> <p><b>Excessive moisture:</b>causes head splitting in cabbage, and radial and concentric cracking of tomatoes and other vegetables.</p> <p><b>Different variety characteristics</b></p>	<p>Avoid high nitrogen fertilizers; maintain even growth rate.</p> <p>Use mulches to maintain even soil moisture.</p> <p>Large-fruited tomato fruits more susceptible.</p> <p>.</p>
Misshapen/ hollow fruits	<p><b>Cold temperatures:</b>before and during bloom, causes "catfacing"(scarring and cavities on blossom end) in tomatoes.</p> <p><b>Poor pollination:</b>causes puffiness of tomatoes and malformed cucurbit fruits.</p> <p><b>Boron deficiency:</b> in celery (hollow heart) and cabbage.</p>	<p>Harden-off tomato plants and set them out after frost-free date. Exacerbated by very high or low temperatures and insufficient sunlight.</p> <p>Boron is less available in sandy, acidic soils.</p> <p>Amend soil to maintain proper pH. Incorporate 90-105 ml of borax each year per 100 m<sup>2</sup> of garden area.</p>
Misshapen/ hollowed/ forked tubers and roots	<p><b>Alternate wet and dry conditions:</b>causes knobiness, cracking and cavities in potatoes, turnips, etc.</p> <p><b>Rocky or heavy clay soils</b></p> <p><b>Fresh manure applied to soil</b></p> <p><b>Over-crowded seedlings</b></p>	<p>Use mulches to maintain even soil moisture.</p> <p>Prepare deep, friable seedbed.</p> <p>Use fully rotted, composted manure, apply in fall.</p> <p>Thin to appropriate spacing.</p>
Woody or tough edible plant parts	Hot, dry weather, over-maturity	<p>Brassicas and leafy greens need a continuous source of water and nutrients for optimum growth and succulence.</p> <p>Select varieties appropriate for the particular season.</p>

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<p><b>Off-flavours, hot flavours</b></p>	<p><b>Cold weather, excessive moisture:</b> causes fruits to be watery and tasteless.</p> <p><b>Hot, dry weather:</b> makes radishes hot, cucumbers bitter and increases chili pepper pungency.</p> <p><b>Acidic soil</b></p> <p><b>Excessive nitrogen</b></p> <p><b>Over-mature or immature fruits</b></p> <p><b>Varietal characteristic</b></p> <p><b>Overcrowding, weed competition</b></p>	<p>October-harvested tomatoes and muskmelons grown under wet conditions are often poorly flavoured. Maintain adequate irrigation.</p> <p>Adjust pH.</p> <p>Avoid high-nitrogen fertilizers.</p> <p>Harvest at proper time.</p> <p>May also result from mislabeled varieties.</p> <p>Thin to appropriate spacing and keep plants mulched.</p>