

Soil Test Standards for Potted Plants and Annuals

NUTRIENT	SPURWAY		SATURATED PASTE	
	Optimal	Excessive/ Toxic	Optimal	Excessive/ Toxic
pH	6.2 - 6.5	>7.5	6.2 - 6.5	>7.5
Electrical Conductivity	120 - 180	>200	2.0 - 4.0	>8.0
Nitrate (NO₃)	150 - 180	>300	100 - 199	>300
Ammonium (NH₄)	2.0 - 8.0	>15	2.0 - 10	>20
Phosphorus (P)	5.0 - 10	>50	10 - 15	>40
Potassium (K)	50 - 60	>100	150 - 250	>350
Calcium (Ca)	120- 180	>200	200 - 300	>500
Magnesium (Mg)	40 - 60	>75	50 - 125	>175
Sodium (Na)	N/A	>70	N/A	N/A
Iron (Fe)	0.25 - 0.50	>3.0	0.3 - 3.0	N/A
Manganese (Mn)	0.25 - 0.50	>3.0	0.3 - 3.0	N/A
Zinc (Zn)	0.25 - 0.50	>3.0	0.3 - 3.0	N/A
Copper (Cu)	N/A	>3.0	0.1 - 0.5	N/A
Molybdenum (Mo)	N/A	N/A	0.01 - 0.1	N/A
Boron (B)	0.25 - 0.50	>1.0	0.1 - 0.5	N/A

Most Common Problems

High pH- High pH is usually expressed first by inducing iron deficiency which is expressed as yellowing between the veins of the uppermost foliage. Plants that show high pH induced iron deficiency first include pansy, petunia, primula, snapdragon, and vinca. High pH problems can be solved/avoided by the following:

- Irrigation water contains bicarbonates (CO₃) that increase media pH over time. Ideally, irrigation water alkalinity (a measure of CO₃ levels) should be adjusted to 120 (potted plants) or 80 meq (plugs). We decrease water alkalinity (often 100-450 meq) by adding acid. Call to calculate how much acid you need.

- If pH is already high, reduce pH by applying a one-time phosphoric acid (3.5 ounces 75-85% phosphoric acid/100 gallons water) or sulfuric acid (1.8 ounces sulfuric acid/100 gallons water) drench.

High Soluble Salts/Electrical Conductivity- Symptoms of high salts include burning of root tips, wilting on sunny days even though media is moist, and browning of lower leaf edges. Plants that show high salt symptoms first include pansy, snapdragon, cineraria, and vinca. High salts result from applying excessive fertilizer or not leaching media periodically. Reduce salt levels by leaching (approx. 10-15 min.) and reducing fertilizer application. If root tips are burned, drench with a fungicide to control *Pythium* and *Rhizoctonia*.

Calcium Deficiency- Early symptoms of calcium deficiency include young leaf distortion, yellowing or whitening of upper leaves, upper leaf edge burn. Plants that express calcium deficiency early include pansy, and seed geraniums. Eliminate calcium deficiency by increasing calcium (calcium nitrate) in the fertilizer regime, spray calcium nitrate (2 ounces CaNO₃/ 10 gallons) on foliage or overhead water with a fertilizer containing calcium and/or reduce humidity. Avoid using calcium deficient fertilizers when you have low water alkalinity.

Magnesium Deficiency- Early symptoms of magnesium deficiency include lower leaf interveinal chlorosis (yellowing between the veins). Drench plants with epsom salts (8 ounces epsom salts/100 gallons water= 1teaspoon/ gallon water) monthly. Alternatively, start using a fertilizer blend that contains magnesium.

Boron Deficiency- Early symptoms include young leaf distortion and/or yellowing and stunting of growth. Plants that express boron deficiency early include pansy, petunia, cyclamen and New Guinea impatiens. Overcome boron deficiency by overhead watering with a fertilizer that includes boron and/or drenching with soluble trace element mix (S.T.E.M.; 2 ounces/ 100 gallons).

Ammonium Toxicity- Symptoms of ammonium toxicity includes reduced growth, yellowing along leaf margins, and reduced root growth. Plants that show ammonium toxicity early include salvia, snapdragon and vinca. Overcome ammonium toxicity by leaching, not applying ammonium based fertilizers, and increasing temperature. Avoid ammonium toxicity by not fertilizing with ammonium nitrate/urea from October to March.