

Master Gardener Catalog of Soil Problems

S. Pettygrove Jan. 2006, University of California Davis

Symptom or Observed Problem	Cause or diagnostic confirmation	Preventative or Corrective Action
Problems related mainly to water or air movement or root penetration		
1 Hard to till -- sticky when wet, hard when dry	High clay content, low SOM, compaction, "fifteen minute soil"	Till at just the right moisture content; multi-stage tillage; careful not to compact;
2 Crust inhibits seedling emergence	Low aggregate stability, water drop impact makes crust; too low salinity, high sodium	Mulch to prevent; light tillage to break up sprinkler crust; green manure; in some cases gypsum is needed;
3 Poor plant root development and penetration of soil	Hardpan; Saturated layer/poor aeration; compaction	Backhoe; deep tillage; adapted vegetation;
4 Erodes easily	Sloping land; Unprotected soil surface with low organic matter content	Mulch; control tillage; don't leave the soil bare; don't till in way that destroys surface aggregation; control water flow on landscape; conservation measures.
5 Droughty -- dries out quickly	Sandy texture, shallow rootzone, or both; low soil organic matter	Frequent, small irrigations; tillage to deepen rootzone ("profile modification")
6 Won't take water -- poor surface water penetration, excessive runoff	Weak aggregate stability, low salt, high sodium, compaction (several different causes); or could be clay soil already saturated.	Gypsum (if excess sodium problem). Mulch, OM additions with shallow incorporation. Irrigation timing. Control rate of irrigation.
7 Slow internal water movement	High clay content, low SOM, restricting layer	Make big pores -- cover crop, OM additions. Careful with irrigation set & frequency
8 Poor lateral movement of water during furrow/basin irrigation	Sand texture with rapid infiltration	Use sprinklers, drip with multiple emitters rather than furrow, small basin or single emitter. Irrigate lighter but more frequently.
9 Slow to drain, stays saturated after rain or irrigation	Clay in subsoil, restricting layer, regionally poor drainage, look for redoximorphic features (streaks, mottle, gley)	Install drain tile; raised beds; careful with irrigation timing/amount; adaptive plant species selection
10 Root rot, phytophthora	High water table, overirrigation, poor drainage	See #9 (Slow to drain)
11 Infertile, runs out of nutrients even though fertilized	Sandy soil, low SOM, shallow soil	Amend with several types of organic inputs; high nutrient (e.g., broiler litter), stable compost, cover cropping. Establish consistent irrigation.
12 Gravel, stones	Natural feature; or erosion has exposed stony subsoil	Adaptive landscaping; spot treatment with compost; Establish consistent irrigation.
Problems related mainly to soil chemistry		
1 Plant leaf burn, plants grow slowly	Saline irrigation water, saline soil. Possibly poor sub-surface drainage. Fertilizer burn; Inadequate irrigation;	Leaching and irrigation management, salt tolerant vegetation, make sure drainage is adequate, use irrigation water with lower salinity.
2 Acid-loving plants grow slowly, show leaf burn, chlorosis	High (alkaline) pH, excessive chloride, salinity	Leaching (also check drainage); use lower salt content water; check metal micronutrients; Lower pH with sulfur.
3 Poor root growth, leaf chlorosis in strongly acid soils	Aluminum toxicity (pH<4.5 plus naturally high Al levels)	Correct pH using liming materials.
4 Nutrient deficiencies (phosphorus)	Soil pH less than 6.0 or greater than 8.0	Correct pH using appropriate amendments.
5 Nutrient deficiencies (iron, zinc, copper, manganese)	Soil pH greater than ~8.0, lime in soil (calcareous soil); Has soil been leveled? (Cut and fill)	Fertilize with micronutrients if needed -- directly apply to plants. Use acidifying soil amendments
6 Nutrient deficiencies (nitrogen)	Acid pH (pH<5.5), low SOM, heavy cropping without replenishing N	Correct rate and timing of N; add carbon to soil; leguminous cover crop; correct pH
7 Leaf burn on canefruit, walnuts, tomatoes, beans, etc.	If not salinity, check for excessive boron (B) in soil/irrigation water. Tends to be a regional problem; soil test info	Select B tolerant plants. Switch to low B irrigation water; long term - leach B from soil.