

Master Gardener Catalog of Soil Problems

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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.