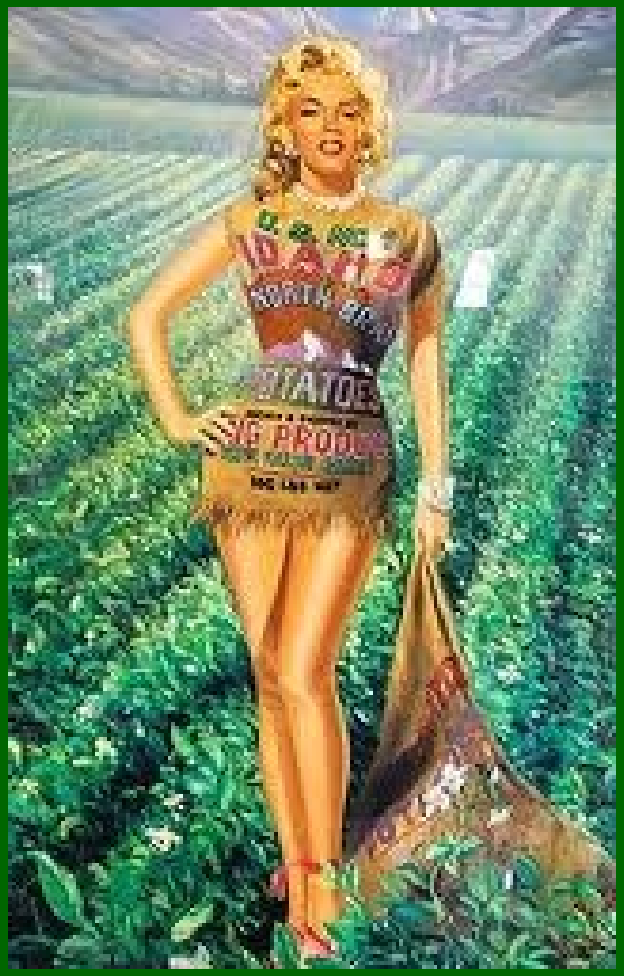
Advertisers once used the theme, "You can never be too rich or too famous!"



Taking a cue from that theme, I've come up with this garden phrase

"Your soil can never be too rich or too good"

Most gardeners are plagued with soil problems of one sort or another

Soil is too sandy or rocky and drains too quickly

Clay soil is hard to work, does not drain well or let oxygen to the roots

Soil improvement is critical because few gardens have perfect soil

One technique, long used by farmers, is a green manure crop

- Green manures are grown to be tilled into the soil while they are still green to improve organic matter
- Green manure helps sustain soil-improving organisms and eventually builds the soil humus

Organic matter creates a rich soil, but it is temporary

- Earthworms, fungi and other soil creatures are always breaking it down
- Because fewer sources of organic matter are now available, planting these crops is an easy way to add organic matter

One benefit of green manures is weed prevention

- Weeds invade if nothing else is growing
- Dense shade from a desirable crop prevents seed germination and controls erosion

Water and wind remove precious topsoil and makes soils less productive

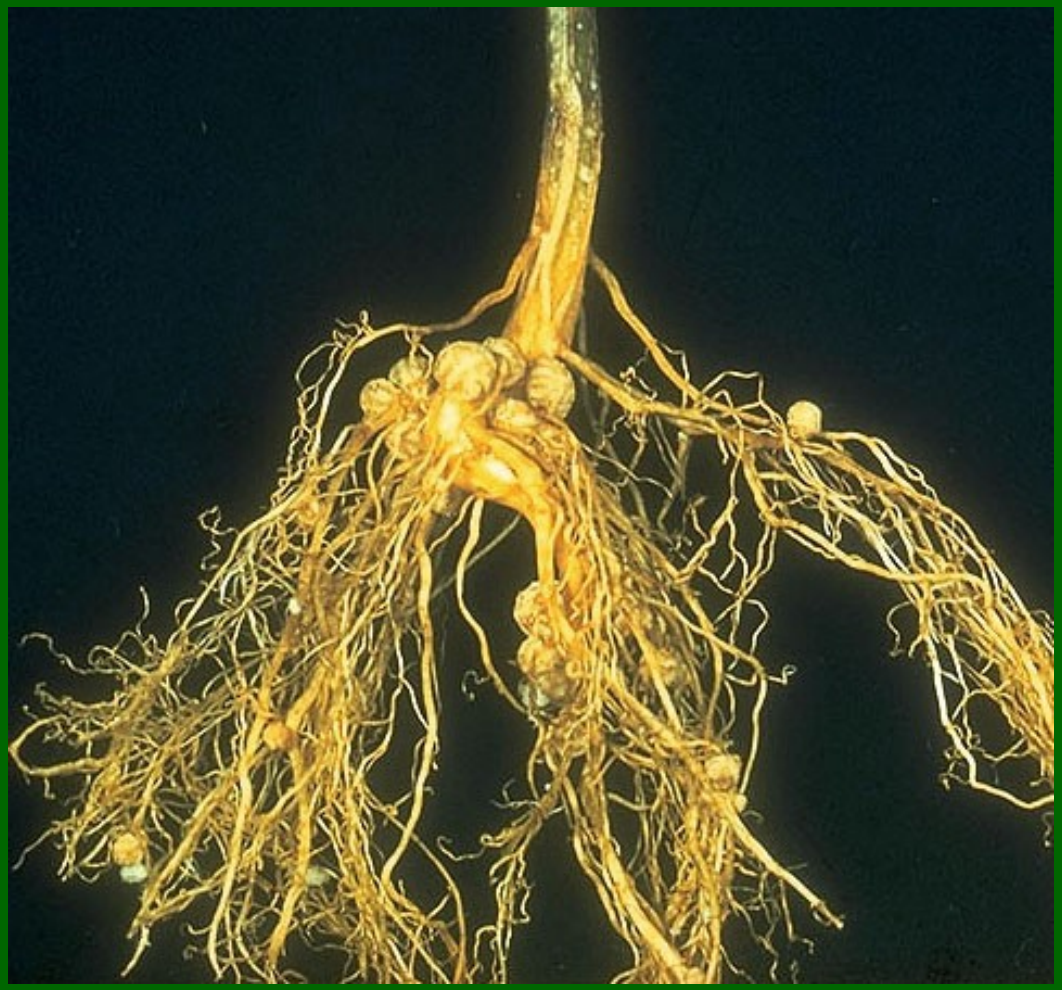
- If you notice dust on snowdrifts in winter, that dust is your topsoil!
- Conservation tillage is promoted in agriculture, and it is just as valuable for your soil

Keep soil in place by leaving crop residue on the soil surface

Some green manure crops provide additional fertilizer

- Legumes, such as peas and beans, take the nitrogen from the air and fix it into their roots
- Rotation with legumes was used extensively before the advent of synthetic fertilizers

These crops replace valuable nitrogen lost from the soil



Green manures provide substantial organic matter

- The crop is not removed, so the entire plant improves the soils
- Growing plants, along with proper addition of essential nutrients, is one of the best methods of soil improvement

It is a misconception that soils are ruined by growing plants

Grasses for planting in the fall include

- Cereal rye
- Spring wheat
- Barley
- Annual rye grass
- Plant these in areas where vegetable crops have been harvested

Do not plant perennial rye grass as it comes back year after year

Cereal rye is the grain from which rye bread is made

- Plant it in the fall and it will be ready to till in prior to planting next spring

Peas make an excellent cover crop

- Adventurous gardeners may try planting peas later in the fall - if they don't get too large they will be off to a good start next spring Harvest the peas very early and till the vines back in

Plant Austrian or snow peas to produce plants to improve your soil next year

Beans work best as a warm-weather cover crop

- Instead of planting them in long, straight rows, scatter them across the soil, harvest the beans and then till them under

Buckwheat is an interesting, though unusual, plant

- Buckwheat is best planted in warm weather for tilling in the summer or fall

It takes a good rototiller or shred the stalks before tilling them under

One problem with green manure crops comes to gardeners who procrastinate

Green manure crops must be tilled in prior to the time the plant goes to seed

If allowed to go to seed, they create a weed problem in subsequent years

Most of us will never be too rich or too thin, but we can improve our soil

- Planting green manure crops is often easier and less smelly than applying the other "green manure"

Green Manure and Cover Crops

Fava Bean

Radish and Turnip
(Oriental and fodder)

Rye (cereal)

Ryegrass (Annual)

Wheat (winter)

Peas

$2.39
Heirloom
FERRY MORSE
The Hand That Seeds The World
Varieties
42 G
PEAS
Melting Sugar
(Snow Peas)
GUARANTEED TO GROW

Barley (fall)

Beans

Hairy and other Vetches

Sweet Clover

Sudan grass/Sorghum

Buckwheat

Amending the Physical Properties of Soils

by
Larry Sagers
Horticulture Specialist
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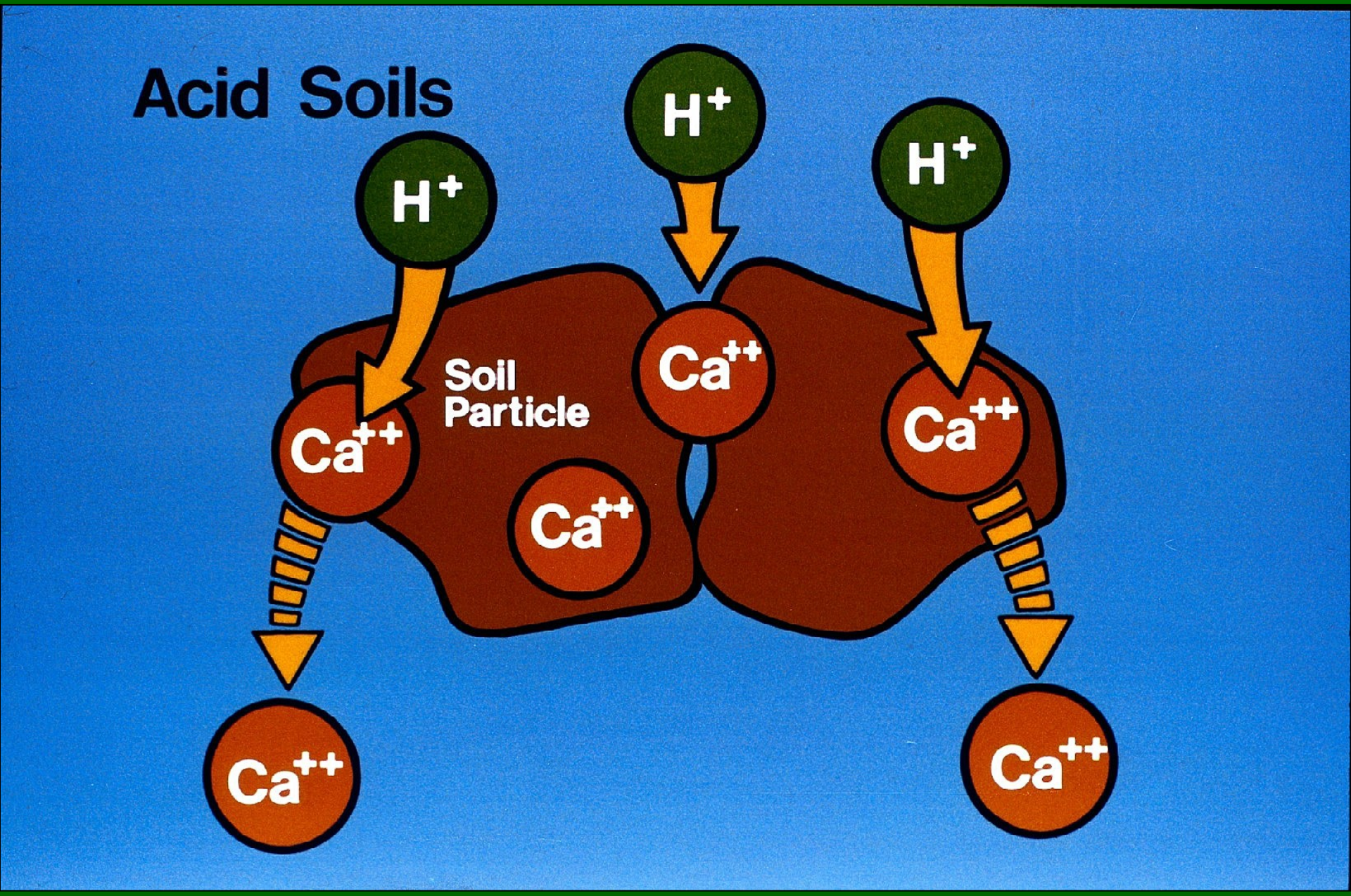
Need for Physical Soil Amendments... To Improve .....

- Permeability
- Water Retention
- Aeration
- Root Growth

Soil Physical Properties

Soil Texture	Permeability	Water Retention
Sand	High	Low
Loam	Medium	Medium
Silt	Low	High
Clay	Low	High


Acid Soils
H+
H+
H+
Soil Particle
Ca++
Ca++
Ca++
Ca++
Ca++
Ca++

Longevity of Amendments
Decomposition Rates

Grass Clippings Manures Mushroom Compost	Rapid... Days to Weeks
Leaf Mold Composts Humus-Type Compost	Up to About Six Months or More
Rice Hulls Redwood Fir Bark Cedar Cypress	Longer Lasting... Possibly for Years

Types of Physical Soil Amendments

ORGANIC
Derived from Living Sources

INORGANIC
Derived from Mineral Sources

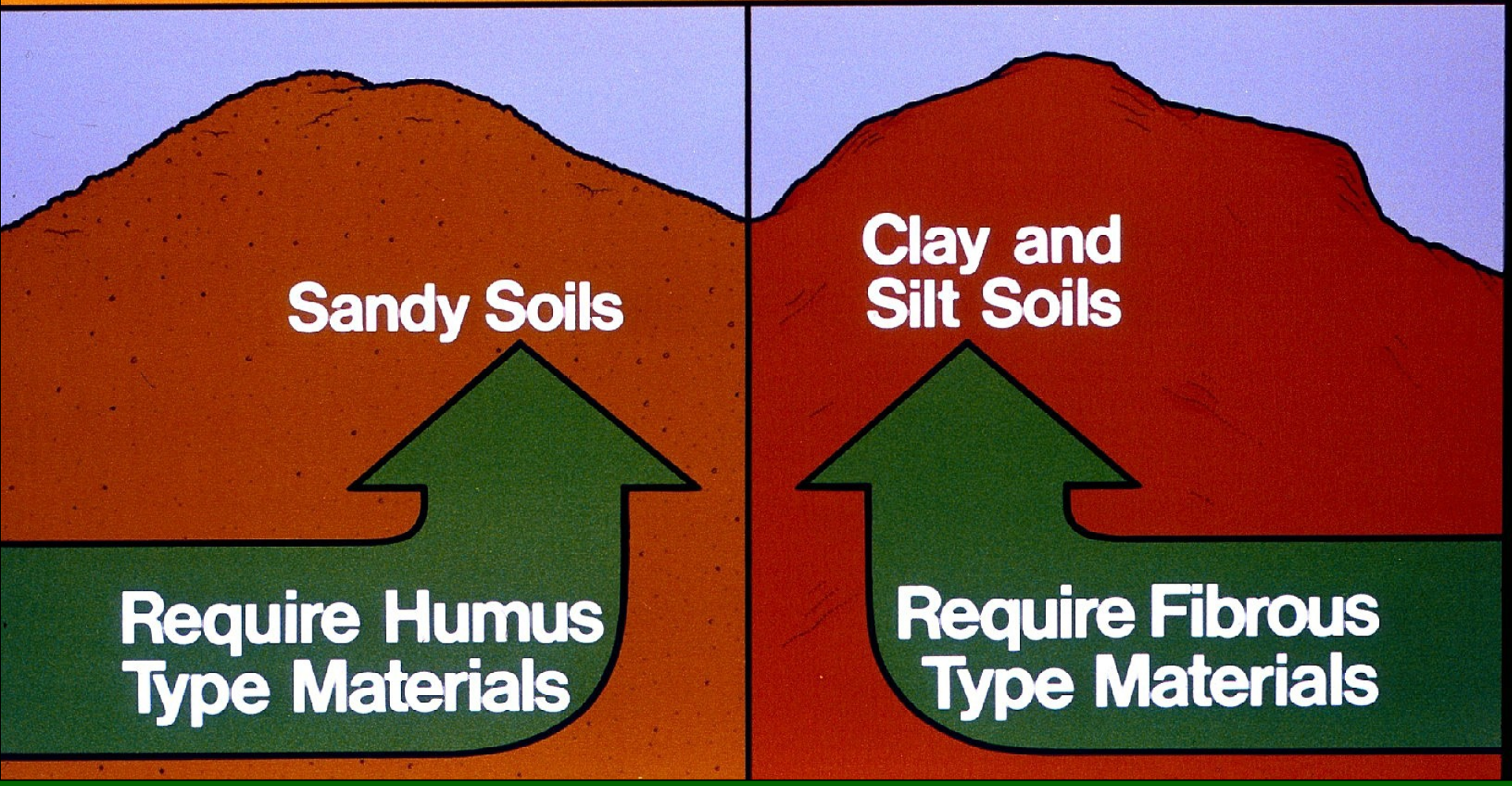
Organic Amendments

- Peat
- Moss Peat
- Fibrous Peat
- Wood Sawdust
- Ground Fir Bark
- Composts
- Shredded Rice Hulls
- Rotted Manures
- Digested Sludges
- Composted Sludges

Inorganic Amendments

- Calcined Clay
- Pumice
- Vermiculite
- Perlite
- Sand

Selecting Physical Soil Amendments for Varying Soil Conditions



Soil-Amending Properties of Some Materials

	Amendment	Permeability	Water Retention
Fibrous	Peat	Low-Medium	Very High
	Wood residues	High	Low-Medium
	Ground fir barks	High	Low-Medium
	Rice hulls	High	Low-Medium
Non-Fibrous or Humus	Composts	Low-Medium	Medium-High
	Rotted manures	Low-Medium	Medium
	Composted sludges	Low	High
Inorganic	Calcined clay	High	High
	Pumice	High	Low-Medium
	Vermiculite	High	High
	Perlite	High	Low
	Sand	High	Low

Determining Quantities of Organic Amendments

Soil Texture	Percent of Amendment
Sand	35
Loamy Sand Sandy Loam	30
Sandy Clay Loam Sandy Clay Loam	25
Silt Loam Silty Clay Loam Clay Loam	30
Silt Silty Clay Clay	35

Determining Volume of Soil Amendments to Add for Various Depths of Treatment (Cubic Yards per 1000 Square Feet)

Percent of Amendment	Depth of Amended Soil in Inches		
	3 in.	4 in.	5 in.
1	0.09	0.12	0.15
3	0.28	0.37	0.46
5	0.46	0.61	0.77
10	0.93	1.23	1.54
20	1.85	2.47	3.09
30	2.78	3.70	4.64

Determining Volume of Soil Amendments Required to Amend Backfill Soils by 33% or 50% (Cubic Feet per Hole)

Hole Size W=Width D=Depth	Container Size							
	1 Gal.		5 Gal.		24 in.		36 in.	
	33%	50%	33%	50%	33%	50%	33%	50%
2W, D	0.1	0.2	0.8	1.2	6.7	10	23	34
2W, D+½ft.	0.3	0.5	1.3	2.0	9.2	14	28	43
2W, D+1ft.	0.4	0.6	1.8	2.7	12.0	17	34	51
2W, 2D	0.3	0.5	1.8	2.7	16.0	24	53	80

Container Mixes

Greenhouse or Foliage Plant Mix

33% Sand

33% Peat Moss

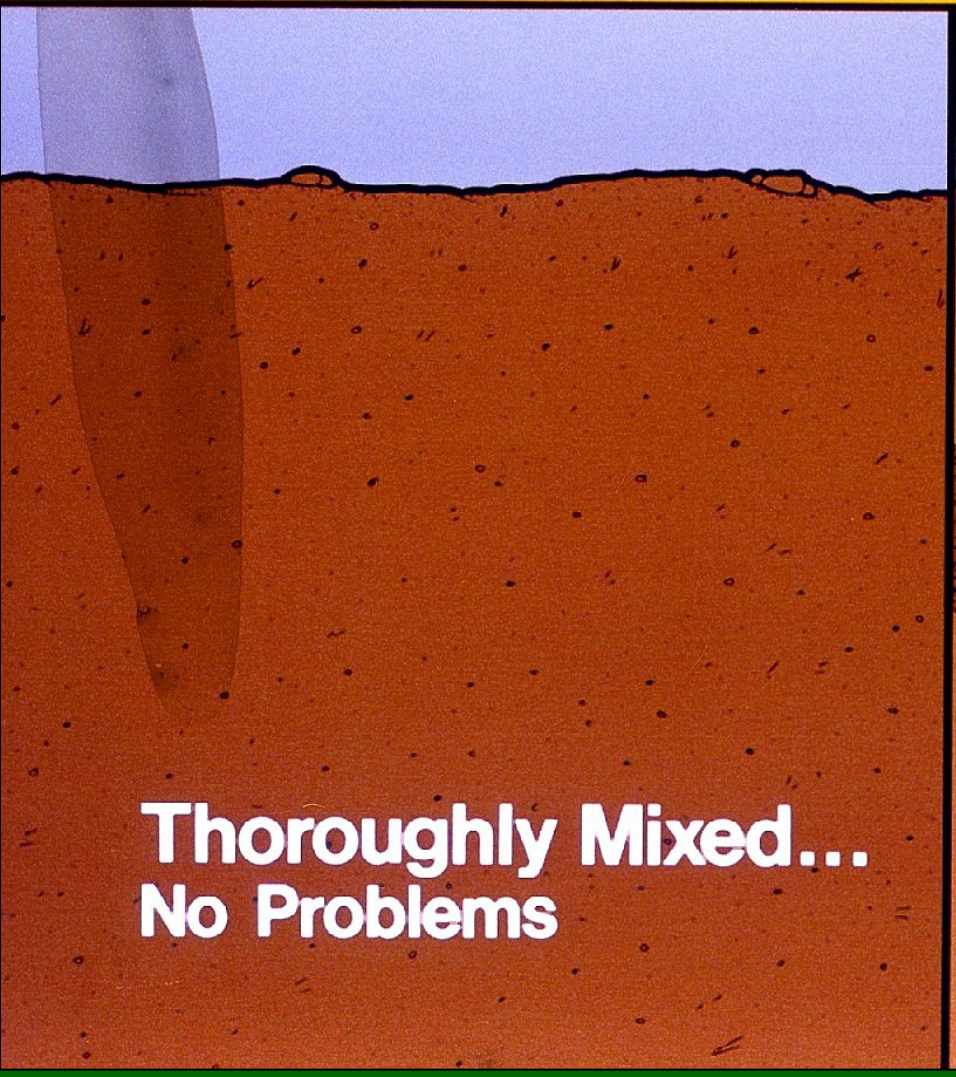
33% Redwood or Perlite

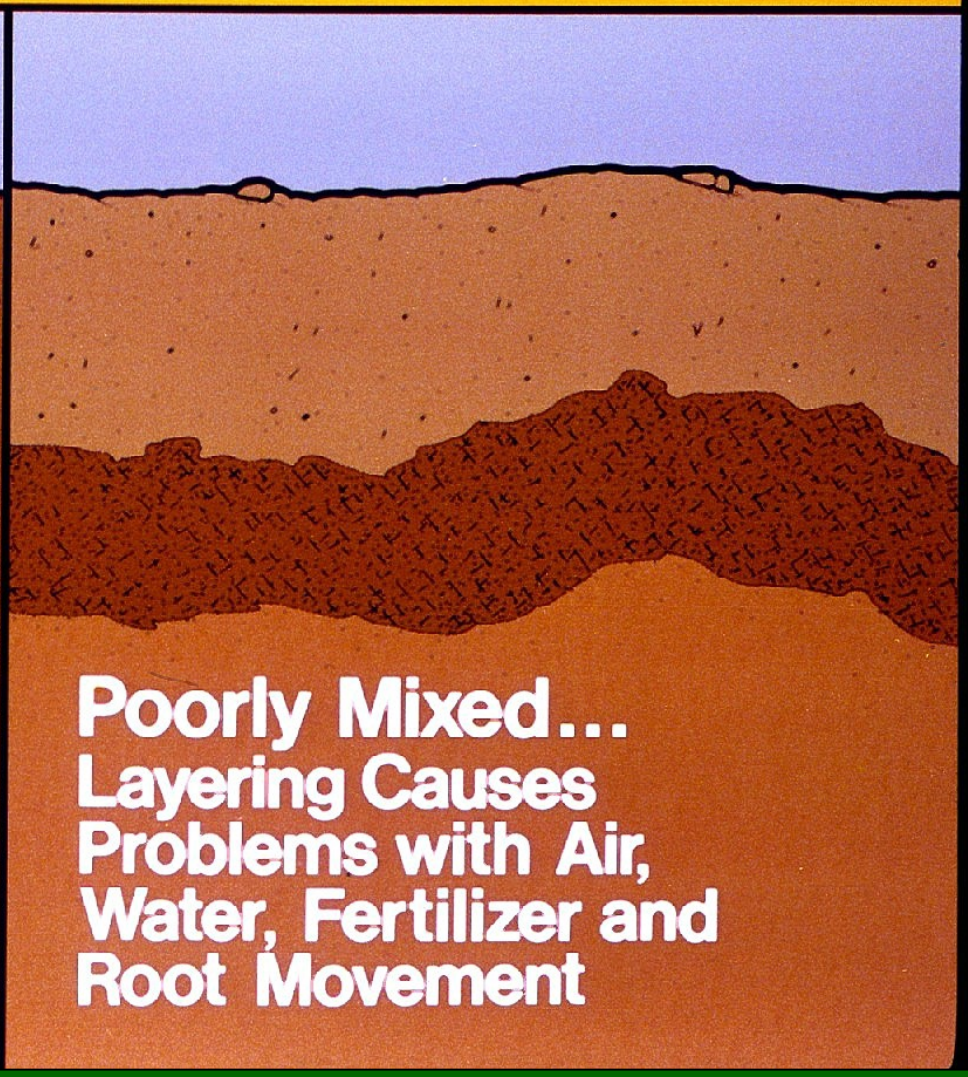
+

Per each cubic yd. add:

- 2 lbs. Single Superphosphate
- 4 oz. Potassium Sulfate
- 4 oz. Potassium Nitrate
- 5 lbs. Hoof and Horn Meal or Blood Meal

Incorporation of Soil Amendments





Mulches

- Protect Against Soil Erosion
- Protect Roots from Heat, Cold and Drought
- Keep Fruit Clean
- Provide Uniform Seed Germination, and Plant Establishment
- Retain Soil Moisture

Mulch Materials

- Straw
- Plastic
- Bark
- Chips
- Sludge
- Fibrous Materials

Volume of Materials Required for Mulching or Top Dressing

Depth (in.)	Approximate Volumes of Material	
	Per 1,000 Sq. Ft. (cu. ft.)	Per Acre (cu. yds.)
1/8	10	16
1/4	20	32
3/8	30	48
1/2	40	64
5/8	50	80
3/4	60	96
7/8	70	112
1	80	128

http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=3&tax_subject=279&topic_id=1468&level3_id=6746&level4_id=0&level5_id=0&placement_default=0