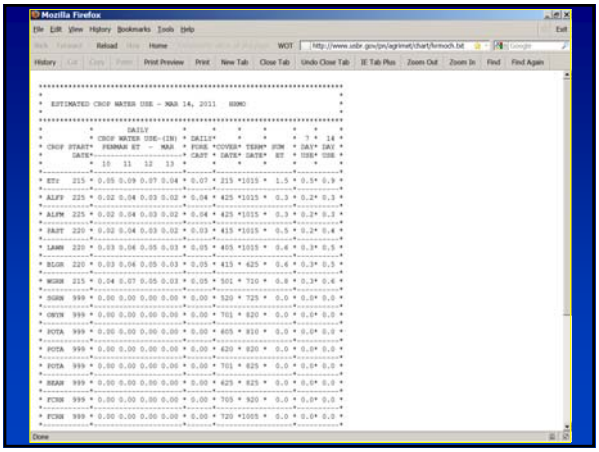
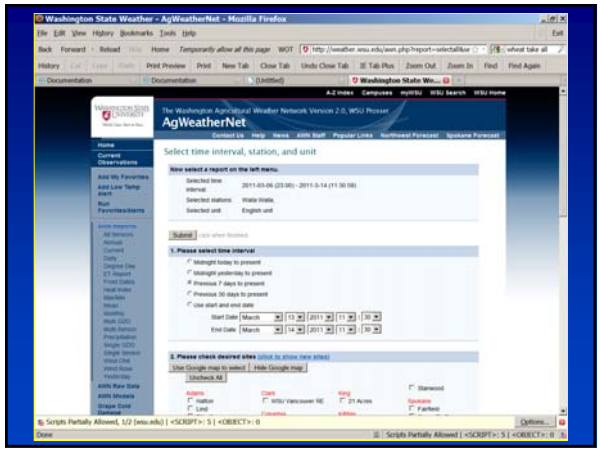
Watering

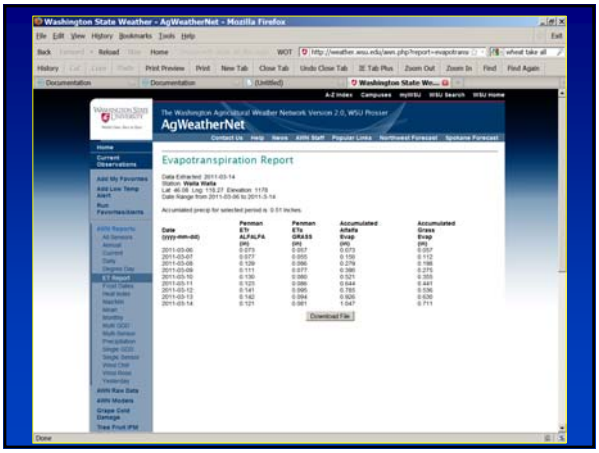
www.usbr.gov/pn/agrimet/chart/hrmoch.txt

ESTIMATED CROP WATER USE - MAR 9, 2011 HRMO

CROP	START DATE	DAILY CROP WATER USE-(IN) PENMAN ET MAR 5	6	7	8	DAILY FORE CAST	COVER DATE	TERM DATE	SUM ET	7 DAY USE	14 DAY USE
Etr	215	0.07	0.07	0.08	0.09	0.08	215	1015	1.2	0.5	0.8







Watering

sandy loam: 1.75"/foot available, water at 40% depletion
so (2' depth)(1.75"/ft)(0.4) = 1.4"
daily use = 0.4", water every 3 days
daily use = 0.25", water every 5-6 days

silt loam: 2.5"/foot available, water at 40% depletion
so (2' depth)(2.5"/ft)(0.4) = 2.0"
daily use = 0.4", water every 5 days
daily use = 0.25", water every 8 days

Watering

Heavier soils hold more water, so water less frequently?

But slower infiltration rate, so if surface run-off or puddling,
water more often, applying less water/irrigation

Most common irrigation method: overhead sprinkler
wind drift

Most efficient irrigation method: drip
conserves water & energy
dry row middles (easier to work & reduced weeds)
dry foliage (less disease, increased efficacy of applied pesticides)
water & fertilizer under mulch

Watering

Crop rooting depths w/ideal conditions

Reduce w/shallow soils, hardpans, transplants (no tap root)

1-2': broccoli, cabbage, celery, sweet corn, potato, onion, radish, sweet corn

1-4': beans, carrots, cucumber, eggplant, peas, pepper, summer squash

1-6': asparagus, cantaloupe, pumpkin, tomato, watermelon

Watering

Other methods: soaker hose
uneven watering w/longer hose

Other methods: furrow or flood
very inefficient
uneven watering w/long rows

Measurement:
sprinkler: tuna can
others: trowel or shovel after irrigating
depth by crop rooting, size

Watering

Avoid

Frequent shallow watering, except seedlings
promotes shallow root depth

Overwatering
"drowns" roots (no oxygen)
leaches nutrients

Delaying watering until plants are stressed
dark bluish green or wilting
once stressed, never fully recover

Common Problems Frequently Observed

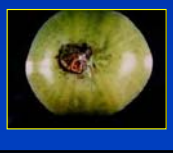
Sunscald

Poor pollination

Radial & Concentric Cracking

Cat Facing

Blossom-end Rot



Rhizoctonia

Gray Wall or Blotchy Ripening

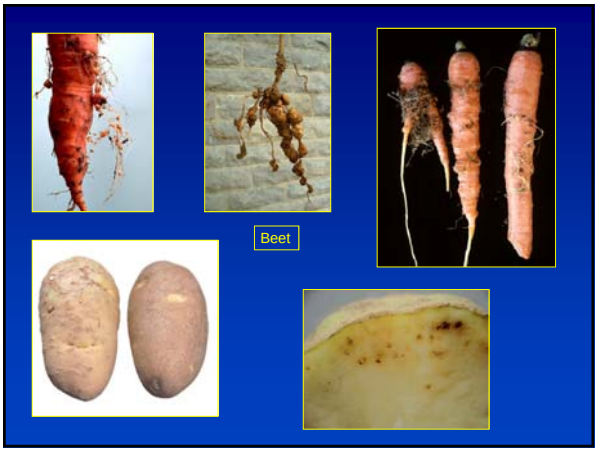
Cloudy Spot or Ghost Spot

Stink Bug

Symptoms of tomato late blight on foliage and fruit. **A.** Brown, water-soaked lesion on leaf surface. **B.** Brown lesion with white sporulation on leaf underside. **C.** Brown, sporulating lesion on stem. **D.** Plum tomatoes with dead foliage. **E.** Brown, firm, lesions on 'Roma' tomato fruit. **F.** Sporulating lesion on shoulders of a ripening fruit.

Beet Curlytop Virus


G. Dively


Beet

B Effect on Sweet Corn

B Effect on Sweet Corn

Poor Pollination

COMPANION PLANTING CHART FOR HOME & MARKET GARDENING (compiled from traditional literature on companion planting)

CROP	COMPANIONS	INCOMPATIBLE
Asparagus	Tomato, Parsley, Basil	
Beans	Most Vegetables & Herbs	
Beans, Bush	Irish Potato, Cucumber, Corn, Strawberry, Celery, Summer Savory	Onion
Beans, Pole	Corn, Summer Savory, Radish	Onion, Beets, Kohlrabi, Sunflower
Cabbage Family	Aromatic Herbs, Celery, Beets, Onion Family, Chamomile, Spinach, Chard	Dill, Strawberries, Pole Beans, Tomato
Carrots	English Pea, Lettuce, Rosemary, Onion Family, Sage, Tomato	Dill
Celery	Onion & Cabbage Families, Tomato, Bush Beans, Nasturtium	
Corn	Irish Potato, Beans, English Pea, Pumpkin, Cucumber, Squash	Tomato
Cucumber	Beans, Corn, English Pea, Sunflowers, Radish	Irish Potato, Aromatic Herbs
Eggplant	Beans, Marigold	
Lettuce	Carrot, Radish, Strawberry, Cucumber	
Onion Family	Beets, Carrot, Lettuce, Cabbage Family, Summer Savory	Beans, English Peas
Parsley	Tomato, Asparagus	
Pea, English	Carrots, Radish, Turnip, Cucumber, Corn, Beans	Onion Family, Gladiolus, Irish Potato
Potato, Irish	Beans, Corn, Cabbage Family, Marigolds, Horseradish	Pumpkin, Squash, Tomato, Cucumber, Sunflower
Pumpkins	Corn, Marigold	Irish Potato
Radish	English Pea, Nasturtium, Lettuce, Cucumber	Hyssop
Spinach	Strawberry, Faba Bean	
Squash	Nasturtium, Corn, Marigold	Irish Potato
Tomato	Onion Family, Nasturtium, Marigold, Asparagus, Carrot, Parsley, Cucumber	Irish Potato, Fennel, Cabbage Family
Turnip	English Pea	Irish Potato

Organic Matter & Soil:

- Improves the soil's physical condition.
- Improves soil *tilth* (the soil's ability to resist compaction).
- Increases water infiltration/retention, decrease erosion.
- Supplies/retains plant nutrients (CEC).
- Increased microbiological activity.

Building Soil Organic Matter:

Compost: intentionally decomposed plant and animal remains; rich earthy smell, dark brown and crumbly. Use to enrich soil, as top-dress/mulch, in making planting mixes. Moderate N level, good balance of all plant nutrients.

Manure: un-decomposed animal manure; may be easily available; give it time to decompose in soil; salt buildup potential. Higher N level.

Building Soil Organic Matter:

Green manure: crop (often legume) grown to be returned to soil; adds bulk carbon, may add nitrogen; feeds soil ecosystem; least loss.

Leaves, grass clippings, etc. can have a place but be aware of limitations (high carbon, matting, etc.).

Compost

Compost

Requires right mix of dry (brown) and fresh (green or manure) materials; C:N between 25:1 and 35:1.

Blend equal parts by volume of grass clippings with dry leaves and shredded twigs or branches.

Urea fertilizer or other nitrogen source can be used in place of green vegetation if necessary.

- 1 lb. urea to 1 cubic yd. leaves.
- 6 lb. urea to 1 cubic yd. wood chips.
- Collected urine from healthy people can also be used.

Compost - organic

- Or mix 5 parts leaves to 1 part manure.
- Or add dried blood meal, alfalfa meal at the rate of 2 cups to a wheelbarrow load of brown leaves or other carbon rich wastes such as shredded paper.

Compost - organic

Nitrogen (N): blood meal, fish emulsion, manure tea, alfalfa mulch (slow release).

Phosphorus (P): bone meal, rock phosphate; at high pH may become unavailable – mix 50:50 with elemental sulfur at application.

Potassium (K): greensand (+ micronutrients)

Humic and fulvic acids (benefits?).

Carbon to nitrogen (C/N) ratios

Kitchen wastes:	15 to 1
Grass clippings:	19 to 1
Cornstalks:	60 to 1
Leaves and straw:	80 to 1
Paper:	170 to 1
Sawdust:	500 to 1

Compost

Ideally you should maintain moisture level at about 50%

Compost should feel like a wet sponge.

If compost is dry with no residue of water you should add water.

If, when a handfull is squeezed, water runs freely, then there is too much water.

Compost

Pile should be at least 3x3x3 to heat up properly (135°F).

Restrict size of the pile to no more than 5 ft. high and 5 ft. wide. 4x4 makes an ideal size. Any length will do. Or make additional piles.

Turn after temperature comes down.

Provide adequate ventilation by turning the pile frequently or by venting.

Use a multiple bin system for easy turning.

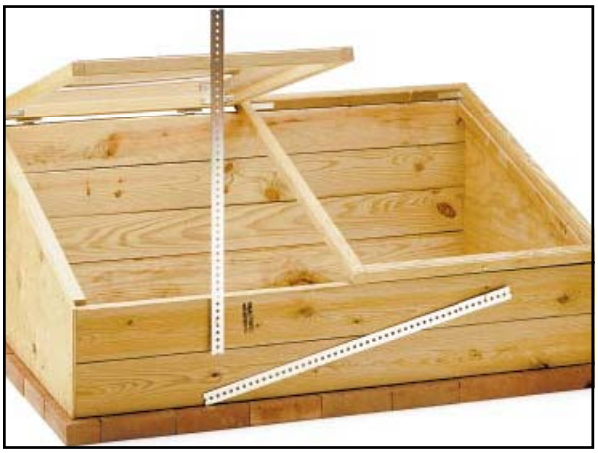
Compost

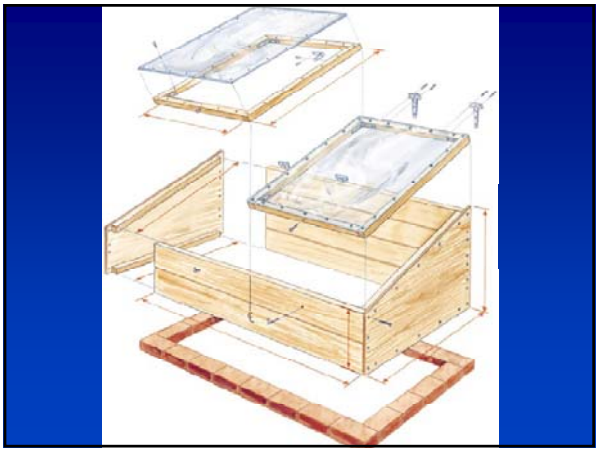
Acceptable	Not Acceptable
Grass clippings	Meats
Leaves and Weeds	Bones
Manures	Large Branches unless chipped
Coffee Grounds	Synthetic Products
Wood Chips, Sawdust	Plastics
Bark, Stems, Stalks	Pet or Human Solid Wastes
Garden & Canning Waste	
Fruit & Vegetables	

Common Compost Problems*

Problem	Remedy
Wet, foul-smelling pile.	Turn pile, add high-carbon material.
Dry center and little or no decomposition of materials.	Turn pile, soak thoroughly; cover with plastic to retain moisture.
Dampness and warmth only in middle.	Increase volume of pile and moisten well.
Damp, sweet-smelling but no heat.	Add nitrogen-rich materials, turn.
Matted, un-decomposed layers of leaves, paper or grass clippings.	Break up layers, or shred, re-layer pile; avoid adding these materials in heavy layers.

*Taken from The Rodale Book of Composting





Mulches
and
Row Covers
for
Vegetables

Mulch:

Any material used to protect the roots from heat, cold, or drought, or to keep the fruit clean.

Molsh:

Old English for "**Soft and Rotten**"

Advantages:

- Weed Control
- Modify Soil Temperature
- Moisture Conservation
- Reduce Compaction, Erosion, Leaching
- Ease Operations

Results:

- Increase Yield
- Improve Quality
- Reduce or Increase Inputs
- Increase Returns
- Improve Profits

Categories:

- Organic
- Synthetic

Organic Mulches:

- Straw
- Leaves
- Compost
- Sawdust
- Paper
- Bark

Advantages of Organic Mulches:

- Weed Control
- Moisture Conservation
- Cool Soil
- Ease Operations
- Add Organic Matter
- Reduce Disease

Disadvantages:

- Weed Source
- Harbor Insects
- Increase Disease
- Cool Soil
- Extra Fertilizer
- Phytotoxic

Synthetic Mulches:

- Plastic
- Latex
- Asphalt
- Foil

Advantages of Synthetic Mulches:

- Weed Control
- Moisture Conservation
- Moderate Soil Temperature
  - Cool (white, white-on-black)
  - Warm (black, clear, IRT)
- Reduce Disease

Disadvantages:

- Removal
- Disposal
- Specialized Equipment
  - Applicator
  - Seeder
  - Lifter/baler

Degradable Synthetic Mulches:

- polyethylene (photo)
- starch (bio)
- asphalt (bio)
- latex (photo/bio)

Non-Degradable Synthetic Mulches:

polyethylene
- black, clear, white
- wave-length selective (IRT, Polyone, Al-OR) - green, brown

Row Covers:

- increase soil and air temperatures
- frost protection
- insect exclusion
- wind protection
- moisture conservation

Results:

- increased earliness
- higher early yield
- higher total yield
- improved quality

Row Cover Materials:

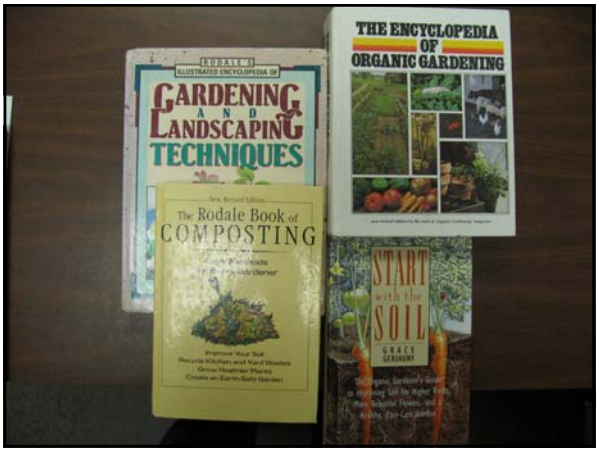
- extruded polypropylene
  (Agronet)
- spunbonded polypropylene
  (Agryl, Gromax, Kimberly Farms, Lutrasil)
- spunbonded polyester
  (Reemay)
- perforated polyethylene
  (Linktuf, Vispore)


Agronet


Reemay

Management:

- pest control
  - weeds
  - insects
- venting
  - >85° F→flower drop
- wind
  - edges anchored
  - hoops properly spaced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