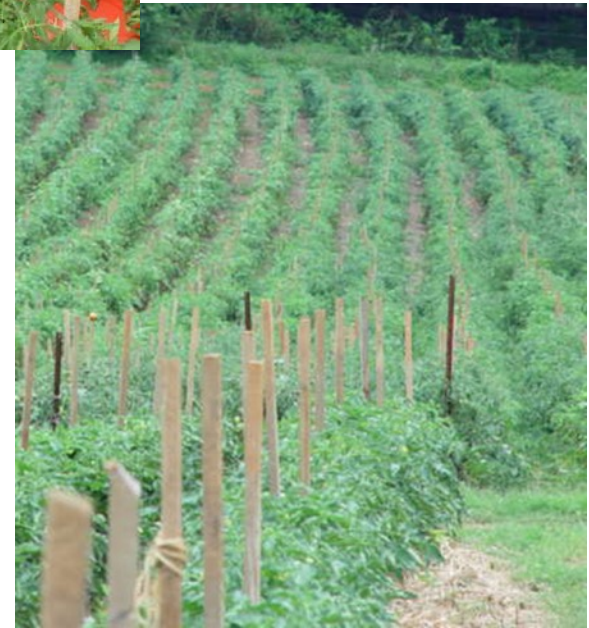


Tomato Production



Anthony Carver
Extension Agent & County Director
Grainger County, UT Extension
865-828-3411

Varieties

- Grow what....
 - Taste Good
 - What Has Best Disease Package
 - Which **Color** You Like Best
 - What Does my Market Want?????



Getting Started



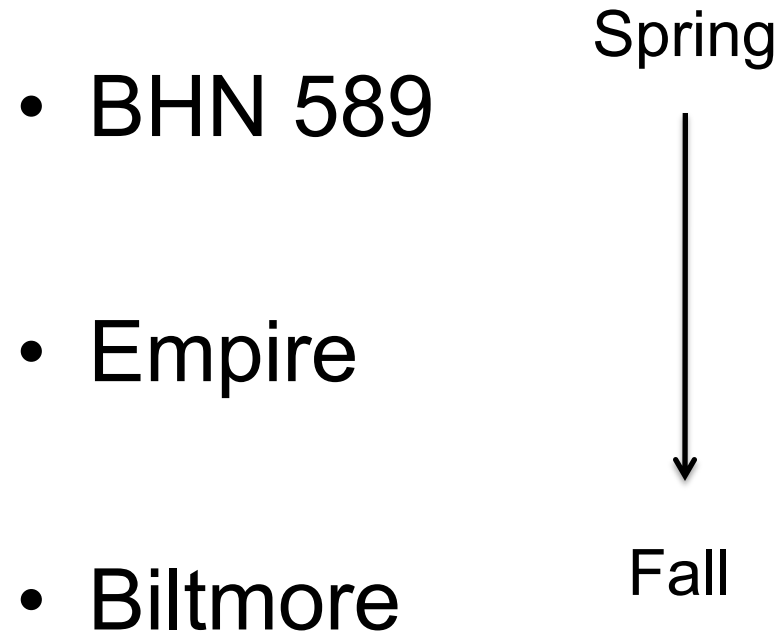
- Variety Selection
 - Determinates Or Indeterminates?
 - Determinates will grow about waist high and be bushy.
 - Indeterminates will grow tall and need support to grow well. They are best grown in cages or on a trellis.
- Resistance
 - Many varieties have resistance to disease. Ask for this information where you purchase plants.

Varieties

- Round
 - Big Beef
 - BHN 589
 - Biltmore
 - Celebrity
 - Celebrity Supreme
 - Empire
 - Mt. Majesty
 - **BHN 871**
 - **Carolina Gold**
- Grape
 - Smarty
 - Jolly Elf
 - Jelly Bean
- Roma
 - Plum Crimson
 - Pony Express
 - BHN 685(don't prune)



Tomato Planting Timeline - Greenhouse



Greenhouses

- Publication – here and on web
- Ventilation
- Pollination
- Fertilization/Watering
- Problem ID

In-Ground Greenhouse Tomato Production

*By Anthony Carver
Extension Agent
Grainger County*



Pollination Tricks

- Bump sticks
- Leaf blower
- Toothbrush
- Bees
- Etc...



Inspect Those Transplants

- Look for
 - Disease
 - Insects
 - Too much growth
 - Stunted
 - Anything weird

Need to be Healthy!!!!!!



Planting Dates

- Spring for Summer
 - Frost Free Date
 - Late April Planting
 - July 4th Harvest
- Early Summer for Late Summer
 - Early June Planting
 - August – September Harvest
- Summer for Fall
 - Early July Planting
 - September – October Harvest
 - Frost usually terminates crop



Tomato Planting Timeline - Field

Flavor

- BHN 589 or 961
- Empire or Emperador
- Biltmore or Mt fresh plus
- BHN 589

Spring



Fall

Vine Ripe

- Fletcher, Mt Glory or Primo Red (fert high)
- Amelia or Crista
- Phoenix or Red Line
- Phoenix or Red Line
- Red Defender or Mt Fresh Plus

Tomato Spacing

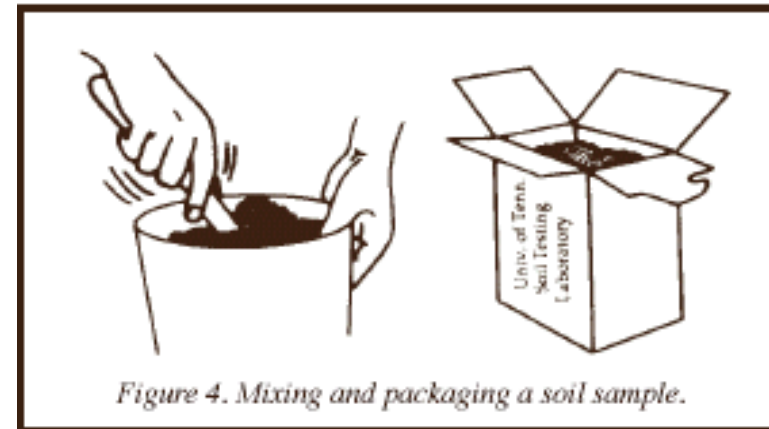
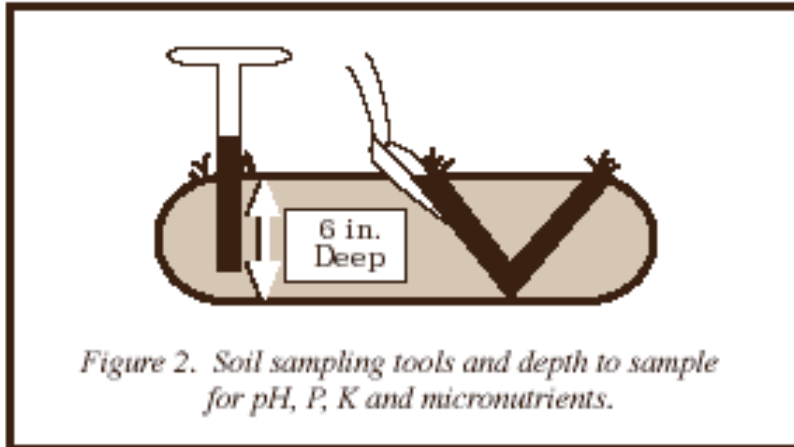
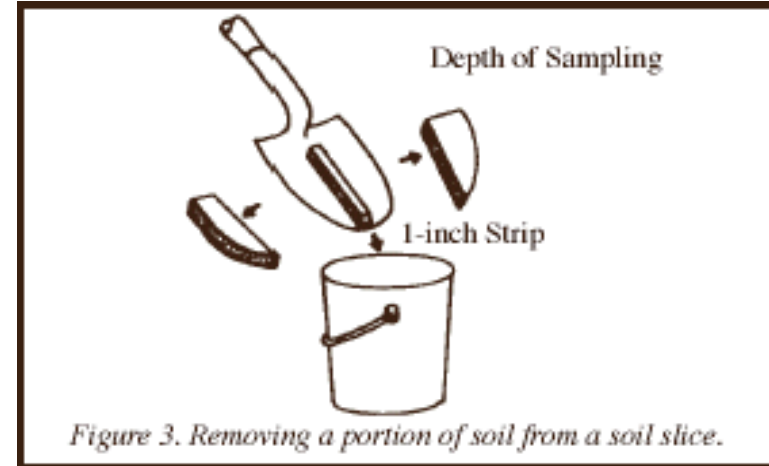
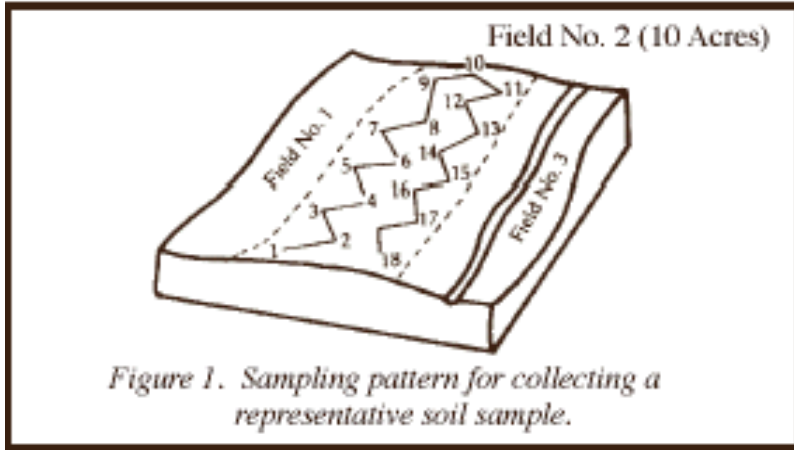
- Between-Row
 - Dictated by the equipment used
 - Bare-Ground
 - 3.5 ft. – 10 ft.
 - Plasticulture
 - 5 ft. – 6 ft.
- In-Row
 - Dictated by:
 - Variety
 - Training System
 - Indeterminate variety in a cage
 - 2 ft. – 4 ft.
 - Determinate variety using Florida Weave
 - 18 in. – 2 ft.



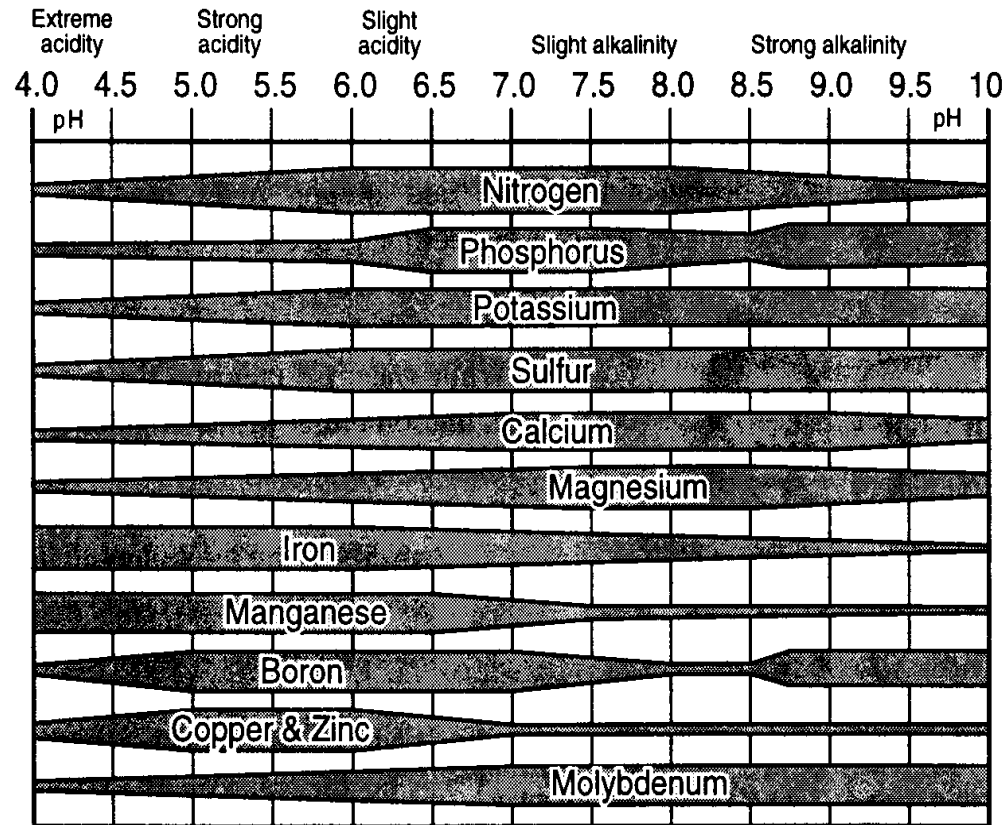
Knowing Your Soil – Important!!!



Soil Testing



pH and Nutrient Availability



- Proper pH Range
 - 6.0 – 6.8
 - Optimum nutrient availability
- Soil Sample in the Fall (best)
- Lime
 - Ag lime is variable in size and reacts over time (6 months/last 4 years)
 - Liquid Lime (quick/1 year)

Soil pH for Tomatoes

- pH

- Range of 6.5 – 6.8



- 6.5

- Good nutrient availability

- Reduced incidence of Fusarium Wilt and other soil borne diseases

- Less than 5.5

- Nutrient deficiencies

- Nutrient toxicities

- Greater than 6.8

- Nutrients become unavailable

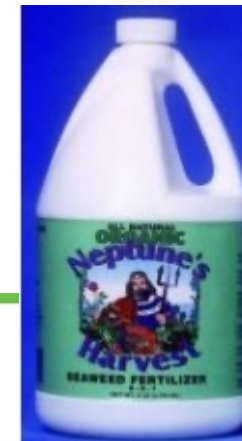
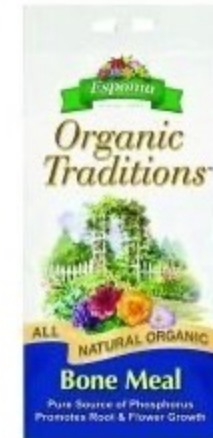
Types of Fertilizers

- Organic
 - Organic matter
 - Composting
 - Green manures/cover crops
 - Liquid fertilizers (organic)
- Traditional
 - Manures
 - Cover crops
 - Granular
 - 6-12-12
 - 19-19-19
 - 10-10-10
 - Liquid
 - Triple 20
 - Calcium Nitrate
 - Potassium Nitrate




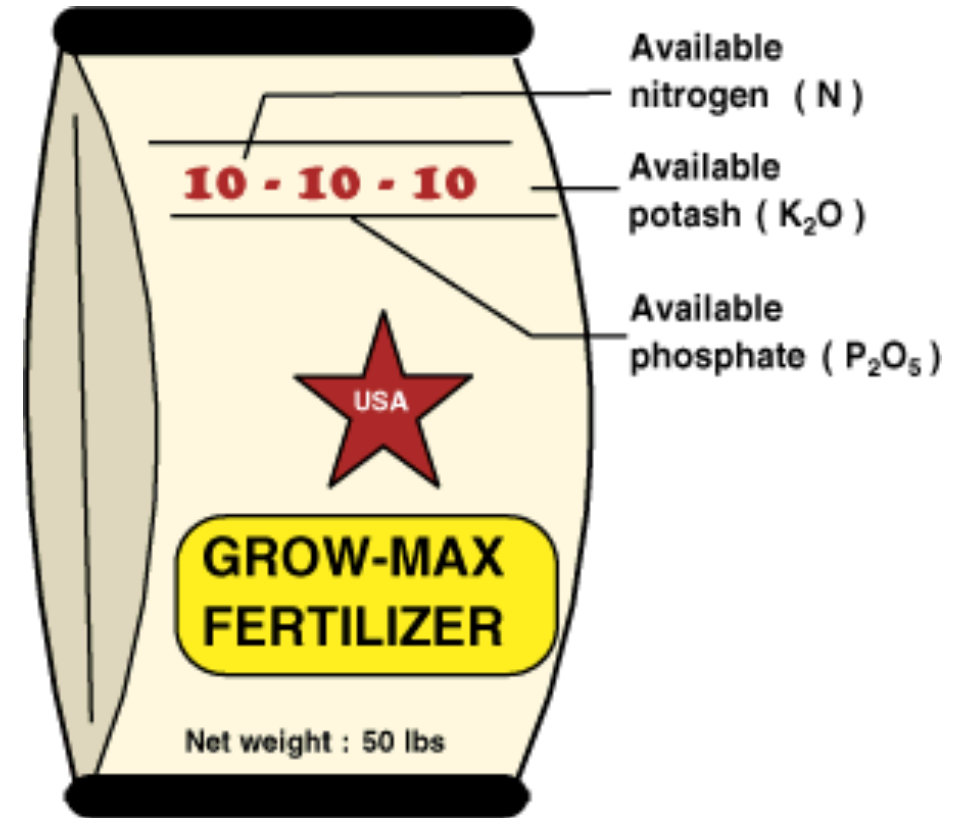
Organic fertilizers

- R-GROW organic soil conditioner 1.8-2.4-2.2
- Fish Emulsion 5-2-2
- Bone Meal 0-10-0
- Blood Meal 12-0-0
- Corn Gluten Meal 9-0-0
- Liquid Kelp(seaweed)



Fertilizers

- Units needed
- What numbers mean
- Example
 - 30 units of N on acre
 - Using bag 
 - Need 300 lbs



Fertility

- A complete fertilizer (10-10-10, 15-15-15 or 6-12-12) before transplanting or during planting.
- Always go by soil test
- If a soil test has not been done, a general rule is to apply **2-1/2 to 3 pounds** of a complete fertilizer, **per 100 square feet of garden area**. Never put fertilizer in direct contact with roots.
- Side-dress or water in (drip)
 - ▣ 1.5 lbs of 6-12-12 after fruit set (2 times)
 - ▣ Calcium Nitrate (early) Blossom End Rot Control
 - ▣ 20-20-20 Plant growth
 - ▣ Potassium Nitrate – fruit development

Applying Fertilizers – rule of thumb

- Bare ground
 1. Broadcast 12-24-24 at 500 pounds an acre.
 2. Side dress with ammonium nitrate or calcium nitrate at second cultivation
- Drip irrigation
 1. Broadcast 12-24-24 at 500 pounds an acre
 2. Starting 4th week after planting rotate between calcium nitrate, potassium nitrate, and 20-20-20 at 50 pounds an acre.



N Rates

- Very Low
 - BHN 669
 - Biltmore
- Low N
 - BHN 543
 - BHN 589 (push in Greenhouse)
- Moderate N
 - Empire
 - Fletcher
 - FL 91
 - Mt Glory
- Moderate N
 - Mt Fresh Plus
 - Nico
 - Phoenix
 - Redline
- High N
 - Amelia
 - FL 47
 - Primo Red

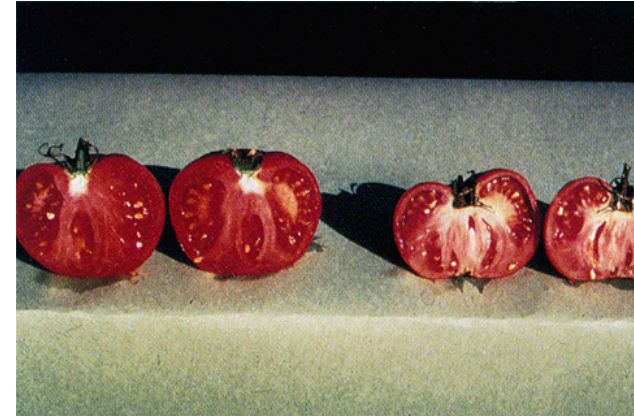
Nitrogen Deficiency



Phosphorus Deficiency



Potassium Deficiency



- *Tomatoes will remove 300 lb/A/season*
- *When fertilizing use 1:2 ratio of N:K₂O*

Potassium



Calcium Deficiency (Blossom-End Rot)



Calcium Deficiency (Blossom-End Rot)

- Weather (to dry)
- Calcium need at fruit set

Prevent – 1. Calcium Nitrate shortly after transplanting
2. a little water in a dry spell



Magnesium Deficiency



Magnesium Deficiency

- Prevention
 - When plants reach knee high – apply Epson Salts
 - 4 Tablespoons/gallon of water every other week.
 - Use Epson Salt at 20 lb/A or 4 lb/greenhouse.
 - Apply on plant, on ground, or through drip

Iron Deficiency

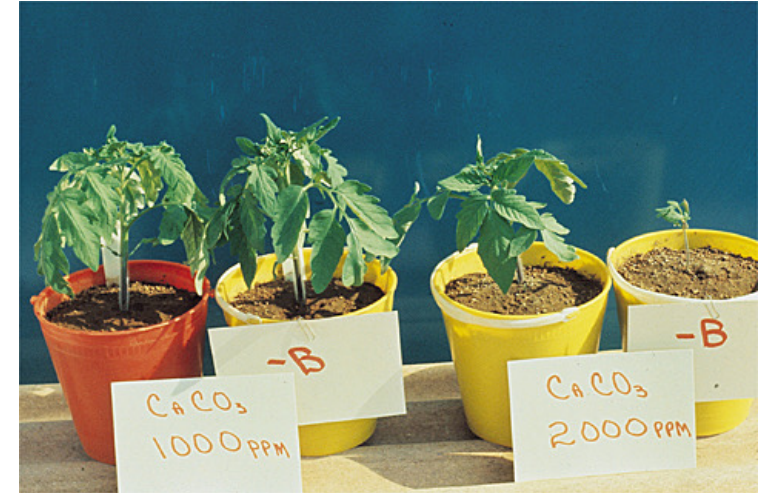


Zinc Deficiency



Using Boron

- *When Plant Blooms*
- *Rate*
 - *2 to 3 lb actual B/A*
 - *0.5 lb B/A/week*



Deficiency



Toxicity

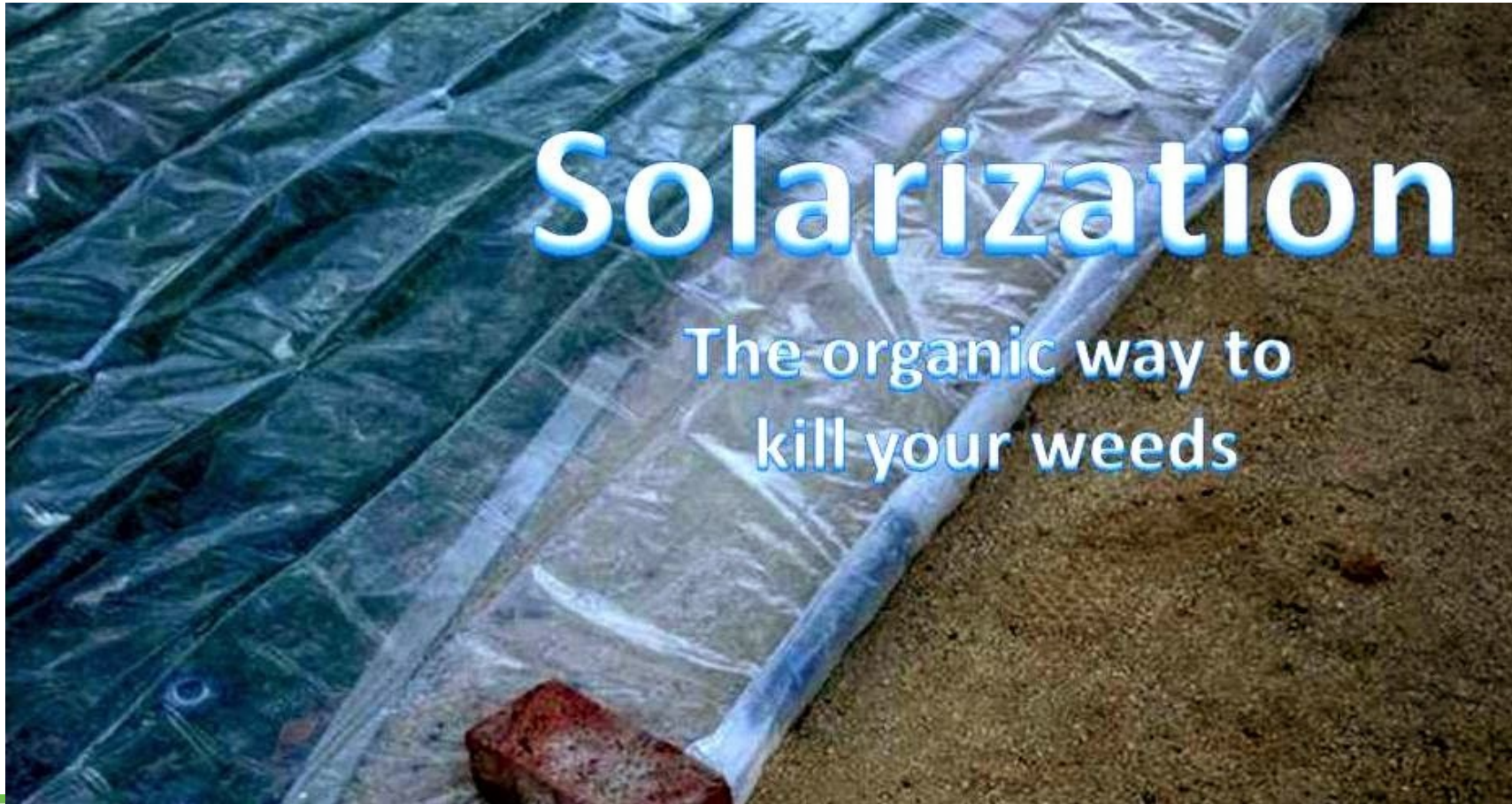
Weed Control



Weed Control with Plastic



Weed Control cont.



Tomato Weed Control (Home Garden) Recommendations



- Pretransplant
 - Treflan 4EC 1.5 pints/acre or 1 Tablespoon/1000sq ft incorporate within 24 hr. control weed seed only.
 - Corn Gluten Meal 20 lbs/1000sq ft – apply 2 weeks before and incorporate lightly (some N)
 - Roundup – spray and wait 7 days to transplant
- or
- Post-transplant
 - Dimetric 75DF @ 1 Tablespoon/gallon (\$\$\$)
 - + Select 2EC @ 6 – 8 fl oz/A or 1 Tablespoon/gallon
 - + COC @ 1% (sicker – Dawn soap, surfactant etc)

Commercial Weed Control

- Dual – some preemergence control
- Sandea (Halosulfuron methyl)
2/3 oz/a with NIS 1 qt/100 water
pre or postemergence

Yellow Nutsedge



Weed Control

- Preplant Burndown
 - Aim 2EC @ 2 fl oz/A
 - Paraquat @ 1.3 pt/A
- PRE to Beds
 - Goal 2XL @ 2 pints/A, 30 days prior to transplanting

Weed Control

- PRE
 - Devrinol 50 DF @ 2 to 4lb/A, PPI
 - Prefar 4EC @ 5 to 6 qts/A, PPI
 - Prowl H2O @ 1 to 3 pints/A, PPI
 - Sandea 75DG @ 0.5 to 1 oz/A, PRE
 - Dimetric 75 WDG @ 0.33 to 0.67 lb/A, PPI
 - Spartan FL 4F @ 2.25 to 8 fl oz/A, PRE
 - Treflan 4EC @ 1 pint/A, PPI

Weed Control

- POST
 - Dacthal 6F @ 8 to 10 pt/A
 - Envoke 75DG @ 0.1 to 0.2 oz/A
 - Matrix 25WDG @ 1 to 2 oz/A
 - Sandea 75 DG @ 0.5 to 1 oz/A
 - Dimetric 75 WDG @ 0.33 to 0.67 lb/A
 - Poast 1.5 EC @ 1 to 1.5 pt/A
 - Select Max 1EC @ 9 to 16 oz/A
- POST – Directed
 - Aim 2EC @ up to 2 fl oz/A
 - Dimetric 75DF @ 0.33 to 1.33 lb/A
 - Paraquat @ 1.3 pt/A



Plant Support

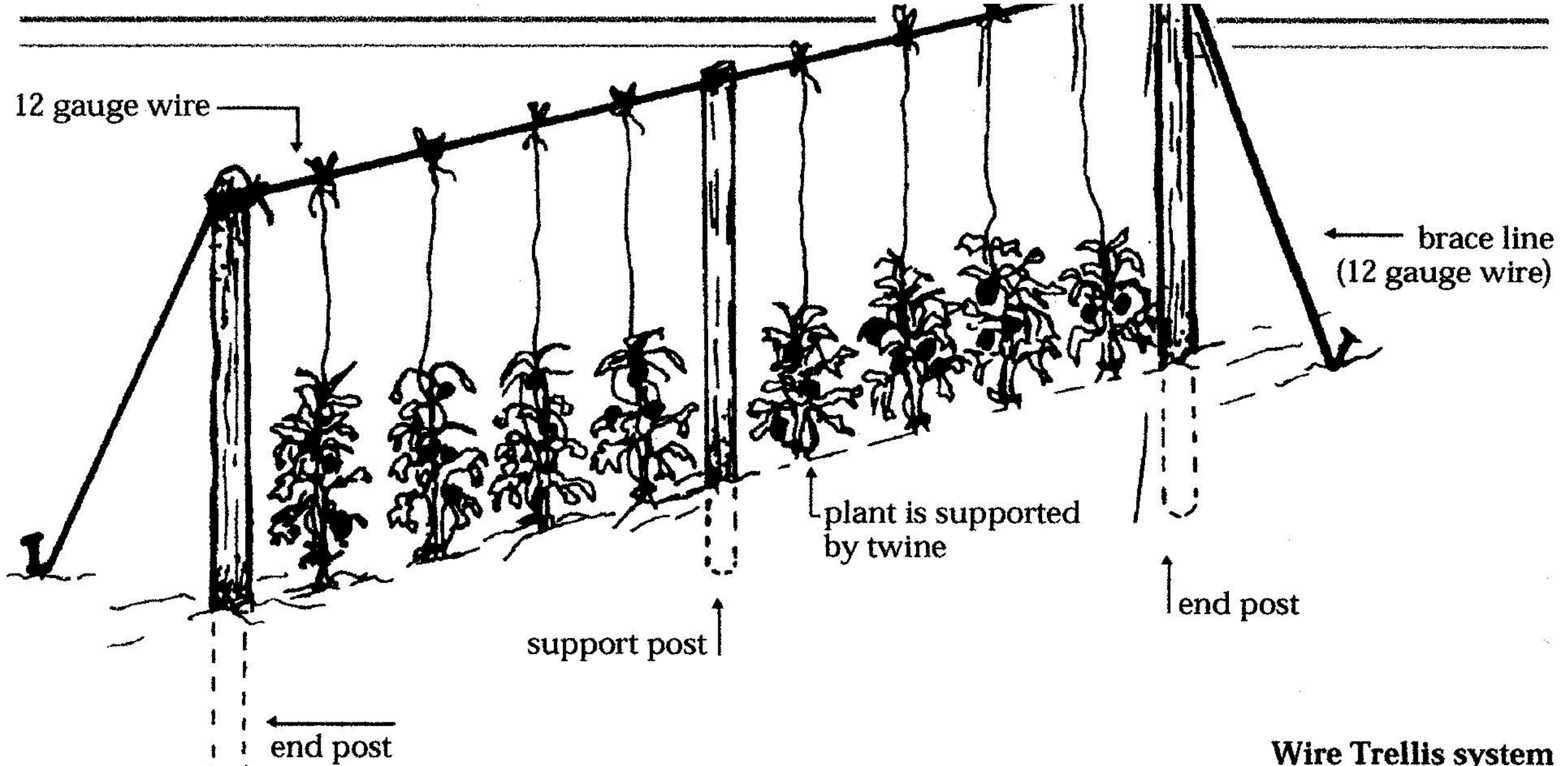
- Cage
- Staking
- Trellis systems
- Florida Weave





Real. Life. Solutions.

Single-stem system. Plants spaced 8 to 12 inches in-row.



Wire stapled to post.

Florida Weave System



Diseases and Control



Foliar Symptoms of Fusarium Wilt



Vascular Symptoms of Fusarium Wilt



Control of Fusarium Wilt

- Cultural Control Practices
 - Crop Rotation – 5 - 7 years
 - Resistant Varieties
 - ‘Amelia’, ‘Floralina’, ‘Sungard’
 - pH – 6.5 – 7.0
 - Fertilization – nitrate forms of nitrogen
 - Sanitation – preventing the spread
 - Control of Root Knot Nematodes

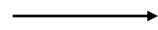
Control of Fusarium Wilt

- Biological Control Practices
 - Use biological control products at planting
 - SoilGuard
 - RootShield



Comparisons of Foliar Symptoms

Speck



Canker



Spot



Comparisons of Fruit Symptoms

Speck



Canker



Spot



Early Blight



Septoria Leaf Spot



Anthracnose



Late Blight



Disease Control (Home Garden)

- ❑ Mancozeb 75DF at 1.5-3 Tablespoon/gal
- ❑ Chlorothalonil 54F at 2 teaspoons/gal
- ❑ Basic Copper (see label)
- ❑ Sulfur (see Label)
- ❑ Prevent water on leaves (growing hoop)
- ❑ Site select for Full Sun
- ❑ Baking soda (some fungicidal properties)

Disease Control (Commercial)

- Bacteria (prevent)
 - Mancozeb @ 2-3 lb/A
 - +
 - Tanos @ 8 oz/A
 - +
 - Copper @ 2-3 lb/A
- Blights and Such
 - Chlorothalonil @ 2 – 2 ¾ pt/A
 - Fontelis 24 fl oz/A
 - Inspire Super
 - Quadris
- Bacteria (Have)
 - OxiDate (1 time)
 - Follow-up later same day with
 - Manzate + Copper + Inspire Super then rotate to Gavel or Manzate + Copper + Tanos
- Blights and Such
 - Cabrio
 - Endura
 - Ridomil Gold



Insects and Control



Aphids



White Flies



Spider Mites



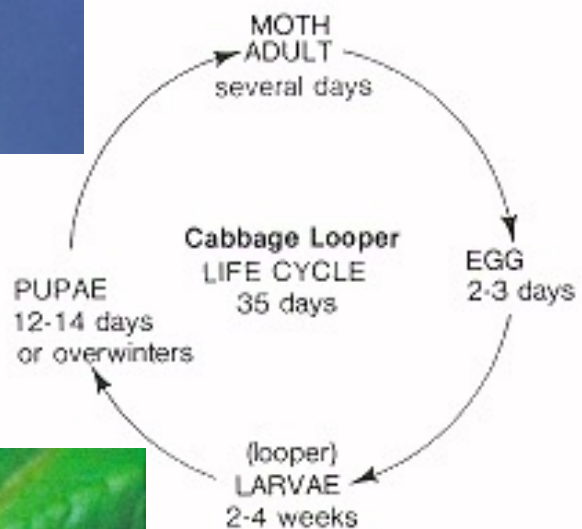
Armyworms



Cabbage Looper



Cabbage looper adult



Cabbage looper larva

Pinworms



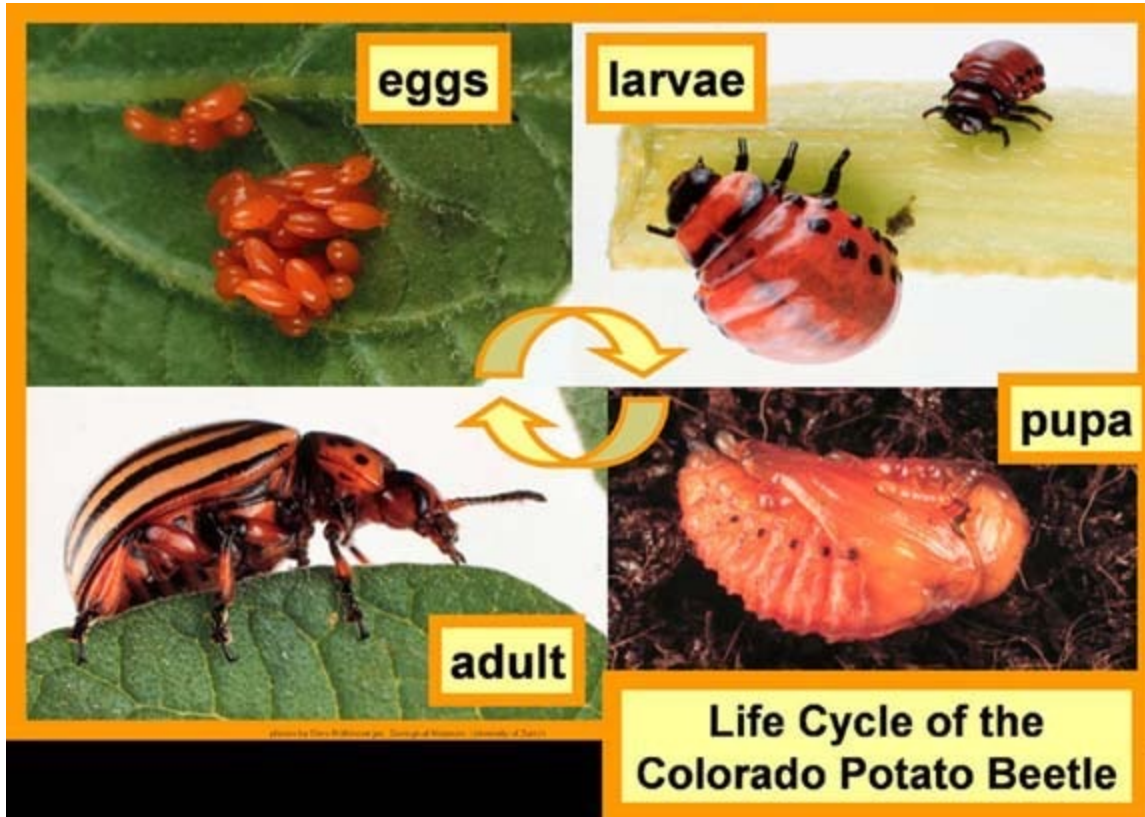
Cutworms



Flea Beetle



Colorado Potato Beetle



Brown Marmorated Stink Bug

- Pyrethroids weekly 2 days get back up

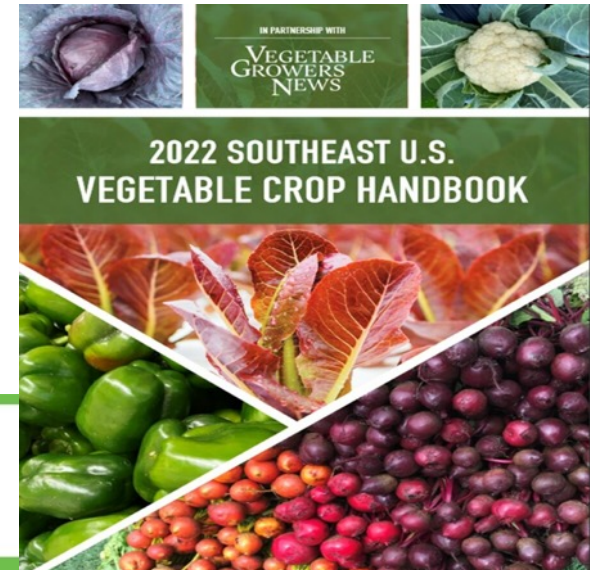


Insect Control (Home Garden)

- Chemical
 - Sevin (liquid form)
 - Bonide Eight
 - Spinosad – best on potato bugs
- Organic
 - Bug zapper (running all night)
 - Insecticidal Soaps
 - Neem Oil
 - Sulfur??
 - Hot pepper
 - Other compounds

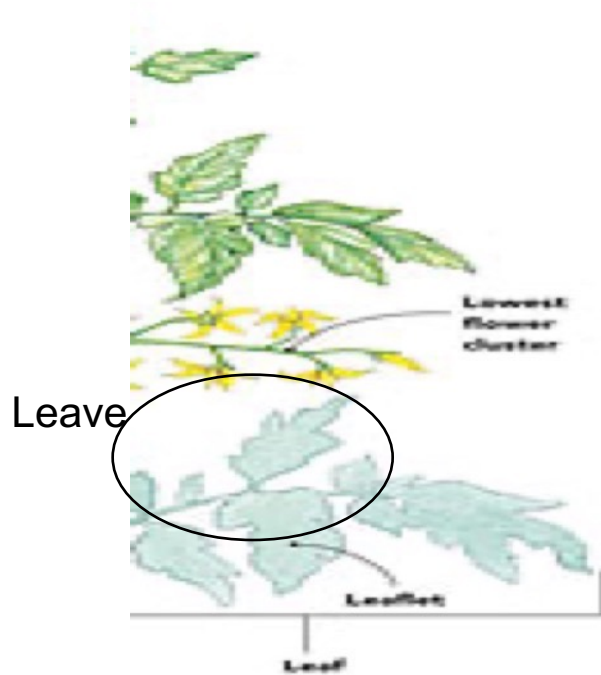
Insect Control (Commercial)

- To Have on Hand
 - Assail
 - Admire Pro
 - Coragen
 - Lannate
 - AgriMek
 - Beleaf
- Whitefly
 - Agri-Mek + PQZ
 - Rotate with Portal + PQZ
- Stink Bug
 - Cormoran + Sultrus + Lannate



Pruning Tips

- *Two Branch Method*
 - *encourages early yield*
 - *good yield*
 - *good fruit size.*



First Flower Cluster



Missouri method

Simple Method



Plant Tomatoes Deep, Deep, Deep



Cover the stem up to the plant's leaves. You can even cover the first few leaves with soil. Roots will grow along the buried stem to make the plant stronger.

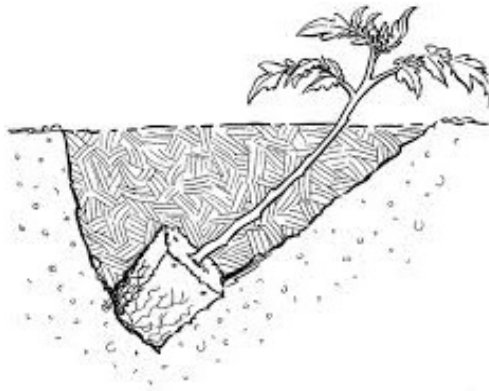
Each Bonnie tomato label urges you to plant tomatoes deep, so that a full 2/3 of the plant is underground. That means that if you buy a 10-inch tall plant, all but the top three inches is buried. Why? Because the plant will have a better, stronger root system. Better roots mean better tomatoes.

We know, we know. This goes against everything you've ever heard about "don't plant too deeply or you'll kill the plant." Tomatoes break that rule. They sprout roots along the buried stem. The extra roots

item. Better roots mean better tomatoes.



Whether in a pot or in the ground, set each tomato plant so that 2/3 of the plant is buried.



DON'T!!!!!!



Production Costs

- Production Costs **\$11,000**
 - Variable Expenses \$3,000
 - Labor, Harvest, & Marketing \$8,000

Tomato Economics

(\$/25 lb box)

Yield / Price	1,000	1,500	2,000	2,500	3,000
4.00	4,000	6,000	8,000	10,000	12,000
6.00	6,000	9,000	12,000	15,000	18,000
8.00	8,000	12,000	16,000	20,000	24,000
10.00	10,000	15,000	20,000	25,000	30,000
12.00	12,000	18,000	24,000	30,000	36,000

Questions?

