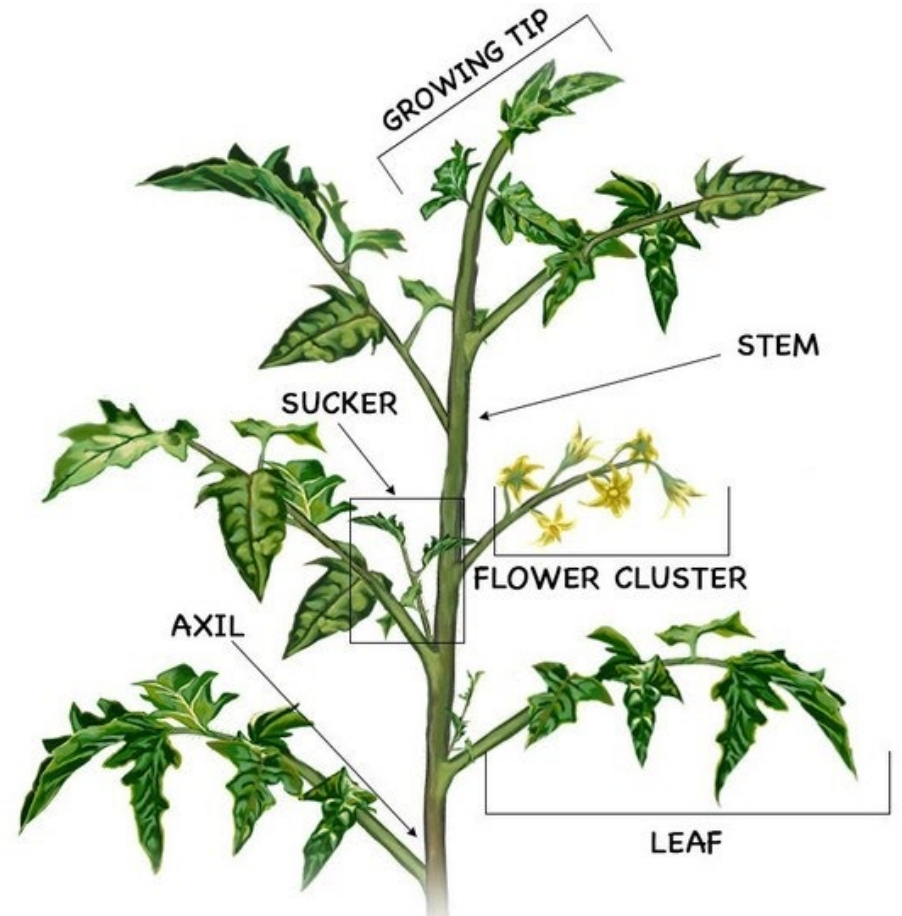


Greenhouse Tomato Production



- Scientific Name: *Solanum lycopersicum*; Family: Solanaceae
- Tomato leaf is a compound leaf with leaflets attached to the rachis
- Tomato has both determinate and indeterminate growth habit
 - Determinate growth: Terminal bud ends as a flower bud
 - Indeterminate growth: Terminal bud ends as a leaf bud
- Greenhouse-grown tomatoes are usually indeterminate in growth habit as continuous production is desirable
- Leaves and flowers appear in a spiral manner on the branch (first 7-9 leaves, then flowers after every 2-3 leaves)
- Tomato is considered as a self-pollinated crop but wind can help in pollination. Sometimes stigma can protrude outside of anthers in warm conditions
- Botanically tomato is a berry (fruit). But for commercial purposes, it is classified as a vegetable. Fruits (3-4) form on a truss

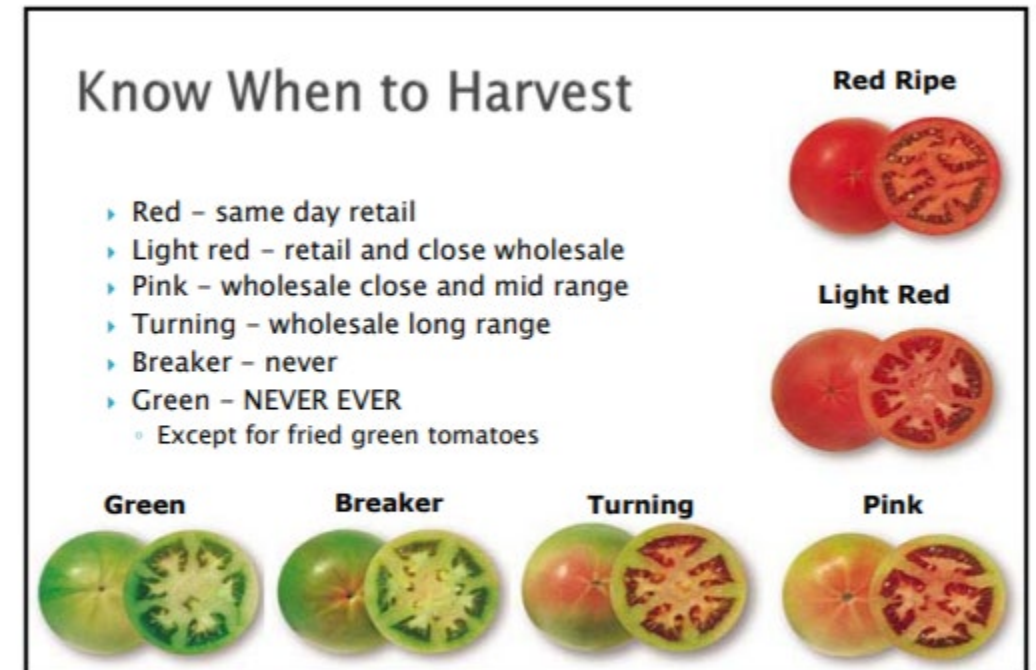


Greenhouse Production

- Greenhouse tomatoes produce 5% of U.S. market (Beefsteak, Cluster, Roma and Cherry varieties are popular)
- Major countries: Spain (30,000 acres), Netherlands (11,500 acres), England (3000 acres), Canada, Mexico, USA (700 acres)
- Main states in the U.S.: Colorado, Texas, Florida, Pennsylvania, New York, California, Ohio
- Growing rapidly in the U.S.
 - High quality, more marketable fruit
 - Controlled environment/year-round production
 - Less land, more production
- Risk factors: Investment is high, requires knowledge, intensive management

Production Basics

- Seed Companies: Seminis, De Ruiter, RijkZwaan
- Spacing : 10,000 plants/acre
- Botany: determinate and indeterminate (indeterminate for greenhouse production)
- Plantings: 2 per year
- Flowering: 6-8 weeks after planting
- Harvest: 2-4 times each week for 15-20 weeks



Environmental Conditions

- PPFD: $> 20 \text{ mol/m}^2/\text{d}$
- Temperature: > 65 and $< 85 \text{ F}$
- EC/pH: ~ 2.0 to 2.5 (higher EC better flavor), 5.5 to 6.0
- CO_2 enrichment up to 600 ppm
- Water quality good, with less alkalinity



Pruning and Support:

<https://www.youtube.com/watch?v=qJgA4n-sCE8>

Production System: Dutch Bucket System

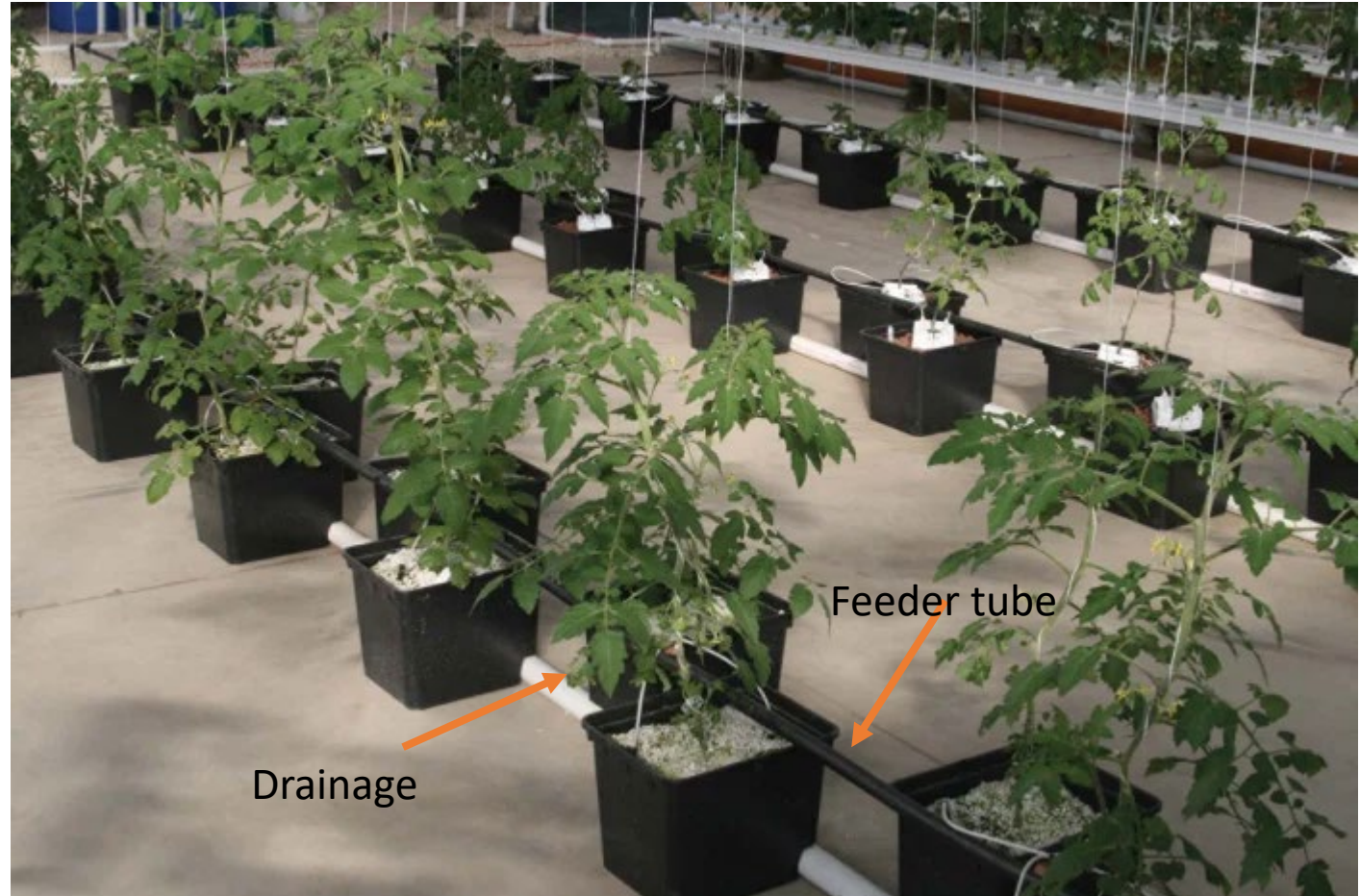
Plants grown in containers usually filled with inert media

Feeder tubes supply nutrient solution

Drainage tubes have pre-drilled holes at certain spacing

Nutrient solution in container drains directly into the holes of the drainage tube and recirculated

Pruning and support are similar



Production System (Cube and Slab):

https://www.youtube.com/watch?v=FIHTZHu_EnM

Tomato Production in the Netherlands:

<https://www.youtube.com/watch?v=X6DmmrglLSs>

Nutrient Deficiencies



Blossom end rot (Calcium deficiency)



Interveinal chlorosis (Magnesium deficiency)

Physiological Disorders



Catfacing (Cool air temperature)



Cuticle cracking (Overly vegetative with few fruits)

Fungal Diseases



Gray Mold: *Botrytis cinerea*



Leaf Mold: *Passalora fulva*



White Mold: *Sclerotinia sclerotiorum*

Management

- Remove crop residues
- Provide ventilation by fans, Prune leaves
- Use fungicides: mancozeb is commonly used for molds; Contans[®], which is a parasite of the white mold fungus

Viral Diseases



Tomato Mosaic Virus
(mosaic, stripes, chlorosis, vein clearing symptoms)



Tomato Spotted Wilt Virus
(Blotchy and concentric leaf spots)

Insect Pests



Green Peach Aphid (*Myzus persicae*)

- Suck cell sap
- Presence of honey dew, sooty mold are characteristic symptoms
- Parasite wasps for biological control



Western Flower Thrips (*Frankliniella occidentalis*)

- White streaks on the leaves due to sucking cell contents
- Transmit TSWV
- Predatory mites for biological control