Solanaceous Crops

- Family: Solanaceae
- Warm Season Perennials
- Naturally self pollinating
  - Tomato (*Lycopersicon esculentum*)
  - Pepper (*Capsicum annuum, C. frutescens, C. chinense*)

Other Solanceous crops:
- Potato (*Solanum tuberosum*)
- Eggplant (*Solanum melongena*)
- Tomatillo (*Physalis ixocarpa*)

Tomato

Center of Origin: Andes Mts.

Eastern Black Nightshade
Tomato

- *Lycopersicon esculentum var. esculentum*  
  (not: *Lycopersicon lycopersicum*)
- Arguably the most important vegetable crop
  - Acreage, production, value
- Types:
  - Fresh Market
    - Salad
    - Beefsteak
    - Cherry
    - Greenhouse
    - Typically hand harvested
  - Processing
    - Pear or Roma shape (old processing varieties are round)
    - High solids content (>6%)
    - Typically machine harvested

Tomato Industry

- Fresh Market:
  - 27% of total US acreage, 62% of value
    - Grown Year-Round
    - Spring & Summer: Throughout the US
      - Spring: California & Southern US
      - Summer: Georgia & North
    - Winter: Mostly Florida
- Processing Tomato:
  - 73% of total US acreage, 38% of value
    - California (94% of acreage)
Tomato: Perfect Flower (Hermaphrodite)
Stigma enclosed within anther tube

Plant Growth & Development

- Vine Types:
  - Determinate
    - Shoots terminate in flower cluster
    - 1 or 2 leaves between flower clusters
    - More concentrated yield
  - Semi-determinate
    - In between determinate & indeterminate
  - Indeterminate
    - Shoots continue to grow with no terminal flower clusters
    - 3 to 4 leaves between flower clusters
    - Yield tends to be spread out over growing season
    - Need Support

Blossom-end Rot: Physiological disorder caused by calcium deficiency
Cracking caused by excess moisture

Catfacing: distorted fruit at blossom end resulting in scar tissue forming

Stinkbug feeding

Stinkbug damaged fruit

Spider mite damaged fruit
<table>
<thead>
<tr>
<th>Stage</th>
<th>Color Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GREEN</td>
<td>Stage 1: The surface of the tomato is completely green in color. The shade of green may vary from light to dark.</td>
</tr>
<tr>
<td>BREAKER</td>
<td>Stage 2: &quot;Breakers&quot; means there is a definite &quot;break&quot; in color from green, to tannish-yellow, pink, or red or not more than 10% of the surface.</td>
</tr>
<tr>
<td>TURNING</td>
<td>Stage 3: &quot;Turning&quot; means that more than 10% but not more than 30% of the surface, in the aggregate, shows a definite change in color from green to tannish-yellow, pink, red or a combination thereof.</td>
</tr>
<tr>
<td>PINK</td>
<td>Stage 4: &quot;Pink&quot; means that more than 30% but not more than 60% of the surface, in the aggregate, shows pink or red in color.</td>
</tr>
<tr>
<td>LIGHT RED</td>
<td>Stage 5: &quot;Light red&quot; means that more than 60% of the surface, in the aggregate, shows pinkish-red or red, provided that not more than 90% of the surface is red.</td>
</tr>
<tr>
<td>RED</td>
<td>Stage 6: &quot;Red&quot; means that more than 90% of the surface, in the aggregate, is red.</td>
</tr>
</tbody>
</table>
Jointed vs. Jointless Fruit

Multiple Varieties of Tomato

BLACK KRIM

- Multiple varieties of tomato are shown, including a jointless fruit and different colored tomatoes such as black and green.
Post Harvest - Tomato

- Optimum Storage Temperature
  - Mature Green: 57-61°F
  - 3 Weeks
  - Pink: 50°F
  - 1 Week
  - Red Ripe: Room Temperature
    - Up to a week
    - Last longer at 39°F (up to 3 weeks), but I wouldn’t want to eat it!
  - All Tomatoes are chilling sensitive at temperatures below 50°F
- Optimum Relative Humidity: 90 to 95%
- Sensitive to ethylene
Pepper

- *Capsicum annuum* ("annual" growing plant)
  - Most commercially important peppers belong to this species
- *Capsicum chinense* ("from China" – misnomer)
  - Habanero pepper
- *Capsicum frutescens* ("bushy" or "shrubby" plant growth)
  - Tabasco pepper
- *Capsicum pubescens* ("hairy-like")
  - Distinct form; will not readily cross with other Capsicum species
  - Rocoto peppers

Pepper

- Not related to black pepper (*Piper nigrum*)
  - But that’s how it got it's name
- Center of Origin:
  - Pungent types: South America (Southern Brazil to Bolivia)
  - Non-pungent types: Central America to Southern Mexico
- Warm season, self-pollinated, perennial

Pepper

- Types:
  - Bell group
    - Most are non-pungent
    - Includes Pimientos as sub-group
  - Anaheim group
    - Most are mild pungent, but some are non-pungent
    - Includes Ancho & Paprika
  - Jalapeño group
    - Pungent (new varieties are mild-pungent)
  - Cherry group
    - Pungent or non-pungent
  - Wax group
    - Yellow mature color; Pungent or non-pungent
  - Tabasco group
    - Very pungent; most are processed
  - Habanero group
    - Most pungent commercial pepper
Pepper Industry

- Bell Peppers
  - Most common form in US
  - ~2/3 of total US production
- Anaheim peppers
  - ~15% of total US production
- Pimiento peppers
  - ~5% of total US production
- Jalapeño peppers
  - ~4% of total US production
- Others considered “specialty” types

Scoville Units

- Named after Wilbur Scoville
- Method to measure the heat level of a chile pepper
- A dilution-taste procedure:
  - Scoville blended pure ground chilies with a sugar-water solution and a panel of testers then sipped the concoctions, in increasingly diluted concentrations, until they reached the point at which the liquid no longer burned the mouth
  - A number was then assigned to each pepper based on how much it needed to be diluted before you could taste no heat (parts of sugar water to parts of pepper)

<table>
<thead>
<tr>
<th>Scoville Units</th>
<th>Chilli Pepper</th>
<th>Heat Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Sweet Bell</td>
<td>0</td>
</tr>
<tr>
<td>100 – 500</td>
<td>Pimentos</td>
<td></td>
</tr>
<tr>
<td>1,000 – 2,000</td>
<td>Habanero</td>
<td></td>
</tr>
<tr>
<td>1,000 – 2,000</td>
<td>Serrano</td>
<td></td>
</tr>
<tr>
<td>2,500 – 4,000</td>
<td>Chipotle</td>
<td></td>
</tr>
<tr>
<td>5,000 – 10,000</td>
<td>Hot Wax</td>
<td></td>
</tr>
<tr>
<td>8,000 – 22,000</td>
<td>Tabasco</td>
<td></td>
</tr>
<tr>
<td>50,000 – 50,000</td>
<td>Cayenne</td>
<td></td>
</tr>
<tr>
<td>50,000 – 50,000</td>
<td>Habanero</td>
<td></td>
</tr>
<tr>
<td>10,000 – 100,000</td>
<td>Serrano</td>
<td></td>
</tr>
<tr>
<td>100,000 – 225,000</td>
<td>Carolina</td>
<td></td>
</tr>
<tr>
<td>100,000 – 225,000</td>
<td>Poblano</td>
<td></td>
</tr>
<tr>
<td>15–16,000,000</td>
<td>Pure Capsaicin</td>
<td></td>
</tr>
</tbody>
</table>
Bell Peppers

• Large, blocky & blunt
• Green immature, can be red, yellow, orange, brown or purple when mature
• Nutrient content usually greater in mature (colored) fruit
• Uses: Mostly fresh (salads, cooking ingredients), but also mild salsa
Pablano Peppers

- **Pablano (Fresh) & Ancho (Dried)**
- Most popular pepper in Mexico
- Heat Index: Mild to Medium
- Scoville Units: 2,500-3,000
- Uses
  - Fresh: Chili Relleno
  - Dried: Sauces & Powders

Jalapeño Peppers

- Round, cylindrical, tapering shape
- Green immature, mature usually red, but can be yellow or orange.
- Heat Index: 2,500 - 5,000 Scoville Units
- Uses: Salsa, preserves, multiple dishes
- Chipotle: Dried, smoked, red Jalapeño
- Name comes from Jalapa, Mexico

Serrano Peppers

- Round, cylindrical, tapering shape, smaller than Jalapeño
- Green immature, mature usually can be red, yellow, orange or brown
- Heat Index: 10,000 - 25,000 Scoville Units
- Uses: Salsa, preserves, multiple dishes
- Name comes from ‘foothills’ of Puebla, Mexico
Tabasco Peppers

- Small, round, cylindrical shape
- Light green immature, maturing to yellow, then orange and finally red
- Heat Index: 30,000 - 50,000 Scoville Units
- Uses: Tabasco Sauce
- A soldier fighting in the Mexican War in the mid-1800's returned to Louisiana with some seeds from the Mexican state of Tabasco

Different forms of C. chinensis
Habanero Peppers

- Lantern-shaped, round or oblong, with a pointed apex
- Green maturing to yellow-orange, orange or bright red
- Hottest commercially available pepper
  - Scoville units: 100,000 – 300,000
- Uses: Sauces, salsas, preserves
Capsicum pubescens – Rocoto type  
Will not readily cross with other species  
Note large black seeds  

Major disease problem: Bacteria, especially on fruit  

Harvest & Postharvest Handling  
- Fresh market types always hand harvested  
  - Increased yield, thin skin susceptible to bruising  
  - Sometimes treated with hot water/chlorine bath to control bacterial rot  
  - Often sprayed with wax coating to reduce moisture loss during storage  
- Processing types can be machine harvested  
- Optimum storage: 45-50°F, 90-95% Relative Humidity (subject to chilling injury < 45°F)  
- Sensitive to ethylene – sometimes used to change color of mature green peppers
Peppers & Capsaicin

- Capsaicin is not water soluble
  - Drinking water will spread capsaicin (same goes for beer)
- Recommended first-aid:
  - Drink milk or eat dairy products
- Capsaicin will penetrate skin
- The intense burning sensation one experiences when eating hot peppers can trigger the body into releasing morphine-like endorphins, often resulting in mild euphoria