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

- **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: Through-out 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
Tomato fruitworm feeding

Colorado Potato Beetle

Fleabitele Damage

Jointed vs. Jointless Fruit

Multiple Varieties of Tomato

GREEN - Stage 1
"Green" means that the surface of the tomato is completely green in color. The shade of green may vary from light to dark.

BREAKER - Stage 2
"Breaker" means there is a definite "break" in color from green to tannish-yellow, pink or red but not more than 10% of the surface.

TURNING - Stage 3
"Turning" 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.

PINK - Stage 4
"Pink" means that more than 30% but not more than 60% of the surface, in the aggregate, shows pink or red in color.

LIGHT RED - Stage 5
"Light red" means that more than 60% but not more than 80% of the surface, in the aggregate, shows red or red and pink.

RED - Stage 6
"Red" means that more than 80% of the surface, in the aggregate, is red.

Multiple Varieties of Tomato

BLACK KRIM
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 35°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

- 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>Chile Pepper</th>
<th>Heat Range</th>
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<tbody>
<tr>
<td>Sweet Bell</td>
<td>0</td>
</tr>
<tr>
<td>Bhut Jolokia</td>
<td>10,000 – 20,000</td>
</tr>
<tr>
<td>Bhut Jolokia</td>
<td>1,000 – 2,000</td>
</tr>
<tr>
<td>Ancho</td>
<td>1,000 – 2,000</td>
</tr>
<tr>
<td>Ancho</td>
<td>500 – 2,500</td>
</tr>
<tr>
<td>Jalapeno</td>
<td>2,500 – 5,000</td>
</tr>
<tr>
<td>Chipotle</td>
<td>5,000 – 10,000</td>
</tr>
<tr>
<td>Hot Wax</td>
<td>1,000 – 10,000</td>
</tr>
<tr>
<td>Serrano</td>
<td>5,000 – 22,000</td>
</tr>
<tr>
<td>Tabasco</td>
<td>50,000 – 100,000</td>
</tr>
<tr>
<td>Cayenne</td>
<td>50,000 – 100,000</td>
</tr>
<tr>
<td>Scotch Bonnet</td>
<td>100,000 – 150,000</td>
</tr>
<tr>
<td>Piquin</td>
<td>500 – 2,500</td>
</tr>
<tr>
<td>Poblano</td>
<td>100 – 2,000</td>
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<tr>
<td>Pepperoncini</td>
<td>0</td>
</tr>
<tr>
<td>Red Savina Habanero</td>
<td>250,000 – 371,000</td>
</tr>
<tr>
<td>Pure Capsaicin</td>
<td>15,16,000,000</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

- Poblano (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
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**

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**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

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**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

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