Tomatoes 101
2025

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Tomatoes

- Probably the most favored “vegetable” grown in home and community gardens and sold at farmers markets. [Botanically it is really a fruit.]
- Fresh-grown taste better than store-bought.
- Different colors and unusual shapes of heirlooms add to the mystique, and opinions about what is best: Beefsteaks vs. cherries? Red, yellow, orange or green?
- Can’t find many in stores because of short shelf life.

History

- Tomatoes are native to the tropical areas of Central & South Americas: Mexico, Peru, Bolivia.
- Originally currant-sized – about pea size. (e.g. Matt's Mexican Midget.")
- Mexico domesticated the original and increased size to that of Cherry, or larger.
- Not accepted in all parts of early Europe when taken back by Spanish & Italians.
- English thought it to be poisonous: related to the nightshade. This perception carried over to "New" England with the emigrants from there in the 16-1700s.
- Thomas Jefferson grew them in his garden. Not widely cultivated in US until about 1835.
- Late 19th century: commercial production.

TYPES OF TOMATOES - Breeding

- **HEIRLOOM:**
  - A variety that is >50 years old, naturally developed, or/and has not been cross-bred in a laboratory research setting, or has been crossed from two different heirloom parents (?), or crossed prior to 1945.
  - Have a perceived reputation for being “fickle” to grow (Not true!)
  - Have better flavor than hybrids.
  - Thought to provide lower yields than hybrids (not necessarily!)
  - May have thinner skin, which makes them more susceptible to cracking.
  - Heirloom tomatoes have seeds that may be collected and re-sown to get plants and fruit the same as the parent.

- **Open Pollinated:** varieties that do not meet heirloom standards, but breed true.

TYPES OF TOMATOES: Breeding

- **HYBRID:**
  - A variety that has been developed in a research setting, by cross-pollinating two or more varieties, usually to bring out certain traits thought to be better, e.g. shorter growing season, larger size fruit, disease resistance, etc.
  - Catalogs & seed packets should tell you that the plant/seed is “hybrid” or have “F1” in the description.
  - Seed for hybrids must be bought new each year, i.e. If saved last year’s fruit and reused, it will not produce true; sibling fruits may all be different from each other.
  - Hybrid seeds, if saved and replanted, may not produce the same fruit as the parent plant, and/or may vary considerably from each other.

Types of Tomatoes - Breeding

- **SPORT:** a naturally occurring cross between two varieties of tomatoes, heirloom or hybrid
- **GRAFTED:** Top part of one variety is put onto a rootstock of another variety, to gain certain characteristics. Bought as a plant. Seed may have unknown characteristics. Expensive. Used in commercial greenhouse production a lot.

TYPES OF TOMATOES: Plant size

- **DETERMINATE**: also called “bush”, “compact”, “patio”
  - grows only to a certain height, then blooms and sets fruit more or less all at the same time. Blooms are at the end of branches, which stops growth.
  - This is good for those who want to preserve a crop.
  - Determinates tend to be earlier season plants,
  - with smaller fruits.
  - *May not* need staking/caging.
  - Many are hybrids.
  - Easier to grow in a container or hanging basket (smaller varieties, e.g. “Tumbling Tom”).

Types of Tomatoes: Plant size

- **INDETERMINATE**: “Pole”, “vine”
  - continues to grow maybe to 6-8ft,
  - blooms and sets fruit all season long, into the Fall. Blooms are all along stems & branches.
  - Tend to be taller, and later season,
  - with larger fruits that take longer to develop.
  - Most heirlooms are indeterminate.
  - Need heavy trellising/caging.
  - Some people say they need to be “pruned.”

Types of Tomatoes: Plant size

- **DWARF, SEMI DWARF:** varieties that have short internodes, and therefore may be "naturally" short. May be determinate or indeterminate. Good for containers. e.g. "Husky Gold," "Patio." Some are <2ft tall; some 12-18" e.g. "Tumbling Tom," and may be used in hanging baskets.
- **SEMI-DETERMINATE:** grows taller than a determinate and may set fruit over a longer period

TYPES OF TOMATOES: Size/Shape

- MINI/MIDGET/CURRANT: about ½" or less, e.g. "Matt's Mexican Midget"
- CHERRY: round, about ½" to ~1" e.g. "Black Cherry, " "Sun Gold"
- GRAPE: an elongated cherry tomato, e.g. "Juliet, Brad's Atomic Grape"
- PLUM: elongated medium size tomato, larger than a grape; usually "meatier" e.g. "Roma" or "Amish Paste."
- ROUND/GLOBE: spherical: e.g. "Big Beef" or "Arkansas Traveler"
- OBLATE: oval; not quite round: e.g.
- FLATTENED: slightly "smashed" round, wider than high, e.g. "Brandywine"
- PEAR: stem (upper) end is smaller than the blossom (lower) end; bulbous; "piriform," e.g. "Yellow/Red Pear, " Speckled Roman."

Types of Tomatoes - Shapes

- STRAWBERRY – bigger at the top (stem end) than the bottom.
- OXHEART: same as a strawberry, but may be larger e.g. “Cour de Toro”
- RIBBED: the fruit is irregular with “humps” around it from top to bottom, like a pumpkin. May be all around the fruit, or only the shoulders, e.g. “Marmande” or “Costoluto Genovese”
- SAUSAGE: longer than wide, like a link sausage, e.g. “Green Sausage,” “ Banana Legs.”
- BEEFSTEAK: generically, an extra large tomato. (There is a variety by that name, as well.)

Tomato Color

- Name of the variety may give you a clue to its color:
- Red – usual color to which people are accustomed, " Campbell" Due to Lycopene.
- Pink – a lighter shade of red, e.g. Mariana's Peace," "Arkansas Traveler"
- Purple/ "Black" – really a dark red with some blackish/greenish overlay, e.g. "Black Krim," "Indigo Rose"" Due to pigment Anthocyanin.
- Yellow – may be light/pale to taxicab yellow, e.g. "Taxi," Banana Legs" Due to Xanthophyll
- Orange – bold orange usually, as in an actual citrus orange, maybe more red or more yellow e.g. "Valencia" Caused by Carotene
- White – really a light to very pale yellow: e.g. "Great White"
- Green – when ripe, usually has a paler to yellowish back ground: "Green Zebra." Aunt Ruby's German green. Chlorophyll
- "Chocolate" – red with a green overlay that makes it look brown (ripe color); e.g. "Chocolate Cherry"
- Bi-Color: a combo of colors show, either external and/or internally, e.g. red/yellow, e.g. "Pineapple," "Ananas Noir."
- Striped: streaked with one color over another, "Speckled Roman," "Striped German, Pink Berkely Tie Dye. "

Tomato Leaf Types

- Potato leaf – smooth edges
- Regular leaf
- Fern leaf

Finding Tomatoes/Seeds

- Any of the local nurseries/"big-box" stores
- Online/Catalogs: rareseeds; totallytomato; tomatofest; southernseedexchange; botanicalinterests; SeedSavers Exchange; Edenbrothers; tomatogrowers; bakercreek, cooksgarden; burpee, park; mypatriotsupply; heirloomseeds; RShumway, Johnnyseeds; anniesseeds; Renesgarden; Seedsofchange; Territorial Seeds; Jung; Reimers; harrisseeds; seedrack; tomatobobs; heinzseed; many others
- Save your own from previous season's heirlooms

Tomatoes: to begin

- Easiest way:
  - go to nursery to buy ready-to-go plants.
    - Nice dark green leaves and stout plant
    - Check for insects & poor looking/droopy leaves.
  - May need to hold the plant in house until plant is hardened off, and weather is amenable to planting it outside.

Tomatoes to Start

- *Tomatoes are easy to start and grow.*
- Know your tomatoes: variety, type, ht, mat. date?
- Seed: Start about 4-6 weeks before last frost date. Frost date varies depending upon location: April 15 Los Lunas-April 20 Alb. - May 20 or later (East Mts.)
  - Start indoors with sunny area, south window or greenhouse
  - Heirloom seed from previous year may be used.
  - Hybrid seed/grafted plants must be bought.
  - Viable seed life is 4-5 yrs., though may do well after that.

Viability Test for seeds

- Put 10 seeds on moist, not soggy paper towel,
- Fold it over seeds.
- Put into plastic zipper bag, and seal.
- Label with variety name & date.
- Put bag in warm (~70ºF.) area, e.g. on top of refrigerator, for 5-10 days.
- Check after4-5 days.
- If 7 seeds germinate (70%), seed can be used. But can put 2 seeds into each pot to ensure a viable start.

Starting Tomato Seeds

- Use whatever you have, or can afford: peat/coir pellets & pots; “cow”pots; commercial set-ups; recycled plastic clamshells, egg cartons, TP inner rolls, boxes, cartons; nursery pots, cell packs; “flats.”

Growing Tomatoes - Seed

- Clean pots/trays, especially if it may have housed diseased plants prior. Use a 1:10 chlorine bleach/ or H2O2 solution to disinfect if needed.
- Make sure the containers you use have drainage holes.
- “Catch tray,” saucer or basin for water under the plants.
- Material for labels
- Use a high quality sterile seed starting mix such Jiffy Mix, Pro Mix or Ferry Morse Seed Starting Mix, or pellets.
- To avoid problems such as damping off, *do not use garden soil; do not over water.*
- Place seeds ¼” deep into the moistened – not soggy – mix and cover.

Growing Tomatoes - Seed

- Label immediately, it's very easy to lose track of varieties.
- Water gently with a fine spray or water from the bottom by setting planted containers in a larger pan with an inch of water in it.
- To retain moisture, cover with plastic dome or slip into a plastic bag. Open once a day to ventilate then reclose until seeds germinate. They should not need water but if the top looks dry, spray with water very gently.
- Keep plants in a warm location, 75 -80 °F. optimally, in full sun area if possible.
- At night, provide bottom heat by using seedling heat mats or regular heating pads on low setting.

Growing Tomatoes

- **HEAT:**
  - Heat mat may help. (Cost: ~$32-35 each) OR, old heating pad on low. Leave on until most germinated.
  - Heating cables in ground of cold frame
  - Greenhouse: has some different problems.
  - Do not leave seed tray on mat after the majority of seeds have germinated. Makes them “leggy.”

LIGHT: Sun is best!

- Move to sunny area inside for as long as sun/day is.
- Once germinated, do not leave lid/plastic on top if in direct sun!
- Outside if temp 55-60º or greater once two sets of true leaves.
- Protect from wind, especially if cool.

Growing Tomatoes

- LABEL YOUR SEEDS & SEEDLINGS!!!
  - As you plant and transplant them and
  - Before you move to seeding or transplanting a different variety
  - Indelible ink/black pencil. Others will fade/wash off
  - Box of tongue depressors or popsicle sticks, or label the cup itself, or masking tape on 6pk, each plant after separated, etc.

Growing Tomatoes: Light

- **Artificial light**:
  - 16 hrs per day best: e.g. 6am to 10pm.
  - Use a timer
  - Regular light table or make a setup.
  - All “natural” or “daylight” bulbs in shop-type lights: two 40 watt or LED bulbs per lamp. Two sets per shelf may be needed.
  - Suspended right above tops of plants without touching the light.
  - Raise light as plants grow.
  - As soon as possible, get plants into the sun instead of indoor light.

Growing Tomatoes

- **TRANSPLANT**: seedlings to larger containers, at least once, e.g. to 4,”or 6” nursery pots or 8oz, 12oz, 16 oz. cups; gallon pot if plant over 12” tall or must be held for a time.
  - The more sun, the stockier they may be.
  - NOTE: some varieties are thinner than others, and with fewer or more leaves
  - When separating seedlings, CAREFULLY hold them by LEAVES, not stem, and gently pull to separate the roots.
  - Poke a hole in receiving potting mix, drop in seedling and firm mix around it. Do not pack it too tight.

Growing Tomatoes: Moving Outside

- Tomato plants will not grow in Temp.~55ºF or less.
- May move outside (?mid-April) to cold-frame/protected area. South-facing. *Protect from wind*.
- 4 Bales of straw ($6-7 each) and an old 6-10 light door, or window, shower door, piece of plastic to fit the opening between bales makes a nice cold frame. Can be partly in-ground.

Growing Tomatoes

- "HARDEN OFF" before planting in full sun. Set plant initially outside in shade, when temp 50ºF. or greater. Over a week, gradually expose it to increasing periods of direct sunlight. *Protect from wind*.
- Prepare garden area for tomatoes. Compost rich. Drains well. Plant ~May 1 (Cinco de Mayo?) in Abq.
- Generally, sturdy plants at least 6" tall. Remove any blossoms.
- May be earlier (mid-April?) if protected by hot caps, plastic jugs, soda bottles, "Wall-o-Water™", "Krazy Koats,™" row cover, plastic tunnel, lights, etc. (Probably will not grow much till 65-70ºF.) *Watch the heat level inside the covering*.

Planting Tomatoes

- After plants have been exposed to at least 6 hrs. of sun for a couple of days,
- Dig hole deep enough, if possible, to bury plant ½-2/3 of length.
- Tomatoes have the ability to root from the stem. This makes a bushier plant.
- NOTE: “Leggy” plants may be laid on their side in a trench with just the top showing. Cover stem all the way with dirt.

Growing Tomatoes

- **Support**
- Fewer problems if plant is not allowed to sprawl.
  - **Cages**: inverted pyramid, square tower, spiral,
  - **Remesh wire**: roll around plant. Width of roll for indet.; Half width for determ. If using tubs, decide if you want mesh inside of outside the tub, measure & cut accordingly.
  - **Trellis**: wire or heavy twine; tomatoes get heavy as they grow and put on fruit. Netting between poles.
  - **Tripod:** with one plant per "leg" tied to it.
  - **French/Florida fence**: two stakes with wire on either side of row of plants. Weave wire/twine back & forth between plants and poles.
  - **Stakes & ties**: One stake /plant with ties of some type, not constricting the stem. (Used in Greenhouses)
  - Others: **picket fencing** formed into circle; tied along **chain-link** fence, **cattle panels**

Tomatoes - Pruning

- Controversial
- Done only to Indeterminate plants
- A sucker is produced at each main branch in the angle next to main stem.
- To rune: pinch out the sucker growing in the “Y” of the branches.
- Decreases fruit and potential seed production, but increases size of what’s left
- May increase chances for sun burning.
- Makes it easier to tie main stem to support and manage.

Growing Tomatoes

- **Fertilizing**
  - Tomatoes are heavy feeders.
  - N-P-K (10-10-10) + minor nutrients as well: Zn, Ca, Fe, S, Si, Mn, MG
  - (Soil test will tell what is missing in your soil – as you prepare the bed.)
  - Do not fertilize until the first transplant – after first “true” set of leaves, or when roots outgrow pellets, pots, etc.
  - Fertilize at planting (into ground): mix w/ dirt in bottom of hole – 1 c. alfalfa meal/pellets, ½ c. Epsom salts ($MgSO_4$), and 2 TBS. timed-release fertilizer.
  - Organic: Fish emulsion, Seaweed/ kelp meal, bone meal, Blood meal.
  - Fertilize minimum every month, with a fertilizer higher in P than N. Specific tomato/vegetable fertilizers.
  - DO NOT NEED HIGH (>10 parts) N! Read pkg. directions. MORE is NOT better!
  - If more dilute, can do q2 weeks.

Growing Tomatoes

- **Watering – Do not need to water daily generally.**
  - Watch plants on a daily basis to see how they look! ?Wilted?
  - When the planting medium is dry to the touch, and lighter brown color
  - USE THE FINGER TEST!
  - Water at *soil level* – enough to get to bottom of *root zone*.
  - Probably every two-three days when in the direct sun.
  - Tomatoes seem to be somewhat drought tolerant, but need water REGULARLY. (Include rain in watering schedule.)
  - Containers (Min. 5 gal – 14”) may need more water than in-ground plants, but not daily. Watch for soil compaction 2° dryness. Grow bags may be better.
  - Younger plants may need less watering than older/larger ones, but just as regularly.
  - Mulch will help conserve moisture and keep it more even. Pine needles or straw, native tree trimmings.
  - Tomato plants may benefit in mid-summer heat from ~ 30% shade: fencing, shade cloth, screening, old gauze, etc.

Tomato Problems

- There are problems to growing tomatoes, as with any crop or plant family. Most occur with the planter.
  - **Environment**: elevation, sun/heat, wind, monsoon, native soil (pH >7.0)
  - **Grower**: over/under watering; over/under fertilization; wrong planting time, method, lack of knowledge
  - **Insects:** leaf hoppers, thrips, Fruit worms, horn worms, white flies
  - **Disease:** bacterial, viral, fungal

Disease Designations

- V **V**erticillium wilt
- F1,F2,F3 **F**usarium wilt (races 1, 2, 3)
- N **N**ematodes
- A **A**lternaria stem canker
- T **T**obacco mosaic virus
- St **S**temphyllium
- Tswv **T**omato spotted wilt virus
- EB **E**arly **B**light
- LB **L**ate **B**light

Tomato Plant Diseases

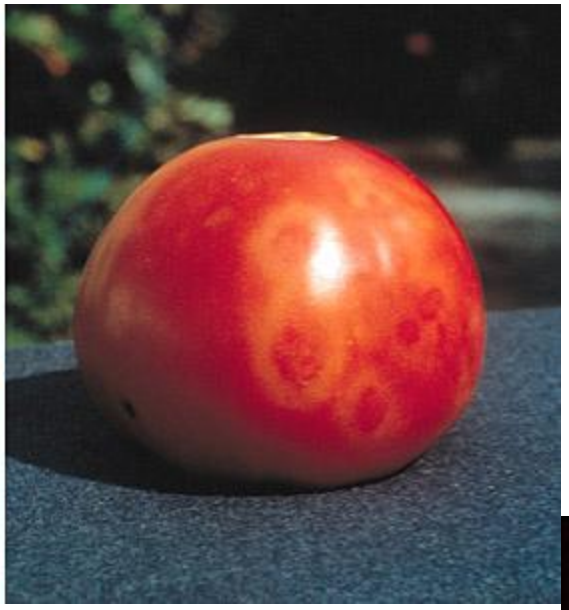
- BEET CURLY TOP VIRUS: caused by a virus transmitted by beet leafhopper.
- *Pull your weeds, especially London Rocket (Wild Arugula).*
- Difficult to control, because by the time the plant shows signs of infection, insect is long gone. Plants are stunted, leaves roll inward and cup/twist upward, while petiole slants downward. Purple veins. NMSU H-106
  - NOTE: Some varieties of tomatoes in the early growth have purplish coloring to otherwise normal veins & leaf undersides.
- Difficult to differentiate viruses without sending to plant pathology lab. (NMSU, thru county extension agent.)

Beet Curly Top Virus in Tomato

Tomato Diseases

- TOBACCO MOSAIC VIRUS (Tmv): May start anywhere; affects fruit, too; interveinal spotty yellowing of the leaves, and multiple “rings” of yellow on ripe fruit, and possibly renders them inedible.
- Do not smoke or use tobacco around the tomato plants, or even when planting!

Tomato Spotted Wilt



Tomato Diseases

- POTATO MOSAIC VIRUS: Similar to Tomato mosaic virus. Do not plant potatoes and tomatoes near each other.

Tomato Plant Diseases:

- TOMATO SPOTTED WILT VIRUS (Tswv): caused by thrips; unripe fruit spotted; stunted growth, bronze-colored leaves; die-back of terminals, dark streaked growing tips; starts on newer growth.

Tomato Diseases

- LATE BLIGHT: *(Phytophthora infestans)* May start end July/Aug. As with early blight. Remove all debris under plants, dead weeds, and do not overwinter plants in ground. Fungicide?

Tomato Plant Conditions

- BLOSSOM-END ROT:
- not a disease,
- caused by a lack of calcium, little actual calcium available to the plant (as in: it was planted in pure peat/potting mix),
- or from too much/irregular watering. In our *native soil*, it is difficult to have too little calcium.
- May need to add to those in potting mix.

- Blossom end rot

Tomato Conditions

- CRACKING:
- a condition that occurs after the plant has received excessive water, which cannot keep up with the inflow, and the skin “cracks” to allow for expansion.
- Some varieties are more susceptible to cracking, espec. thin-skinned. If left on the vine after cracking, the fruit will mold, rot, draw insects, become unusable.

Tomato Plant Conditions

- **SUN SCALD:** brown patches on the sunny side of the fruit, which will turn white, and eventually rot.
- Cover sunny side of the plant with netting, shade cloth (30%), screen wire, light cloth or row cover, or similar protection. Do not “prune” in this country. The plant needs its leaf cover.

Tomato Plant Conditions: "No Fruit”

- There may be any of several reasons for this condition:
  - The plant is not to its maturity date yet.
  - The plant has received too much nitrogen.
  - The plant has received too much water.
  - The temperature may be greater than 90ºF.during the day, or <75ºF during night, at which point fruit-set stops.
  - The plant may not be getting enough phosphorus - difficult to imagine in our native soil. May occur in potting mix soil.

Tomato Plant Conditions

- PHYSIOLOGICAL WILTING:
- a *NORMAL* process
- the plant “wilts” (reversible) when transpiration exceeds its ability to up-take water/nutrients and distribute it to the plant parts.
- The leaves will roll up at the edges, but will remain green and usual looking. This usually happens when it is really hot: 90-100ºF. during the hottest part of the summer.

Physiological Wilting

Tomato Problems

- Insects
  - Horn worms –They eat the Whole thing! Hand-pick and put in soapy water or put where birds eat! Caterpillar of a pollinator hawk moth. May be brown, depending upon species. Check at night with a flashlight to see reflective stripes.
  - Fruit worms – ¼” holes into fruit.
  - Stink bugs – suck, make dimples in fruit
  - Scavengers – feed on rotted/split tomatoes

Tomato Problem Solutions

- Keep garden clean of debris!
- Rotate crops if possible!
- Companion planting: Onions, marigolds, nasturtiums, chives, parsley
- Allow native predators! Insecticides kill both bad and good insects

Tomato Problems

- Chemical residual & overspray (Note that the color is normal, just deformity and twisting
- Roundup 2-4-D pesticide

Tomato Problems

- Nutritional deficiencies
  - Calcium: blossom end rot
  - Magnesium: green veins/yellow inter-veins, younger leaves first
  - Iron: Yellow veins/green inter-veins, older leaves first

Summary - Tomato Problems

- **The best way to avoid the problems:**
  - DO NOT GROW TOMATOES!
  - Absent that, do the following:
  - Grow plants resistant to the diseases: VFFNTmvSATswv
  - Grow hybrids
  - Rotate crops, as much as possible - every 3 yrs.
  - Solarize your soil. (Note: kills beneficial stuff, too!)
  - Use containers, tubs, and soil-less potting mix,
  - Pull & keep down weeds.
  - Remove debris from ground. Pull plants in fall. Do not compost diseased plants.
  - Mulch heavily under plants, but not against stem.
  - Inspect plants regularly.
  - Do not over/under fertilize.
  - Do not over/under water.
  - If at first you don't succeed, try, try, and try again!

References

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- www.rareseeds.com
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Tomato Plant Sale

- Who will grow tomatoes for the AAEMG Tomato Plant Sale end of April?
- Put your knowledge to work and grow any number of plants to donate for our sale. We usually have ~ 1000 plants, which used to be all member grown.