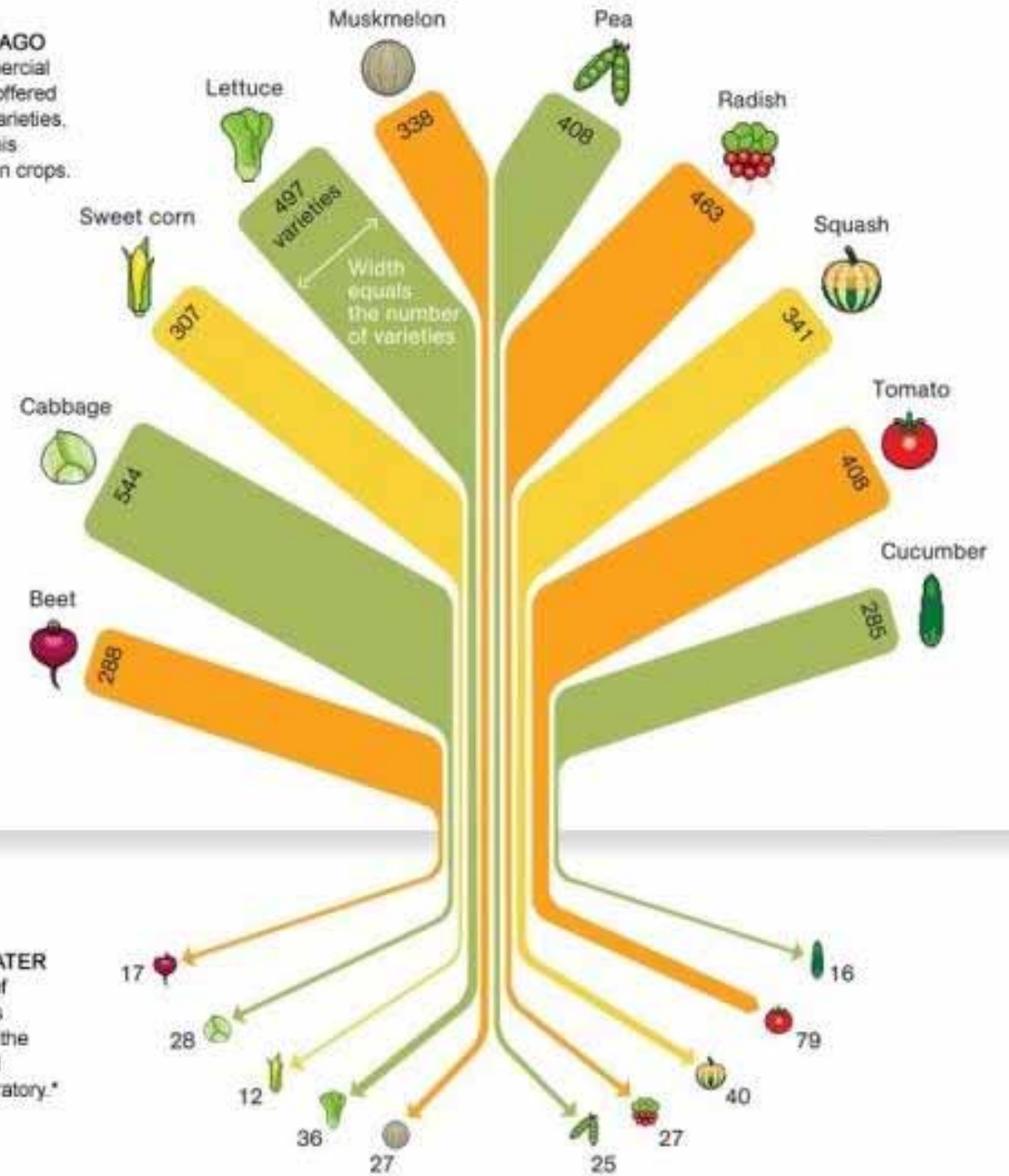


Special Considerations When Growing Heirloom Vegetables

A CENTURY AGO
In 1903 commercial
seed houses offered
hundreds of varieties,
as shown in this
sampling of ten crops.



80 YEARS LATER
By 1983 few of
those varieties
were found in the
National Seed
Storage Laboratory.*

General heirloom info
examples of varieties

Challenges of growing heirlooms

Pest Issues

Grafting

Seed saving/seed treatment

Variety/Cultivar

A named “type” of a vegetable

- taste, shape, color, size, length of season, etc.
- adapted to certain climates and soils
- resistant to certain insects/diseases

Hybrid or open-pollinated

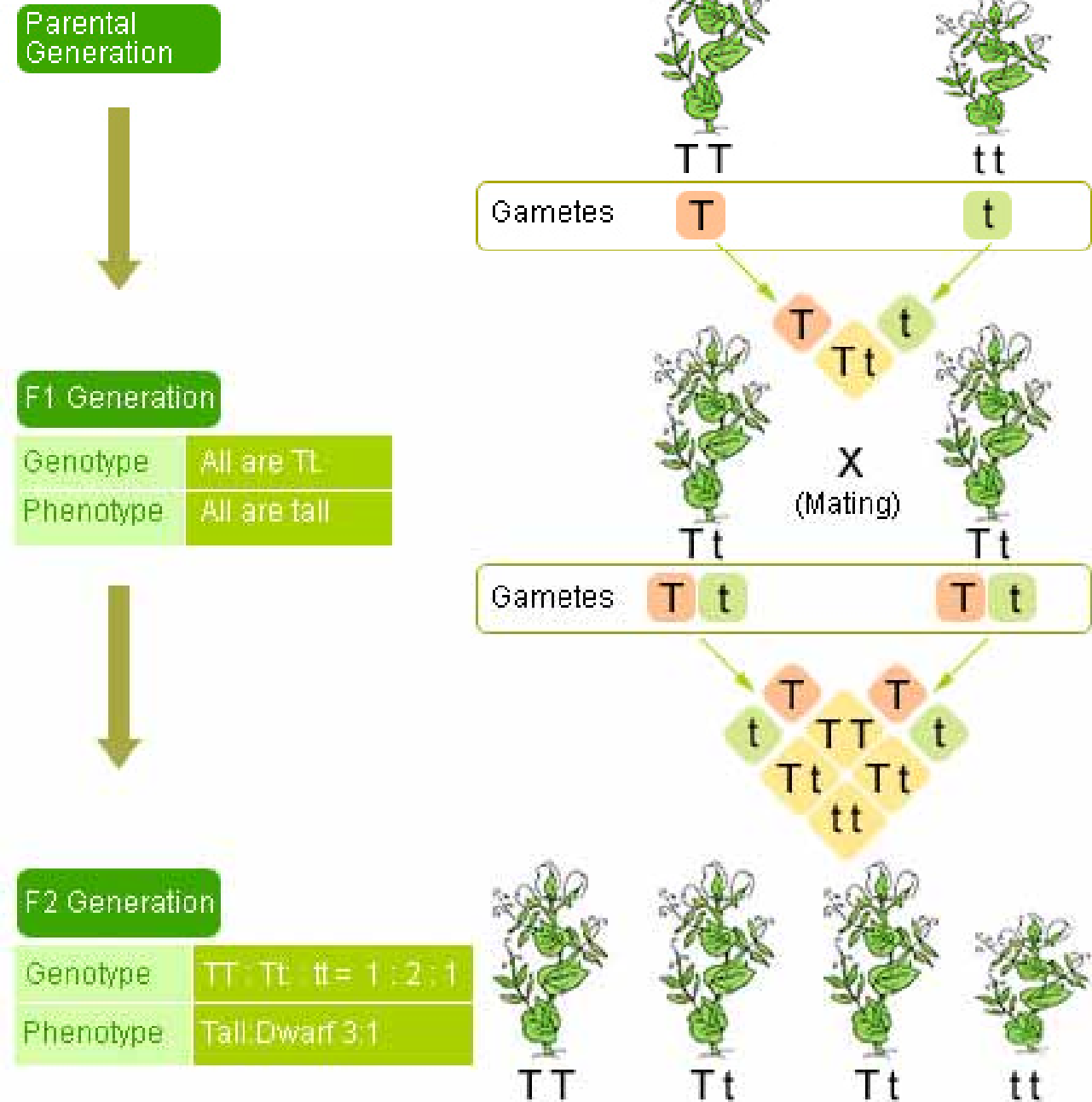


Hybrid

Cross made between two "pure" individuals

"F₁ Hyb"

Seeds will not have same characteristics



Open-Pollinated Varieties

Characteristics of offspring is similar to parents

provided proper care has been taken to prevent out-crossing with other varieties



Heirloom Vegetable Varieties

Open-pollinated

Developed over several generations in a limited geographic area

Cultural connection with human society of origin
seeds are passed on through generations

Can save seeds (isolate cross-pollinating species like herbs, melon, squash)

Primarily selected for shape, size, and flavor, to the detriment of disease resistance, cracking, and splitting

Early Scarlet Horn Carrot

One of the oldest vegetable varieties still in cultivation, introduced in 1610

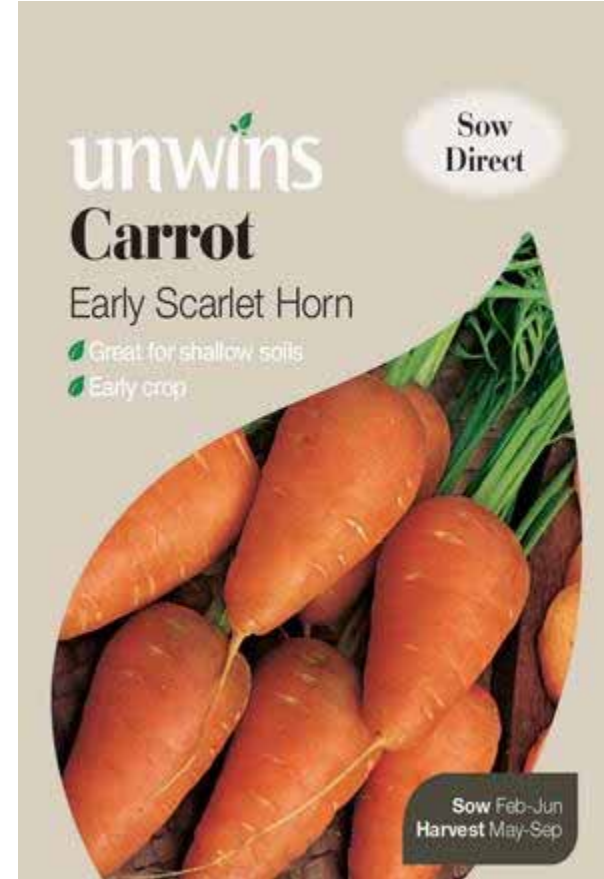
The name actually comes from the town of Hoorn, Holland

One of the first two carrots grown in the U.S.

In 1889, one seed supplier description:

"One of the best for table use and one of the most popular varieties grown for an early crop"

Sweet, stout carrots up to 4 inches long; 60 days



Brandywine Tomato

Been around for more than 100 years

May have been introduced by Burpee's in 1886

First known as 'Turner's Hybrid'

Produces generous crops large, flavorful tomatoes

90 days



Jenny Lind Melon

Originated in 1850s, named for the Swedish opera singer

Was the leading early green-fleshed variety for fresh market

Small, flattened melon that averages about a pound and a half

Sweet, juicy green flesh; ripens in 70-85 days

Too delicate for shipment

parent of a number of other popular varieties



Hubbard Squash

Originated in West Indies or South America
introduced to trade in 1840s

Hubbard, Blue Hubbard, Wartyed Hubbard

1909 seed catalog description:

"Fine grained, dry, sweet, and rich flavored,
esteemed by many to be as good baked as a
sweet potato."

A standard against which all other hard-
shelled squash are judged; award-winning

100-120 days



Why grow heirloom varieties?

The variety of varieties

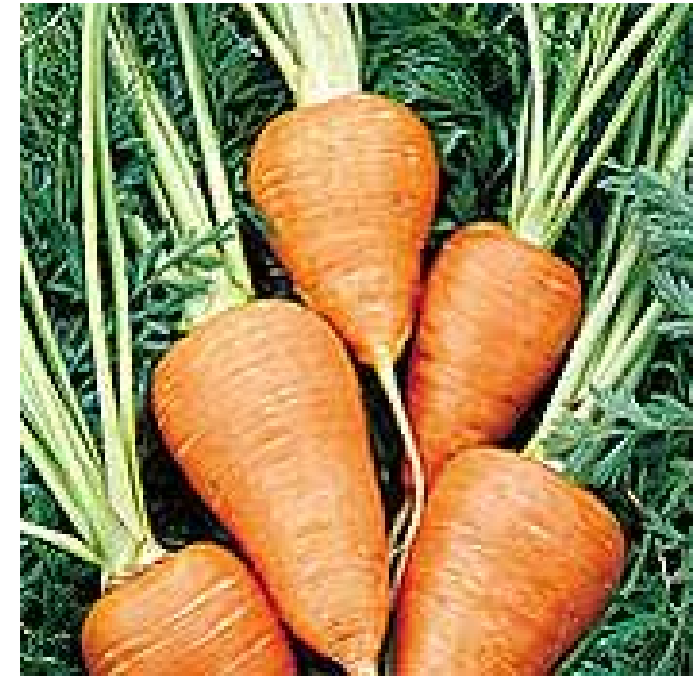
The biodiversity: flavor, color, shape, size

In demand by consumers and restaurants: tomatoes - \$2 to \$5/lb

Iowa State University: potential net returns (at \$2/lb of Brandywine producing 9 lb/plant) of \$625 per 400 sq. ft. of bed space.

To save seeds

The challenge



Kaysville Farmer's Market Tomato Taste Testing Results

| <u>Variety</u> | <u>Votes</u> |
|----------------------|--------------|
| Sunsugar | 30+ |
| Celebrity | 25 |
| Charger | 21 |
| Better Boy | 19 |
| Rutgers (OP) | 15 |
| Cherokee Purple (OP) | 11 |
| Jet Star | 11 |
| Pineapple (OP) | 6 |
| Mr. Strikey (OP) | 4 |
| Champion II | 4 |
| Golden Queen (OP) | 2 |
| San Marzano | 0 |

The Challenges of Heirloom Vegetables

Variability from seed lot to seed lot



The Challenges of Heirloom Vegetables

Some take more days to harvest



The Challenges of Heirloom Vegetables

More labor

- harvested by hand
- careful handling and shipping
- staking





The Challenges of Heirloom Vegetables

Less yield per plant/greater losses

- shorter shelf life
- not as forgiving of poor soils
- thin skinned
- skin cracking
- don't ship well



The Challenges of Heirloom Vegetables

Very little disease resistance

- bacterial leaf spot
- early blight
- late blight
- verticillium wilt
- fusarium wilt



Bacterial Leaf Spot

- *Xanthomonas campestris*
- Occasional on tomato, peppers, carrots
- Overwinters on crop debris or is introduced on seed or transplants
- requires warm, moist conditions







Bacterial Leaf Spot Management

Maintain optimal watering and fertilization

Crop-rotation (3 years)

Sanitation:

remove weeds and volunteer tomatoes

Fungicides

Actigard alone, or alternating with Copper (Cueva)



Early Blight

Alternaria solani

tomato, potato

Overwinters on infected crop debris

Requires warm, moist conditions

Older foliage affected first



Early Blight

Bulls-eye spot
on older leaves
with yellow
halo

Black, sunken
spot on stem
end of fruit –
but fruit not
normally
affected in
Utah



Early Blight Management

Compost-amended soil reduces infestation

Good sanitation practices

Crop rotation (3-4 yr)

Fungicides

- Copper (Cueva)
- Sulfur
- Compost tea plus Serenade, Sonata, or Double Nickel 55
 - research shows effective reduction in disease



Late Blight

Phytophthora infestans

tomato, potato

Overwinters on plant debris or introduced by wind-blown spores

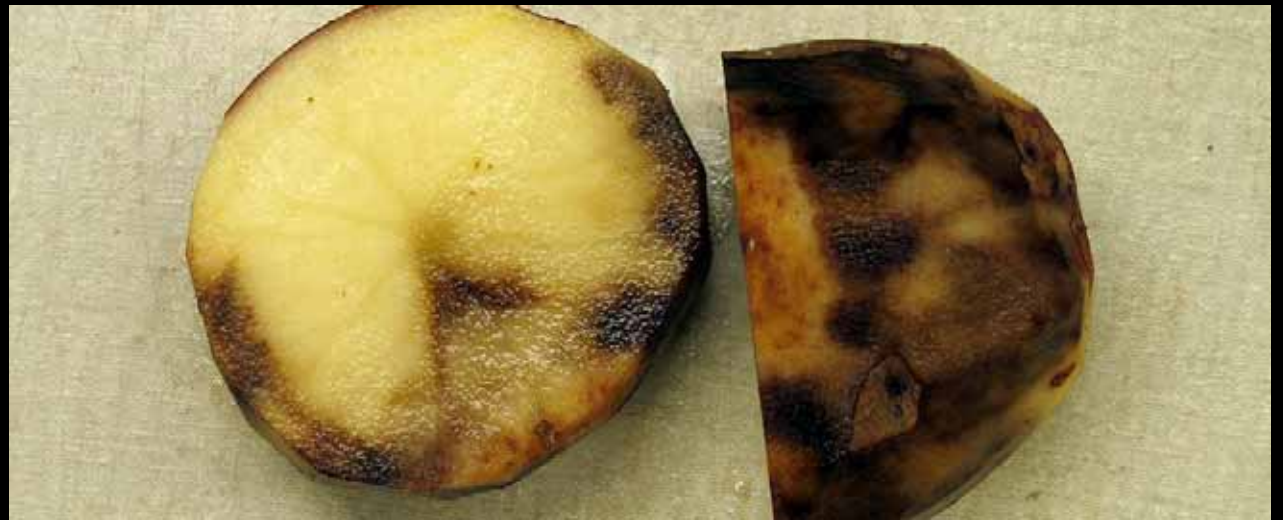
Needs cool, moist conditions

Succulent foliage affected first









Late Blight Management

Sanitation:

- remove all plant debris at end of season
- remove volunteer plants and solonaceous weeds
- remove infected plants immediately

Good air circulation (stake and prune tomatoes) and minimize leaf wetness

Fungicides only prevent infections

- Copper: Cueva or NuCop
- Biologicals: Double Nickel 55, Serenade WP (*Bacillus subtilis*), Sonata (*Bacillus pumilus*)
 - average control



**Bacterial Leaf
Spot**



Early Blight



Late Blight

Verticillium Wilt

Verticillium dahliae

pepper, tomato, potato, eggplant

Occasional problem under no crop rotation

Needs cool, saturated conditions

Lowest leaves show symptoms first





Verticillium Wilt vs Tomato Russet Mite



Fusarium Wilt

Fusarium oxysporum

melons, squash, pumpkin

Overwinters in soil debris for many years

Needs cool soil temps, moderate moisture, and high soil pH for severe disease

At higher temps, infections occur, but plants become stunted instead of wilting







Fusarium and Vert. Wilt Management

Improved soil structure with amendments/green manures

Crop rotation (6 – 7 years)

- corn, hairy vetch

Sanitation

- weeds
- diseased tissue
- cull piles

Disease Resistant Heirlooms

Melons (fusarium)

- Calsweet watermelon
- Crimson Sweet watermelon
- Minnesota Midget melon

Tomato (verticillium and fusarium)

- Abraham Lincoln
- Clint Eastwood's Rowdy Red
- Oregon Spring
- Rutgers VF

Tomato (late blight)

- Black Plum
- Big Rainbow
- Matt's Wild Cherry
- Pruden's Purple
- Wapsipinicon Peach

Tomato (early blight)

- Legend
- Manyel
- Old Brooks
- Tommy Toe

Grafting

First reports of vegetable grafting occurred in Asia in the 1920's

Fusarium wilt of melon

Popularized in Japan and Korea; tunnel and greenhouse production



Scion

Rootstock

Benefits of Grafting

Management tool for soilborne disease

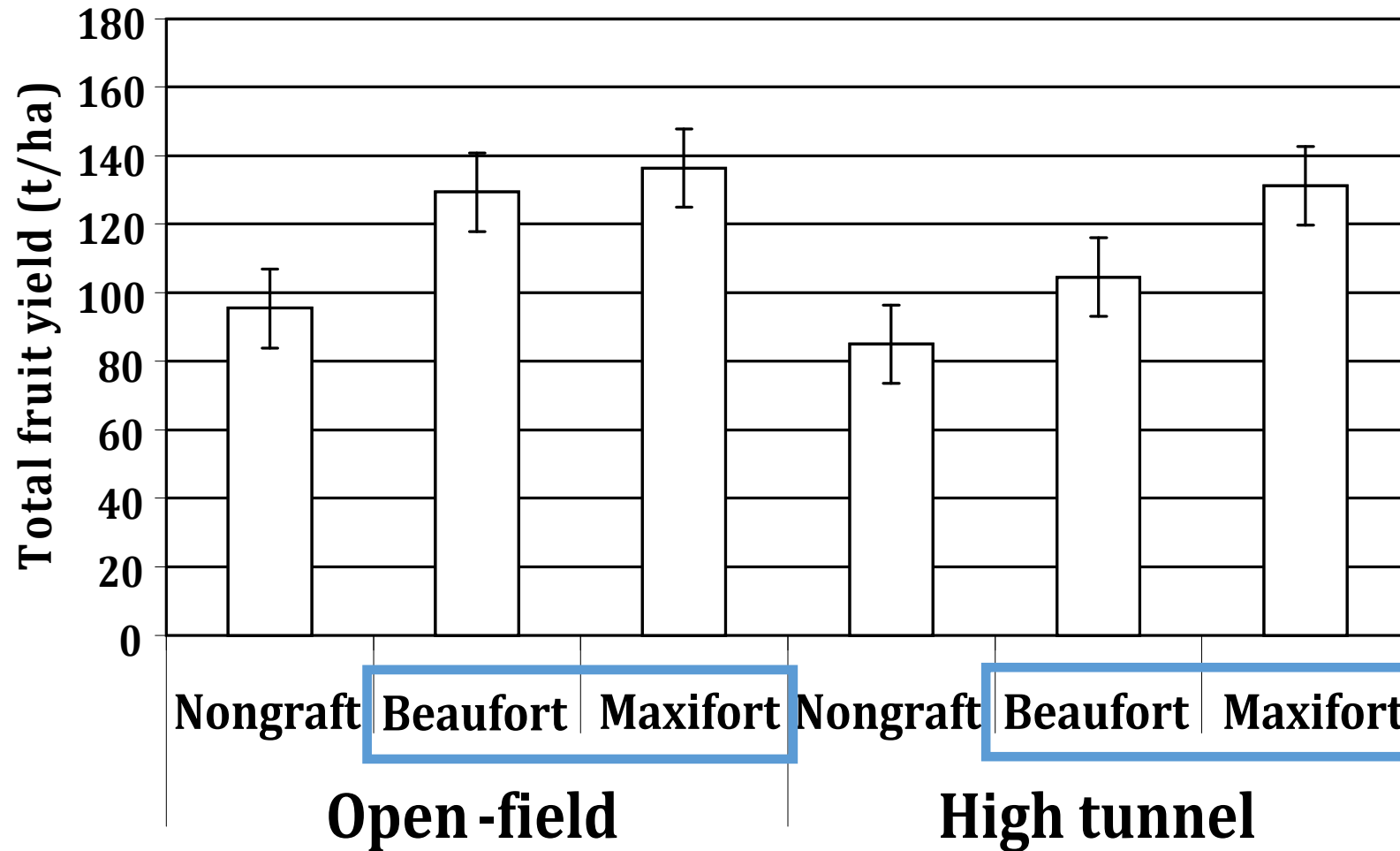
- disease diagnosis and rootstock selection are critical

Increased yield through added vigor and nutrient uptake

Cultural management may reduce economic constraints

- planting density
- pruning/training
- fertility

Yields of Brandywine Tomato Grafts, NC State





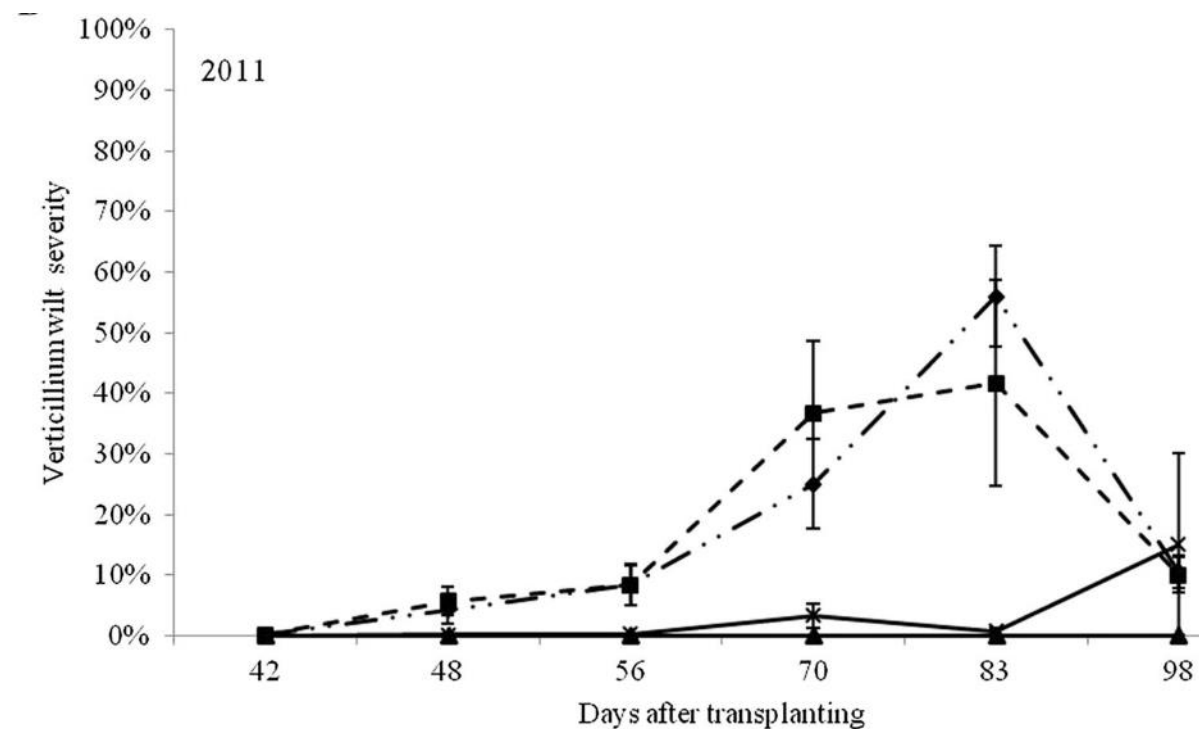
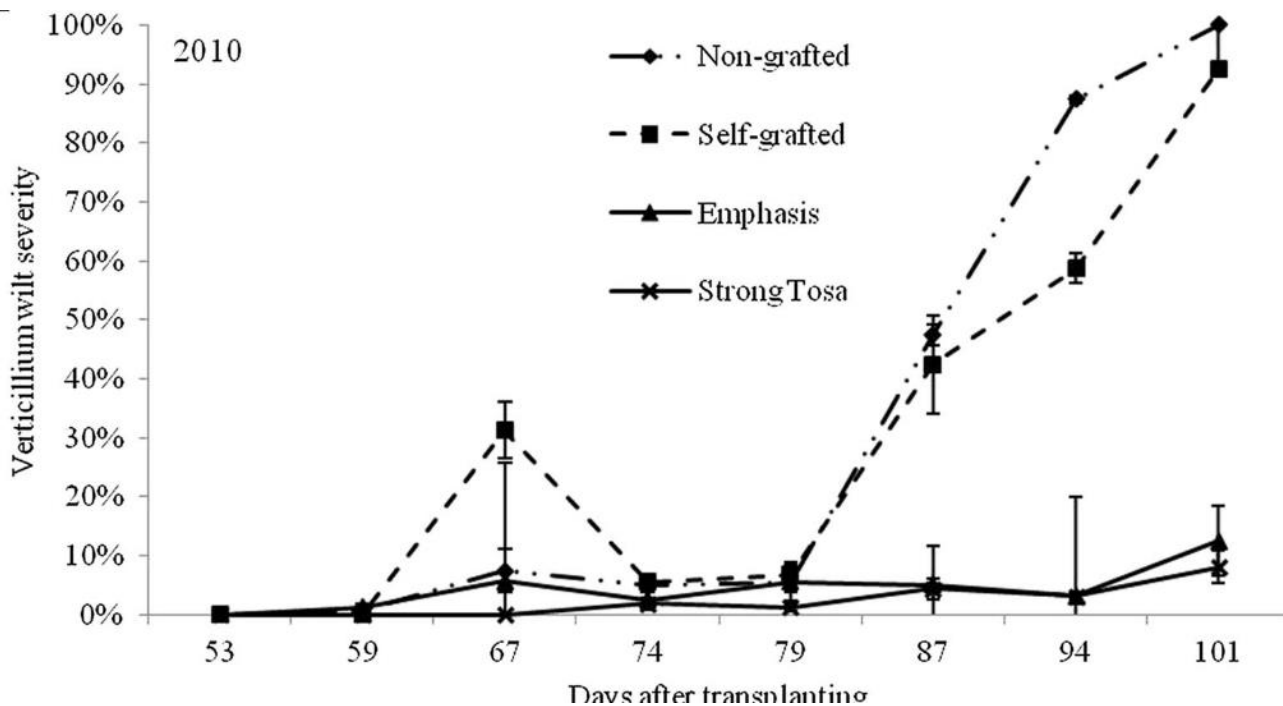
NON-GRAFTED

MAXIFORT

Late Blight Grafted plus Organic Mgmt



Verticillium Wilt Severity of Grafted Watermelon, Washington State University



Grafting Basics

Start rootstock and scion seedlings at same time

Make sure plants are not water or nutrient stressed

Have a clean working area

Disinfect hands, tools, and grafting clips

Carry out grafting indoors

Move plants immediately to humid environment

Tube/Top Grafting



Wedge Grafting



Crops in Pots



Saving Seeds

Isolate varieties that may cross-pollinate

brassica, cucurbits

Collect from healthiest fruits from healthiest plants that represent the variety's traits

preserve the heirloom variety's genetic makeup

Grow enough plants of self- or cross-pollinating plants to ensure vigorous seed

howtosaveseed.com



Danger of Seed-Saving: Diseases

Yield loss

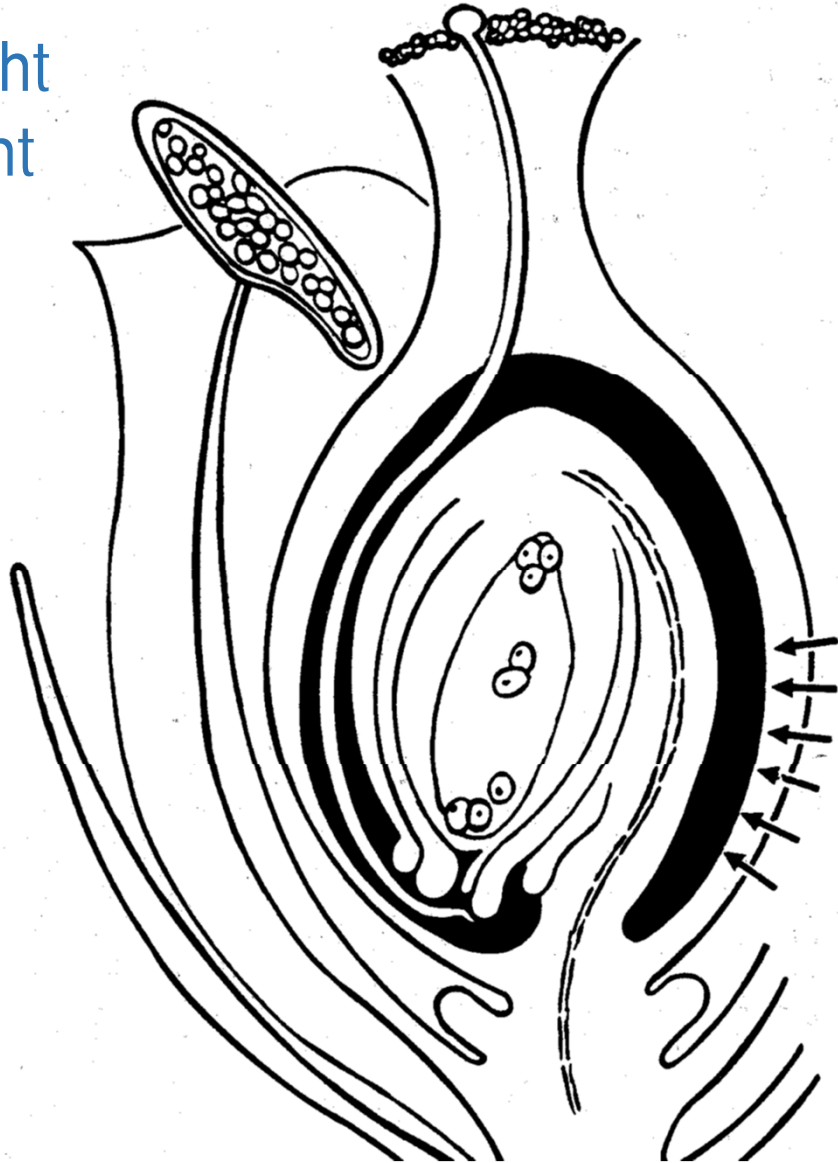
Reduction in seed germination & vigor

Seed transmission of pathogen(s) to new crops

Infection of harvested seed

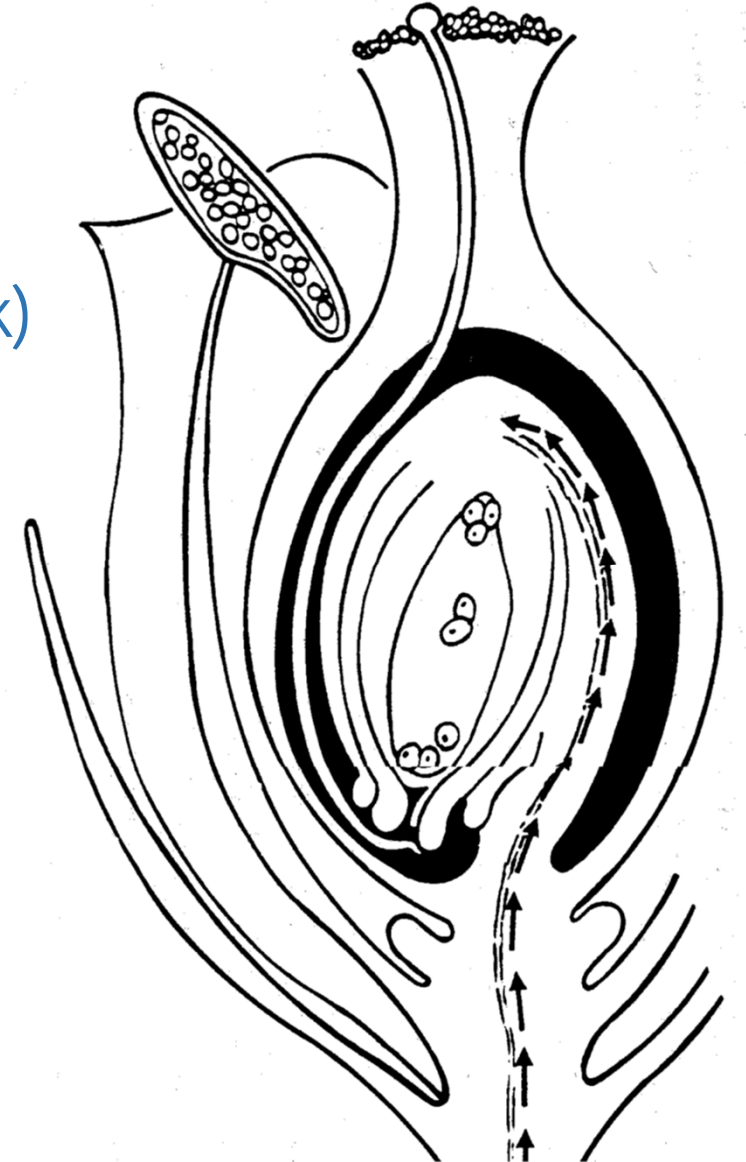
Diseases Carried on Seed

Early blight
Late blight



Wilts (fusarium,
verticillium)

Bacterial diseases
(bacterial spot, speck)



Heat-Treating Seeds, I

Treat close to planting time

Enclose seed

cheesecloth, cone coffee filter



Heat-Treating Seeds, II

Heat water on stove or in water bath:

Use an accurate thermometer to check the temperature

Stir the water and seed regularly



| Vegetable | Temp (F) | Time (min) | Diseases controlled |
|---|------------------------------|-------------------|---|
| Cabbage | 126° | 30 | bacterial leaf spot, damping-off |
| Broccoli | 122° | 20 | bacterial leaf spot, damping-off |
| Brussels sprouts | 122° | 20 | bacterial leaf spot, damping-off |
| Tomato | 133° | 30 | bacterial canker, speck and spot; damping-off |
| Celery | 122° | 30 | blights, damping-off |
| Carrot | 122° | 20 | alternaria, bacterial blight |
| Pumpkin | 131° | 15 | fusarium |
| Cucurbits (squash, melons, etc.) | can be damaged; do not treat | | |

Heat-Treating Seeds, III

Spread the seed out to dry in a thin layer on paper in a shady area

Plant the seed as soon as it is thoroughly dry

Do not store treated seed



Conclusions for Heirloom Production

Maintain healthy soil and keep garden area clean (sanitation)

Watch for diseases: bacterial spot, early blight, late blight, wilts

Grafting can reduce disease incidence

If saving seed, follow precautions

Heat-treat seed

Marion Murray

Utah State University

marion.murray@usu.edu

435-797-0776

