




# Tomatoes for the Great Plains

Great Plains Vegetable Conference 2008

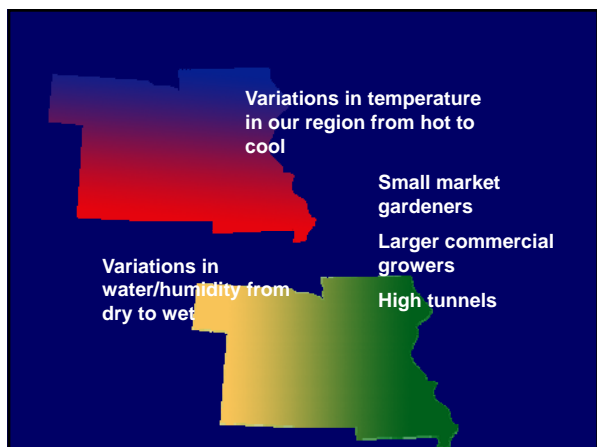
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## For your information

- This PowerPoint and the listing of tomato varieties will be posted at Buchanan Co Missouri Extension web site
  - <http://extension.missouri.edu/Buchanan/>
- You can review it later and get a copy of the varieties list if you didn't get one here today
- Contact me at [cmarr@ksu.edu](mailto:cmarr@ksu.edu)




Variations in temperature in our region from hot to cool

Variations in water/humidity from dry to wet

Small market gardeners

Larger commercial growers

High tunnels



### Replicated tomato variety trials are not being done now!


15-20 plants of each variety to determine yield potential- usually 3 years worth of data

Isolated, controlled location so production is accurate

Expensive to establish and harvest (2x per week for 6-7 weeks)

Most of our observations now are just that- observations from a few plants or from various grower comments. More difficult to establish 'fact from fiction'

### What's available now (standard or 'slicing' tomatoes)




- Semi-determinate vine
- Multiple disease resistance
- Uniform ripening (UG uniform green)
- Set fruit in hot weather (hot-set gene)
- Better flavor (furaneol genetic trait)

### Semi-Determinate or "Determinate"- "Compact" Vine Habit

Standard vine	Determinate/Compact vine
	

### Advantages of Compact Vine

- Adapted to raised bed culture
- Short cages or 'stake-weave'
- More stable in wind
- Use less water and fertilizer
- Closer spacing-more plants per row
- Yields comparable to large vined types



### Variations in vine size: moderate to vigorous



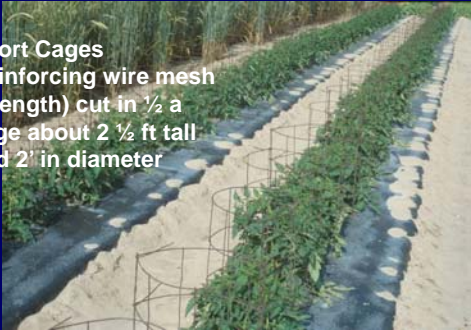
Large-Medium vine with good foliage-cover

Compact-very compact vine with good foliage cover

2' apart in rows 5 ft apart (4200 plants/A)

Note windbreak strip along side. Tall-growing early crop such as rye, standard wheat, or

Short Cages (reinforcing wire mesh 5' length) cut in 1/2 a cage about 2 1/2 ft tall and 2' in diameter



### Stake and Weave

Steel, wood, or rebar post every 2-4 plants




### Blossom End Rot (BER)

- Early in season
- Fluctuations in watering
- Lush, succulent growth
- Underdeveloped root system

Avoid sidedressing with ammonium forms of N fertilizer. (common one is urea).

Preferred:

- Calcium nitrate
- Liquid N
- Organic sources

Most early maturing varieties are more prone to developing BER



**Don't plant too early!**

Soil temperature should be a consistent **55° F**.  
Check soil temperature - late morning at a 2 inch depth.

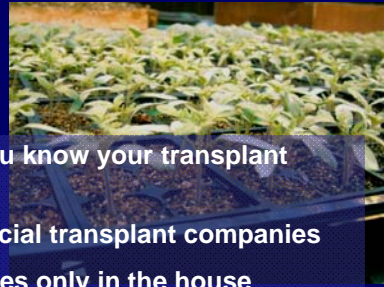
Below critical soil temperature, plant roots don't develop and plants don't absorb nutrients properly.

Plants may survive but don't 'thrive'



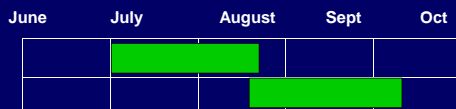
Make sure you know your transplant source.

- Commercial transplant companies
- Vegetables only in the house
- Sanitation and good growing procedures



**Longer harvest season?**

- Early spring planting (plant set early May)
- Summer planting (plants set mid-late June)



It is very difficult to get a 'semi-determinate' tomato to produce longer than about 6-7 weeks- maintaining quality and size

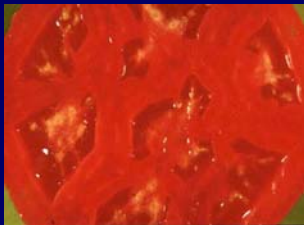
**Uniform Ripening (UG Gene)**



Fruit ripens uniformly- top to bottom and inside-outside. Uniformly ripe. No 'green shoulder' or waste when using.

**Meaty Firm Fruit**

- Fruit holds into slices
- Can be chopped or diced
- Does not soften easily when stacked
- Modern consumers prefer
- Not irregular or rough like a 'beefsteak' type



**Multiple Disease Resistance**

- Resistance or 'tolerance' to important tomato diseases that may prevail in your area
- (Most everything now has Verticillium wilt resistance V)
- More important in 'confined' growing areas (ie small locations, high tunnels, etc)
- Need will vary with location and type of grower

### Fusarium wilt

Fusarium wilt is a soil borne fungus that will persist from 10-15 years

There is NO KNOWN CONTROL



### Resistance to Fusarium wilt (F or Fol + numbers)

Races 1 and 2- common in region

Race 3- deep south only now- may move this way

Can get anywhere in region

Careful selection of transplants

Especially critical in permanent locations-high tunnel



Most newer varieties resistant to races 1 and 2 (some even to 3)

### Leaf blight diseases (Early Blight and Septoria Leaf Spot)

Fungus, encouraged to grow on leaves by warm, humid weather

Older leaves on plant. Usually after fruit load has developed



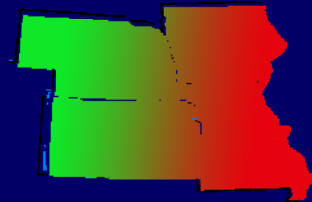
### Leaf blight diseases in our region

Lower humidity and rainfall regions have fewer problems

Air-blown spore but some possible infection from stakes or plant debris

Very few varieties show 'tolerance' to Early blight (EB) - none to Septoria

Spray lower leaves on plant to prevent spread



### Dealing with Leaf Blight Diseases

Warmer, humid weather after fruit load has developed



Fungicide spray controls

- Bravo/ Equus
- Quadris/ Flint
- Cabrio
- Mancozeb (Dithane M45)

Some tolerance in certain newer varieties- especially to Early Blight

### Tomato Spotted Wilt Virus (TSWV)

Stunted plants, purplish color. Mottled, marbled fruit

Spread by western flower thrips-primarily in greenhouse or transplants

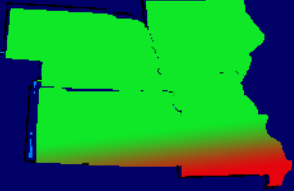
Especially serious in southern states. Only a random problem in our region





### Dealing with TSWV

Very southern parts of our region  
 Transplants from greenhouses with a variety of flowers  
 High tunnel culture

Many newer varieties are now resistant (see printed list)



### Bacterial Spot or Speck

Spots or specks on fruit, stem, and leaf. Usually a problem in cooler, wet conditions.

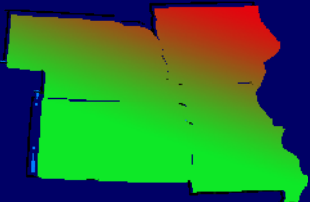
Spots are black, irregular in shape and may coalesce together

### Dealing with Bacterial Sp Diseases (Xcv or BS)


More apt to develop in cooler regions  
 Early in season- may start on transplants in greenhouse  
 Hard to control once established

Some variety resistance

Spray controls  
 Copper fungicides  
 Actiguard

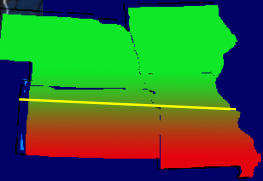


### Nematode Damage to Tomato Roots (N or M)



Some varieties are resistant.  
 Treatment is very difficult if not impossible

South of I-70 where problem is most significant (over-wintering)



### Minor disease problems





Tobacco Mosaic Virus (TMV)  
 Tomato Mosaic Virus (ToMV)

Must be moved from live hosts in the area (or greenhouse)  
 Transmitted by insect vectors, twisted leaves with 'mosaic' green/yellow areas  
 Random plants- usually not uniform over field

### Minor tomato diseases

- Grey Leaf Spot (GLS or Ss)



Develops in 'high humidity' areas  
 May be a problem in greenhouse or high tunnel  
 Control with fungicides and 'moving air'

Blossom drop from excessive summer heat.

Daytime 95 F, Night 75 F

Excessive N; Hot, dry winds make problem worse

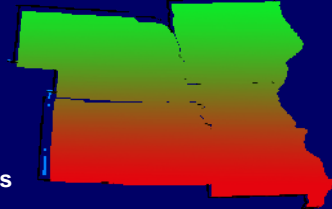
A genetic trait- usually referred to as the Hot Set or Heat Set gene allows tomatoes to set under heat conditions.

Many new varieties now are being developed with the Hot Set gene incorporated.



Days with temperatures above 95 (D) 75 (N) increase to the southern part of our region. Days in succession are more critical than individual days here and there.

Worse with hot, dry windy conditions on plants that may be too actively growing.



Summer plantings

### Better flavor in tomatoes

Sugars (glucose, fructose)

Aromatic compounds

Acids (citric, malic)

- |                  |                          |
|------------------|--------------------------|
| cis-3-hexenal    | trans-2-hexenal          |
| cis-3-hexenol    | 6 methyl-5-heptene-2-one |
| hexanal          | 2-isobutyl thiazole      |
| 1-pentene-3-one  | B-ionone                 |
| 3-methyl butenal |                          |

### Furaneol (fur ANN e ul)

- Thought to be present in very low concentrations- about the same in all varieties
- In 1998, found it had been underestimated- higher in 'tastier' tomatoes
- Genetic trait to increase just the right amount- bred and tested for 8-9 years
- A few varieties now commercially available with higher 'furaneol' concentration

### Varieties with 'improved flavor'

- Mountain Glory
- Red Defender
- Security 28
- FL 7514
- BHN 589 ?
- BHN 591 ?
- BHN 602 ?
- Scarlet Red
- May be others in addition to older varieties

### Some varieties to consider..

- Known, 'reliable' producers for years
- Some new things that have done well in last 3-4 years
- Some very new things for your trial- plant a few to see what you/your customers think

**Celebrity**

Oldest of the 'semi-determinates'

F1,2 TMV, GLS

(Most are now Celebrity Supreme with nematode resistance)

Moderately early



**Mountain Spring**

Moderately early

Medium-large fruit

F 1,2

Not much cracking

Moderate sized vine



**Mountain Fresh Plus**

Midseason

Large fruit size, consistent

Larger, vigorous vine

F1,2 N

Small 'stem scar'



FL 47

FL 91

FL 7514

Midseason production

F 1,2 GLS, Xcs (7514)

Hot Set (FL 91)

Large, firm meaty fruit

Vigorous, strong vine

Good flavor (7514)



**Amelia**

**Crista**

Midseason production

Vigorous vine

Large fruit size

F 1,2,3 (Crista), N, TSWV, GLS

'Smaller vine' Jet-Star type

Fairly good crack resistance



**Scarlet Red**

Early-Midseason

Dark red, fleshy interior

Uniform, large fruit

F 1,2 GLS

Medium size vine

Good flavor



**Red Defender**  
**SecuriTY 28**

Midseason production  
 Large, consistent fruit  
 Good flavor  
 F1,2 GLS TSWV, TYLC (SecuriTY)  
 Medium sized plants



**Mountain Glory**

Early-midseason  
 Large, consistent fruit  
 Medium vine  
 Good flavor  
 F 1,2 GLS TSWV  
 Deep red color, good interior



**Fabulous**


Midseason  
 Large fruit, not much cracking  
 Large, vigorous vine  
 F1,2 GLS Xcs TMV  
 Good eating quality, gourmet type



**BHN 589**  
**BHN 602**  
**BHN 640**

Good sturdy vine  
 F 1,2 GLS TSWV (not 589)  
 Flavor (589)  
 Midseason to late  
 Good for end of season production

*BHN is a seed company in Immokalee FL that does not name varieties- only uses the BHN and numbers as indicators*



**Conestoga**

Heirloom 'Marmande'-like shape  
 Brilliant red color  
 Large vine  
 F1,2 TMV



**K-State**  
**Research Extension**



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