Breeding for High Temperature Fruit Set in Processing Tomato
Background

- Yield is primary trait in processing tomato (cost structure of crop)
- Most fields lose some yield due to setting problems
- Flowering is over a 40 day period
- Temperature dependent
- Day vs night temp (100+ F day/ 70 F night)

- Possible reasons:
  - Pollen tube growth
  - Fertilization
  - Pollen viability
  - Ovule development

- Flowers abort or fruit that set are parthenocarpic
TBRT Sacramento, CA 29 June – 1 July, 2009
Methods

- Extremadura area of Spain near Badajoz
- A consistent environment for high temperature during flowering for late plantings
- Pre-2001 plots
- Post 2001, 400-500 plots, F1’s and Lines
- Set of consistent S and R checks used
- Flowering period mid June to late July
- Evaluation week of Sept 8
- Visual rating
Results

- In first years, anyone could select (difficult to walk)
- In recent years, setting is improved and selection requires more attention
- “Tractor row” effect (vine training and cooling effect)
- Confounding with earliness
- Evidence that in recent years temperatures are a little cooler in Spain
Temperature Data, Caceres, Spain

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<th>Avg mean</th>
<th>Avg min</th>
<th>Avg max</th>
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- Set improved by selection of materials and recombination
- Dominant gene action
Genetic Progress?

- Factors behind genetic progress for a single trait

1. Starting germplasm – degree of trait (e.g. 6 or 8 brix)
2. Gene action (dominant, recessive, additive)
3. Number of genes
4. Heritability and GxE
5. Negative linkages or negative pleiotropic effects
6. Number of generations per year in selection environment
7. Repeatability of expression environment
8. Availability of an artificially reproduced environment
9. Breeder skill for visual traits and complete objectivity
10. Measurement limitations (e.g. complex extraction and measurement)
11. Marker assisted selection availability
Thank you for your attention. Questions?