

Increasing Processing Tomato Fruit Soluble Solids

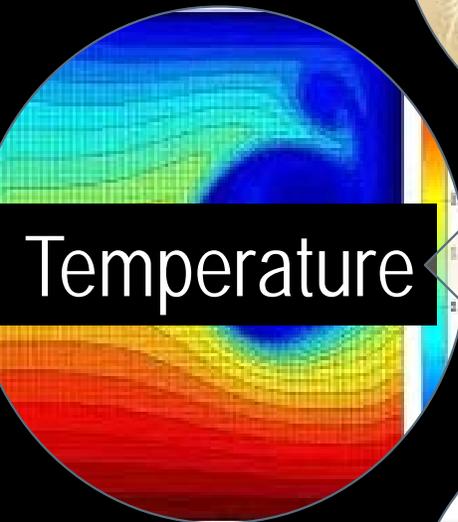
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Temperature



Soil
Micronutrients



Cultivar

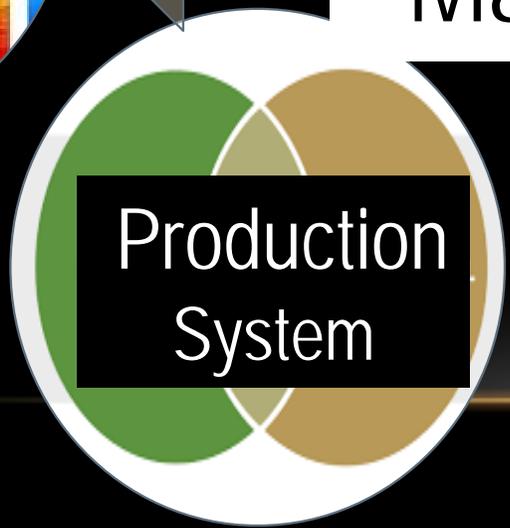


Light



Soil
Nitrogen

Genotype
Environment
Management Practices



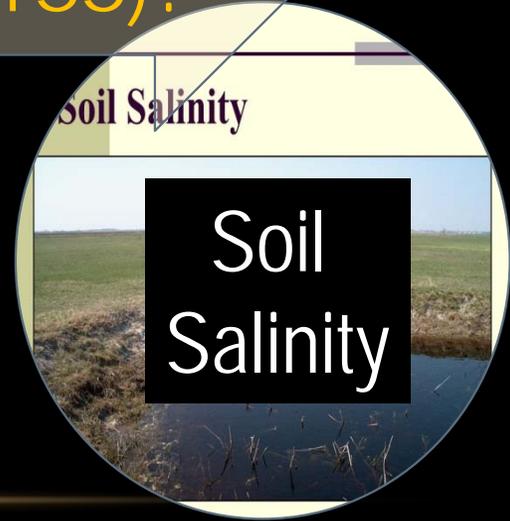
Production
System



Harvest
stage



Irrigation

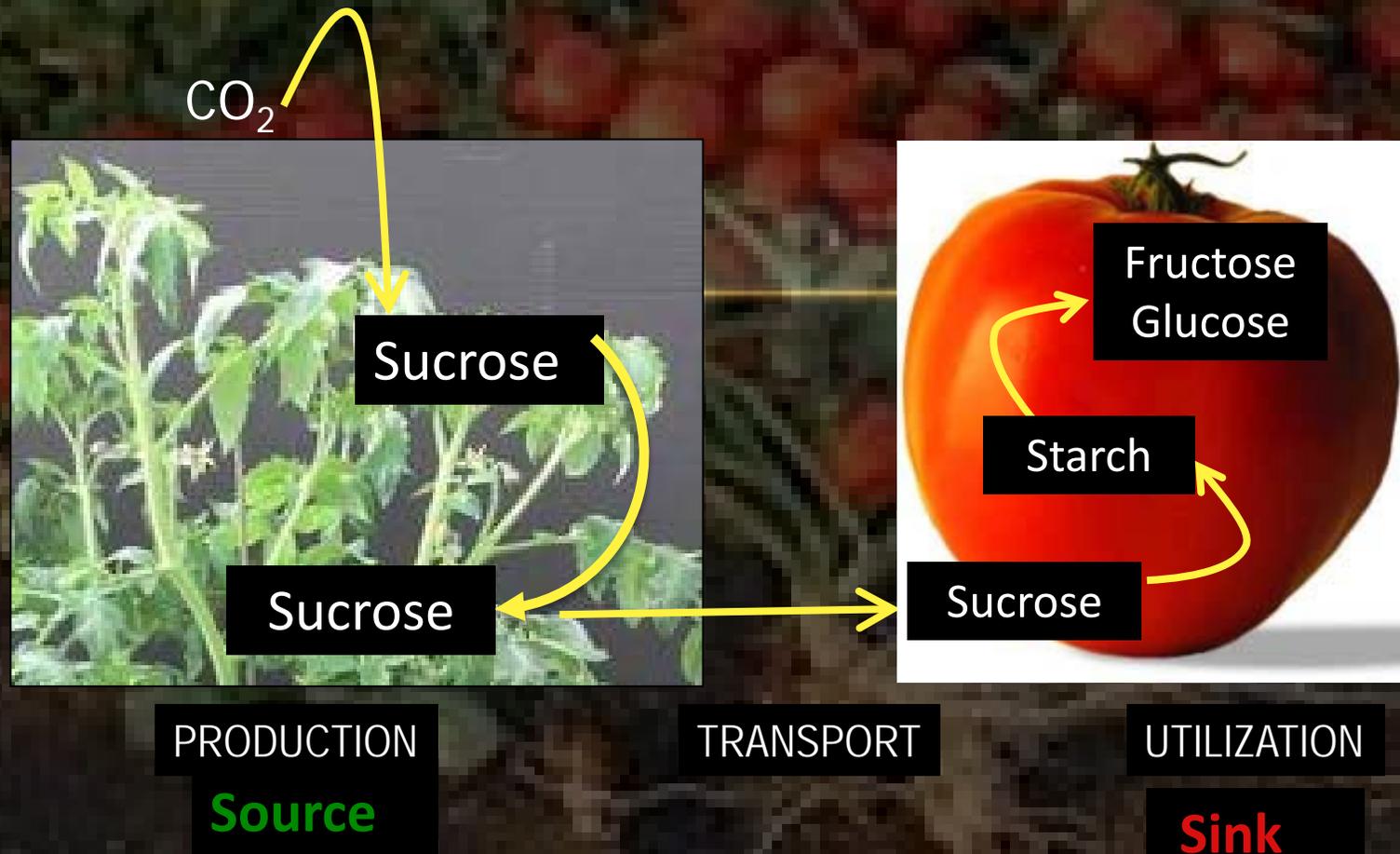


Soil
Salinity

What

ds (TSS)?

TSS is determined by multiple, spatio-temporally separated, but interconnected, biological processes and is often negatively correlated with yield

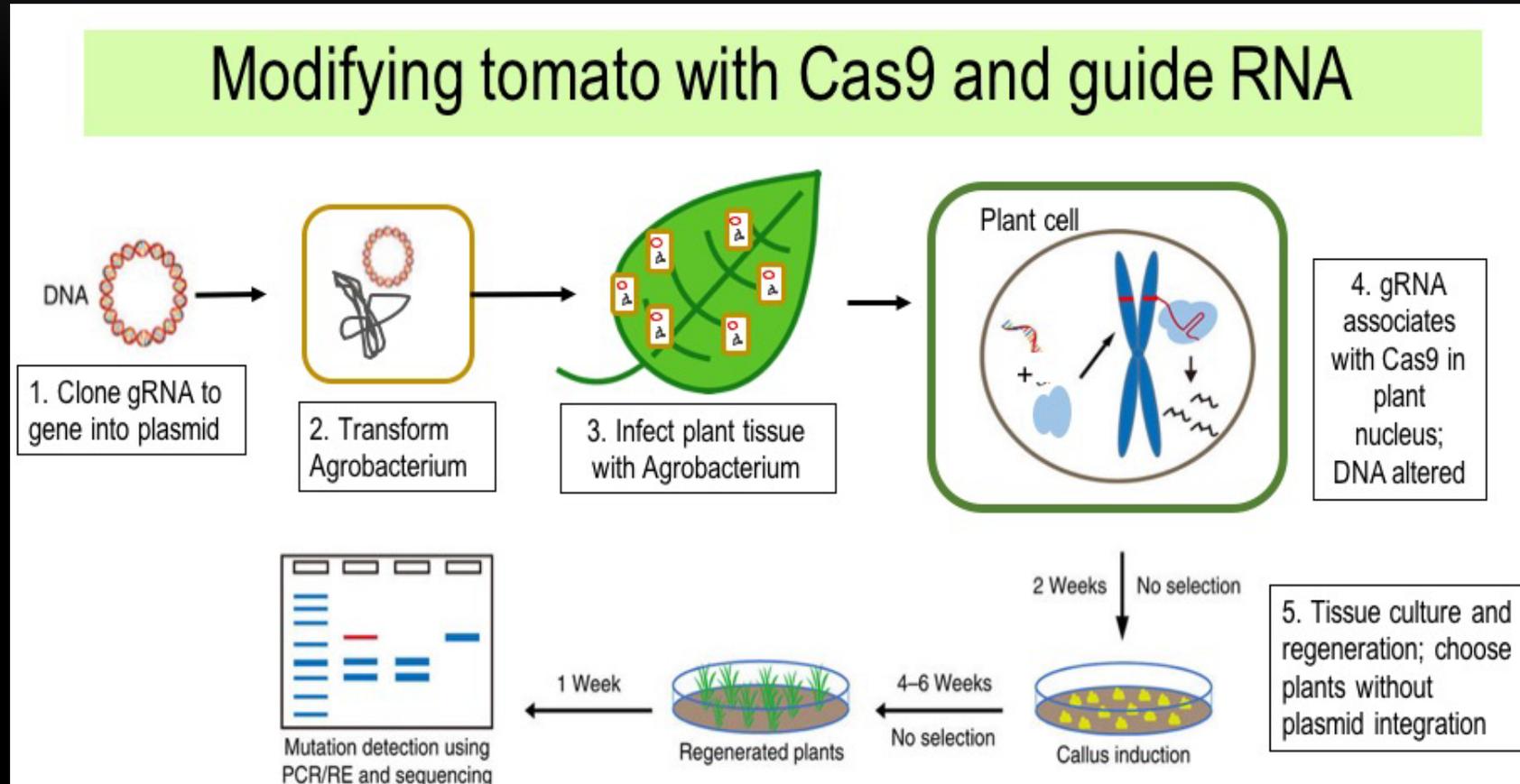


Can single gene modifications increase TSS with no negative effects on yield?

- Published studies suggest that this is possible:
 - *SIARF* - suppress expression
 - *SIAGPase-L* - modify response to negative effectors
 - *Sllnv6* - suppress their negative regulators
 - *STOMSSF* - suppress their negative regulators
-

How to target changes in these key genes?

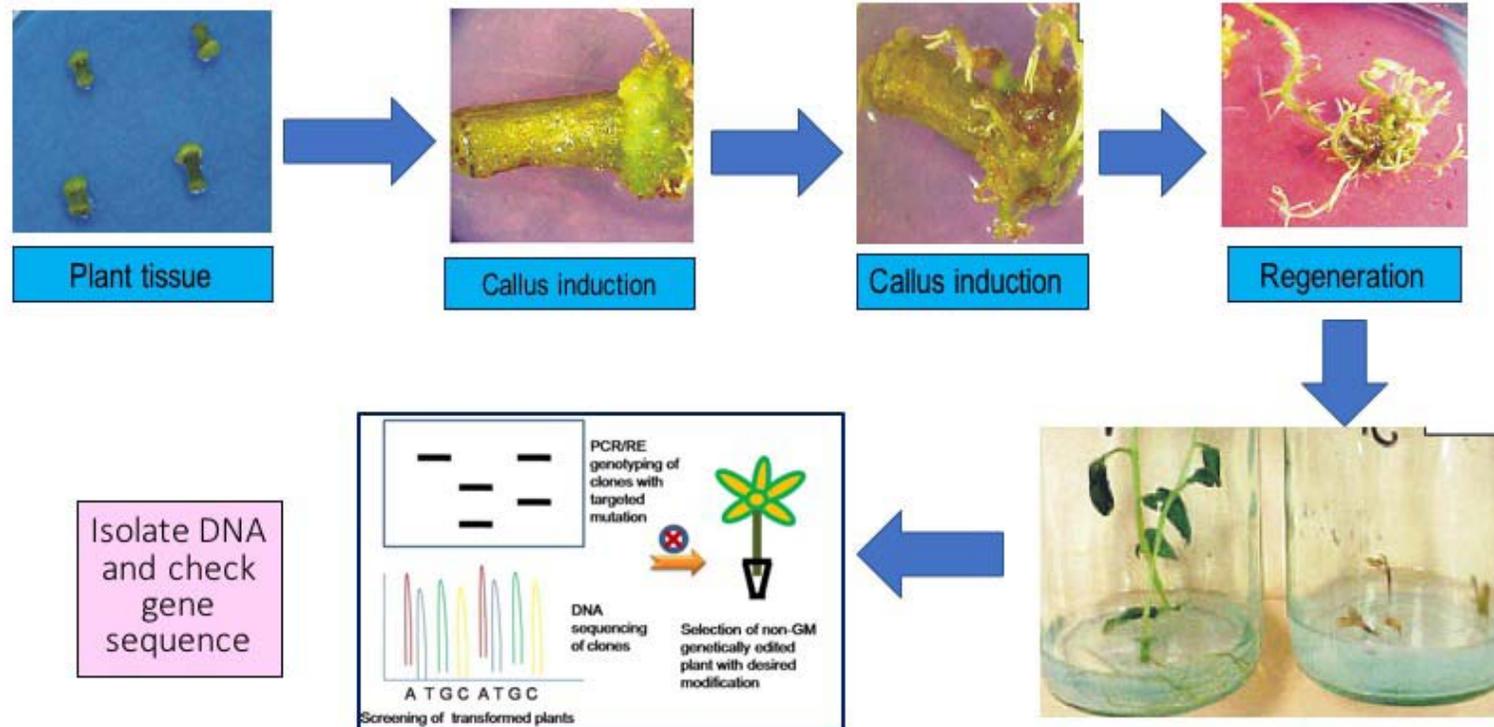
Using CRISPR-Cas9 to create non-GMO plants altered in the target gene



Edited plants with: (i) no foreign DNA and (ii) minor edits to the desired gene are selected.

Using CRISPR-Cas9 to create non-GMO plants altered in the target gene

Agrobacterium-mediated transformation of tissue



Exploratory Costs using CRISPR-Cas9 to create non-GMO tomato plants

- To test for changes in TSS and yield in greenhouse-grown plants:
 - Cost: \$70-80,000.
 - Time: 2 years.
-

Using CRISPR-Cas9 to create non-GMO tomato plants

Advantages

- New germplasm:
 - ↑ TSS (5-20%)
 - ↑ Yield stability under environmental stress.
- The modification is specific.
- Non-GMO.
- Relatively easy & cheap.
- Multiple genes can be edited simultaneously.
- Proven for complex traits.

Disadvantages

- Not ideal for all traits.
- Public perception.
- Patent landscape murky.

Bottom line

The processing tomato industry in California has always been the first adopter of technologies that are able to move the industry forward. This has allowed California to stay competitive in this space. You are in a position to **both lead and drive efforts that could revolutionize agriculture.**

Thank you for your attention

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