

Increasing Processing Tomato Fruit Soluble Solids



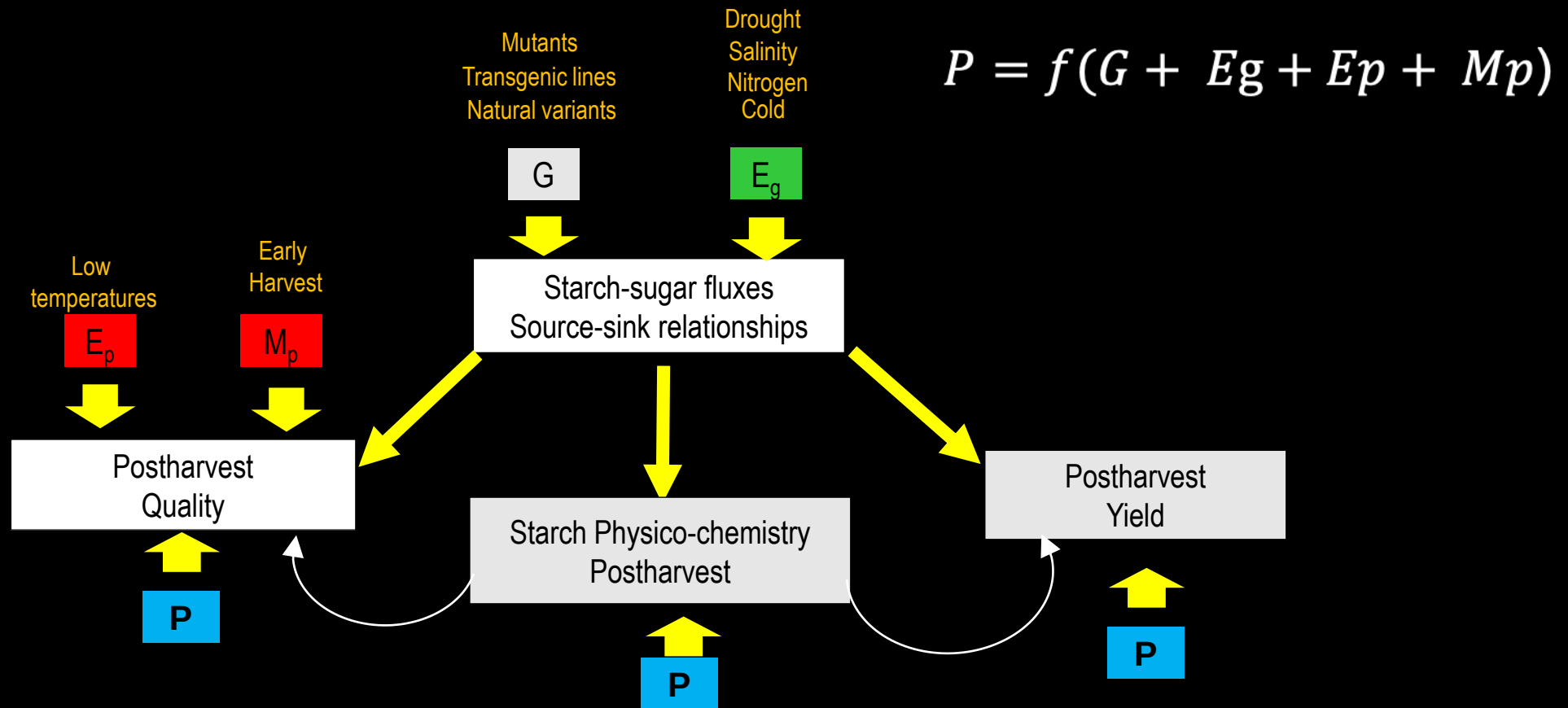
Diane M. Beckles
Department of Plant Sciences

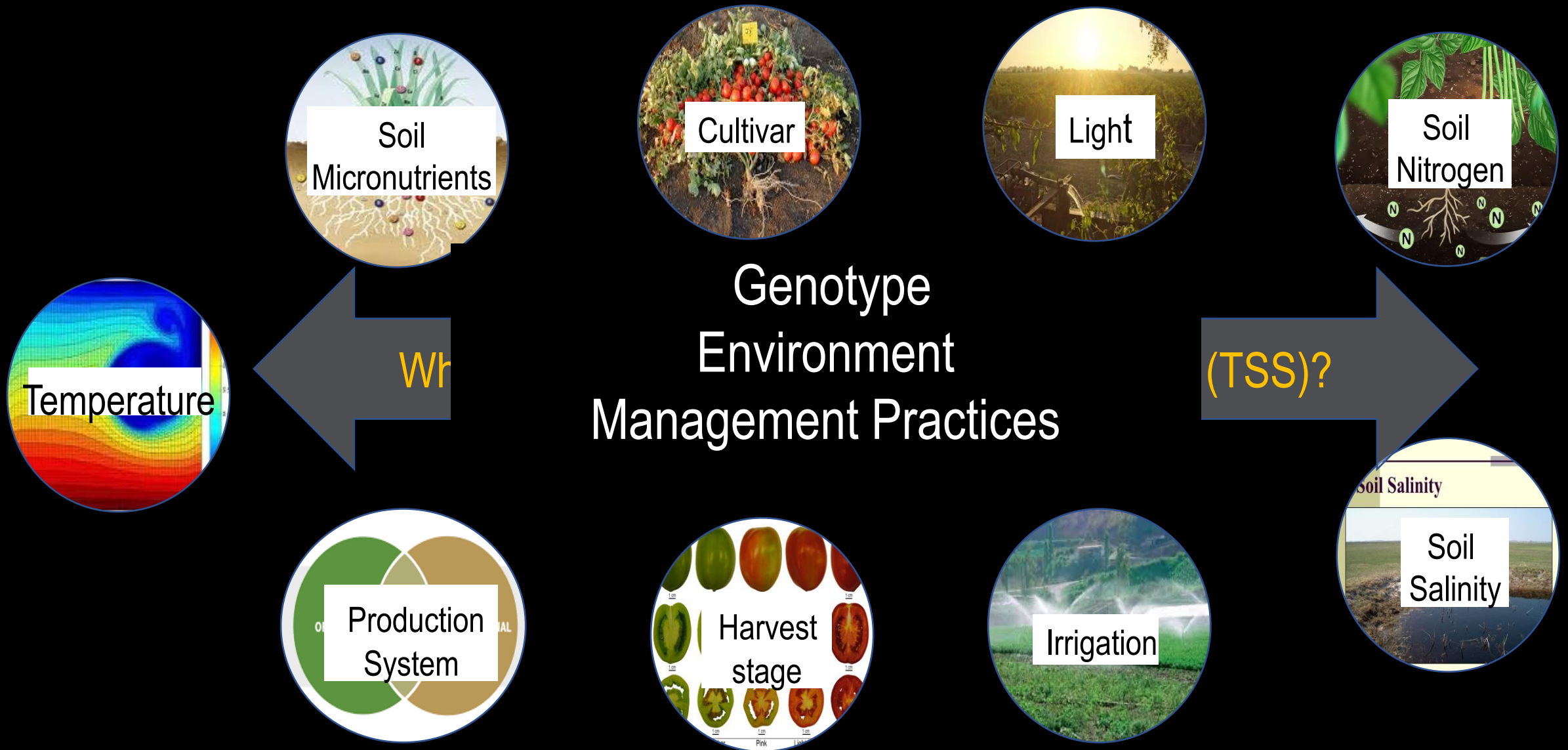


@dianemaria71

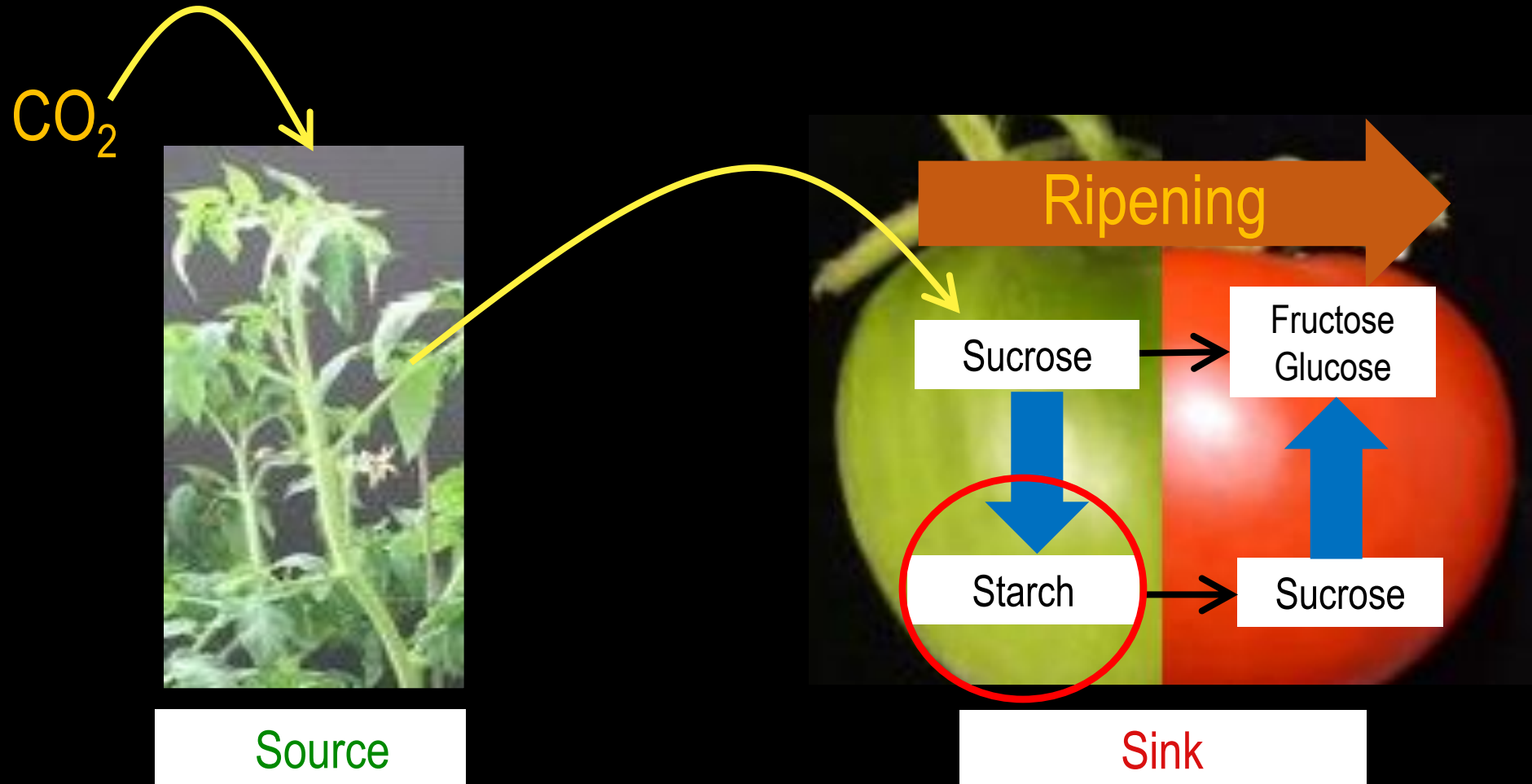
Seminar 2:11 PM PST; December 10th, 2020

Beckles Lab Research

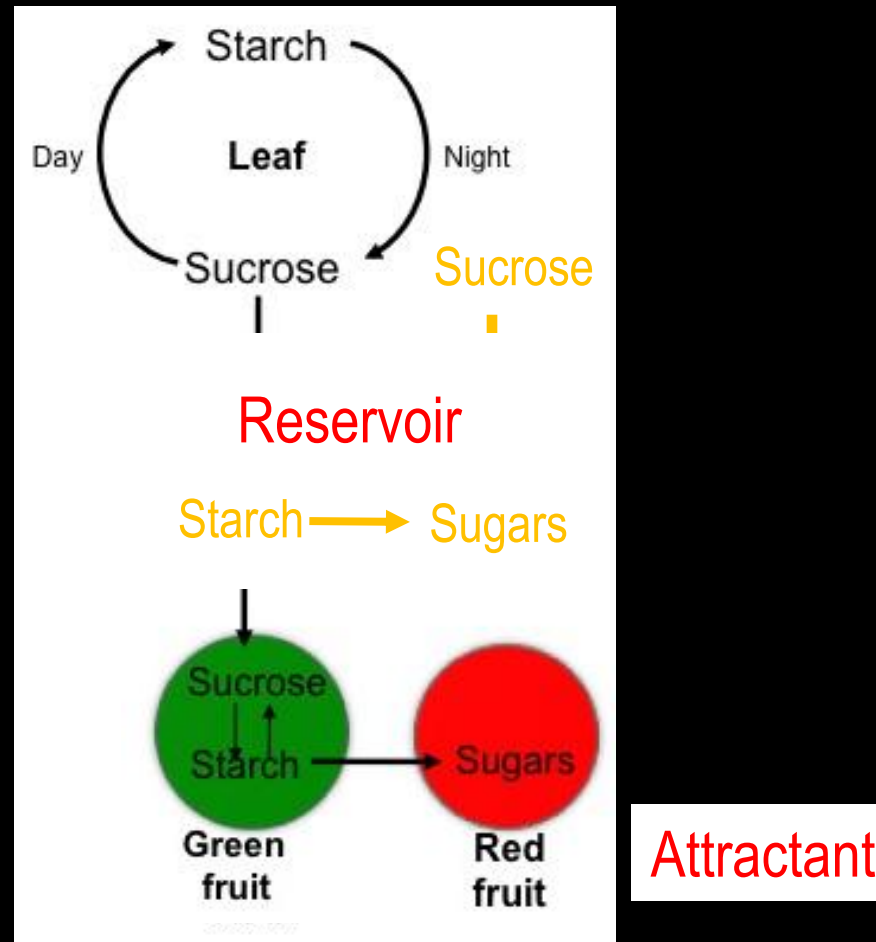




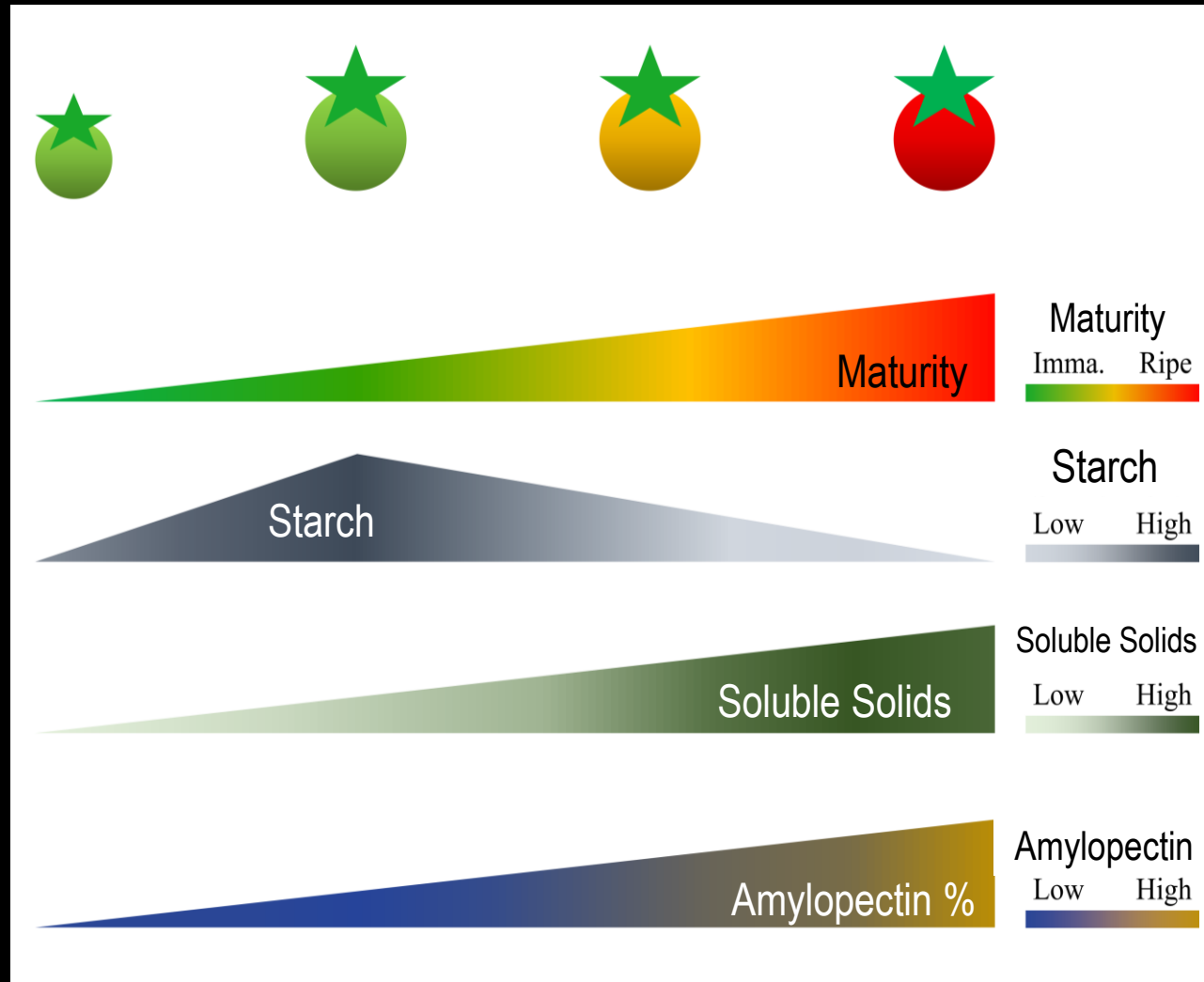
TSS is Determined by Multiple, Spatio-Temporally Separated, but Interconnected, Biological Processes and is often Negatively Correlated with Yield



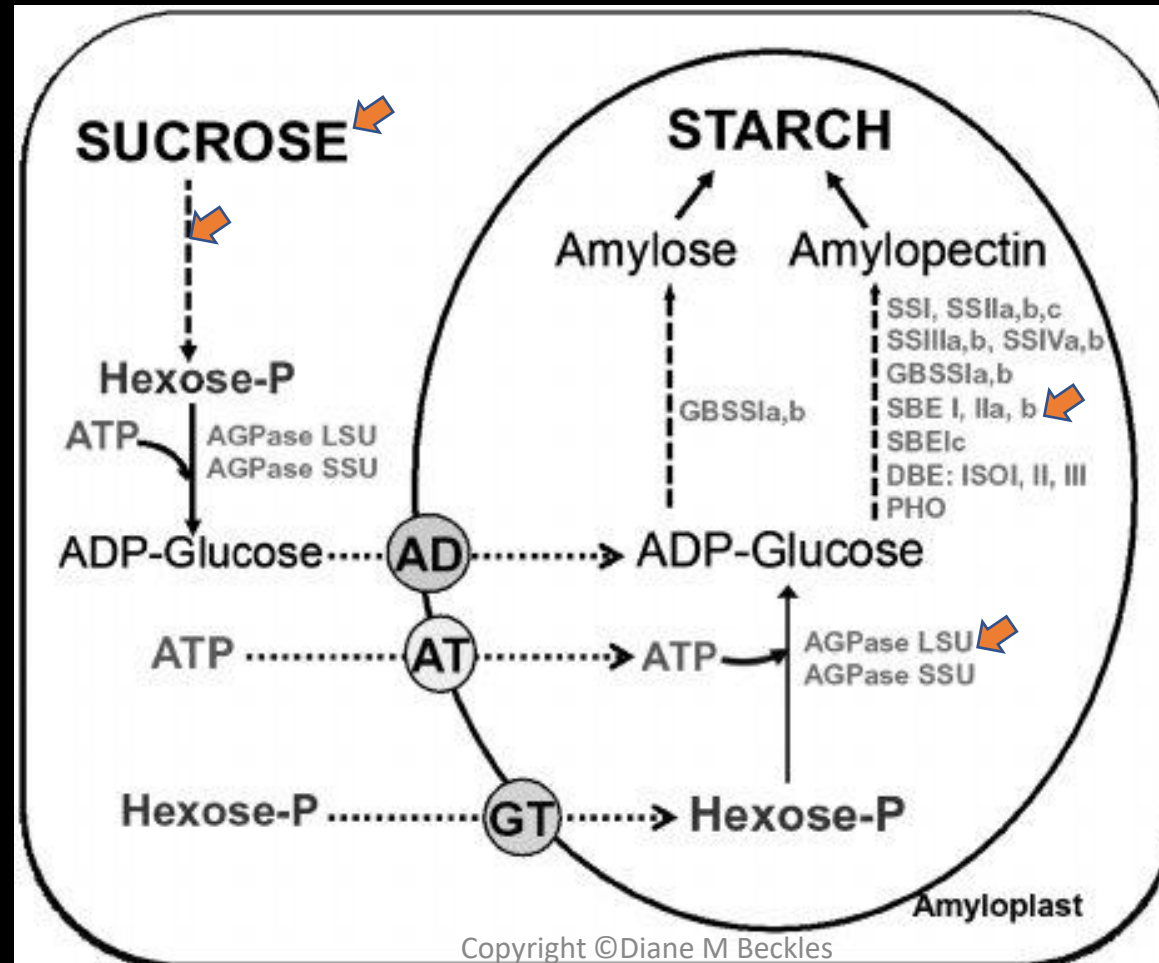
Tomato Source-Sink Relationships & Starch



Starch-to-Sugars in Ripening Tomato Fruit

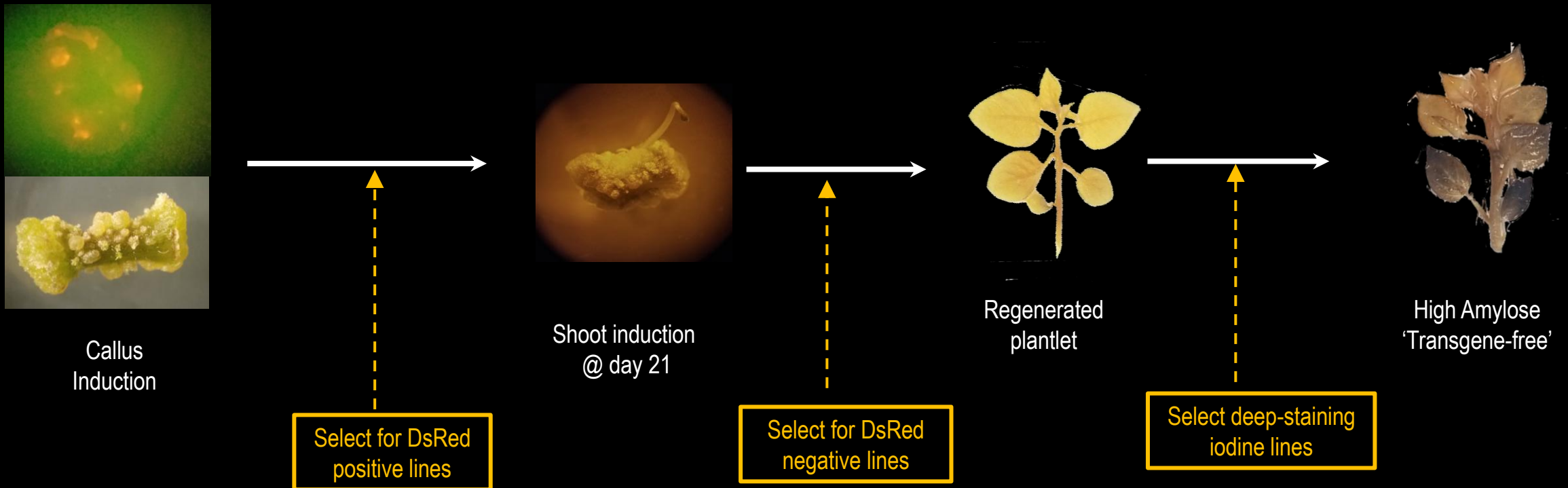


Alter The Amount And Structure Of Fruit Starch To Influence Fruit Sugar By Gene Editing



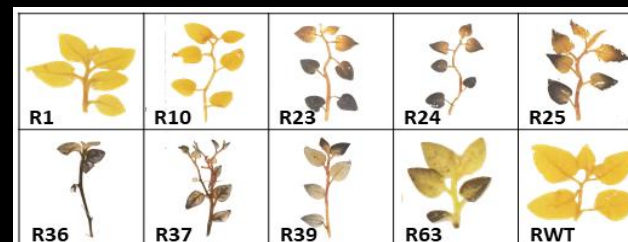
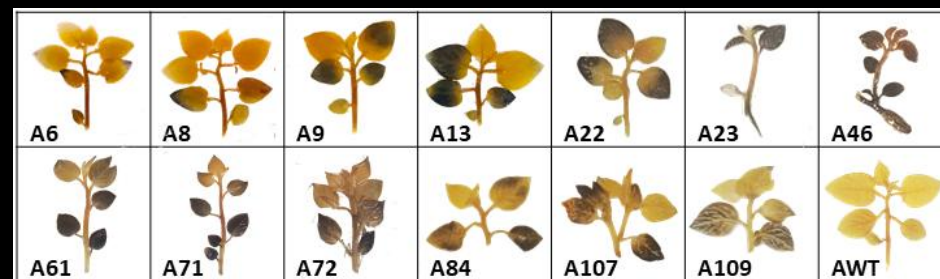
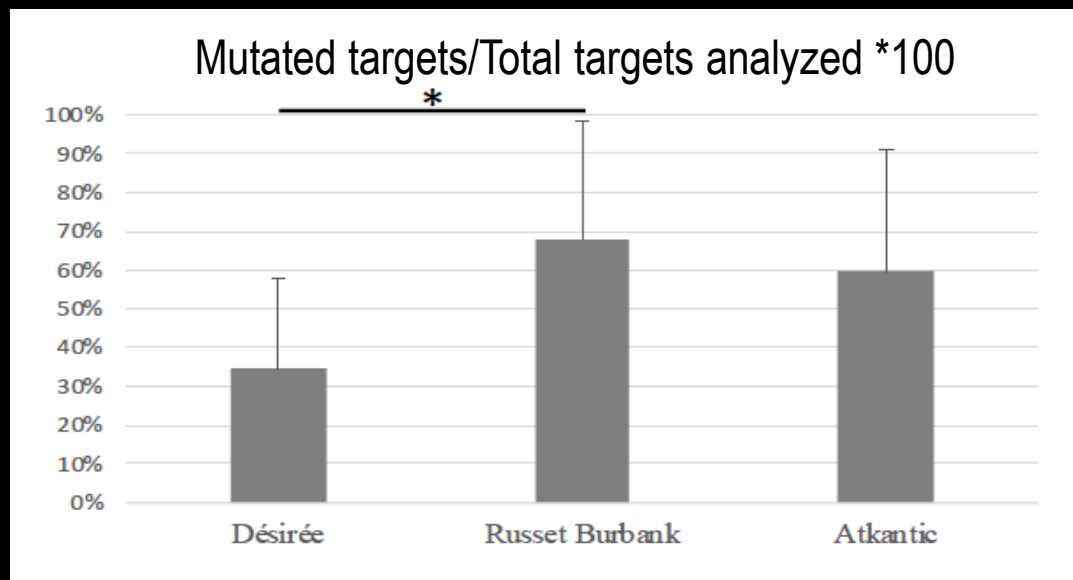
Aim: Make the screening of edited lines cheap,
fast, easy using proven techniques.

Established Pipeline for Production of Transgene-Free Potato Altered in Starch Amount, Composition and Yield

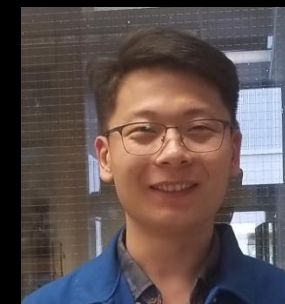


Recapitulate for tomato

Iodine Staining Is A Good Indicator of Starch Genetic Lesion In Edited Lines

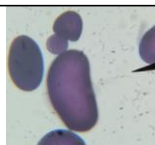
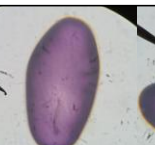
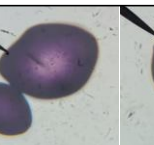
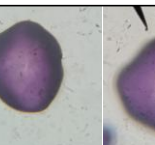
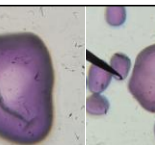
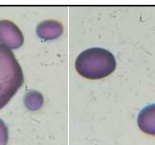
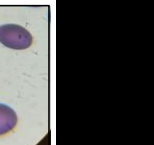


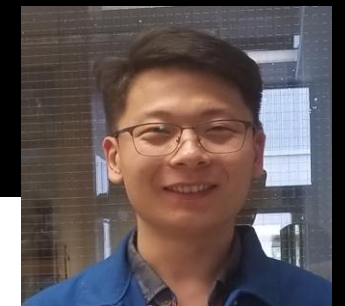
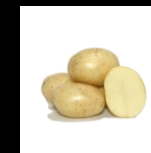
- Total of ~1400 calli were screened for DsRed
- 240 Ds-negative lines screened with iodide
- 27% iodine-positive.
- 43 iodine-positive sequenced
- 84% were edited



Jingwei Yu

Phenotype of Greenhouse-Grown Starch Edited 'Atlantic' Lines

A		Genotype	AWT	A109	A46	A107	A22	A23	A72
		In vitro plantlets							
		Iodine Stain Score	0	3.5	3.5	3.5	3	4	4
		SBE Lesion Severity	0	66.5	64.5	48.5	28	28	38
		Greenhouse Plants							
		Minituber Stained Diluted Lugol's Solution							
% Change to WT * p<0.05, ** p<0.01									
AM%		Low High		-2.1%	9.1% *	18.2% **	18.20%	24.1% **	25.7% **
Yield		Low High		-2.4%	-23.5% *	-51.1% **	1.3%	-26.9% *	-48.5% **
Starch		Low High		7.5%	-9.0%	-12.1%	-11.1%	-15.0% *	-6.8%
CIS-Starch		Low High		18.2%	12.0% *	8.4% *	16.3%	2.4%	-0.5%
CIS-Sugar		Low High		-0.6%	4.8%	-7.8%	17.4%	-4.8%	111.2%
C		Granule Morphology Observation							



Jingwei Yu

Starch amount and structure may determine tomato fruit dry matter accumulation and soluble solids.

Using CRISPR-Cas9 to Create Non-GMO Tomato Plants

Advantages

- New germplasm:
 - ↑TSS (5-20%)
- The modification is specific.
- Non-GMO.
- Relatively easy & cheap.
- Multiple genes can be edited simultaneously.

Disadvantages

- Public perception.
- Patent landscape murky.
- Environmental effects on the trait

Bottom Line

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

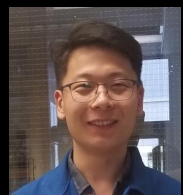
Acknowledgements



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• Collaborations

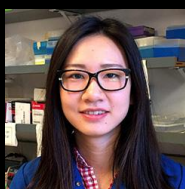
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Jessie Bacha



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Thank You For Your Attention.



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