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WESTERN EXTENSION RISK MANAGEMENT EDUCATION

Dry-farmed Organic Tomato Production in Western Oregon

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

NREL
Transforming ENERGY

WESTERN SARE
Sustainable Agriculture Research & Education

NIDIS

Oregon State University

Culinary Breeding Network

Dry farming along US west coast

Photo by Lynn Ketchum, © Oregon State University

Dry Farming in the Maritime Pacific Northwest

Intro to Dry Farming Organic Vegetables

Amy Garrett

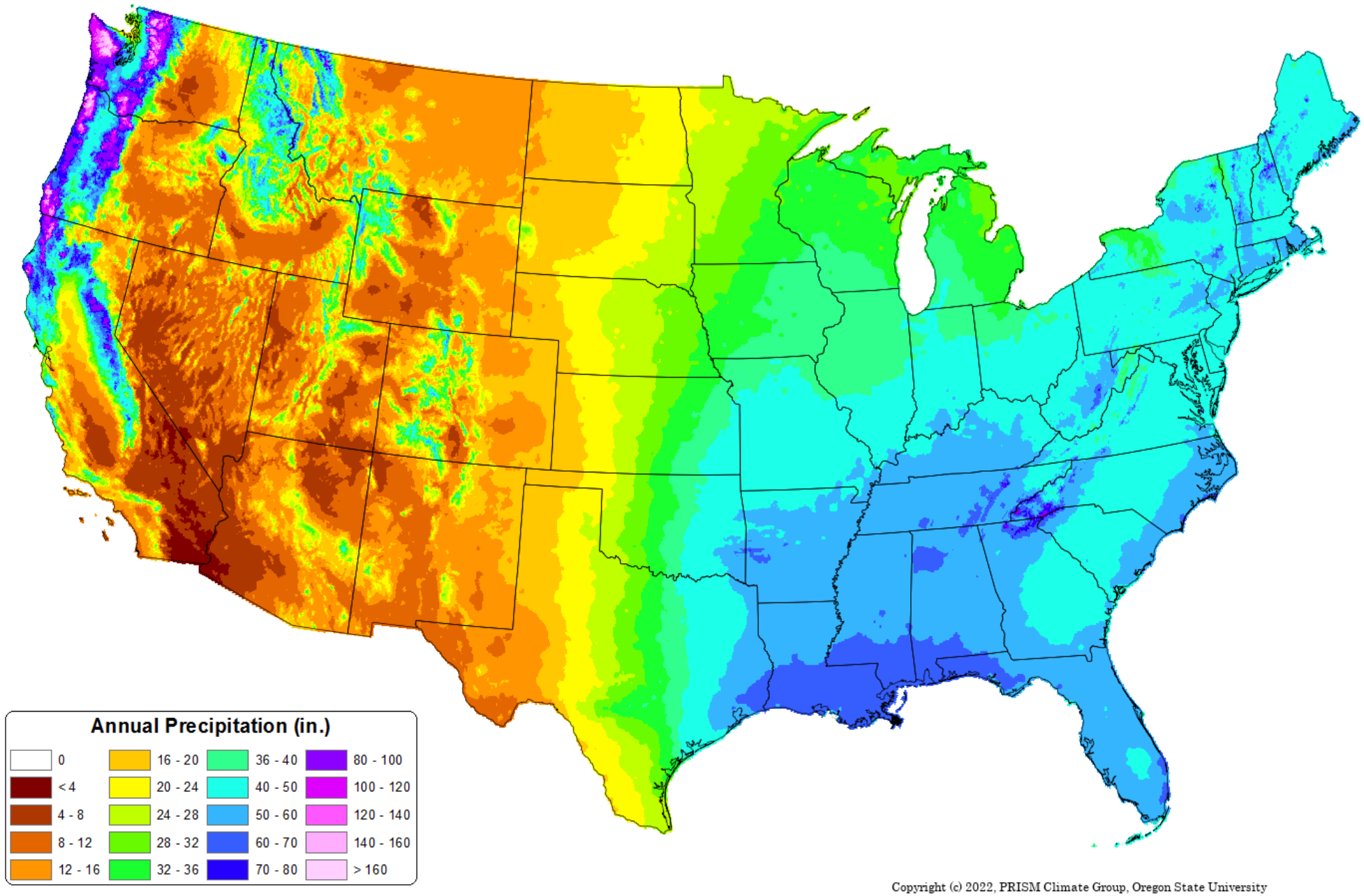
CAFES GROWER GUIDE *dry-farmed tomatoes*

ORGANIC DRY-FARMED TOMATO PRODUCTION ON CALIFORNIA'S CENTRAL COAST:

A Guide for Beginning Specialty Crop Growers

30-yr Normal Precipitation: Annual

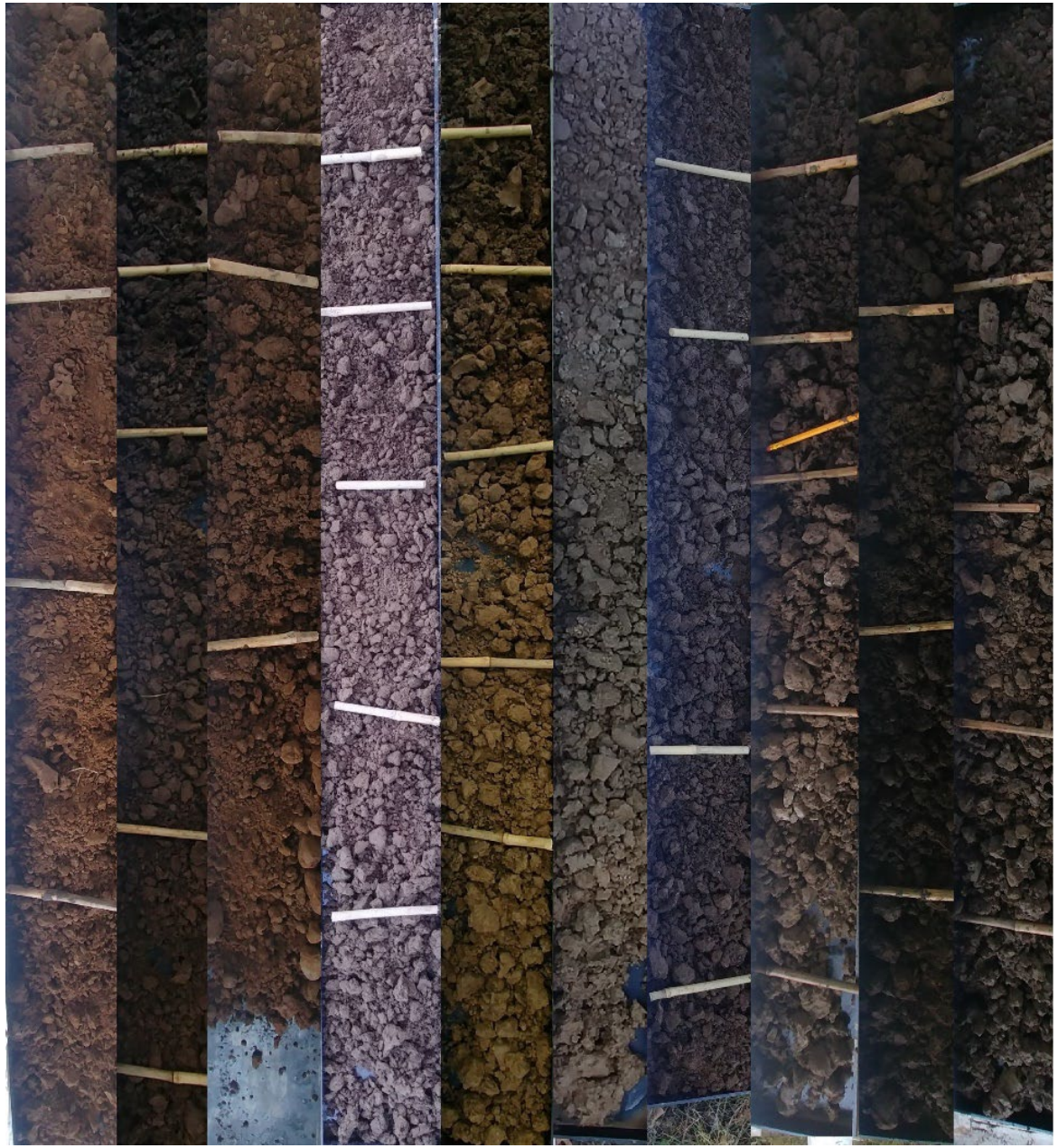
Period: 1991-2020



Outline

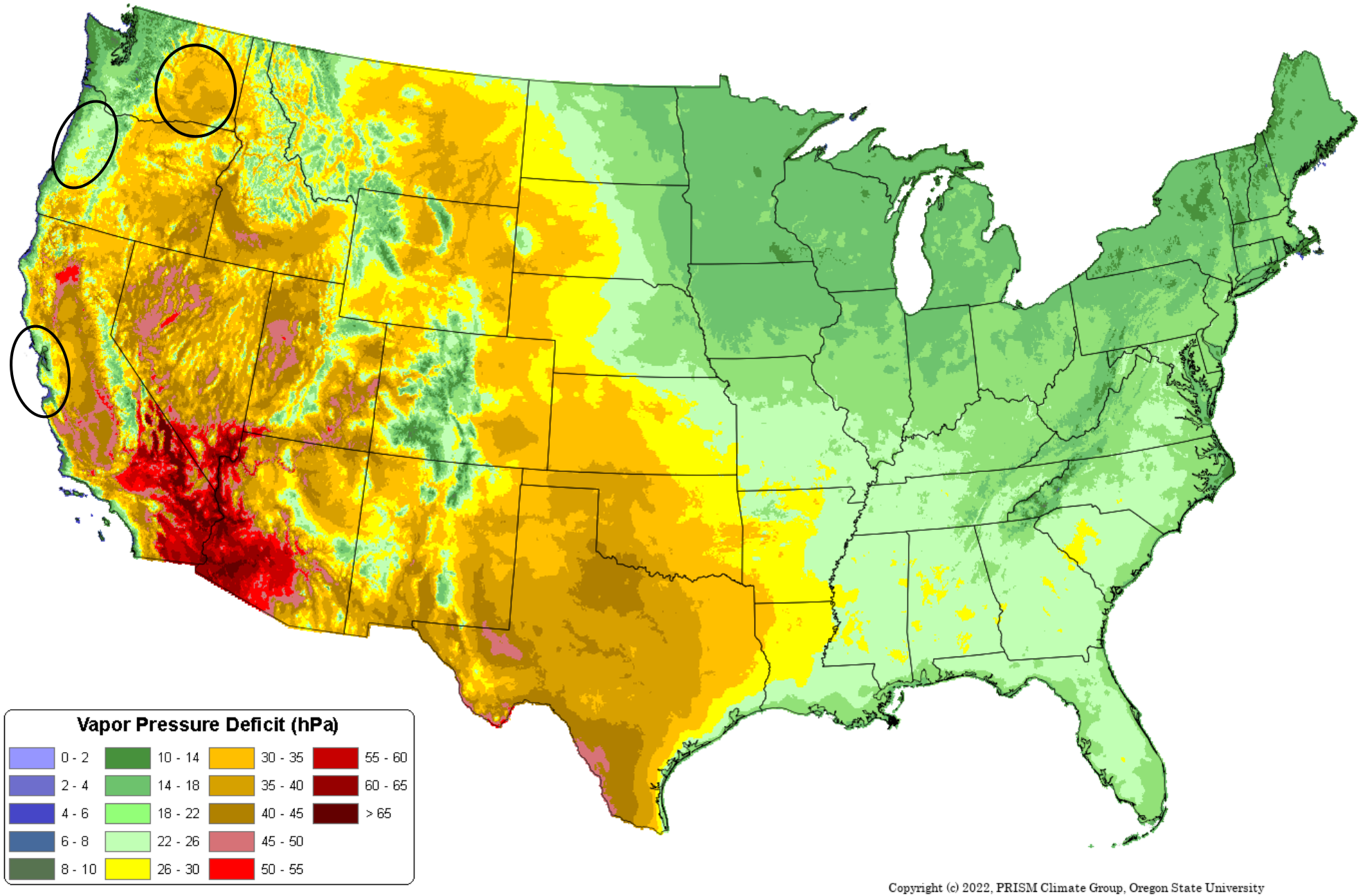
- Site suitability for dry farming
- Issues for dry-farmed tomatoes
- Dry farming practices
- Methods for improving production of dry-farmed tomato
- Processing tomatoes

Soils



30-Year Normal Maximum Vapor Pressure Deficit: August

Period: 1991-2020



Blossom-end rot

Other physiological disorders

Tomato exhibiting gold top and splitting

Tomato exhibiting internal whitening

Disease

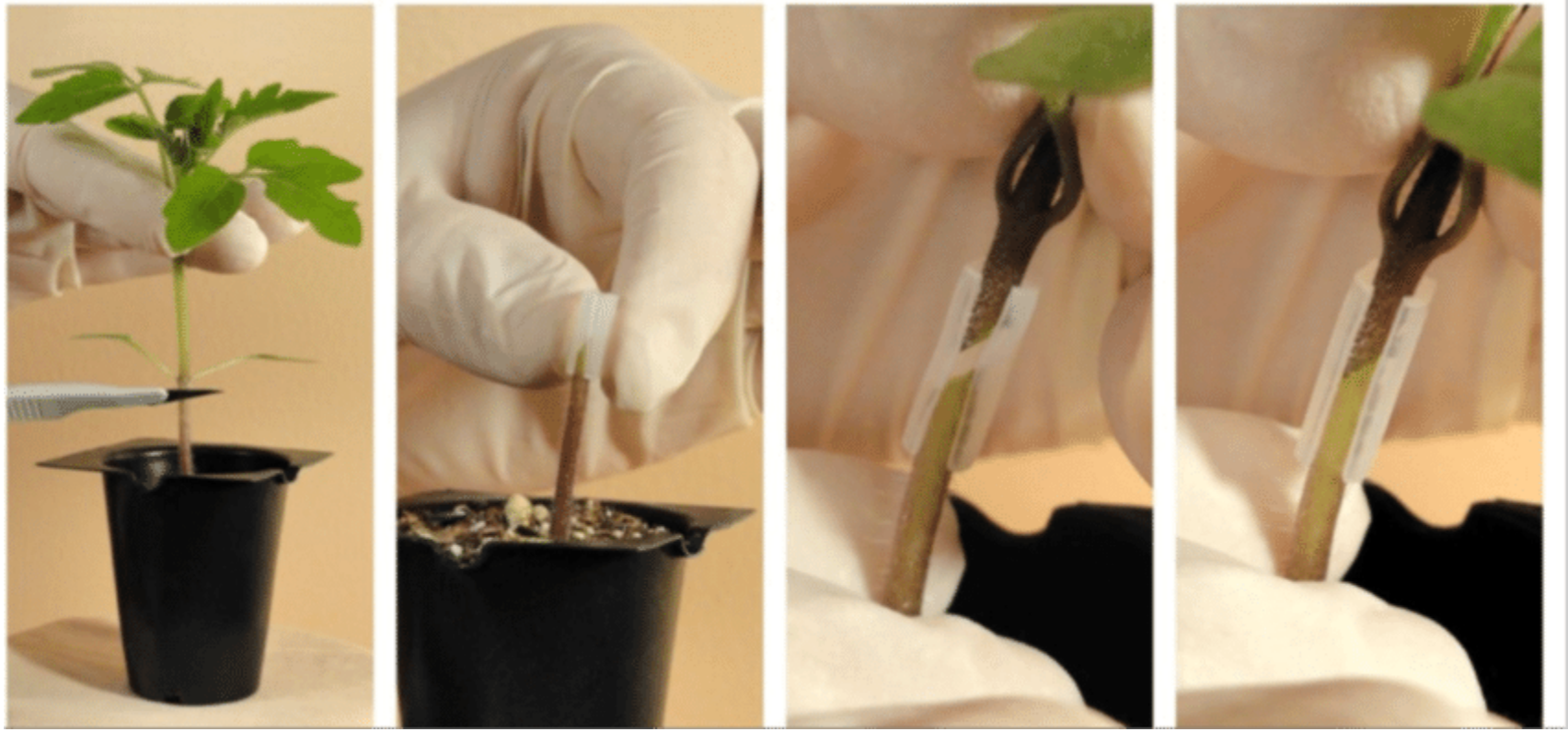
Powdery Mildew

Tomato Spot and Wilt Virus

Field prep and planting

Vegetable grafting

- High performing rootstocks:
  - DRO141TX
  - Emperador RZ
  - Fortamino
  - Maxifort
- Poor performing rootstocks:
  - Shincheonggang
- vegetablegrafting.org
- https://horticulture.oregonstate.edu/article/principles-tomato-grafting



Splice Grafting: Photo by Cary Rivard

Grafting impacts DF tomato yield and quality

Rootstock	Total yield (t/a)	% Blossom end rot	Average wt (lbs)
DRO141TX	35.2	9	0.36
Fortamino	29.8	8	0.33
None	19.4	29	0.29

Means calculated using 55 plots with DRO141TX, 47 plots with Fortamino, and 87 plots with ungrafted plants

The Blossom-End Rot Toolkit

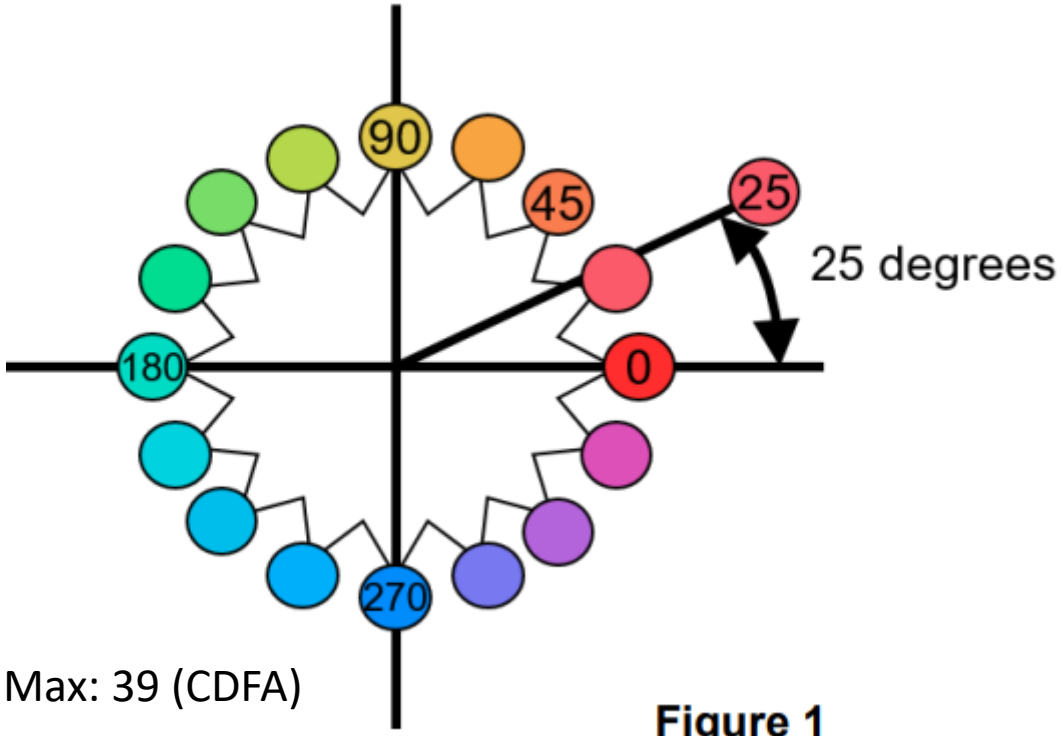
- Saure Hypothesis – luxurious growth followed by stress results in blossom-end rot
- Sheltering from wind
- Soil amendments
- Planting density – 9’ x 20”
- Seedling production practices

Processing tomato

- ~47.2 tons/acre
- ~104 $/ton
- ~229,000 acres in production in California
- ~1 billion dollar industry

Processing tomato quality

Blended Color



Max: 39 (CDFA)

Figure 1

Free from blemishes: heavy BER, yellow shoulder, unripe, mechanical damage, worm damage, rot…

Soluble solids concentration: 4.5 ^{o}Brix desired

pH: 4.2-4.3 desired

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated								
	Dry Farmed								
N6416	Irrigated								
	Dry Farmed								
H8504	Irrigated								
	Dry Farmed								

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated	75							
	Dry Farmed	11							
N6416	Irrigated	79							
	Dry Farmed	23							
H8504	Irrigated	66							
	Dry Farmed	13							

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated	75	36						
	Dry Farmed	11	4.2						
N6416	Irrigated	79	40.4						
	Dry Farmed	23	8.3						
H8504	Irrigated	66	37.7						
	Dry Farmed	13	4.6						

2022 California Average: 47.2 t/a

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated	75	36	20					
	Dry Farmed	11	4.2	67					
N6416	Irrigated	79	40.4	18					
	Dry Farmed	23	8.3	35					
H8504	Irrigated	66	37.7	37					
	Dry Farmed	13	4.6	62					

BER light, BER heavy, rotten, sunburn, unripe

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated	75	36	20	34.3				
	Dry Farmed	11	4.2	67					
N6416	Irrigated	79	40.4	18	30.7				
	Dry Farmed	23	8.3	35	35.9				
H8504	Irrigated	66	37.7	37	34.1				
	Dry Farmed	13	4.6	62	37.1				

California Max: 39 (CDFA)

Processing Tomatoes

Variety	Irrigated	Marketable Fruit (10k/a)	Marketable yield (t/a)	% Unmarketable	Color hue angle	°Brix	pH	Titratable acidity (TA)	Brix/TA
UG16112	Irrigated	75	36	20	34.3	5.0			
	Dry Farmed	11	4.2	67					
N6416	Irrigated	79	40.4	18	30.7	4.6			
	Dry Farmed	23	8.3	35	35.9	6.6			
H8504	Irrigated	66	37.7	37	34.1	5.4			
	Dry Farmed	13	4.6	62	37.1	6.5			

Desired: 4.5

Processing Tomatoes

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N6416	Irrigated	79	40.4	18	30.7	4.6	4.5		
	Dry Farmed	23	8.3	35	35.9	6.6	4.9		
H8504	Irrigated	66	37.7	37	34.1	5.4	4.9		
	Dry Farmed	13	4.6	62	37.1	6.5	4.8		

Desired: 4.2-4.3

Processing Tomatoes

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	Dry Farmed	23	8.3	35	35.9	6.6	4.9	3.6	
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N6416	Irrigated	79	40.4	18	30.7	4.6	4.5	3.3	1.4
	Dry Farmed	23	8.3	35	35.9	6.6	4.9	3.6	1.8
H8504	Irrigated	66	37.7	37	34.1	5.4	4.9	3.5	1.6
	Dry Farmed	13	4.6	62	37.1	6.5	4.8	3.3	2.0

Summary

- Dry farming has a long history in the western US
- Climate and soil influence dry farm success in western Oregon
- Dry-farmed tomato struggles with physiological disorders including blossom-end rot, yellow shoulders, cracking, and internal whitening
- Field prep and planting should be conducted in a way that protects soil moisture
- Grafting onto high performing rootstocks improves dry-farmed tomato yield and reduces blossom-end rot incidence
- Management practices can reduce blossom-end rot and yellow shoulder incidence
- Irrigation improves processing tomato yield and reduces fruit loss to blossom-end rot
- Dry-farmed processing tomato tended to have higher degree brix and brix/ta, but were more orange colored

Questions?

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