

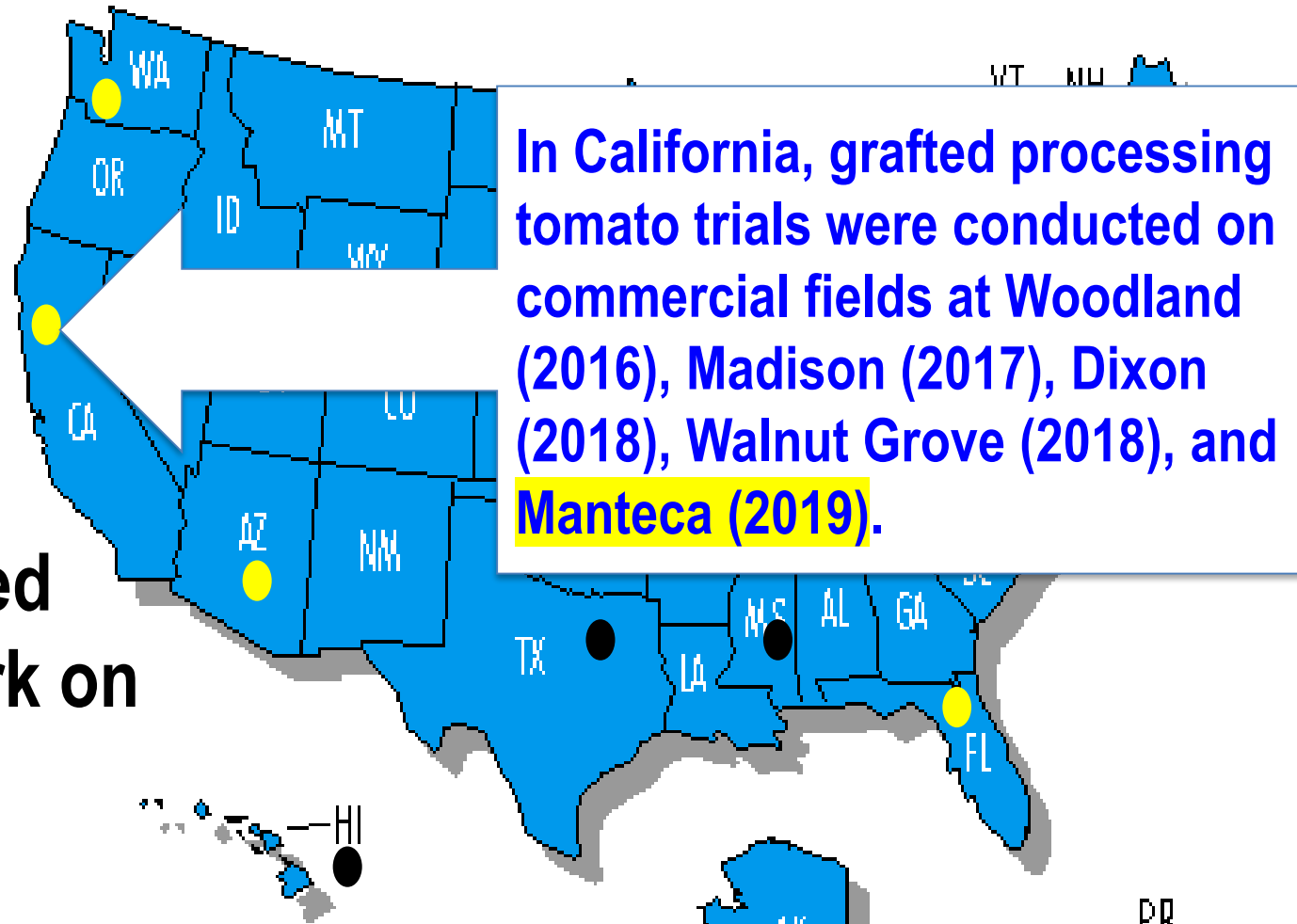
Evaluation of Yield Performance of Grafted Processing Tomato

Northern San Joaquin Valley Processing Tomato Meeting

Brenna Aegerter, Zheng Wang, and Gene Miyao
Farm Advisors, San Joaquin, Stanislaus, and Yolo Counties
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USDA Specialty Crop Research Initiative

- SCRI Team
- other academic teams that have worked or now work on vegetable grafting



Trials with Grafted Processing Tomato

- **Different rootstock and scion**
- **Pre-commercial, non-disclosed rootstocks**
- **Yield performance**
- **Economically viable**

Vegetable Grafting

requires 2 varieties; may use more

Scion: 'recipient'

- supplies shoot
- fruit marketable
but roots flawed

Rootstock: 'donor'

- supplies roots
- fruit not
marketable but
roots better

scion

**vegetable
grafting**



rootstock

**combine
and
secure**



**several
ways
possible**



Grafted plants can be more:

- (1) resistant to biotic, abiotic stresses,
- (2) vigorous in root system,
- (3) resource-efficient (e.g., water and fertilizer),
- (4) productive (yield potential), but
- (5) **expensive (seeds, grafting, field management).**

than nongrafted counterparts.

2019 Field Trial, Manteca

- Scion: N 6428 and HM 3887.
- Rootstocks: Maxifort, Estamino, FusaPro, Shield, V90109, and two pre-commercial, non-disclosed rootstocks, plus non-grafted controls.
- Plot length: single bed by 75 feet, replicated four times.
- Transplants: produced by California MasterPlant.
- Trial setup: transplanted on May 28, harvested on Oct. 3 (128 days).
- In-row spacing: 12 - 13" regular vs. 24 - 26" wide spacing.
- Data collection: machine harvested, yield and PTAB quality.

SCION: N 6428

<u>Rootstock</u>	Yield (tons per acre)		Soluble solids (°Brix)		PTAB color	
Estamino	90.6	a	4.05	g	21.0	a
Maxifort	90.5	a	4.10	fg	21.0	a
V90109	89.0	ab	4.33	defg	20.8	ab
FusaPro	88.7	ab	4.18	efg	20.8	ab
FusaPro - wide spacing	80.8	abc	4.43	cdefg	20.3	bc
Rootstock #2 * - wide spacing	78.2	abcd	4.55	bcde	20.4	abc
Shield	74.6	cd	4.63	bcd	20.4	abc
Non-grafted control	69.9	cde	4.80	bc	20.5	ab
Rootstock #1 *	69.0	cde	4.78	bc	20.3	bc
Non-grafted control - wide spacing	59.3	e	4.85	b	20.3	Bc

SCION: HM 3887

<u>Rootstock</u>	Yield (tons per acre)		Soluble solids (°Brix)		PTAB color	
Maxifort	89.2	ab	4.48	bcdef	20.1	bcd
Estamino	79.6	abcd	4.45	bcdefg	20.0	bcd
FusaPro	77.8	bcd	4.63	bcd	19.8	cd
Rootstock #1 *	68.6	cde	5.35	a	19.5	d
Non-grafted control	66.9	de	4.83	bc	20.0	bcd

SCION: N 6428

<u>Grafting - Spacing</u>	Yield (tons per acre)	Soluble solids (°Brix)	PTAB color
Grafting - regular spacing	83.7 a	4.35 b	20.7 a
Grafting - wide spacing	79.5 ab	4.49 ab	20.4 a
Non-grafted - regular spacing	69.9 bc	4.80 a	20.5 a
Non-grafted - wide spacing	59.3 c	4.85 a	20.3 a

Combine: N 6428 and HM 3887Grafting vs. Non-grafting

Grafted plots	81.4 a
Non-grafted plots	65.4 b
	P < 0.0001

Summary of average yields from five trials, 2016 to 2019

Year	2016		2017		2018		2018		2019	
Location	Woodland		Madison		Dixon		Walnut Grove		Manteca	
Grafted plot yield (tons/acre)	60.4	10%	49.9	19%	83.5	8%	67.5	27%	81.4	24%
Non-grafted plot yield (tons/acre)	55.2		41.9		77.1		53.0		65.4	
P value	0.001		< 0.0001		< 0.0001		< 0.0001		< 0.0001	
Max increase	15%: DRI 0319 on DR 0138TX		32%: HM 3887 on Maxifort		20%: HM 3887 on FusaPro		55%: HM 3887 on Maxifort		38%: N 6428 on Estamino	

POTENTIAL ADVANTAGES	CHALLENGES
	<p>High cost of establishment (rootstock seed, grafted plants)</p>
	<p>Greenhouse logistics:</p> <ul style="list-style-type: none"> • Rootstock seed germination and uniformity challenges • Doubling greenhouse space for first month, plus special healing facility
<p>Higher yield</p>	<ul style="list-style-type: none"> • Potentially lower soluble solids? • Potentially slightly higher input costs? • Delayed harvest
<p>Improved resistance to soil-borne diseases</p>	<ul style="list-style-type: none"> • Planting with union belowground may compromise disease resistance • Few/no rootstocks with F3, Vert race 2
<p>Abiotic stress tolerance</p>	<p>Yield advantage may be greater at some sites than others.</p>
<p>High vigor, better fruit cover, less sunburn</p>	<p>Perhaps greater need to manage vines with training or trimming?</p>

Resources for help: rootstock table and grafting manual



Home » Tomato Rootstock Table

Tomato Rootstock Table

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Rootstock Variety	Product URL	Developer	Bacterial Wilt	Corky Root Rot	Fusarium Wilt Race 1	Fusarium Wilt Race 2	Fusarium Wilt Race 3	Fusarium Crown and Root Rot	Southern Blight	Vertillium Wilt	Root-knot Nematode	Tor Mo Vir
Aegis F1	Click Here	Takii	IR	IR	HR	HR		HR		HR	HR	R
Aibou	Click Here	Asahi Industries	R		R	R		R		R	R	R
Akaoni	Click Here	Asahi Industries										R
Anchor-T F1	Click Here	Takii	IR		HR	HR				HR	HR	R
Aooni	Click Here	Asahi Industries			R	R				R	R	R



Grafting Manual: How to Produce Grafted Vegetable Plants

www.vegetablegrafting.org

University of California
Agriculture and Natural Resources

Thank you!



Grower cooperators

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Seminis Vegetable Seeds/Bayer

Ag Seeds

Vilmorin/H.M.Clause

Timothy Stewart and Lekos (TS&L)

Rijk Zwaan

Enza Zaden



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