Influence of Grafting on Yield of Canning Tomatoes: 2017 Progress Report

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USDA Grant # 2016-51181-25404

Goal: Reduce premature vine senescence

66 days before harvest

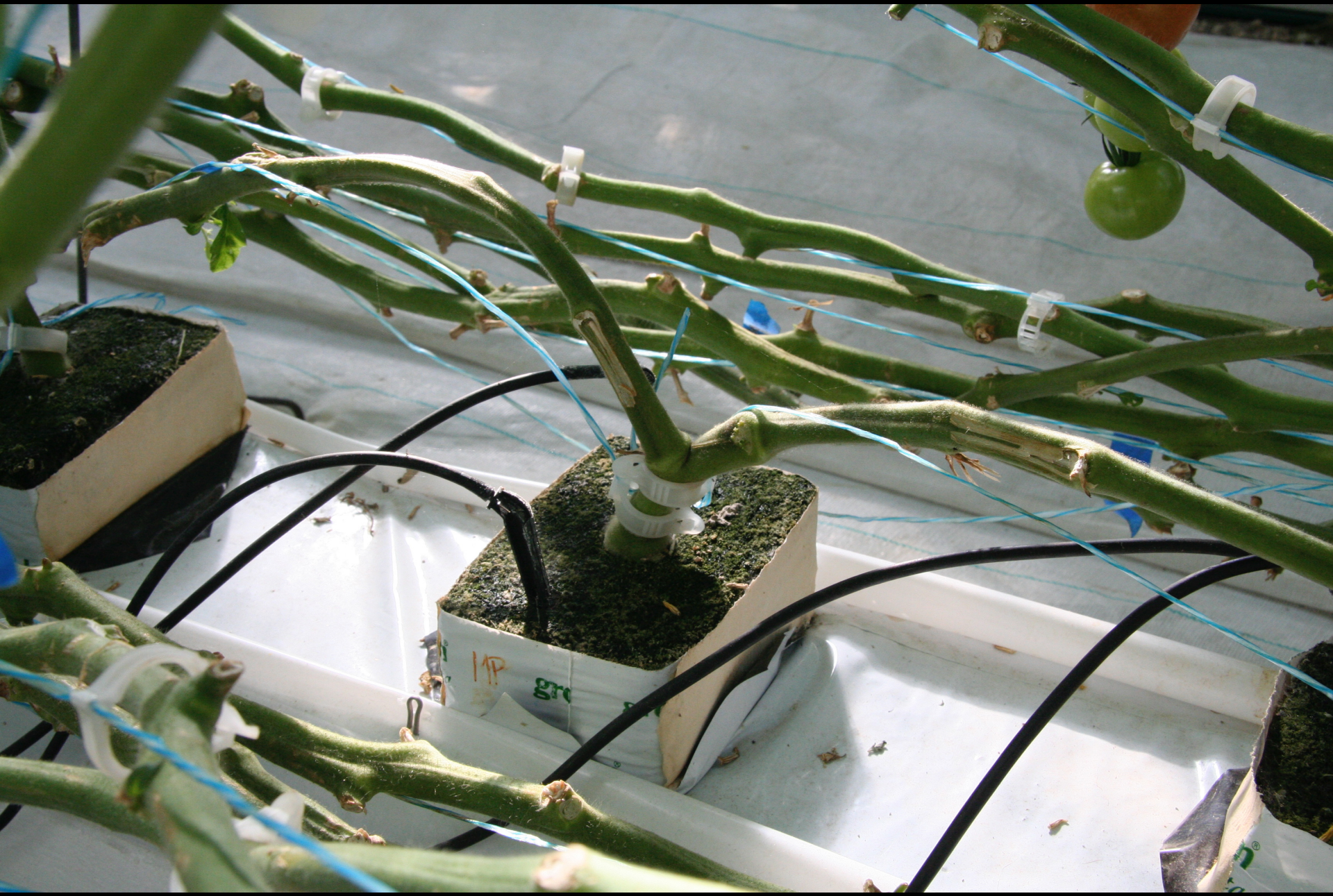
fruit sizing

18 days before harvest

fruit ripening

8 days before harvest

approaching harvest



Slides: Brenna Aegerter

1) Sterile trays & sterile media seeded 5 weeks before grafting

3) Grafting clips positioned half-way on rootstock stems

2) Both rootstock & scion plant stems clipped at ~45º angle

4) Scion stems align to rootstock angle with attention to match stem diameter


1
2
3


Healing conditions
Temp. = 28-29°C
R.H. = ≒100%
Light = ≒100 μmol/m²/s
Tomato = 4 days
Cucurbits = 7 days


Scion (Fruit):
N 6428
DRI 319
HM 3887
X
Rootstock:
MaxiFort
MultiFort
DR 0138TX
=
(3 x 3)
9 combinations


DRI 319 (conventional)
DRI 319 on rootstock

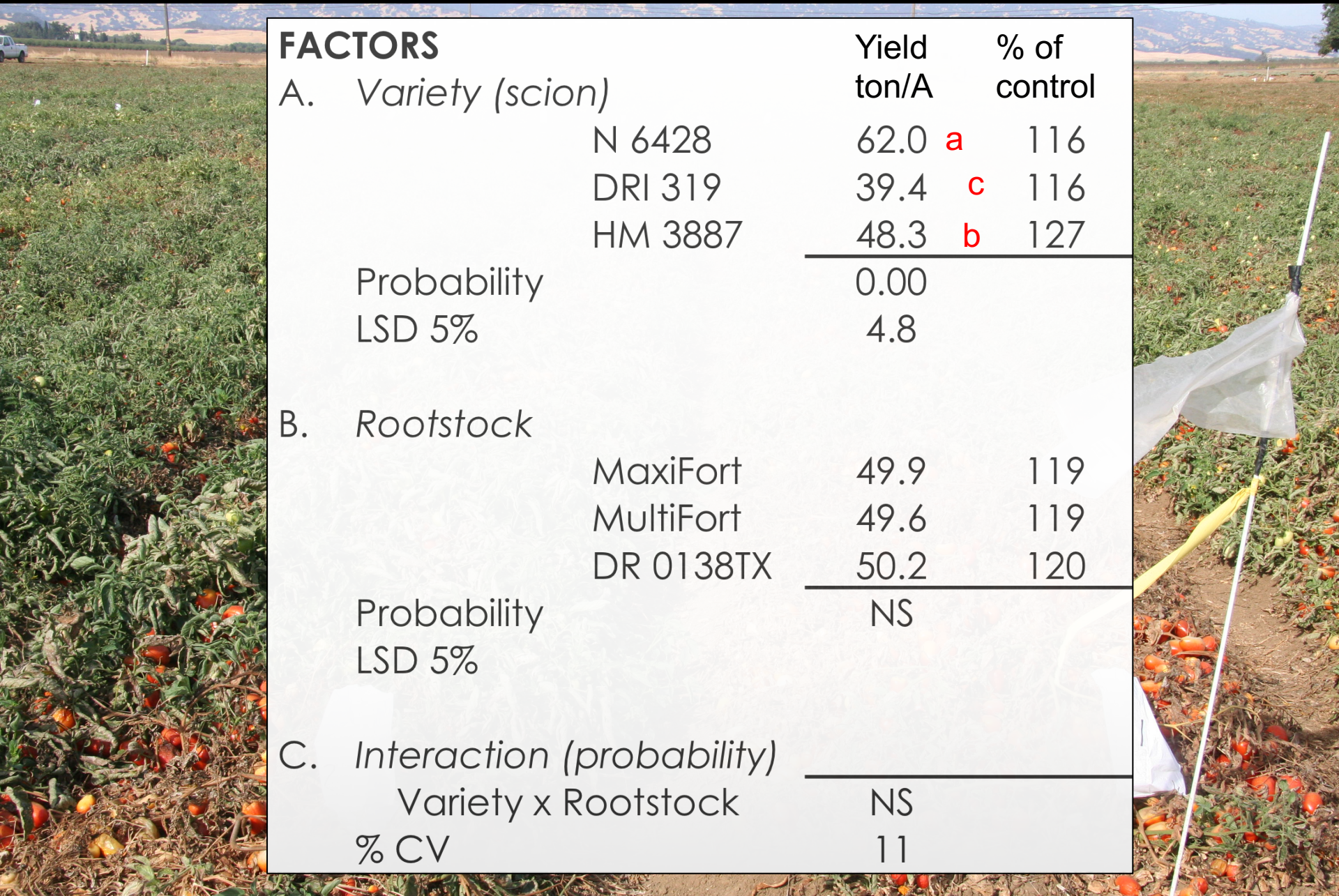
N 6428 on rootstock MaxiFort

N 6428 (conventional)

Effect of rootstocks on processing tomatoes, Harlan Family Farm, Madison area, 2017

			Marketable yield	non-grafted	
	Rootstock	**Scion**	Tons/A	% yield	°Brix
1	-	**N 6428**	53.5	-	4.2
2	MaxiFort	N 6428	62.2	116	4.1
3	MultiFort	N 6428	59.7	112	4.0
4	DR 0138TX	N 6428	64.1	120	4.0
5	-	**DRI 319**	34.0	-	4.8
6	MaxiFort	DRI 319	37.1	109	4.6
7	MultiFort	DRI 319	40.3	118	4.6
8	DR 0138TX	DRI 319	40.7	120	4.7
9	-	**HM 3887**	38.1	-	5.1
10	MaxiFort	HM 3887	50.4	132	4.5
11	MultiFort	HM 3887	48.8	128	4.5
12	DR 0138TX	HM 3887	45.7	120	4.4
	LSD 5%		8.1		0.3
	%CV		12		4
CLASS COMPARISONS:					
	Grafted vs		49.9	119	4.4
	non grafted		41.9	100	4.7
	Probability		0.00		0.00

Effect of rootstocks on processing tomatoes, Harlan Family Farm, Madison area, 2017



FACTORS		Yield ton/A		% of control
A. *Variety (scion)*				
	N 6428	62.0	a	116
	DRI 319	39.4	c	116
	HM 3887	48.3	b	127
Probability		0.00		
LSD 5%		4.8		
B. *Rootstock*				
	MaxiFort	49.9		119
	MultiFort	49.6		119
	DR 0138TX	50.2		120
Probability		NS		
LSD 5%				
C. *Interaction (probability)*				
Variety x Rootstock		NS		
% CV		11		

Effect of rootstocks on processing tomatoes, Harlan Family Farm, Madison site, 2017

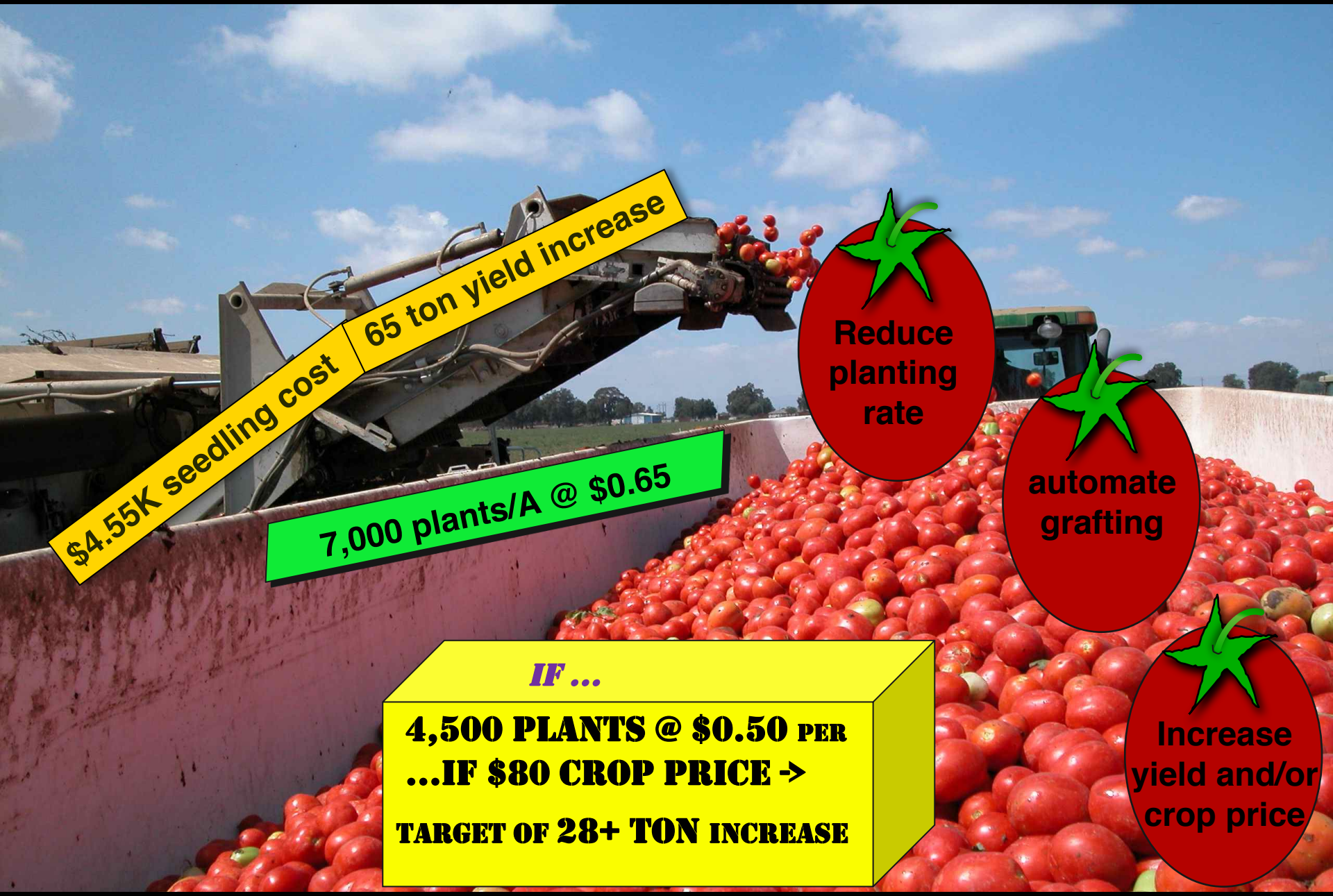
FACTORS		Yield ton/A	% of control
A. *Variety (scion)*			
	N 6428	62.0 a	116
	DRI 319	39.4 c	116
	HM 3887	48.3 b	127
Probability		0.00	
LSD 5%		4.8	
B. *Rootstock*			
	MaxiFort	49.9	119
	MultiFort	49.6	119
	DR 0138TX	50.2	120
Probability		NS	
LSD 5%			
C. *Interaction (probability)*			
Variety x Rootstock		NS	
% CV		11	

Woodland site, 2016

FACTORS		Marketable yield Tons/A	non-grafted yield (%)
A. *Variety (scion)*			
	H 8504	53.5 b	110
	DRI 319	62.7 a	114
	HM 3887**	65.0 a	105
Probability		0.000	
LSD 5%		3.57	
B. *Rootstock*			
	MaxiFort	59.3	108
	MultiFort**	60.2	109
	DR 0138TX	61.8	109
Probability		NS	
LSD 5%			
C. *Interaction (probability)*			
Variety x Rootstock		NS	
% CV		7	

Challenges ?

- High establishment costs > $0.65 @
- Rootstock disease resistance:
  searching for Verticillium wilt race 2
  other pathogens
- ~~Location of graft union relative to soil surface~~
- ~~Variability, rootstock x scion interactions~~
- Coordination of rootstocks w/ scion plants- doubling greenhouse space plus healing room


$4.55K seedling cost
65 ton yield increase
7,000 plants/A @ $0.65
Reduce planting rate
automate grafting
Increase yield and/or crop price
IF …
4,500 PLANTS @ $0.50 PER
…IF $80 CROP PRICE ->
TARGET OF 28+ TON INCREASE

Year 2017 Cooperators:

Blake Harlan

Harlan Family Farm, Woodland

Grafting- (small-scale by hand)

Growers Transplanting Inc.

Josh Chase

Joan Venegas

Experimental Assistance

Timothy Stewart and Lekos Ag Seeds

Statistical Analysis of Variance

support- Brenna Aegerter

2018 project:

Brenna Aegerter coordination of project with USDA, multi-year grant