Powdery Mildew Control in Tomatoes

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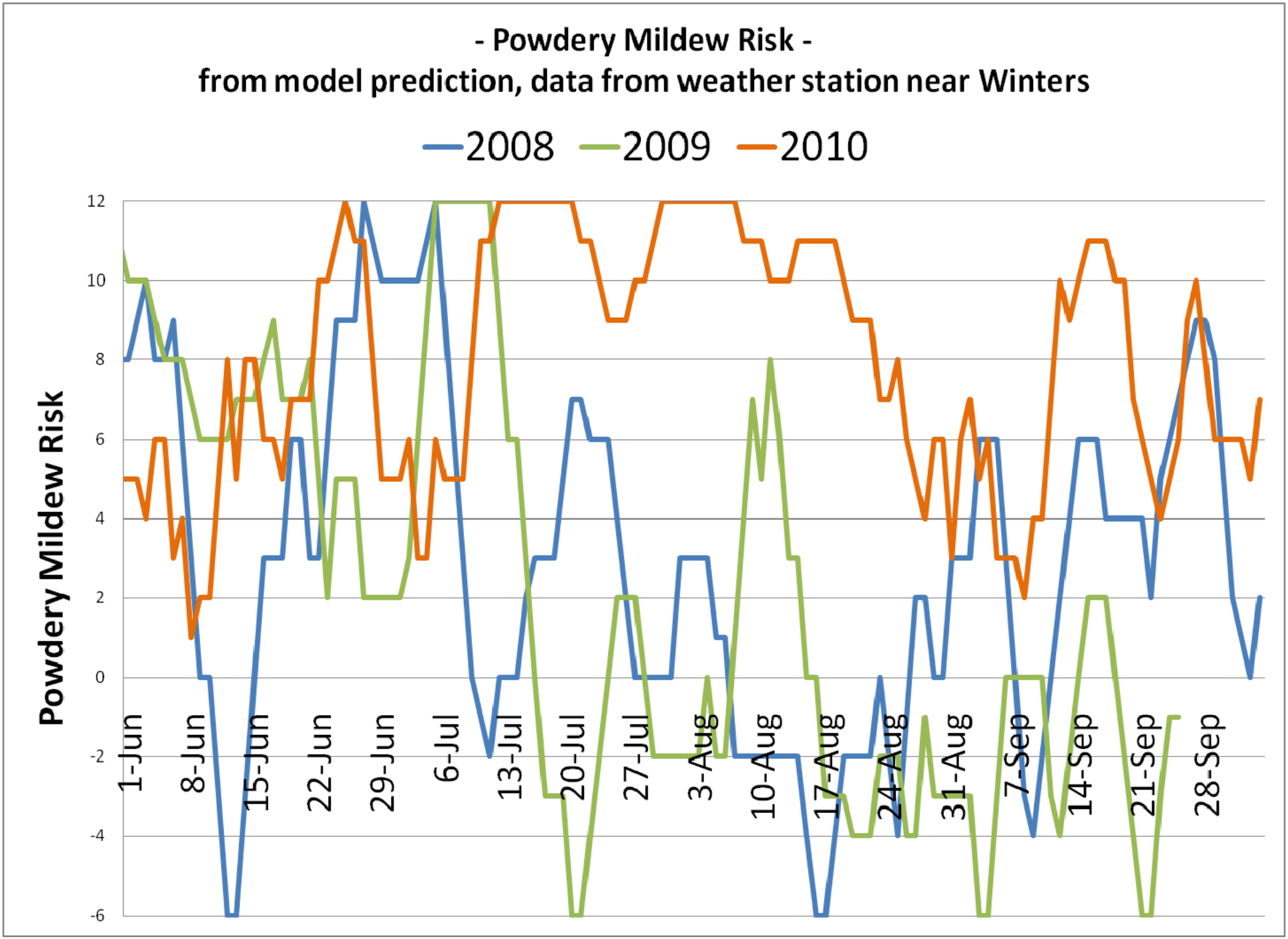
Symptoms

Yellow spots (or not)

Powdery white sporulation (or not)

Turning necrotic in age


- Powdery Mildew Risk -
from model prediction, data from weather station near Winters
2008
2009
2010
Powdery Mildew Risk
12
10
8
6
4
2
0
-2
-4
-6
1-Jun
8-Jun
15-Jun
22-Jun
29-Jun
6-Jul
13-Jul
20-Jul
27-Jul
3-Aug
10-Aug
17-Aug
24-Aug
31-Aug
7-Sep
14-Sep
21-Sep
28-Sep

2010 CTRI trials evaluating spray program timings and materials

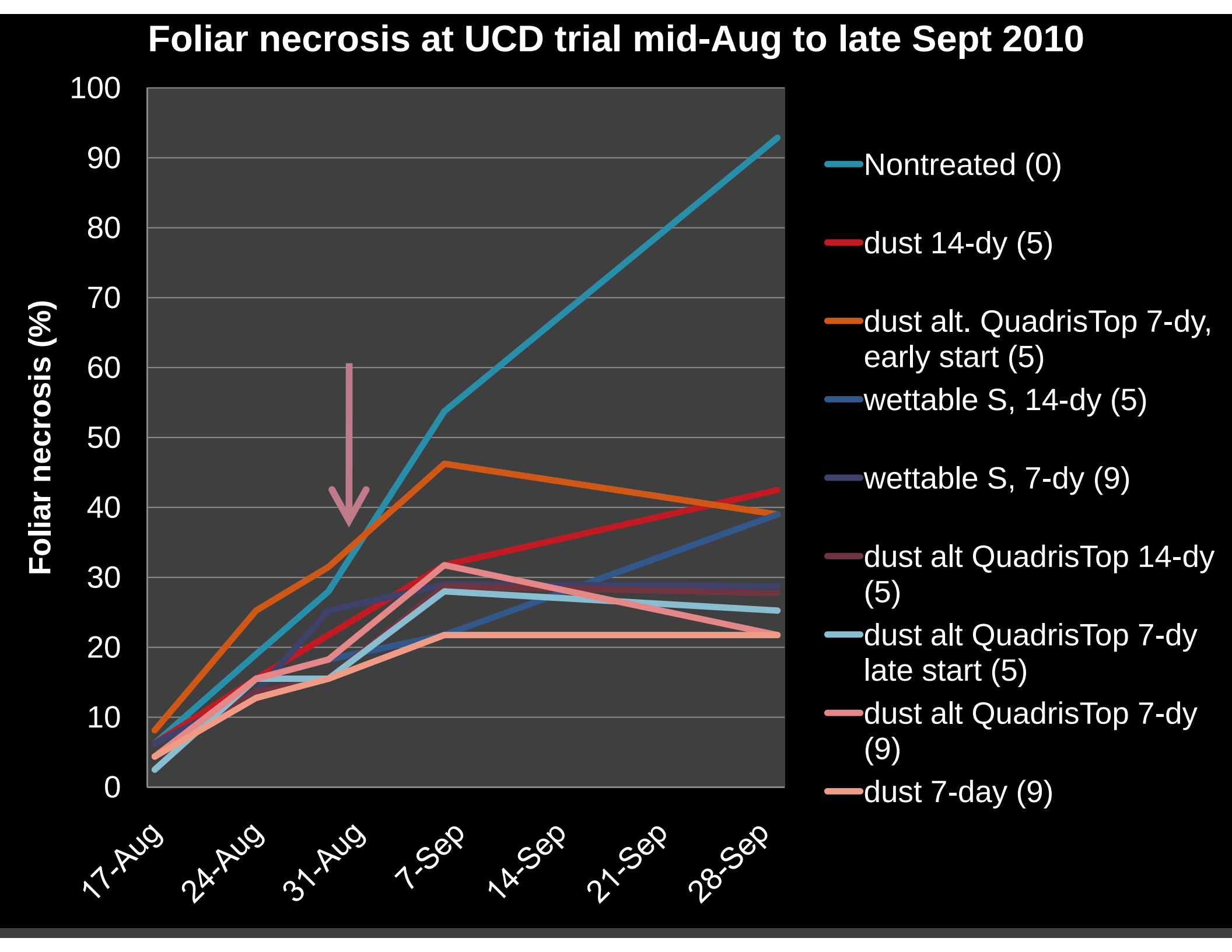
- Three trials in commercial fields (Davis-Dixon, Stockton and Los Banos areas)
- Two trials on-station (West Side Research and Extension Center & UCD campus)
- All trials transplanted in May, harvested in Sept.
- All trials (except Davis-Dixon area trial) were with variety SUN6366
- Powdery mildew developed at all but one trial location (Stockton)

2010 CTRI trials evaluating spray program timings and materials

- Quadris Top alternated with dust sulfur - 7 day interval (July & August)
- Quadris Top alt. sulfur– as above but 14 day interval
- Quadris Top alt. sulfur– 7 day - late start at ~6 weeks before harvest (August)
- Quadris Top alt. sulfur – 7 day – early start but ending about 6 weeks before harvest (July)
- Sulfur dust – 7 day (July- August)
- Sulfur dust – 14 day (July- August)
- Wettable sulfur – 14 day (July- August)
- Non-treated control – no mildew fungicides

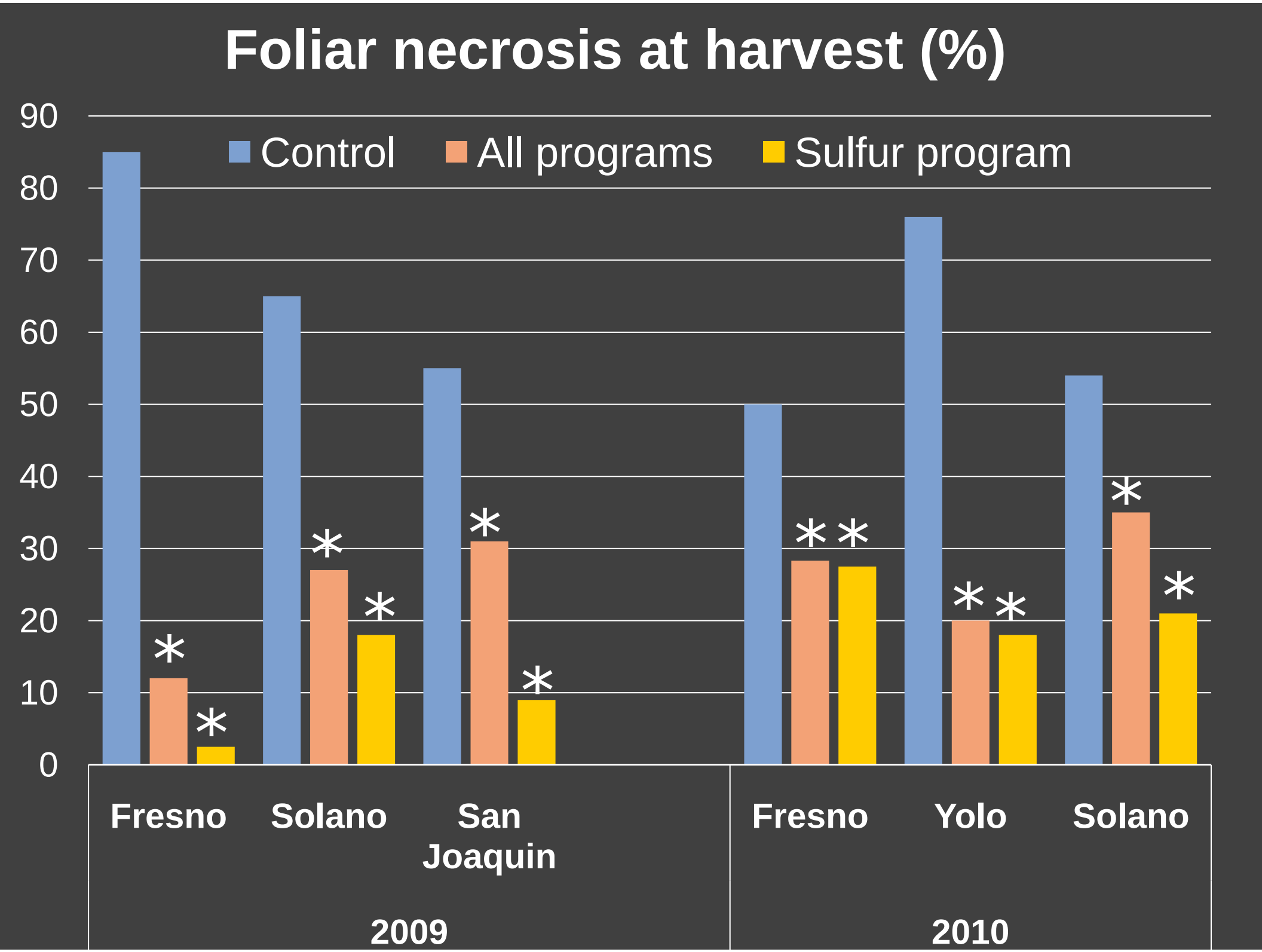
Field Trial Methods

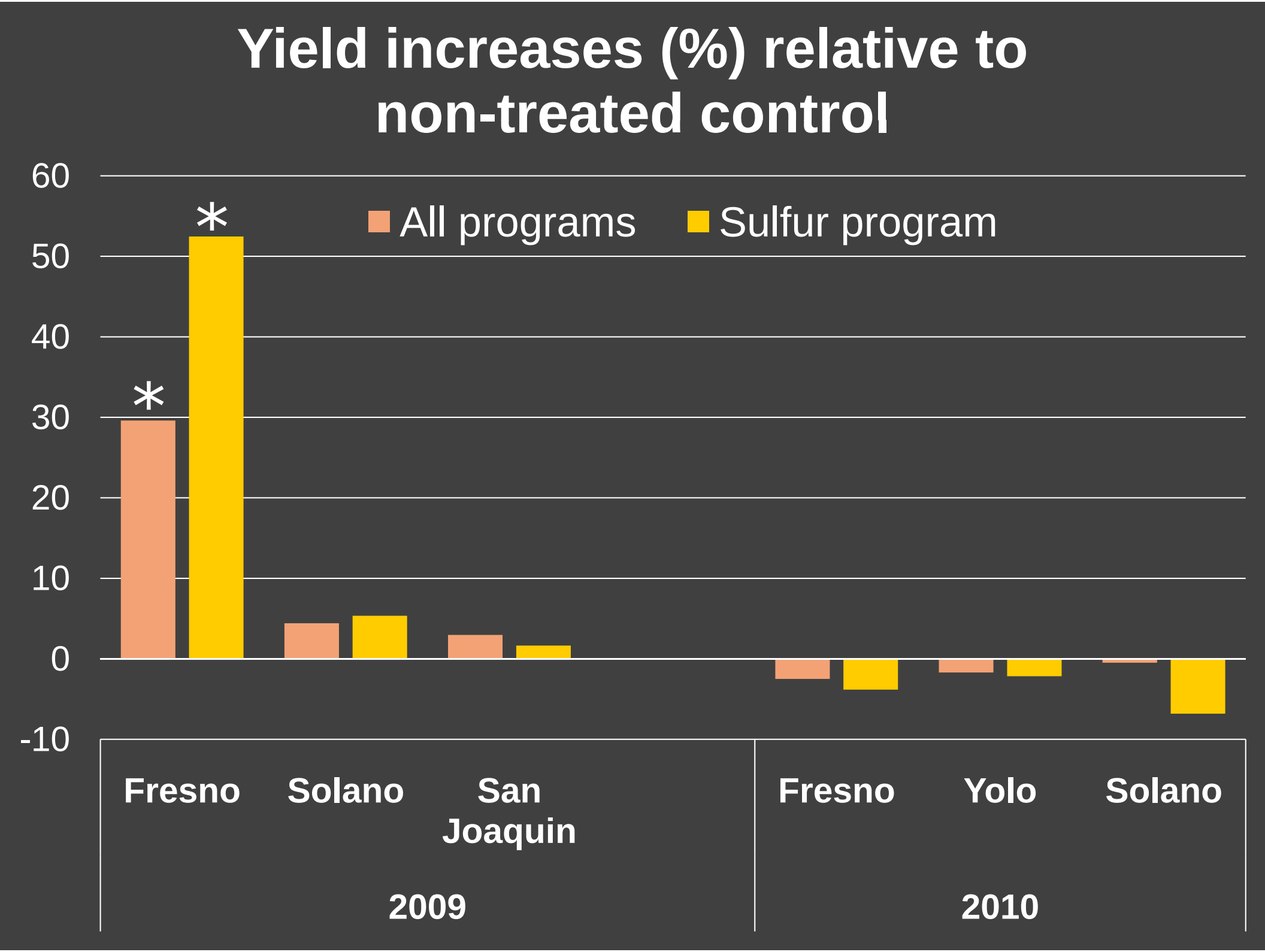
- Fungicides applied with CO_2 backpack sprayer and a hand-held boom (32 to 40 psi)
- Sulfur dust applied with hand-crank operated duster
- Plots consisted of a single bed by 50 (to 75 feet) – with one buffer row between treated rows – plots replicated four times
- Plots evaluated for:
  - Percent of foliage affected by mildew
  - Percent necrosis at end of season
  - Fruit yield and maturity
  - Fruit quality (sunburn, color, soluble solids, pH)

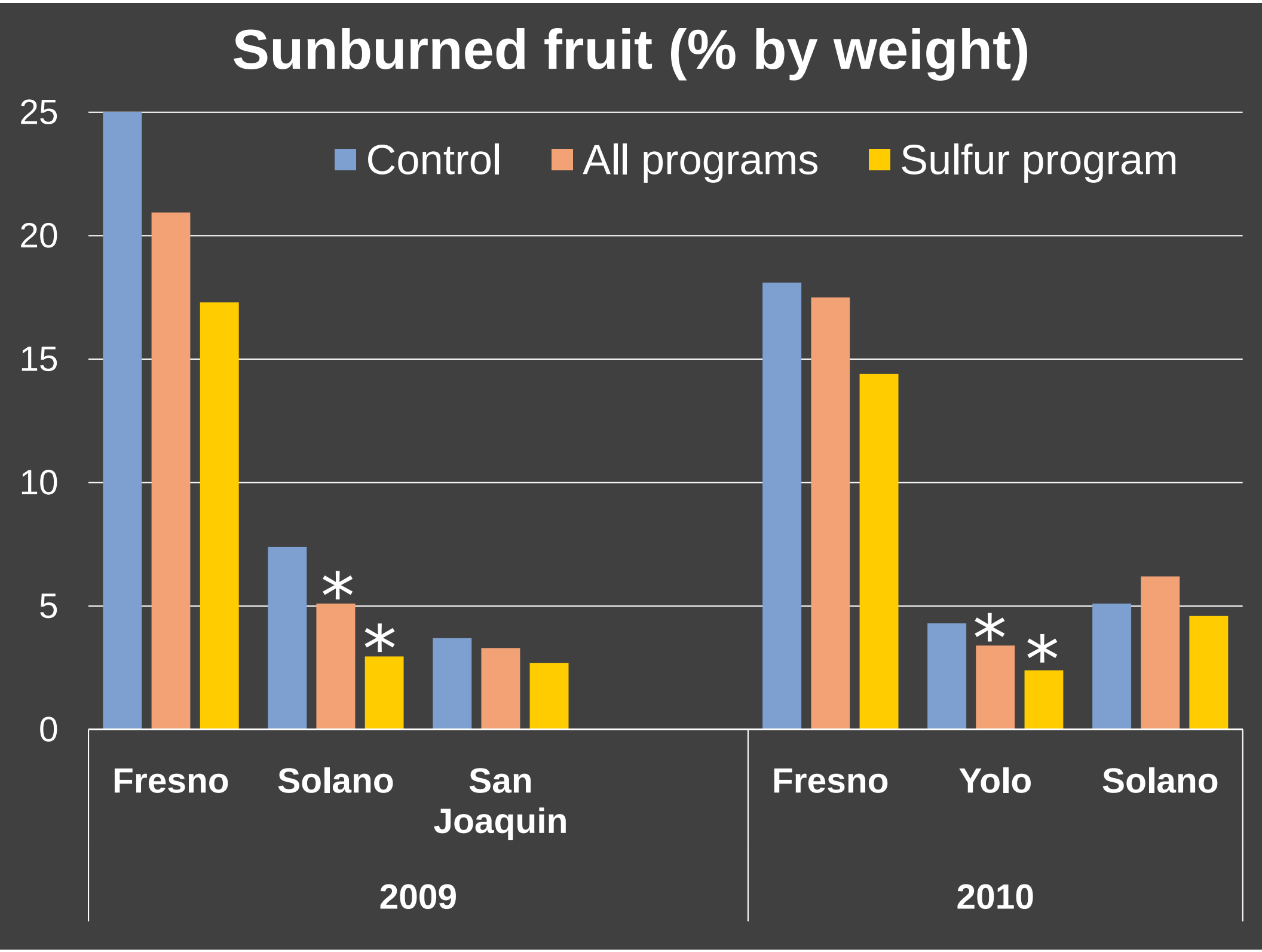

Foliar necrosis at UCD trial mid-Aug to late Sept 2010
Foliar necrosis (%)
100
90
80
70
60
50
40
30
20
10
0
17-Aug
24-Aug
31-Aug
7-Sep
14-Sep
21-Sep
28-Sep
Nontreated (0)
dust 14-dy (5)
dust alt. QuadrisTop 7-dy, early start (5)
wettable S, 14-dy (5)
wettable S, 7-dy (9)
dust alt QuadrisTop 14-dy (5)
dust alt QuadrisTop 7-dy late start (5)
dust alt QuadrisTop 7-dy (9)
dust 7-day (9)

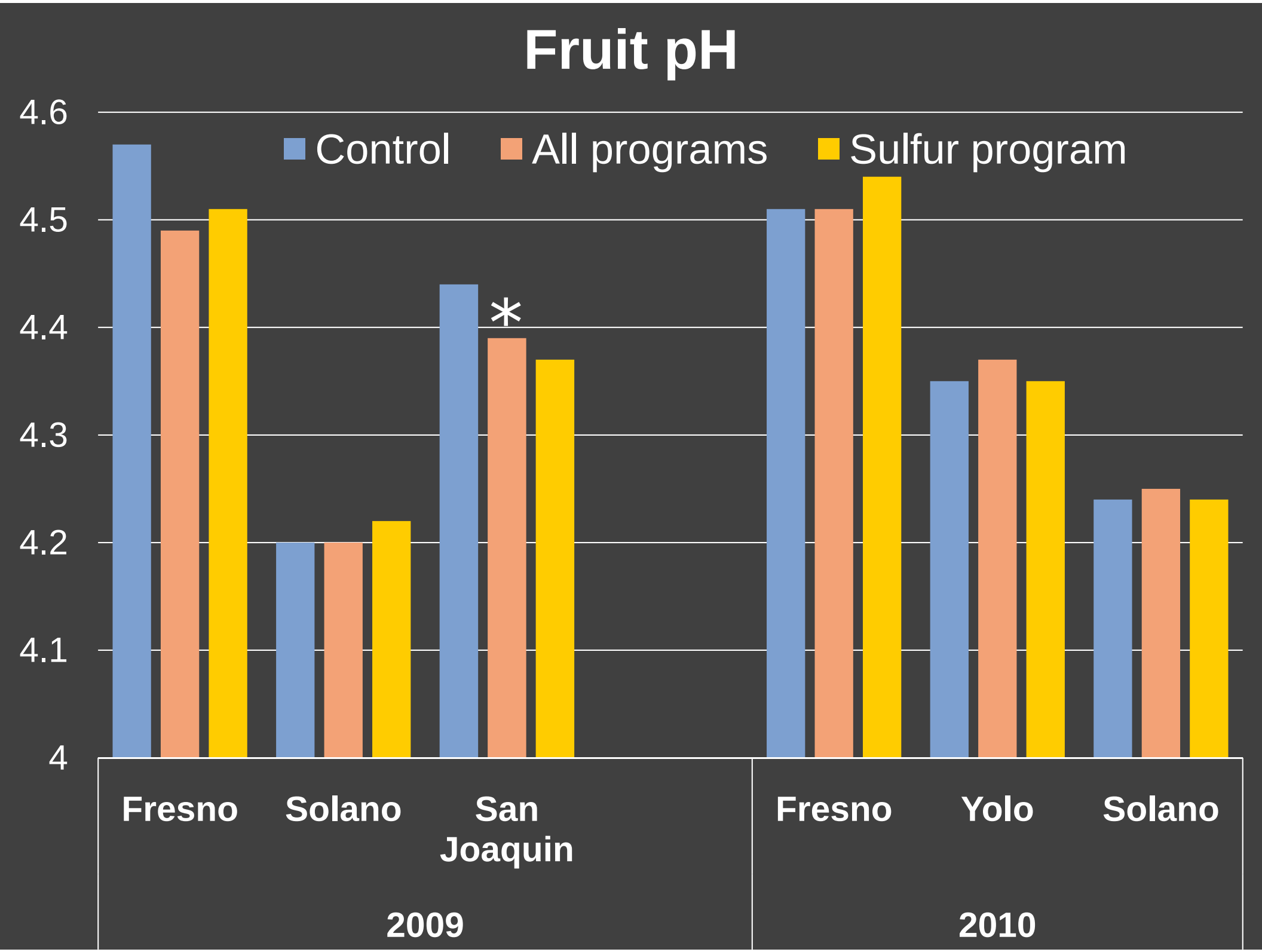
UCD campus trial Treatments	Spray interval (days)	sprays (#)	Yield (ton/a)	Sunburn (%)	Soluble solids (°Bx)	Color	pH
Nontreated	-	-	57.79	4.3	5.0	24.3	4.33
Sulfur dust	14	5	55.27	3.4	5.4	23.5	4.40
Sulfur dust alt w/ QuadrisTop (early start)	7	5	54.33	5.4	5.7	23.0	4.39
Wettable sulfur	14	5	60.38	2.2	5.1	23.5	4.38
Wettable sulfur	7	9	53.24	3.9	5.7	23.8	4.39
Sulfur dust alt w/ QuadrisTop	14	5	58.42	3.6	5.6	23.3	4.36
Sulfur dust alt w/ QuadrisTop (late start)	7	5	59.65	3.5	5.3	25.0	4.35
Sulfur dust alt. w/ QuadrisTop	7	9	56.66	3.2	5.5	25.5	4.37
Sulfur dust	7	9	56.54	2.4	5.4	24.0	4.35
		LSD	NS	NS	NS	NS	NS
		CV	10.9	45.2	7.1	5.4	1.0
Group comparisons							
Treated vs			57.5	3.1	5.41	23.7	4.37
non-treated			56.9	4.1	5.00	24.1	4.35

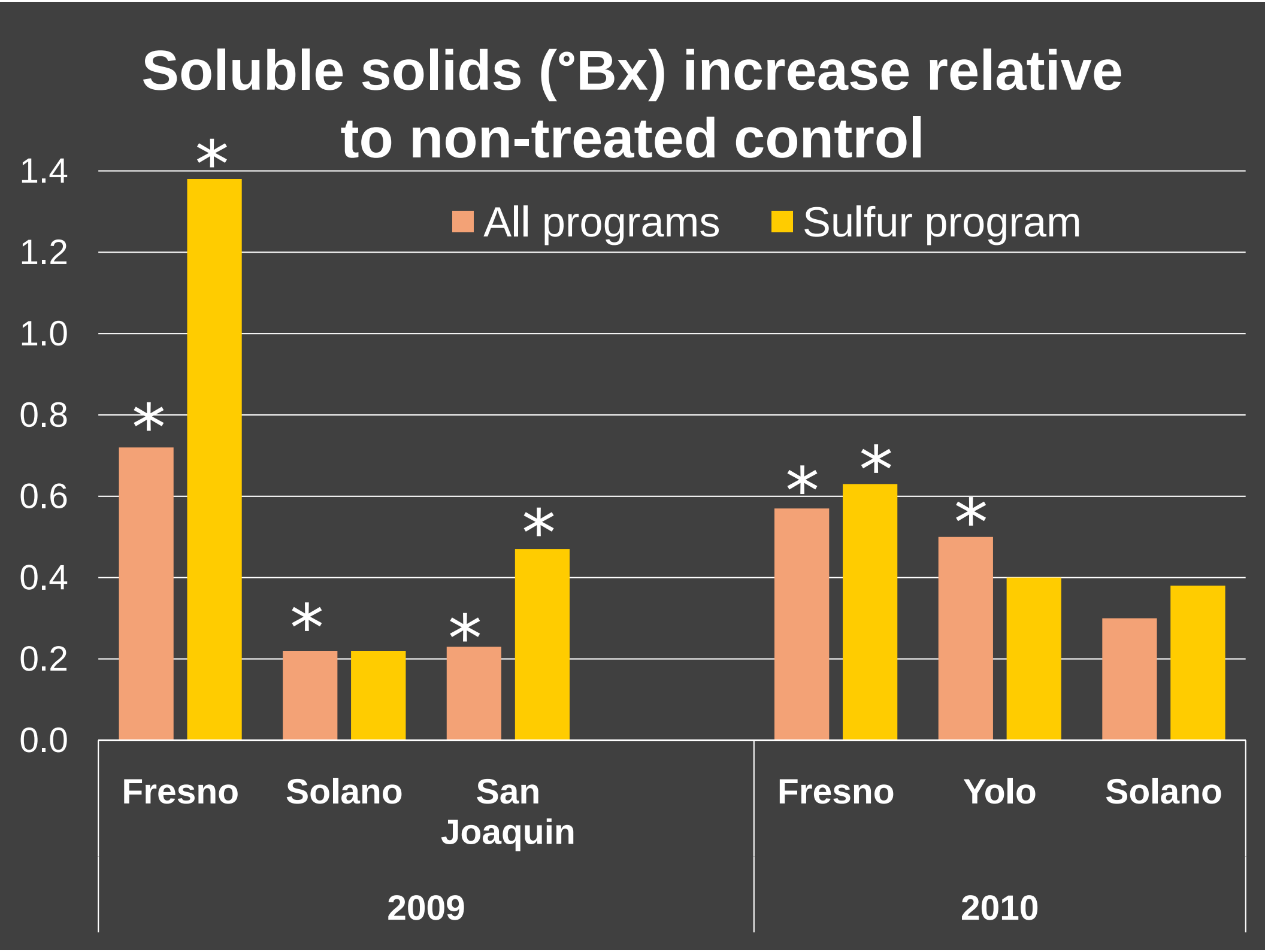
UC WSREC trial Treatments	Spray interval (days)	Sprays (#)	Necrosis (%) Sept 8		Yield (ton/a)	Sunburn (%)	Soluble solids (°Bx)		Color		pH
Nontreated	-	-	50.0	a	24.06	18.1	5.60	b	24	a	4.51
Sulfur dust alt w/ QuadrisTop	14	5	26.3	b	21.84	20.7	6.18	a	23	ab c	4.53
Sulfur dust alt w/ QuadrisTop	7	9	27.5	b	25.24	12.8	6.13	a	22.5	bc	4.51
Sulfur dust	14	5	26.3	b	25.68	17.5	6.18	a	22.75	c	4.49
Sulfur dust alt w/ QuadrisTop (early start)	7	5	31.3	b	23.12	13.7	6.15	a	22.75	c	4.50
Wettable sulfur	14	5	26.3	b	23.68	17.1	6.13	a	22.75	c	4.52
Sulfur dust alt w/ QuadrisTop (late start)	7	4	31.3	b	23.04	23.4	6.23	a	22.75	c	4.51
Sulfur dust	7	9	27.5	b	23.14	14.1	6.23	a	22.75	c	4.54
		LSD	13.73		NS	NS	0.34		1.04		0.05
		CV%	30.66		13.25	39.3	3.82		3.09		0.83
<u>Group comparisons</u>											
Treated vs			28.0		23.68	17.05	6.17		22.75		4.52
non-treated			50.0		24.08	18.08	5.60		24.0		4.53
P value			0.0003		NS	NS	<0.0001		0.0046		NS


Foliar necrosis at harvest (%)
90
80
70
60
50
40
30
20
10
0
Control
All programs
Sulfur program
*
*
*
*
*
*
**
**
*
*
*
Fresno
Solano
San Joaquin
2009
Fresno
Yolo
Solano
2010


Yield increases (%) relative to non-treated control
60
50
40
30
20
10
0
-10
All programs
Sulfur program
*
*
Fresno
Solano
San Joaquin
2009
Fresno
Yolo
Solano
2010


Sunburned fruit (% by weight)
25
20
15
10
5
0
Control
All programs
Sulfur program
*
*
*
*
Fresno
Solano
San Joaquin
2009
Fresno
Yolo
Solano
2010


Fruit pH
4.6
4.5
4.4
4.3
4.2
4.1
4
Control
All programs
Sulfur program
*
Fresno
Solano
San Joaquin
2009
Fresno
Yolo
Solano
2010


Soluble solids (°Bx) increase relative to non-treated control
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
All programs
Sulfur program
*
Fresno
Solano
San Joaquin
2009
Fresno
Yolo
Solano
2010

Conclusions

- Disease increasing one month prior to harvest may affect soluble solids (Brix) without affecting yield; earlier high disease pressure may significantly reduce yields
- Preventative applications are needed, 2-week treatment interval may be too long when disease pressure is high?
- Young plants appear less susceptible

Fungicide screening trials

- Many registered materials are effective, but sulfur dust is one of the best treatments, as are Quadris Top (strobilurin/11 plus DMI/3), and Quadris (strobilurin/11)

- Promising materials in new/different chemical classes (not yet registered for tomato):
  - Luna (fluopyram, SDHI/7, Bayer), Luna Sensation
  - Vivando (metrafenone, benzophenone/U8, BASF)
  - Torino (cyflufenamid, phenyl-acetamide/U6, Gowan)
  - Quintec (quinoxyfen, quinoline/13, Dow)
  - Q8Y78 (penthiopyrad, 7 + picoxystrobin,11, DuPont)

Thank you!

- California Tomato Research Institute
- Our cooperating growers and PCAs
  - Double D Farms
  - Del Terra Farms
  - Nickels Farming
  - Timothy & Viguie Farms
- Technical and field support staff of
  - UCCE
  - UC Davis Veg Crops field facility
  - UC WSREC

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