

# Variety Evaluation: TSWV and Fusarium

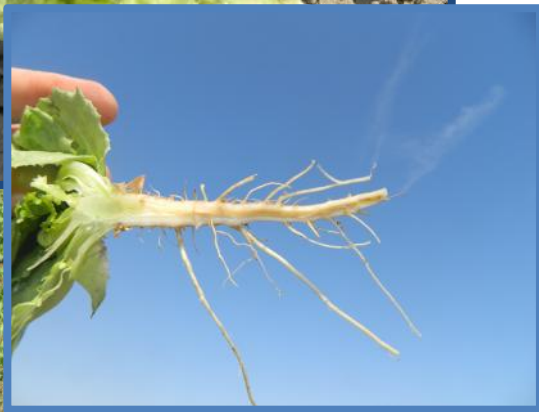
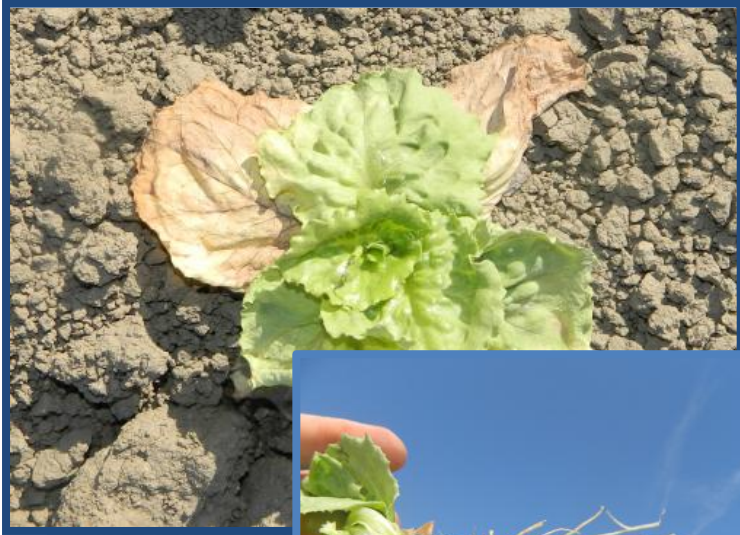
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# Tomato spotted wilt virus and Fusarium wilt increases in Fresno County Lettuce



Fusarium Wilt of lettuce  
*Fusarium oxysporum* f. sp. *lactucum*

*Tomato spotted wilt virus*  
Thrips-transmitted

## Primary Objective: Evaluate varietal response of lettuce varieties under high-disease pressure in Fresno Co.

- Commercial Field west of Five Points/Huron
- History of Fusarium wilt of lettuce and in area with TSWV in tomatoes
- Planted the trial three times (mid- and late-Aug, and mid-Sep).



First irrigation: 17 Aug  
Photo: 2 Oct



First irrigation: 30 Aug  
Photo: 6 Nov



First irrigation: 13 Sep  
Photo: 6 Nov

# Methods:

- Three Trials:
  - First irrigation dates were 17, 30 Aug and 13 Sep
- Twenty-one to 25 entries
- Randomized complete block design with 4 replications
- Single bed plots x 17 ft
- Evaluations:
  - Plants with TSWV or Fusarium were recorded at 7 to 14 day intervals
  - In the first two trials, entries with heads appearing healthy were evaluated at the end of the trials.



# Entries

## 17 Aug planting

### Iceberg

Autumn Gold\*

Patriot\*

Salinas\*

Vanguard\*

Vanguard 75 \*

Beacon

Coyote

Diamond back

Javolina

Laguna Fresca

Lighthouse

Raider

Sidewinder

Sharpshooter

Sniper

Heat Master\*\*

Sun Devil\*\*

Sun Quest\*\*

### Romaine

Conquistador\*

CR#4\*

Del Sol\*

Sawa Up\*

## 30 Aug planting

### Iceberg

Autumn Gold\*

Patriot\*

Salinas\*

Vanguard\*

Vanguard 75 \*

Beacon

Coyote

Diamond back

Javolina

Laguna Fresca

Lighthouse

Raider

Sidewinder

Sharpshooter

Sniper

El Guapo

Crusader\*\*

Heat Master\*\*

Sun Devil\*\*

Sun Quest\*\*

### Romaine

Conquistador\*

CR#4\*

Del Sol\*

Sawa Up\*

## 13 Sep planting

### Iceberg

Autumn Gold\*

Patriot\*

Salinas\*

Vanguard\*

Vanguard 75 \*

Beacon

Coyote

Diamond back

Javolina

Laguna Fresca

Lighthouse

Raider

Sidewinder

Sharpshooter

Sniper

El Guapo

Crusader\*\*

Deuce\*\*

Maxim\*\*

Sun Devil\*\*

Sun Quest\*\*

### Romaine

Conquistador \*

CR#4 \*

Darkland\*\*

Del Sol\*

Sawa Up\*

\* Standards for Fusarium wilt, which were obtained from Jim McCreight.

\*\* Used commercially and obtained from grower

Results: Extremely high Fusarium wilt levels in 1st trial; TSWV was present



# Influence of Temperature on Pathogen and Disease

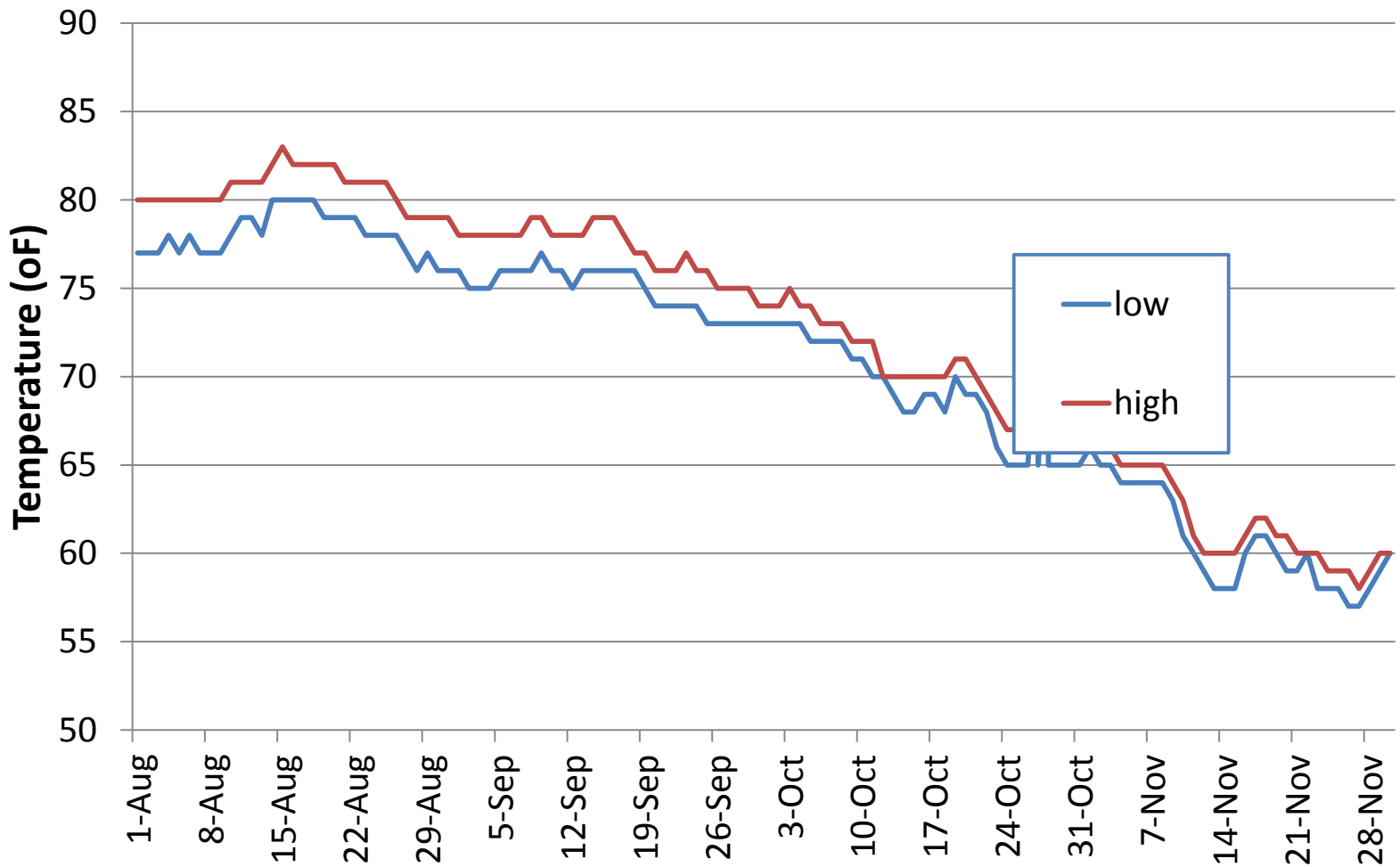
- Growth of pathogen in culture: <sup>z</sup>
  - Optimum: 82°F
  - Range: 46°-90°F
- Decrease disease incidence with temp decline: <sup>y</sup>
  - Lettuce planted when soil temperatures averaged 79°F (4 in depth) averaged 92 and 74% across varieties over two years
  - Lettuce planted at soil temperatures of 57°F averaged <15 and 5% over the two year study
- Disease severity was lower in susceptible varieties grown at 73°/64°F than at 83°/68°F and 91°/73°F. <sup>x</sup>

<sup>z</sup> Hubbard, J. C. 1997. Fusarium Wilt in Compendium of Lettuce Diseases. APS Press. 21-22.

<sup>y</sup> Matheron, M. E., McCreight, J. D., Tickes, B. R., and Porchas, M. 2005. Effect of planting date, cultivar, and stage of plant development on incidence of Fusarium wilt of lettuce in desert production fields. Plant Dis. 89:565-570.

<sup>x</sup> Scott, J. C., Gordon, T. R., Shaw, D. V., and Koike, S. T. 2010. Effect of temperature on severity of Fusarium wilt of lettuce caused by *Fusarium oxysporum* f. sp. *lactucae*. Plant Dis. 94:13-17.

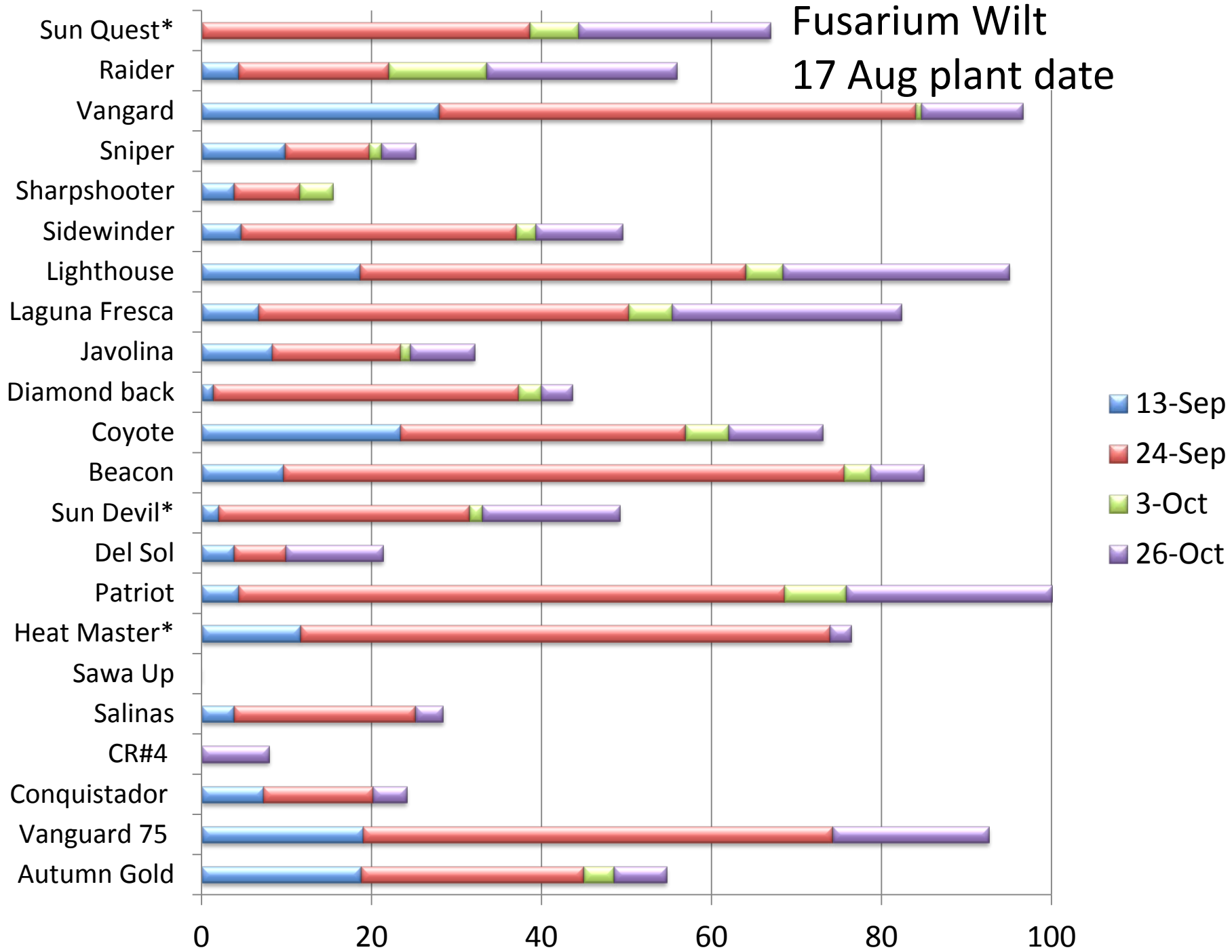
# Soil Temperatures at Five Points, 2012



\*Temperature at 6" depth  
CIMIS #2, Five Points/WSFS USDA

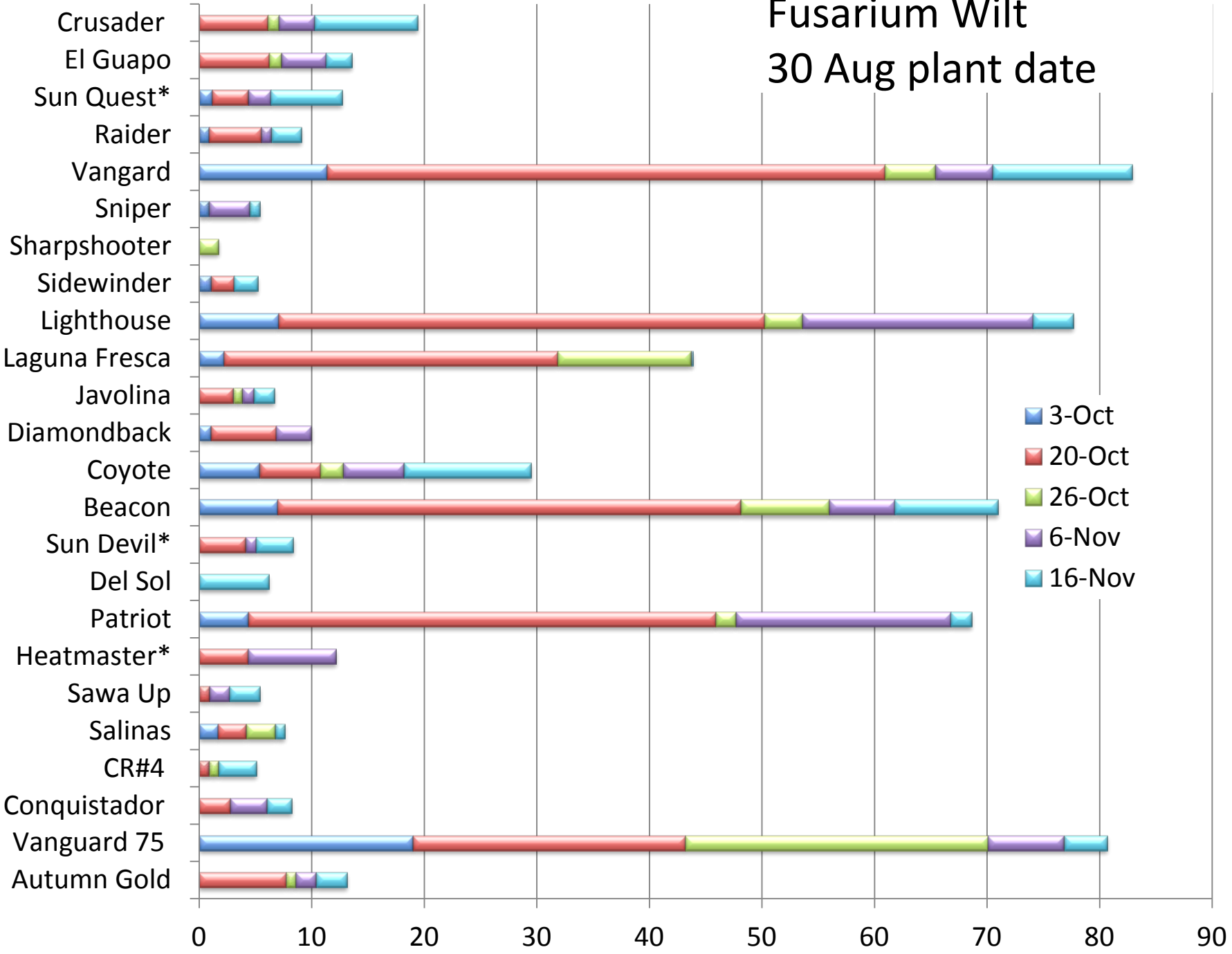
# Fusarium Wilt

17 Aug plant date



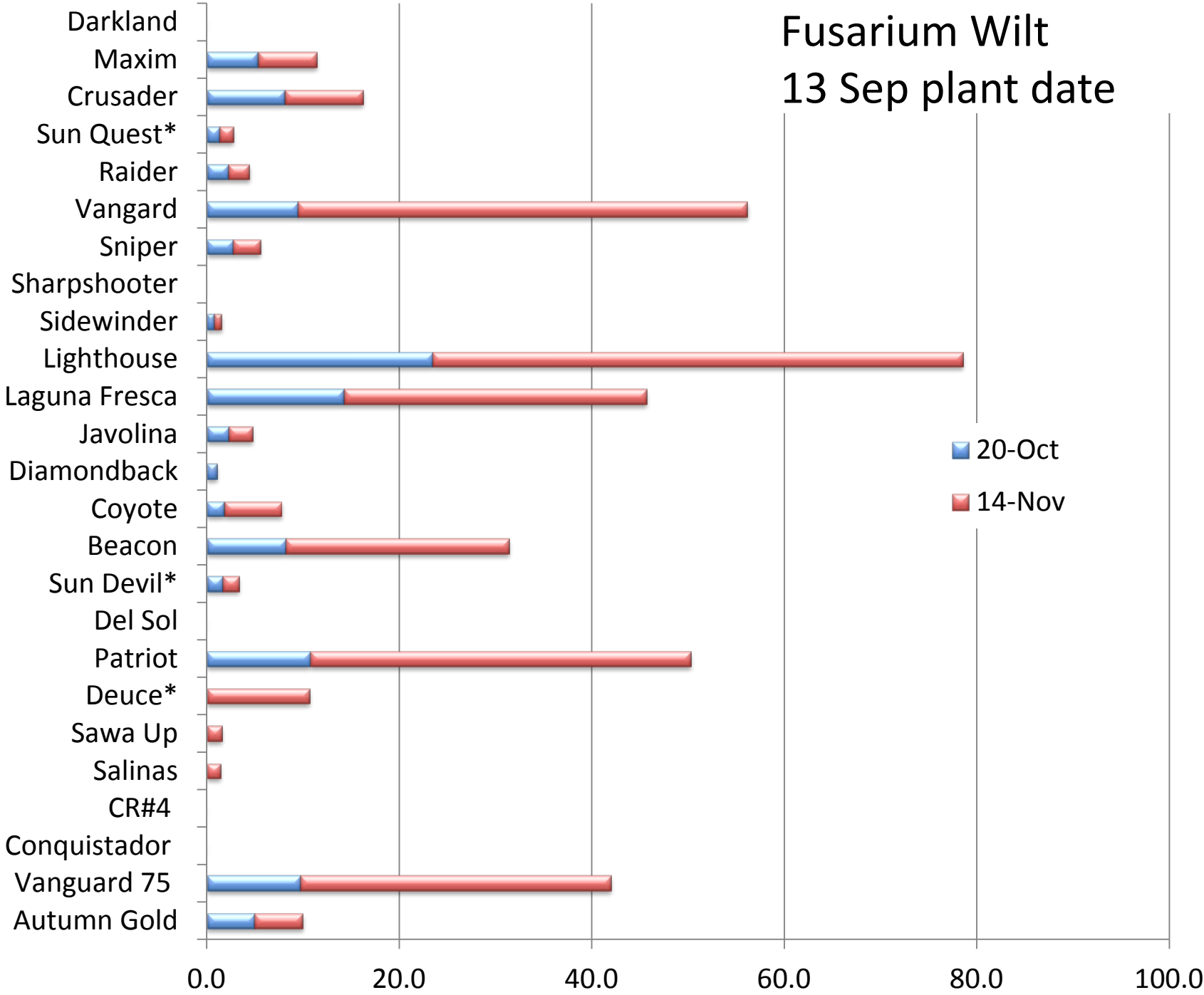
# Fusarium Wilt

## 30 Aug plant date

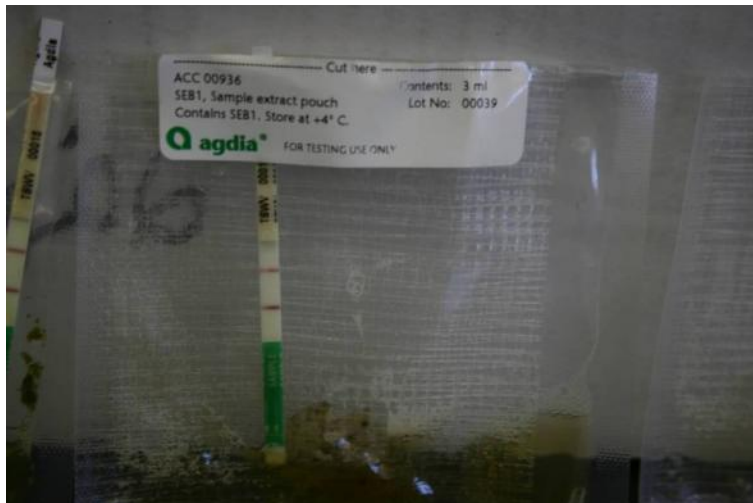


# Fusarium Wilt

## 13 Sep plant date

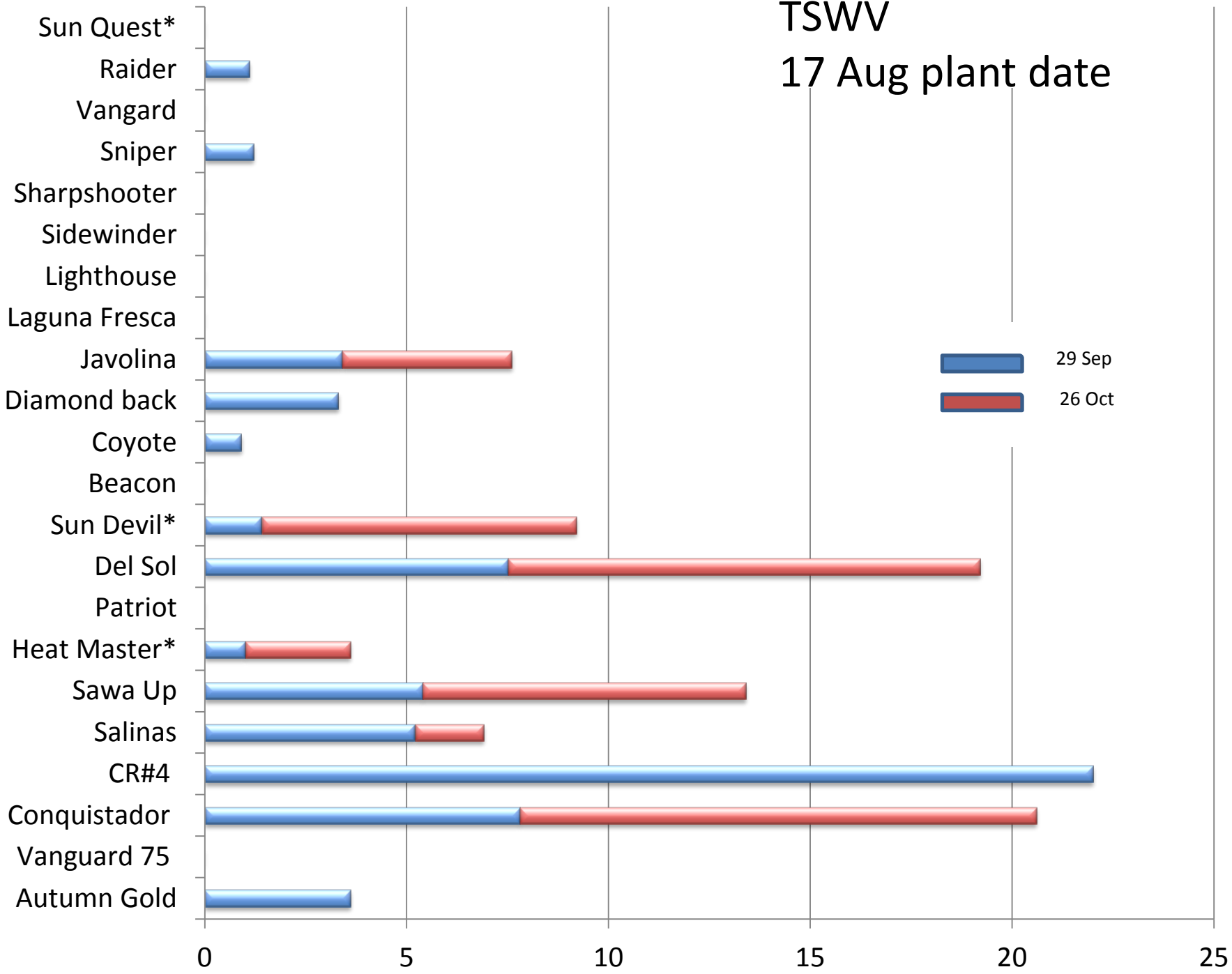


# *Tomato spotted wilt virus (TSWV)*



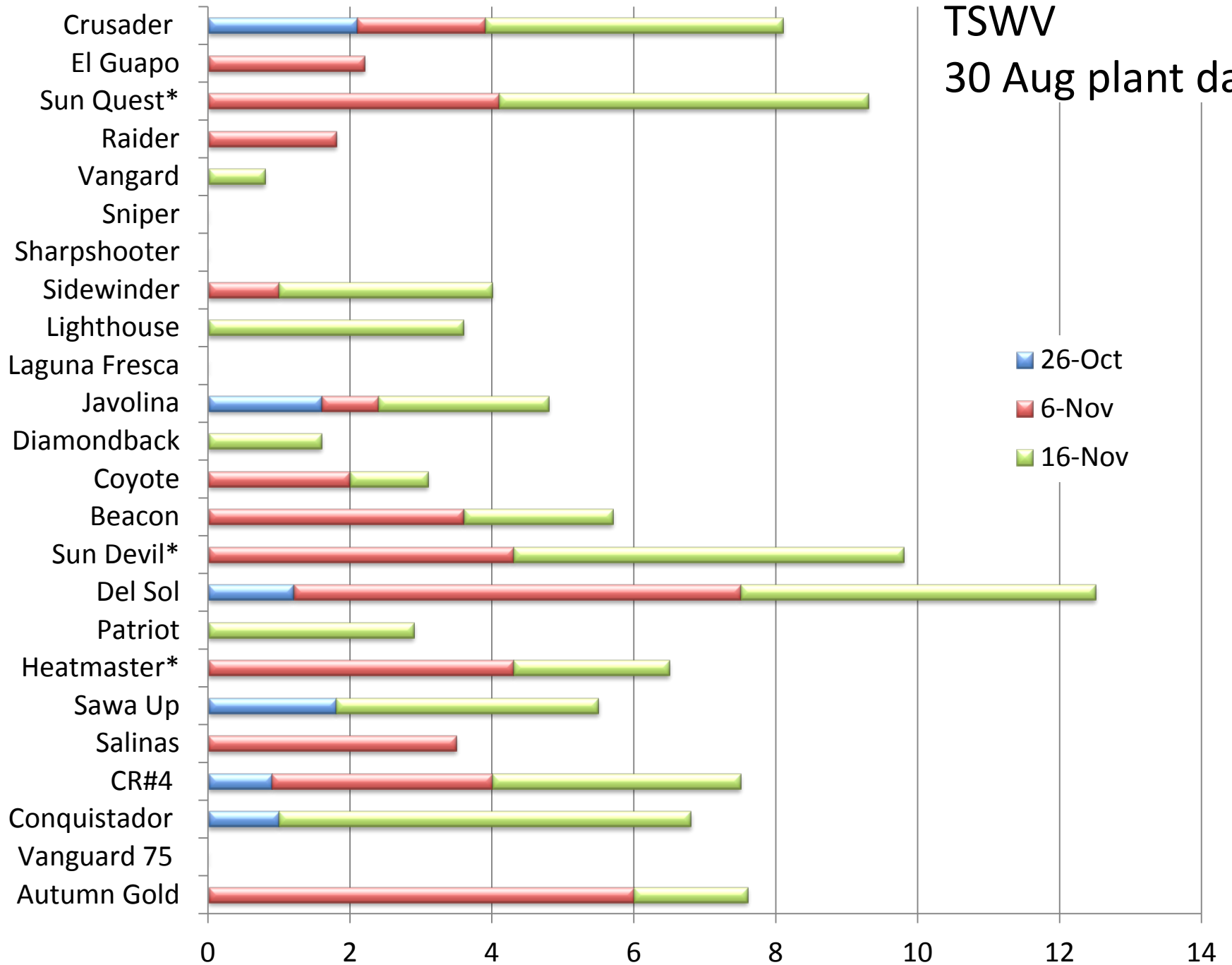
# TSWV

17 Aug plant date

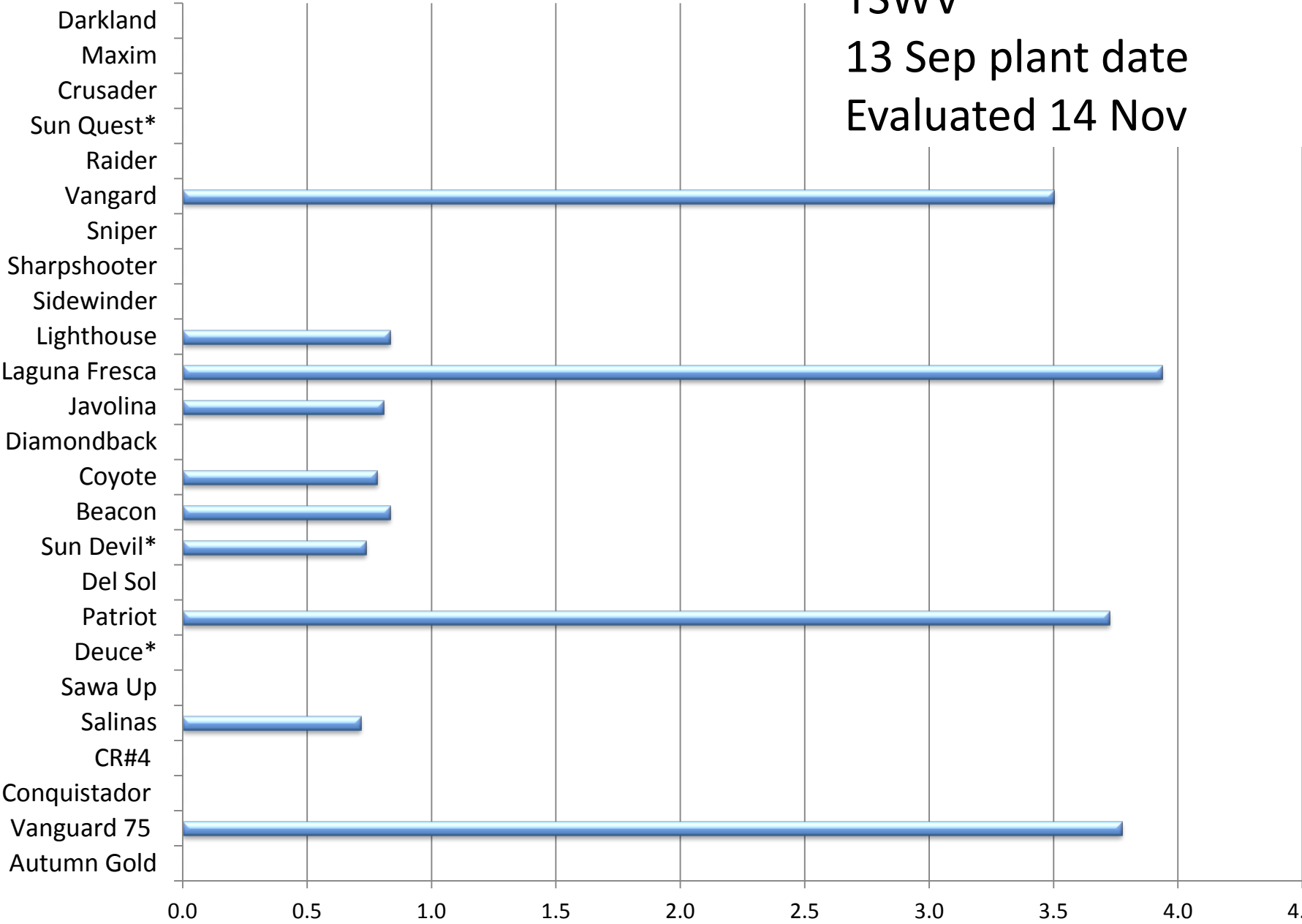


# TSWV

## 30 Aug plant date



TSWV  
13 Sep plant date  
Evaluated 14 Nov



# Non-Iceberg Appearance

2<sup>nd</sup> planting on 6 Nov



Del Sol with TSWV



Sawa Up



CR#4



Del Sol



Conquistador

# Harvest of 1<sup>st</sup> and 2<sup>nd</sup> Plant Dates

- Very few iceberg entries had heads were possibly marketable.
- The iceberg entries with potentially marketable heads were measured, weighed and assessed for maturity. Five heads per plot were measured (length, width, core) and the 5 heads were weighed.



Coyote



Lighthouse



Patriot



Vanguard

# Examples of Iceberg Entries Harvested



Sun Quest



Raider



Sharpshooter

2<sup>nd</sup> planting on 6 Nov

# Head Quality 30 Aug Plant Date

	Maturity	Height	Width	Core length	Weight/head
<b>cultivar</b>	(0-5)	(in)	(in)	(in)	(lbs)
Salinas	4.3	4.8	4.4	3.8	1.3
Sun Devil*	3.1	4.4	4.0	2.1	0.9
Diamond back	3.7	4.4	4.1	1.6	1.0
Javolina	3.5	4.4	4.5	1.5	1.0
Sidewinder	3.8	4.1	4.1	1.3	0.9
Sharpshooter	4.1	5.2	4.6	3.6	1.4
Sniper	4.2	4.8	4.3	3.7	1.1
Sun Quest*	3.6	4.3	3.8	1.4	0.9
LSD <sub>0.05</sub>	1.08	0.82	NS	1.10	NS
CV (%)	19.72	9.94	23.72	44.01	22.50

All heads were undersized and some had cores that were longer than desirable.

# Head Quality 17 Aug Plant Date

	Maturity	Height	Width	Core length	Weight/head
cultivar	(0-5)	(in)	(in)	(in)	(lbs)
Salinas	3.8	5.5	5.6	2.5	1.3
Sun Devil*	2.6	4.5	4.3	0.7	0.9
Diamondback	3.6	4.7	5.0	1.1	1.2
Javolina	3.6	4.6	5.5	1.3	1.3
Sidewinder	3.6	4.7	4.7	0.8	0.9
Sharpshooter	3.1	5.0	5.3	2.8	1.0
Sniper	3.1	5.3	4.0	2.2	1.1
Raider	3.6	5.0	5.0	1.1	1.3
Sun Quest*	3.3	4.5	4.5	1.7	1.0
El Guapo	2.0	4.1	4.3	0.7	0.8
Crusader	3.1	4.7	4.6	1.0	1.1
LSD <sub>0.05</sub>	<b>1.08</b>	<b>0.82</b>	<b>NS</b>	<b>1.10</b>	<b>NS</b>
CV (%)	<b>19.72</b>	9.94	23.72	44.01	22.50

# Summary:

- Response to both TSWV and Fusarium varied among varieties
- Romaine types had lower incidence than most iceberg.
- Sawa Up had no Fusarium wilt in absence of TSWV.
- TSWV levels tended to be high in romaine types.
- Among iceberg, Sniper and Sharpshooter had low levels similar to Salinas, even under very high pressure.
- All iceberg entries evaluated for quality in 1<sup>st</sup> and 2<sup>nd</sup> planting would have been unmarketable.

# Acknowledgements

- **Leafy Greens Research Advisory Board**
- **Harris Farms**
- **Devon Rodriguez: UCCE, Fresno**
- **Jim McCreight: USDA, Salinas**

