

Host resistance for managing soilborne diseases in strawberry production

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CAL POLY
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NEXT GENERATION DISEASE RESISTANCE BREEDING

Disease Common Name	FL	SD-CA	DN-CA	NP	R-Gene	QTL	Complex
Charcoal rot	1	1	1	1		?	+
Fusarium wilt	N	1	1	1	<i>FaFo2A</i>		
Verticillium wilt	N	2	2	1		?	+
Anthracnose	1	3	3	2	<i>FaRca2</i>	?	
Phytophthora crown rot	2	3	3	2		<i>FaRPc2</i>	
Powdery mildew	2	3	3	2		+	+
Angular leaf spot	2	3	3	2	<i>FaRXf1</i>		
Colletotrichum crown rot	3	N	N	3		<i>FaCg1, FaCg2</i>	

1 = highest priority; 2 = medium priority; 3 = lowest priority; N = non-priority.

SD = short-day, DN = day-neutral, and NP = nursery production.

R-gene = resistance gene, QTL = large-effect quantitative trait locus, complex = polygenic, complex genetics, and ? = unknown or hypothesized.

Fields infested on the campus of Cal Poly:

Macrophomina phaseolina

Verticillium dahliae



Field infested at the Monterey Bay Academy:

Fusarium oxysporum* f.sp. *fragariae



Cal Poly Trials

- 6 breeding programs
- 90 genotypes
 - 30 cultivars
 - 60 elite selections

Fields infested on the campus of Cal Poly:

Macrophomina phaseolina



MACROPHOMINA TRIAL

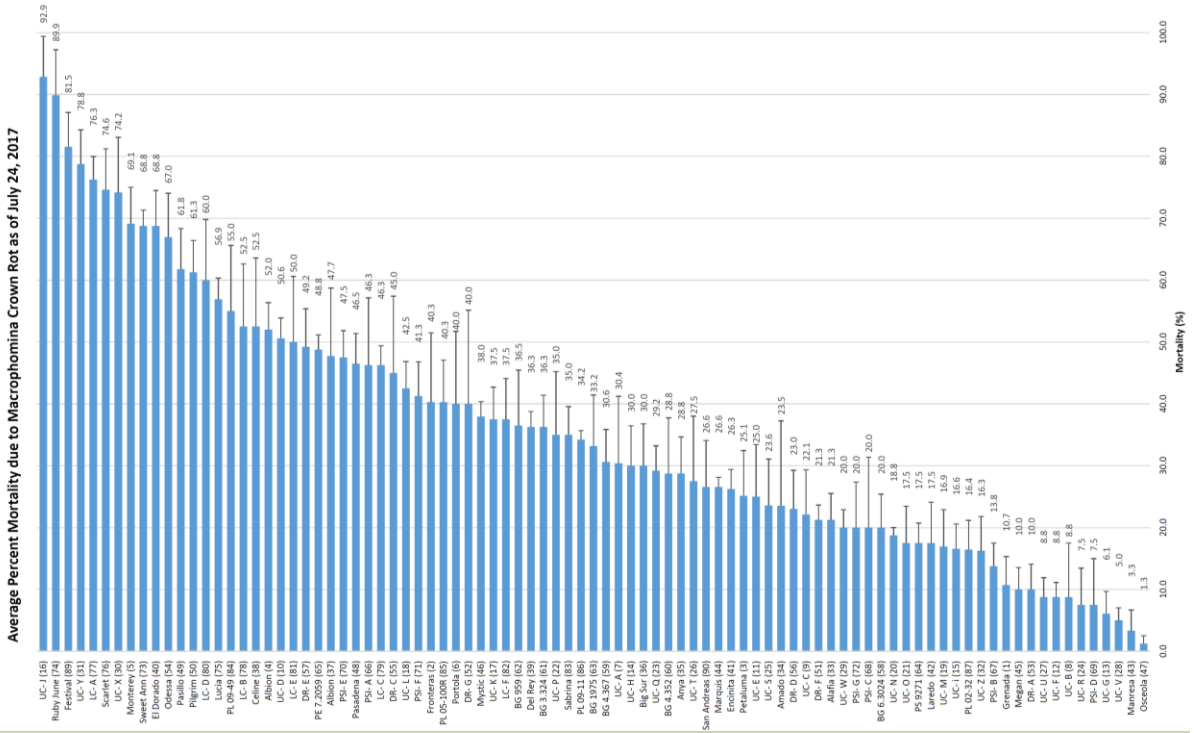


March 1, 2017

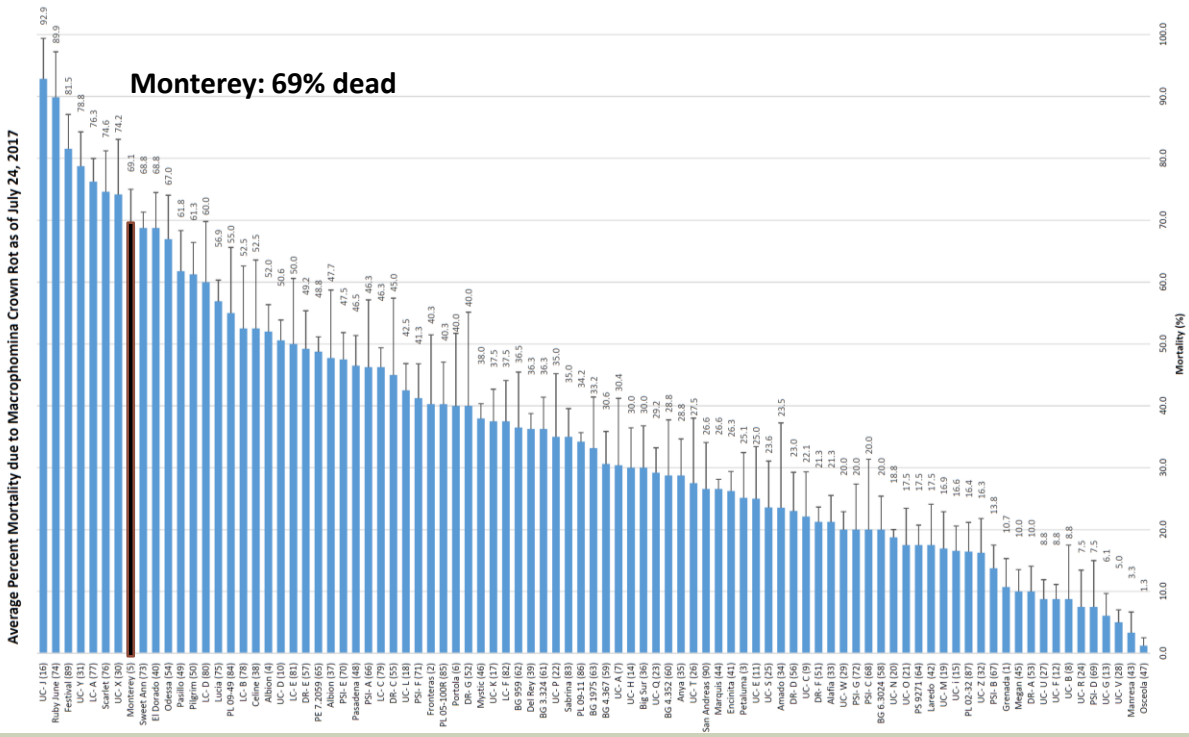
MACROPHOMINA TRIAL



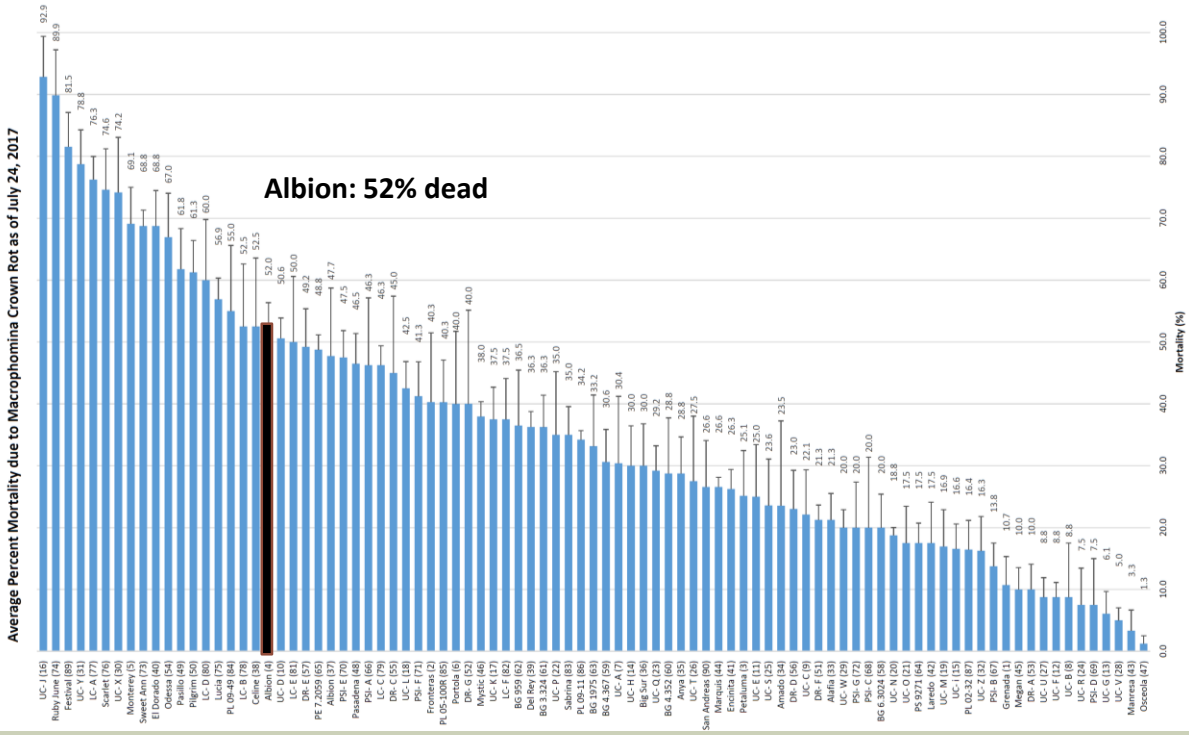
MACROPHOMINA CROWN ROT SUSCEPTIBILITY



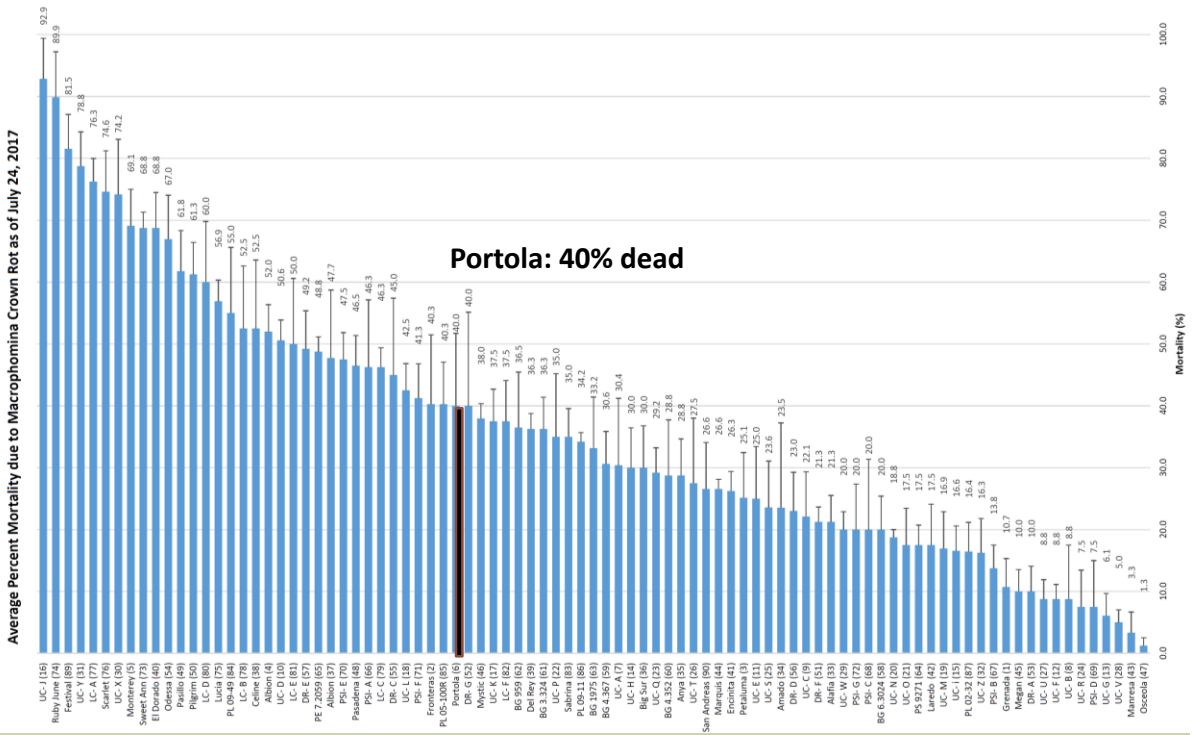
MACROPHOMINA CROWN ROT SUSCEPTIBILITY



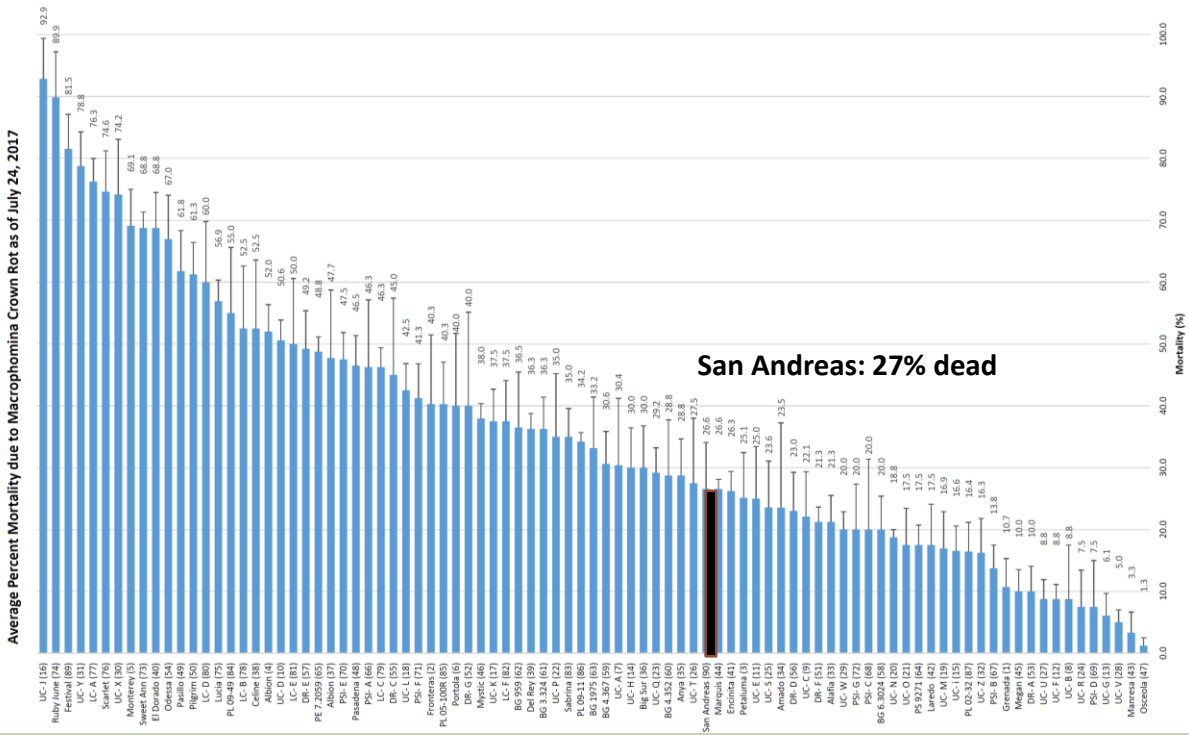
MACROPHOMINA CROWN ROT SUSCEPTIBILITY



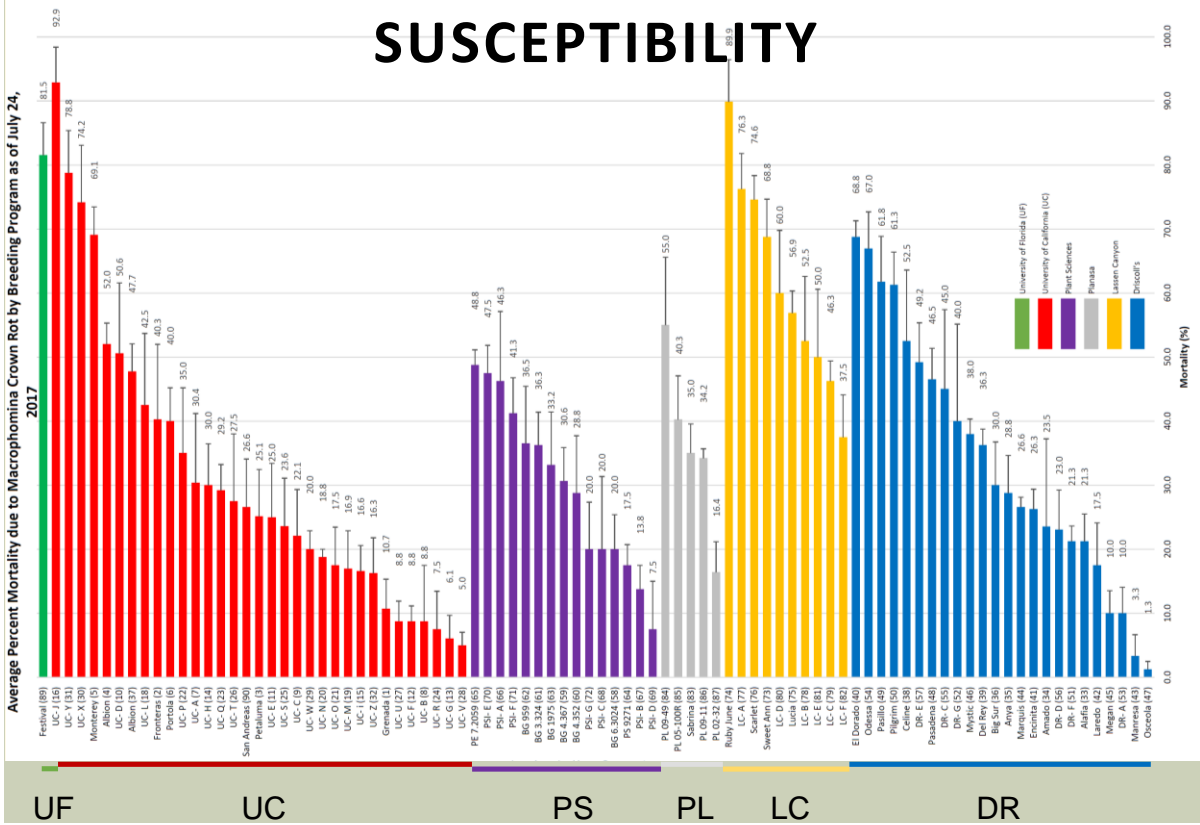
MACROPHOMINA CROWN ROT SUSCEPTIBILITY



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Macrophomina phaseolina

Verticillium dahliae

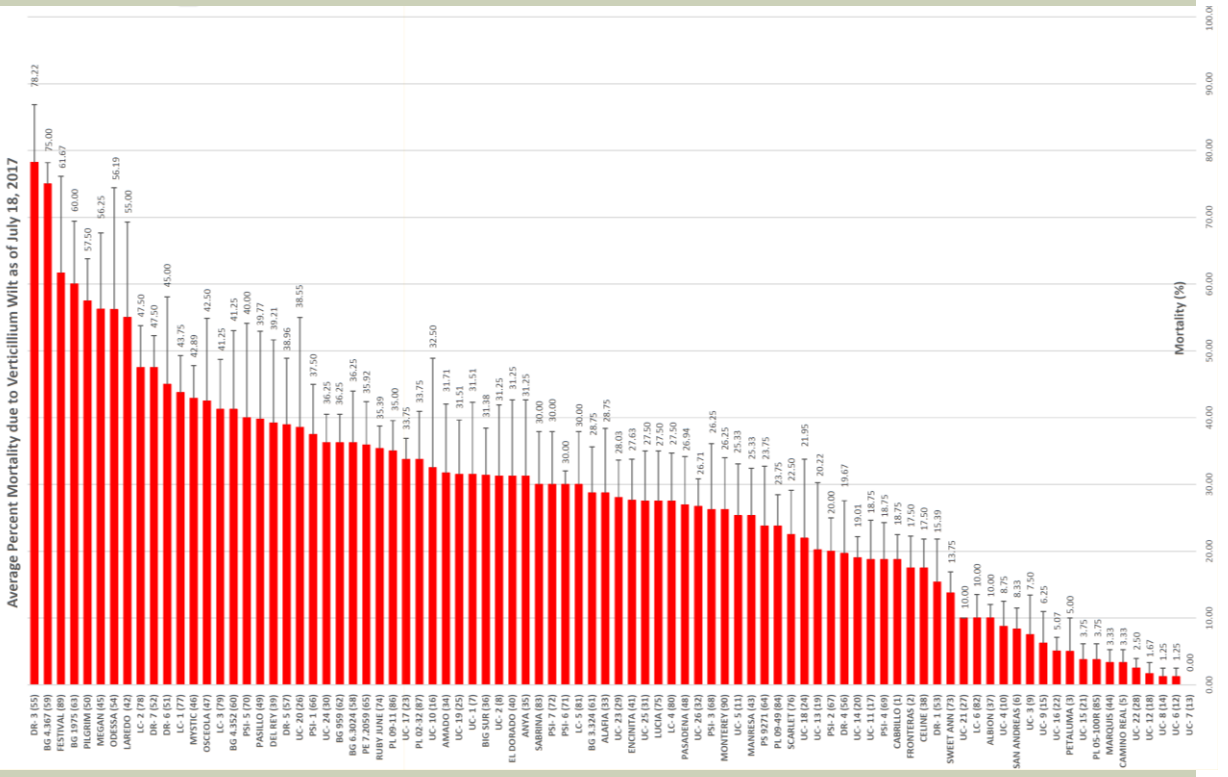




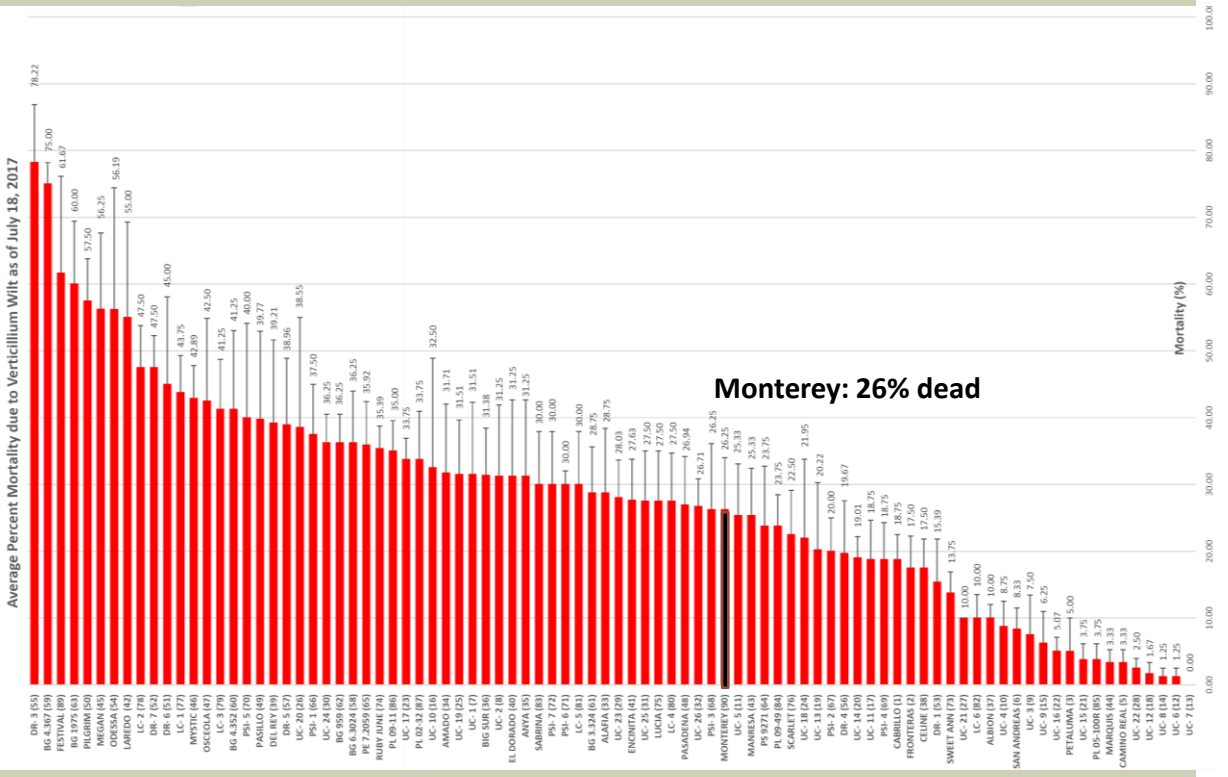
VERTICILLIUM TRIAL



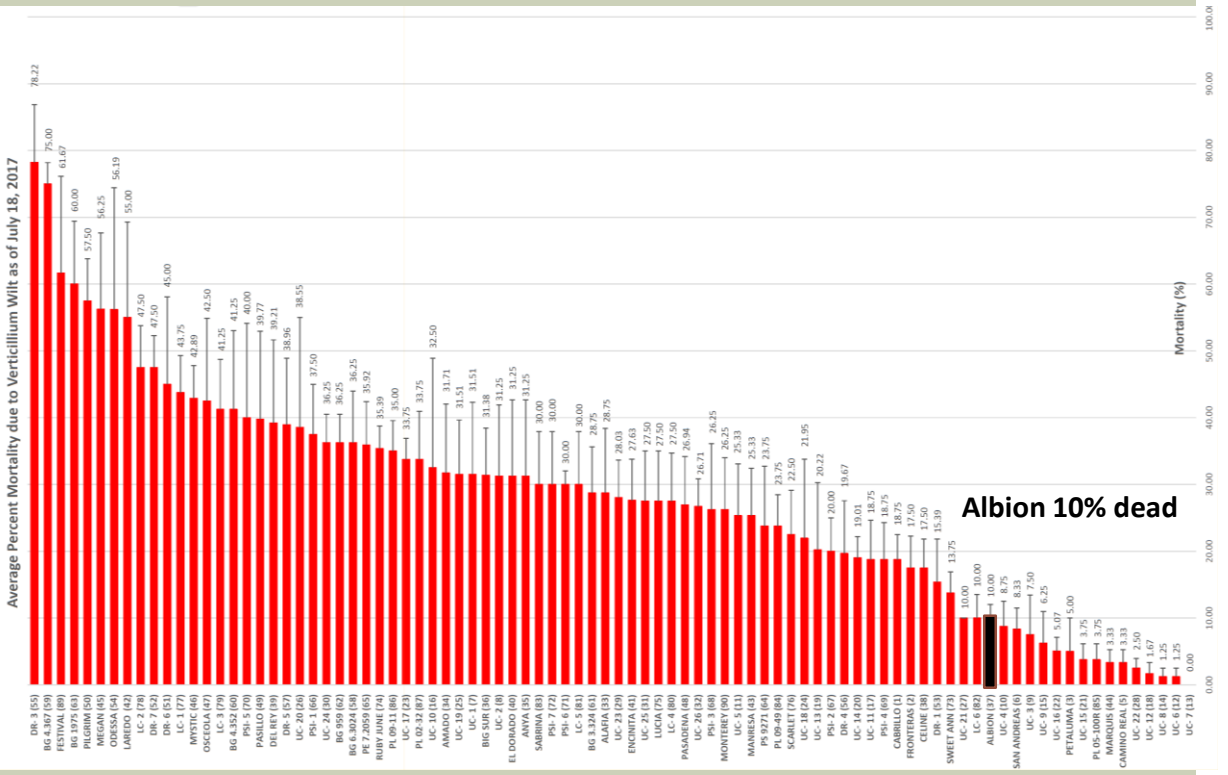
VERTICILLIUM WILT SUSCEPTIBILITY



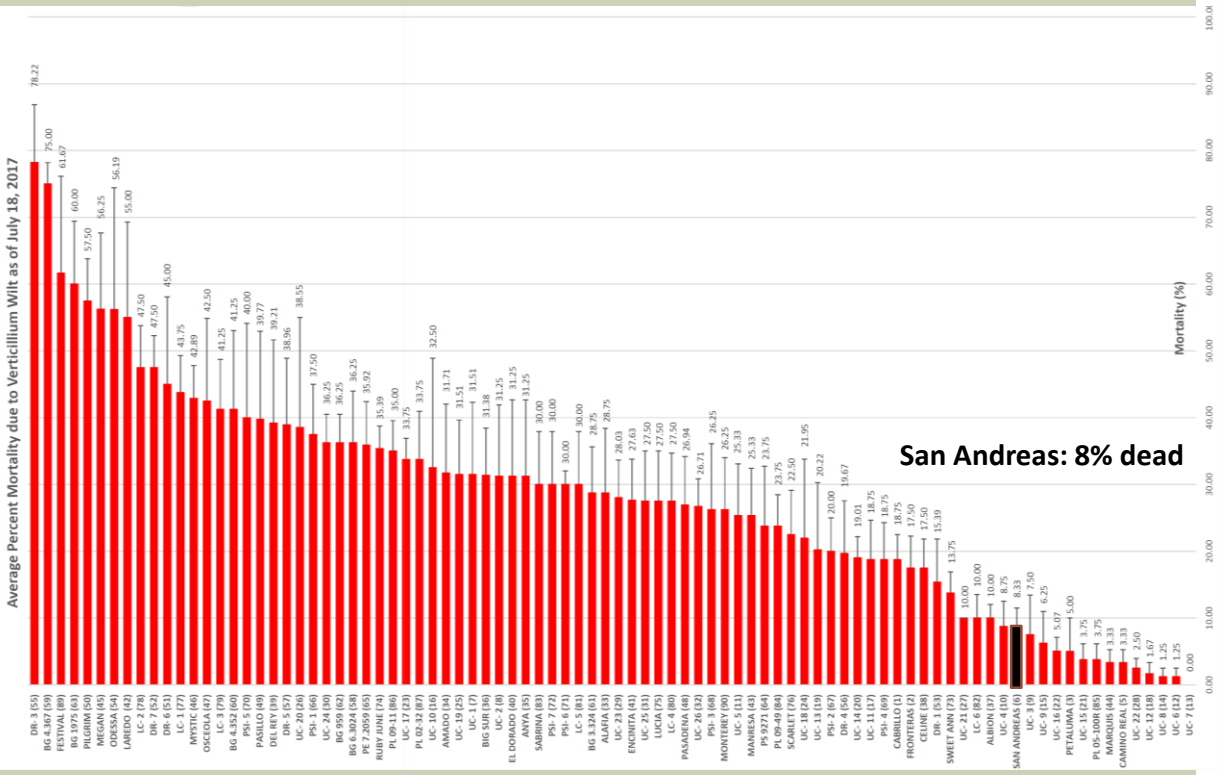
VERTICILLIUM WILT SUSCEPTIBILITY



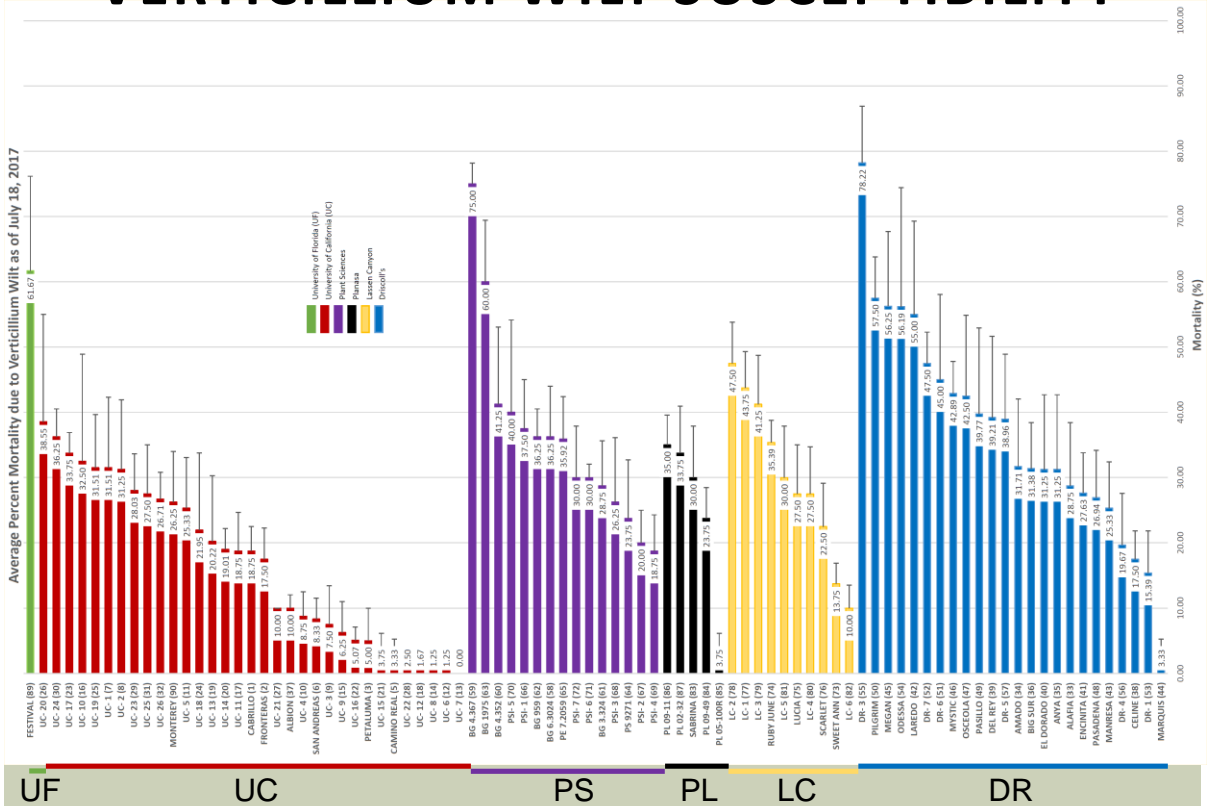
VERTICILLIUM WILT SUSCEPTIBILITY



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VERTICILLIUM WILT SUSCEPTIBILITY



VERTICILLIUM TRIAL 2015



Cultivar	Disease incidence (% plant mortality) ^z		AUDPC ^y	Yield (g/plant) ^z		
	12 Jun	11 Sep		Early season ^{xz}	Late season ^{vz}	Total ^{uz}
Portola.....	44.4 a	98.4 a	8536.3 a	652.6 c	21.9 b	674.5 c
Monterey.....	27.8 ab	89.9 a	6572.5 b	759.3 b	69.6 b	828.9 b
Albion.....	4.8 c	46.0 b	2409.6 c	709.2 bc	136.5 a	845.7 b
San Andreas.....	10.1 bc	34.7 b	2623.4 c	923.5 a	170.9 a	1094.4 a
<i>P Values</i>	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Field infested at the Monterey Bay Academy:

Fusarium oxysporum* f.sp. *fragariae



FUSARIUM TRIAL 2015

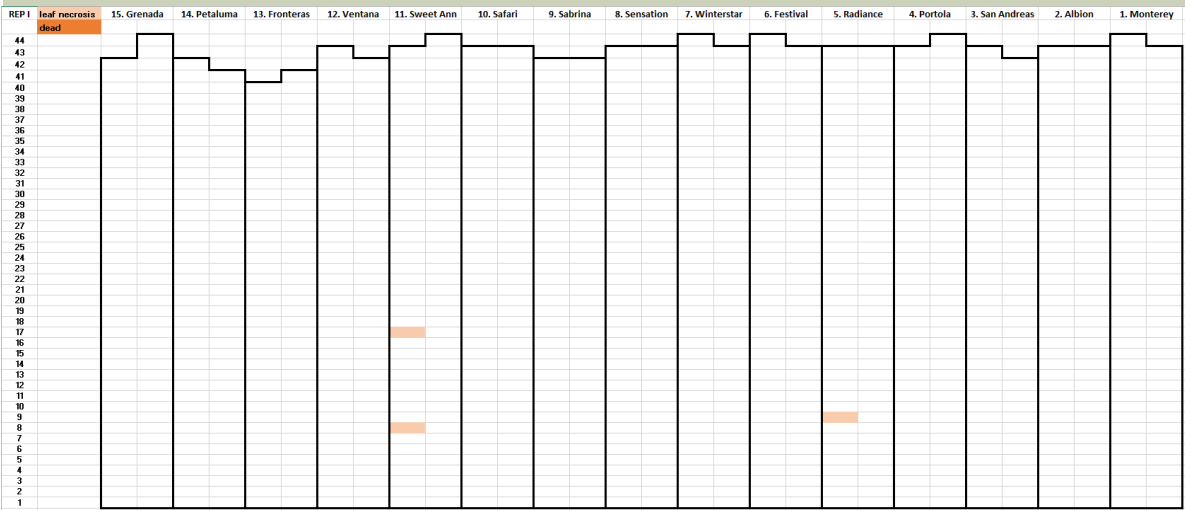


FUSARIUM TRIAL 2015



FUSARIUM TRIAL 2015

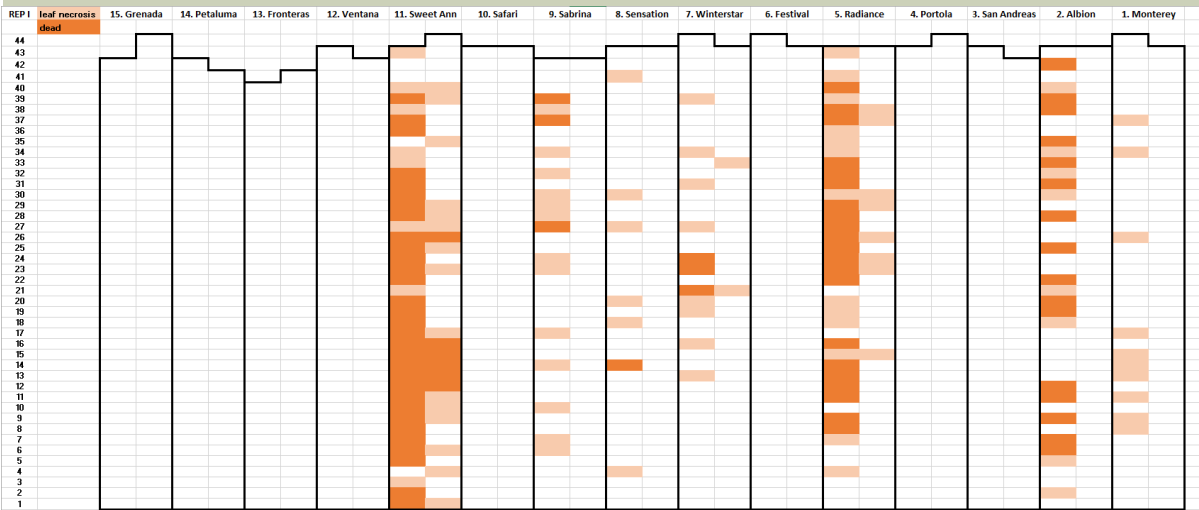
March 20, 2015



This is a map of Rep 1 in the MBA variety trial, where the soilborne fungus *Fusarium oxysporum* f. sp. *fragariae* is established. Each area surrounded by black lines represents one bed of a different strawberry cultivar (cultivar name listed at the top of each bed). Light orange color = leaf necrosis; burnt orange color = dead strawberry plant.

FUSARIUM TRIAL 2015

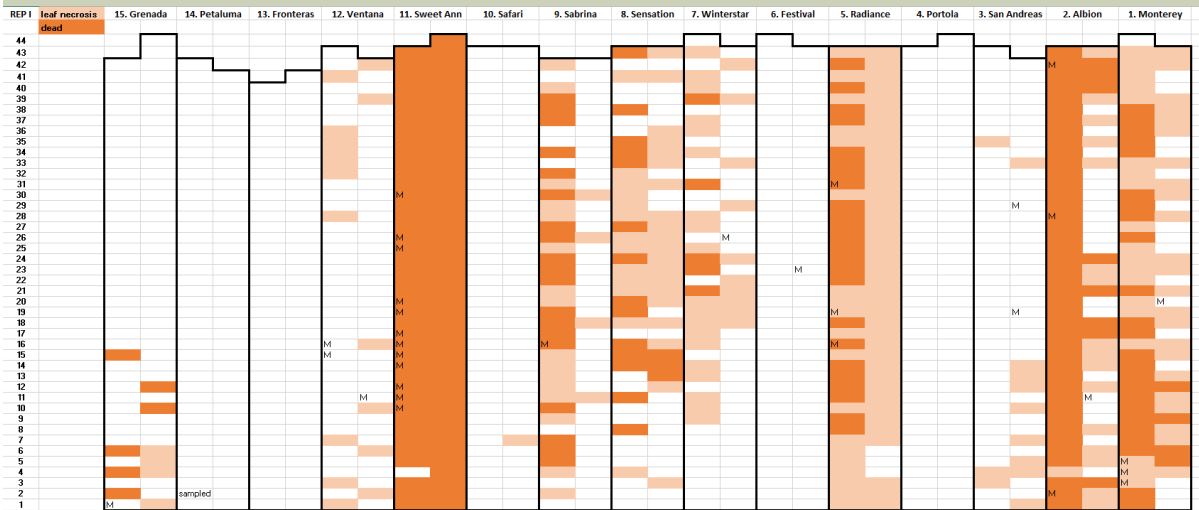
May 15, 2015



This is a map of Rep 1 in the MBA variety trial, where the soilborne fungus *Fusarium oxysporum* f. sp. *fragariae* is established. Each area surrounded by black lines represents one bed of a different strawberry cultivar (cultivar name listed at the top of each bed). Light orange color = leaf necrosis; burnt orange color = dead strawberry plant.

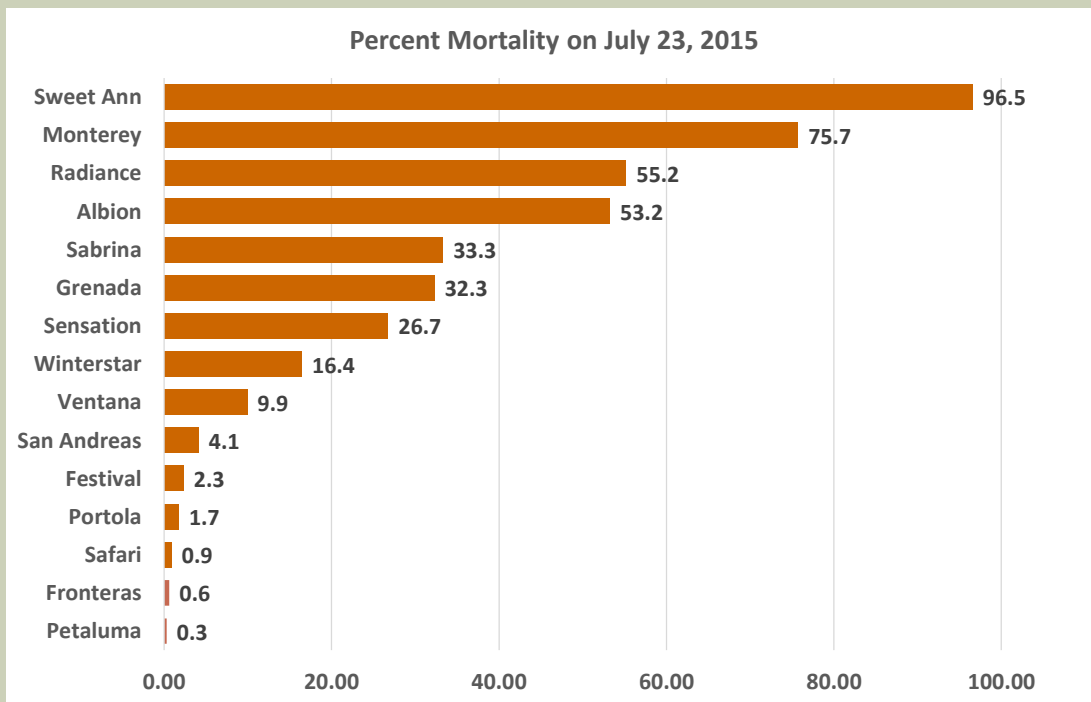
FUSARIUM TRIAL 2015

July 23, 2015

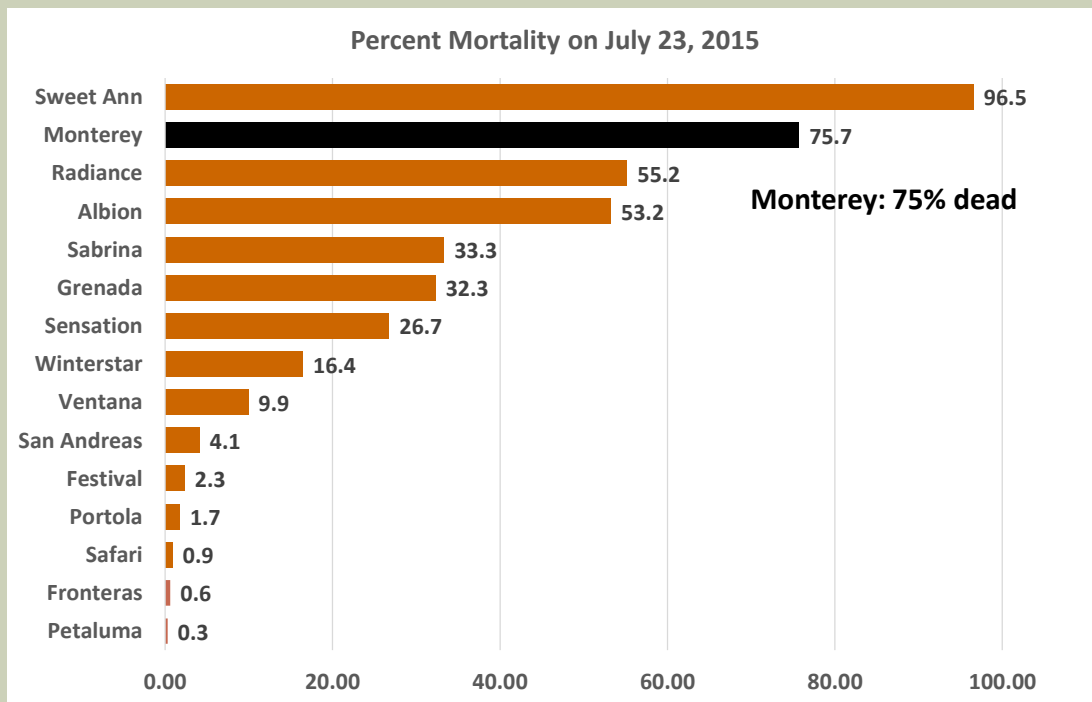


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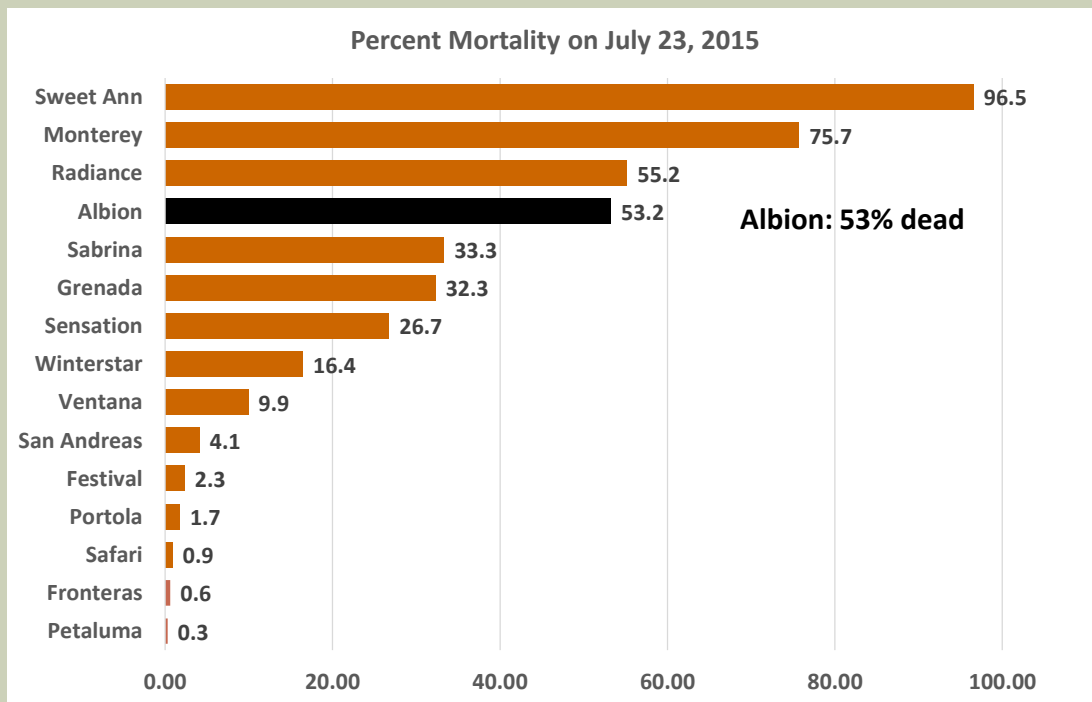
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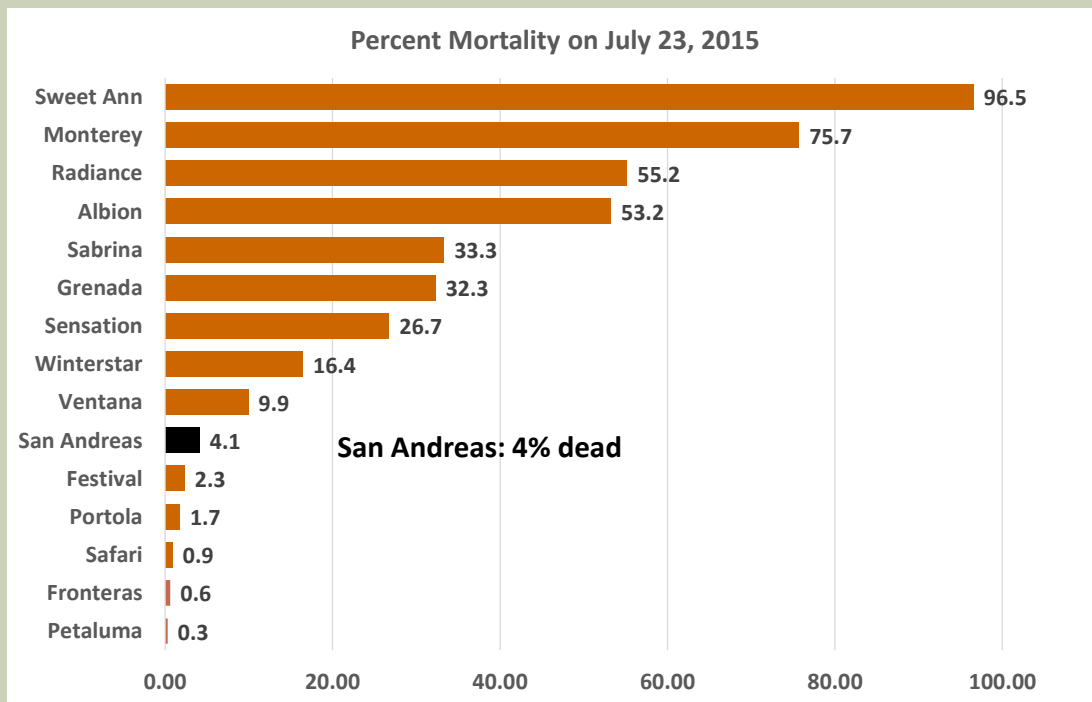
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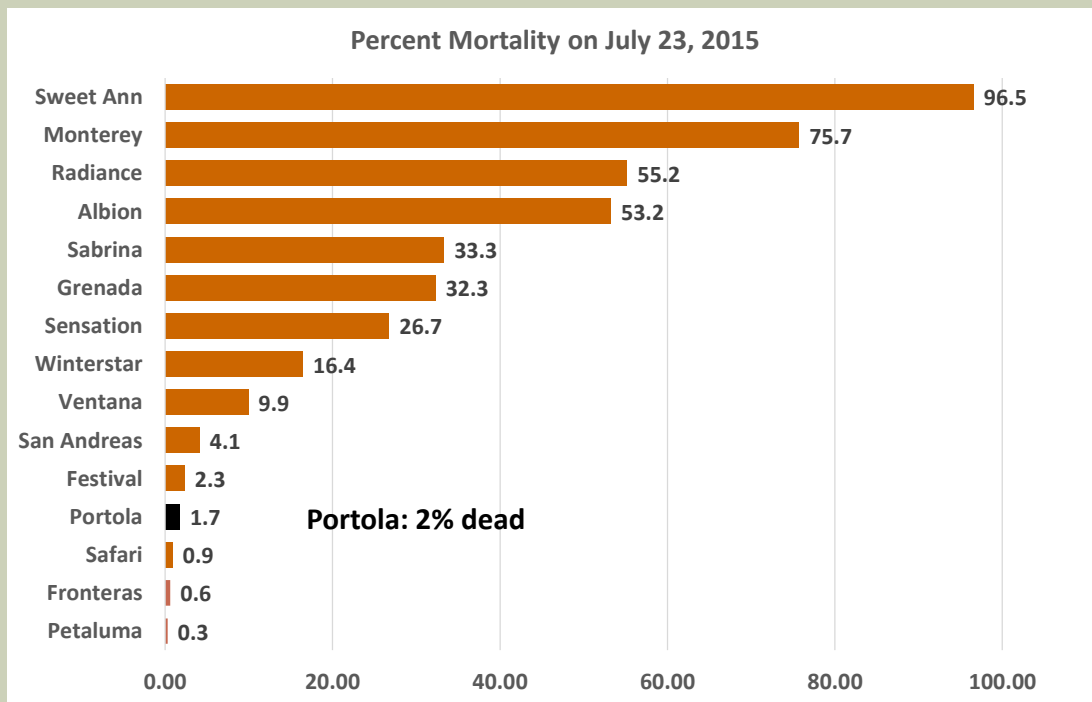
FUSARIUM TRIAL 2015



FUSARIUM TRIAL 2015



FUSARIUM TRIAL 2015





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CULTIVAR EVALUATION TABLE

CULTIVAR	Soilborne diseases				Fruit diseases			Arthropods		
	Fusarium wilt	Verticillium wilt	Macrophomina crown rot	Phytophthora	Anthracnose	Gray mold	Powdery mildew	Anthracnose	Mites	Lygus
Alafia		28.8	21.3							
Albion	53.2	10	49.85							
Amado		31.7	23.5							
Anya		31.3	28.8							
Big Sur		31.4	30							
Cabrillo		18.8	--							
Camino Real		3.3	--							
Celine		17.5	52.5							
Del Rey		39.2	36.3							
El Dorado		31.3	68.8							
Encinita		27.6	26.3							
Festiva	2.3	61.7	81.5							
Fronteras	0.6	17.5	40.3							
Grenada	32.3	--	10.7							
Laredo		55	17.5							
Lucia		27.5	56.9							
Manresa		25.3	3.3							
Marquis		3.3	26.6							
Megan		56.3	10							
Monterey	75.7	26.25	69.1							
Mystic		42.9	38							
Odessa		56.2	67							
Osceola		42.5	1.3							
Pasadena		26.9	46.5							
Pasillo		39.8	61.8							
Petaluma	0.3	5	25.1							
Pilgrim		57.5	61.3							
Portola	1.7	--	40							
Radiance	55.2	--	--							
Ruby June		35.4	89.9							
Sabrina	33.3	30	35							
Safari	0.9	--	--							
San Andreas	4.1	8.3	26.6							
Scarlet		22.5	74.6							
Sensation	26.7	--	--							
Sweet Ann	96.5	13.75	68.8							

CONCLUSIONS

High levels of resistance

Wide range of susceptibility in germplasm

Strawberry Center to continue host resistance screening for additional diseases...

THANKS TO...

CALIFORNIA
STRAWBERRY[™]
COMMISSION

UC DAVIS
UNIVERSITY OF CALIFORNIA

UF UNIVERSITY of
FLORIDA

Plant Sciences ^{PSI} Inc.
Advancing Agriculture through Science

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