



THE UNIVERSITY OF ARIZONA

Yuma Center of Excellence
for Desert Agriculture

YCEDA Fusarium wilt of lettuce trials



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Yuma Trials

Year	Wet Date	Evaluation Date
2019	9/16/2019	11/18/2019
2020	9/24/2020	11/19/2020
2021	9/14/2021	11/29/2021
2022	9/12/2022	11/28/2022
2023	9/18/2023	11/27/2023

Analysis:

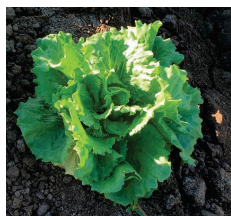
Analysis of variance (ANOVA) on disease severity and marketable head data was performed ($P \leq 0.05$) followed by post-hoc comparison of varieties using Tukey's honest significance difference (HSD) test.

In the graphs on the following pages, cultivars with the same letter are not significantly different.

Disease Severity Rating

0=No Disease

1=slight chlorosis on outer leaves, stunting



2=More extensive chlorosis and stunting, in-slot varieties have

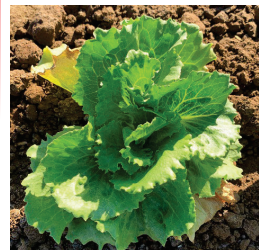


Marketable Heads

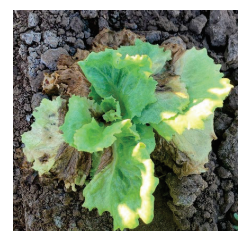
← Approximate cut-off point

- Low DS with stunting
- High DS with good head formation

3=Chlorosis and stunting, severely stunted or no head



4= Remaining leaves are chlorotic and nearly dead or plant is entirely dead



Bottom line: Plants rated 0 are healthy and 4 are dead or nearly dead. Plants rated above a 2 will likely not produce a marketable head, even for processing.

2019 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ²		Lettuce cultivar	Mean DS	
108	4.0	A	Tamarack	1.9	D
Esky	3.7	AB	Dover	1.4	DE
Buckskin	3.7	AB	Desert Eagle	1.2	EF
Growler	3.4	BC	Meridian	0.8	FG
El Guapo	3.3	BC	Blas	0.6	G
Slotmachine	2.9	C	Midway	0.4	G

² Disease Severity (DS) was recorded by evaluating on a 0-4 disease severity scale 0 = symptomless plants; 1=slight chlorosis on outer leaves, stunting; 2 = more extensive chlorosis and stunting, in-slot varieties have stunted head; 3 = severe stunting, chlorosis, and no head formation; and 4 = remaining leaves are chlorotic and nearly dead, or plant is entirely dead. Mean DS was calculated by averaging 50 plants from each of the four replicates.

2020 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ²		Lettuce cultivar	Mean DS	
Grizzly	3.2	A	#97	0.6	FGHIJ
El Guapo	2.0	B	18C1230	0.6	FGHIJ
Growler	1.6	BC	Meridian	0.5	GHIJ
Midway	1.4	CD	#99	0.4	GHIJK
Kyoto	1.2	CD	#98	0.4	GHIJK
Primo	1.2	CD	Blas	0.3	HIJK
4204	1.2	DE	PX 1671	0.3	HIJK
4083	1.0	DEF	Franchise	0.3	IJK
Tamarack	0.8	EFG	Fredonia	0.2	IJK
#83	0.7	FGH	#14	0.2	JK
Desert Eagle	0.7	FGH	Powerball	0.1	K
Dover	0.7	FGH	#13	0.1	K
Copper	0.6	FGHI			

² Disease Severity (DS) was recorded by evaluating on a 0-4 disease severity scale 0 = symptomless plants; 1=slight chlorosis on outer leaves, stunting; 2 = more extensive chlorosis and stunting, in-slot varieties have stunted head; 3 = severe stunting, chlorosis, and no head formation; and 4 = remaining leaves are chlorotic and nearly dead, or plant is entirely dead. Mean DS was calculated by averaging 50 plants from each of the four replicates.

2020 Wellton Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ²		Lettuce cultivar	Mean DS	
#71	1.0	F	Primo	2.4	BC
Meridian	1.1	EF	#71	2.5	BC
#12	1.2	EF	Tamarack	2.8	BC
#13	1.3	DEF	4083	3.0	AB
#14	1.5	DEF	El Guapo	3.1	AB
#71	1.9	CDE	Growler	3.1	AB
Copper	1.9	CDE	Slotmachine	3.1	AB
Desert Eagle	2.1	CD	#83	3.2	AB
4204	2.1	CD	Dover	3.3	AB
#71	2.1	CD	Kyoto	3.7	A
Blas	2.2	CD	Grizzly	3.9	A

² Disease Severity (DS) was recorded by evaluating on a 0-4 disease severity scale 0 = symptomless plants; 1=slight chlorosis on outer leaves, stunting; 2 = more extensive chlorosis and stunting, in-slot varieties have stunted head; 3 = severe stunting, chlorosis, and no head formation; and 4 = remaining leaves are chlorotic and nearly dead, or plant is entirely dead. Mean DS was calculated by averaging 50 plants from each of the four replicates.

2021 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ^z		% MH ^y	
Powerball	0.8	m	80.5	a
Fredonia	1.4	m	67.5	ab
18C1230	1.7	m	49.5	bc
Oracle	1.7	m	42.5	cd
PX 1671	1.7	l	34.5	cdef
Midway	2.1	l	14.5	efghijk
Blas	2.1	kl	37	cdef
Desert Eagle	2.3	jkl	30.5	cdefg
Frosty	2.3	jkl	38	cde
Meridian	2.3	ijkl	24.5	defghij
Franchise	2.4	hijk	28.5	cdefgh
SV4204	2.6	hij	25	defghi
Raider	2.6	hij	15	efghijk
Uppercut	2.6	ghi	34	cdef
Hotshot	2.7	ghi	17	efghijk
Sun Devil	2.7	gh	10	ghijk
Sunquest	2.8	gh	10	ghijk
Javalina	2.9	gh	21.5	defghijk
Estival	2.9	fgh	5	ijk
Dover	2.9	fg	22	defghijk

Lettuce cultivar	Mean DS		% MH	
PYB 7101	3.0	ef	6.5	hijk
LT 4083	3.2	def	8	ghijk
Tamarack	3.2	cde	5	ijk
Slot Machine	3.5	bcde	8	ghijk
Coyote	3.6	bcd	0.5	k
Lucky	3.6	abc	10	ghijk
Prescott	3.6	bcd	2.5	ijk
Growler	3.7	abc	3.5	ijk
El Guapo	3.7	abc	1	k
Huskey	3.8	abc	0	k
Winter Select	3.9	abc	0	k
Quest	3.9	ab	1	k
EXP 1221	3.9	a	1.5	jk
Darkhorse	4.0	a	0	k
Serengeti	4.0	a	0	k
Antelope	4.0	a	0	k
Grizzly	4.0	a	0	k
Pocona	4.0	a	0	k
Supai	4.0	a	0	k
Bubba	4.0	a	0	k

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^y Marketable Heads (MH) was recorded as a plant having a head >5 inches and no symptomatic leaves on the head. Outer wrapper leaves may show symptoms.

2021 Field Trial Results-Romaine

Lettuce cultivar	Mean DS ^z	
Sweetheart*	1	0.5
Adempak	2	0.8
Boranda*	2	1.4
Holbrook*	3	1.0
Big Green Cos*	3	0.6
Camino Verde*	4	1.0
Sun Valley*	4	0.8
Sunland	5	2.5
Valley Heart	5	1.3
Fresh Heart*	6	1.8
Roseheart*	7	2.6
Carizzo*	8	2.4
Jara	8	0.8
Platinum*	8	1.2
Del Sol	9	2.4
Green Forest*	9	1.7
Mesquite*	9	1.3
Sweetheart*	1	0.5
Adempak	2	0.8
Boranda*	2	1.4

Lettuce cultivar	Mean DS	
SV8403LN*	10	3.5
Solid Heart	10	1.4
Pacific Heart*	11	4.4
SV8893LN	11	3.7
Vaquero	11	2.4
Vicious	12	3.9
River Road*	13	2.6
Grackle	14	4.7
Prospector	14	3.7
Pinion*	15	3.6
True Heart*	15	1.0
Blue Rock*	16	2.2
Rocky Row*	18	5.2
Valencia*	19	1.3
Fort Romie	20	5.4
Duquesne	25	4.3
Solid King	31	4.6
Patton	32	5.0
Solid King EL	33	5.0
Sunbelt	39	4.2

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*out-of-slot cultivars

2022 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ²		Lettuce cultivar	Mean DS	
21713	0.1	F	Havasu	0.3	BCDEF
Balboa	0.1	F	33	0.3	BCDEF
Powerball	0.1	F	Hotshot	0.4	BCDEF
Meridian	0.1	F	Tamarack	0.4	BCDEF
Blas	0.1	EF	Paulie	0.4	BCDEF
Adrian	0.1	EF	Hercules	0.5	BCDE
Fredonia	0.2	EF	SVLD0093	0.6	BCD
Micky	0.2	DEF	Outfitter	0.6	BCD
Estival	0.2	CDEF	El Guapo	0.6	BC
P41698	0.2	BCDEF	Uppercut	0.6	B
Desert Eagle	0.2	BCDEF	180	0.6	B
Big Shot	0.3	BCDEF	SVLD0184	0.6	B
Franchise	0.3	BCDEF	Bankroll	1.2	A
229	0.3	BCDEF	Canyon	1.5	A
Paonia	0.3	BCDEF			

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^YMarketable Heads rating was not reported this year due to uneven stands due to high humidity at germination.

2022 Field Trial Results-Romaine

Lettuce cultivar	Mean DS ²		Lettuce cultivar	Mean DS	
Sunland	1.0	C	Vicious	1.1	BC
Cardinal	1.0	BC	Klondike	1.1	BC
Pacific Heart	1.0	BC	Aticamp	1.1	BC
Grackle	1.0	BC	Poulidor	1.1	BC
Momentous	1.0	BC	Bluerock	1.1	BC
Boronda	1.0	BC	Carizzo	1.1	BC
Placer	1.0	BC	Warbler	1.1	BC
Pinion	1.1	BC	Duquesne	1.1	B
Sunland	1.0	C			

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^YMarketable Heads rating was not reported this year due to uneven stands due to high humidity at germination.

2023 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS ^z		% MH ^y		Lettuce cultivar	Mean DS		% MH	
Micky	0.0	g	84	ab	LICU18-0033	0.2	defg	79.5	abc
KWS 4612	0.0	g	82	abc	Dover	0.3	defg	73.5	abc
Pauli	0.0	g	94	a	Nupic	0.4	def	79	abc
Adrian	0.0	g	75.5	abc	LICU20-0138	0.4	de	79	abc
Mr. T	0.0	g	93.5	a	LICS19-0033	0.4	d	56.5	abcd
Powerball	0.1	g	84	ab	Franchise	0.5	de	65	abcd
Fredonia	0.1	fg	78	abc	Desert Eagle	0.5	d	64	abcd
Balboa	0.1	fg	90	a	Tamarack	1.2	c	36.5	cd
Meridian	0.1	fg	76.5	abc	El Guapo	1.4	c	39	bcd
XLE 12301	0.1	efg	92	a	Sand Storm	2.1	b	41.5	bcd
19c1293	0.2	defg	59	abcd	Grizzly	2.5	a	24	d

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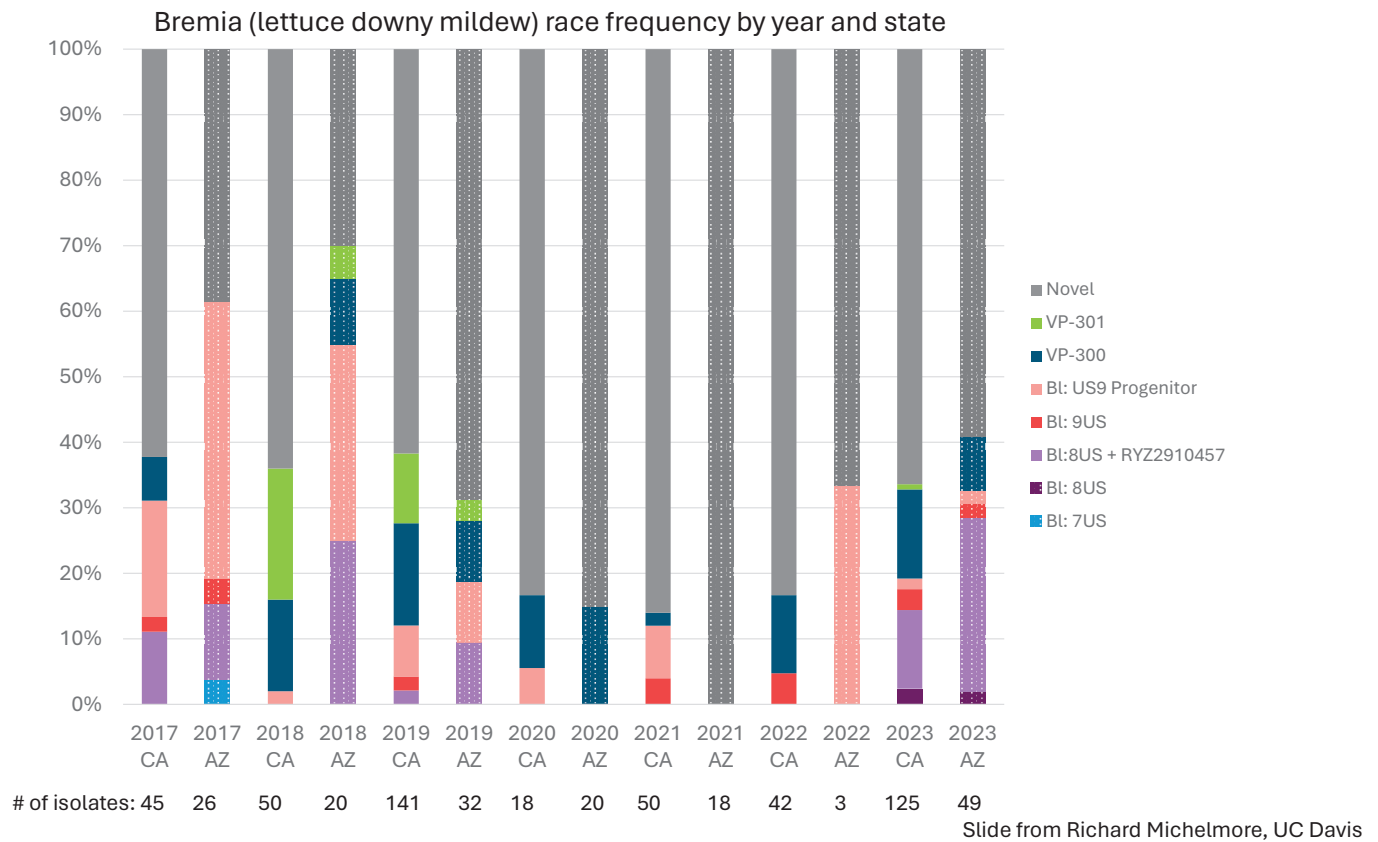
^y Marketable Heads (MH) was recorded as a plant having a head >5 inches and no symptomatic leaves on the head. Outer wrapper leaves may show symptoms.

2023 Field Trial Results-Romaine

Lettuce cultivar	Mean DS ^z		Root Discoloration ^y		Lettuce cultivar	Mean DS		Root Discoloration ^y	
Grackle	0.1	C	0	E	ROM 21616	0.2	C	1	CDE
Pulse/18503	0.1	C	0	E	Boronda*	0.2	C	0.75	DE
Valley Heart	0.1	C	0.25	E	Momentous*	0.3	C	0.75	DE
Del Sol	0.1	C	0	E	Luminous*	0.3	C	2	ABCDE
Copius	0.1	C	0	E	PINION*	0.3	C	2	ABCDE
Poulidor*	0.1	C	0.75	DE	Fort Romie*	0.4	BC	4.25	A
Placer	0.1	C	0.25	E	Laredo	0.5	BC	3.5	ABC
Duquesne	0.1	C	0	E	Farmin RZ*	0.5	BC	2	ABCDE
ROM 22804	0.2	C	0.5	DE	Jammin RZ*	0.5	BC	3	ABCD
Vicious*	0.2	C	1.25	BCDE	Sunbelt*	0.8	B	3.75	AB
Carrizzo*	0.2	C	0.75	DE	Bondi	2.7	A	5	A
Adicamp*	0.2	C	2	ABCDE					

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^y Root discoloration = average root discoloration of 5 roots per plot



Information on WmCSV can be found on the Emerging Viruses in Cucurbits Working Group Webpage



- The mission of the Emerging Viruses in Cucurbits Working Group (EVCWG) is to improve communication and knowledge about viruses across the cucurbit industry and develop strategies to successfully identify and mitigate virus threats to cucurbit production in the United States.



eCucurbitviruses.org

Downy mildew of lettuce sample collection for phenotyping

Please fill in as completely as possible and include with sample. This will help entry into the database but do not worry if some of this information is not available.

Date Collected: ___/___/___

Collector ID: _____

Collector: _____

(UC Lab ID: _____)

Location: _____

GPS coordinates if known: _____

Disease Intensity / Level of infection (circle one):

Low (Few infected plants),

Intermediate (Infected plants scattered throughout field).

Severe (Many infected plants)

Please comment whether collected from a single plant or from several plants and whether from multiple locations in the field:

Fungicide treatment: Yes No Not known

If yes: Alliete Ridomil Orondis Revus Forum Other: _____

Type: Crisphead Romaine Looseleaf Butterhead Babyleaf Other: _____

Cultivar/Variety: _____

Approximate planting/wet date: _____

Other Comments:

Collection and Shipping Instructions:

Please send leaves with fresh sporulating lesions. These should be green or only slightly chlorotic:



Please not send leaves with dark necrotic lesions; it is difficult to rescue isolates from such samples because of bacterial contamination:



Yuma drop-off sites:

1. Yuma Agricultural Center, 6425 W. 8th Street -Refrigerator located across from front desk.
2. Yuma Center of Excellence for Desert Agriculture (YCEDA) 899 E. Plaza Circle, Suite 2 -Drop off at front desk.

Contact Stephanie Slinski with Yuma drop-off questions, sslinski@arizona.edu or 928-782-5891

Shipping instructions:

Please send overnight by Fed Ex (Account # 2630-4693-5) in a box rather than an envelope (to prevent samples being crushed) along with the datasheet and the words "Refrigerate upon arrival" on the outermost packaging to:

Attn: Charlotte Acharya
The Genome Center
Genome and Biomedical Sciences Facility
451 East Health Sciences Drive
University of California
Davis, CA 95616
Tel. 530-752-8889

Please notify Charlotte Acharya (cacharya@ucdavis.edu) with the tracking number when sent.

Please time the sending so that the isolate is not in the Fed Ex system over a weekend (i.e. do not send on a Friday). Isolates can be kept in a fridge at 5°C for a few days before sending, if necessary, although sending samples immediately after collection is best.

Thank you for your help. Please address questions to Charlotte Acharya cacharya@ucdavis.edu, and/or Richard Michelmore, rwmichelmore@ucdavis.edu.

Results will be available from http://bremia.ucdavis.edu/bremia_database.php.

Fusarium wilt of lettuce sample collection

Please fill in as completely as possible and include with sample.

Date Collected: ____/____/____

Collector: _____

Location: _____

GPS coordinates if known: _____

Disease Intensity / Level of infection (circle one):

Low (Few infected plants),

Intermediate (Infected plants scattered throughout field).

Severe (Many infected plants)

Cultivar/Variety: _____

Approximate planting/wet date: _____

Corky root suspected? (circle one) Yes No

Drop-off Instructions

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