



# YCEDA Field Trial Data 2019-2023

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THE UNIVERSITY OF ARIZONA

Yuma Center of Excellence  
for Desert Agriculture

# 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

A replicated complete block design was used for each trial each year. Four 80-100-foot plots of each cultivar were planted. Fifty plant subplots within each plot were evaluated at crop maturity.

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 stunted heads



## 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 <sup>z</sup>		Lettuce cultivar	Mean DS	
108	4.0	a <sup>x</sup>	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

<sup>z</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.

# 2020 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS <sup>z</sup>		Lettuce cultivar	Mean DS	
Grizzly	3.2	a <sup>x</sup>	#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			

<sup>z</sup>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.

<sup>x</sup>Cultivars with the same letter are not significantly different.

# 2020 Wellton Field Trial Results-Iceberg

Lettuce cultivar	Mean DS <sup>z</sup>		Lettuce cultivar	Mean DS	
#71	1.0	f <sup>x</sup>	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

<sup>z</sup>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.

<sup>x</sup>Cultivars with the same letter are not significantly different.

# 2021 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS <sup>z</sup>		% MH <sup>y</sup>	
	Mean	SD	%	Significance
Powerball	0.8	m	80.5	a <sup>x</sup>
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	fghijk
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	
	Mean	SD	%	Significance
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

<sup>z</sup> 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.

<sup>y</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.

# 2021 Field Trial Results-Romaine

Lettuce cultivar	% Disease <sup>z</sup>	
Sweetheart*	1	l <sup>x</sup>
Adempak	2	hi
Boranda*	2	hi
Holbrook*	3	gi
Big Green Cos*	3	ghi
Camino Verde*	4	ghi
Sun Valley*	4	fghi
Sunland	5	fghi
Valley Heart	5	fghi
Fresh Heart*	6	fghi
Roseheart*	7	fghi
Carizzo*	8	fghi
Jara	8	fghi
Platinum*	8	fghi
Del Sol	9	efghi
Green Forest*	9	efghi
Mesquite*	9	efghi
SV8403LN*	10	efghi
Solid Heart	10	efghi

Lettuce cultivar	% Disease	
Pacific Heart*	11	efghi
SV8893LN	11	efghi
Vaquero	11	efghi
Vicious	12	efghi
River Road*	13	efghi
Grackle	14	efghi
Prospector	14	efghi
Pinion*	15	defghi
True Heart*	15	defghi
Blue Rock*	16	defghi
Rocky Row*	18	efghi
Valencia*	19	cdefg
Fort Romie	20	cdef
Duquesne	25	bcde
Solid King	31	bcd
Patton	32	bc
Solid King EL	33	bc
Sunbelt	39	bc
Bondi*	100	a

<sup>z</sup> Percent disease = % heads with symptoms n=50

<sup>x</sup> Cultivars with the same letter are not significantly different.

\*out-of-slot cultivars



# 2022 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS <sup>z</sup>		Lettuce cultivar	Mean DS	
21713	0.1	f <sup>x</sup>	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			

<sup>z</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.

# 2022 Field Trial Results-Romaine

Lettuce cultivar	Mean DS <sup>z</sup>		Lettuce cultivar	Mean DS	
Sunland	1.0	c <sup>x</sup>	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			

<sup>z</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.

# 2023 Field Trial Results-Iceberg

Lettuce cultivar	Mean DS <sup>z</sup>		% MH <sup>y</sup>		Lettuce cultivar	Mean DS		% MH	
Micky	0.0	g	84	ab <sup>x</sup>	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

<sup>z</sup>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.

<sup>y</sup>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.

<sup>x</sup>Cultivars with the same letter are not significantly different.

# 2023 Field Trial Results-Romaine

Lettuce cultivar	Mean DS <sup>z</sup>		Root Discoloration <sup>y</sup>		Lettuce cultivar	Mean DS		Root Discoloration <sup>y</sup>	
Grackle	0.1	c <sup>x</sup>	0	e	21616	0.2	c	1	cde
Pulse	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
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					

<sup>z</sup> 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.

<sup>y</sup> Root discoloration = average root discoloration of 5 roots per plot

<sup>x</sup> Cultivars with the same letter are not significantly different.

# California Trials 2023

Wet dates for both locations was May 20th

Fifty plants were rated for marketability (MH) based on the recommendations of harvesting professionals. Cultivars that were out-of-slot or not developed for the planting region may have a low marketable head rating that is not related to disease severity. The romaine cultivars at the Santa Maria site were past maturity, which affected MH counts.

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.

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# 2023 King City CA Field Trial Results-Iceberg

Results from the CA trials need further analysis due to multiple pathogens causing disease and due to multiple races of the Fusarium wilt pathogen in the field.

Lettuce cultivar	Mean DS <sup>2</sup>		% MH <sup>y</sup>		Lettuce cultivar	Mean DS		% MH	
San Andreas	0.1	i	25.3	a <sup>x</sup>	Telluride	3.1	c	0.0	f
Paraiso	0.2	i	23.5	ab	Primo	3.2	bc	0.0	f
San Miguel	0.3	i	16.3	abc	Oso Flaco	3.2	bc	0.3	f
Armstrong	0.4	i	23.8	ab	Black Horse	3.5	b	0.3	f
Powerball	0.7	h	11.8	cde	Vail	3.5	b	0	f
Meridian	1.2	g	13.8	bcd	Chalone	3.5	b	0.0	f
Confidential	1.2	g	9.3	cdef	Roper	3.6	b	0.0	f
Molera	1.3	g	11.5	cde	Tamarack	4.0	a	0.0	f
Confidential	1.8	f	15.3	abc	Tombstone	4.0	a	0.0	f
Pueblo	2.4	e	3.8	def	Republic	4.0	a	0.0	f
Fredonia	2.5	de	2.3	ef	El Guapo	4.0	a	0.0	f
Newcastle	2.7	d	1.0	ef	Salute	4.0	a	0.0	f

<sup>2</sup>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.

<sup>y</sup>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.

<sup>x</sup>Cultivars with the same letter are not significantly different.

# 2023 King City CA Field Trial Results-Romaine

Results from the CA trials need further analysis due to multiple pathogens causing disease and due to multiple races of the Fusarium wilt pathogen in the field.

Lettuce cultivar	Mean DS <sup>z</sup>		% MH <sup>y</sup>		Lettuce cultivar	Mean DS		% MH	
Inferno	0.2	m <sup>x</sup>	2.0	ab	Rawhide	0.9	g	9.3	ab
Arroyo	0.3	lm	2.5	ab	Carbine	1.0	g	2.3	ab
Abilene	0.3	klm	9.5	ab	Momentum	1.8	f	6.8	ab
Holbrook	0.5	jkl	8.8	ab	Adicamp	2.2	e	0	b
Golden Forest	0.5	ijkl	10.3	ab	Vicious	2.4	de	0	b
Cardinal	0.5	ijkl	7.0	ab	Laredo	2.5	cd	0	b
Patton	0.6	hijk	2.5	ab	Farmin RZ	2.8	bc	0	b
Deuquesne	0.7	ghij	9.5	ab	Klondike	2.9	b	0	b
Sunland	0.7	ghij	1.3	ab	Fort Romie	2.9	b	0	b
Boranda	0.8	ghi	12.5	a	Jammin RZ	3.0	b	0	b
Solid Heart	0.9	gh	1.0	ab	Sunbelt	3.1	b	0	b
Valencia	0.9	gh	3.8	ab	Salvius	3.7	a	0	b

<sup>z</sup> 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.

<sup>y</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.

# 2023 Santa Maria CA Field Trial Results-Iceberg

Results from the CA trials need further analysis due to multiple pathogens causing disease and due to multiple races of the Fusarium wilt pathogen in the field.

Lettuce cultivar	Mean DS <sup>z</sup>		% MH <sup>y</sup>		Lettuce cultivar	Mean DS		% MH	
Paraiso	0.0	g <sup>x</sup>	30.5	abcde	Primo	1.8	e	5.8	ghij
Canyon	0.0	g	36.0	ab	Telluride	2.0	de	2.0	ij
Meridian	0.0	g	15.8	efghi	Roper	2.1	de	4.8	hij
Molera	0.0	g	40.0	a	Black Horse	2.1	de	5.3	hij
Powerball	0.0	g	34.0	abc	Oso Flaco	2.2	de	10.0	fghij
San Andreas	0.0	g	30.0	abcde	Vail	2.3	d	2.5	hij
Armstrong	0.1	g	22.8	bcdef	Chalone	2.6	c	1.0	ij
San Miguel	0.1	g	31.3	abcd	Tamarack	2.8	c	0.0	j
Hercules	0.1	g	31.8	abcd	Tombstone	3.5	b	0.0	j
XLE12301	0.1	g	42.8	a	Salute	3.5	b	0.0	j
Balboa	0.3	g	17.3	defgh	Republic	3.6	ab	0.0	j
Fredonia	0.3	g	20.8	cdefg	El Guapo	3.6	ab	0.0	j
Newcastle	1.3	f	9.3	fghij	Stagecoach	3.6	ab	0.0	j
Pueblo	1.4	f	17.3	defgh	Darlington	3.9	a	0.3	j

<sup>z</sup>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.

<sup>y</sup>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.

<sup>x</sup>Cultivars with the same letter are not significantly different.



# 2023 Santa Maria CA Field Trial Results-Romaine

Results from the CA trials need further analysis due to multiple pathogens causing disease and due to multiple races of the Fusarium wilt pathogen in the field.

Lettuce cultivar	Mean DS <sup>z</sup>		% MH <sup>y</sup>		Lettuce cultivar	Mean DS		% MH	
Abilene	0.1	o <sup>x</sup>	23.5	ab	Adicamp	0.1	ijklm	23.25	ab
Stampede	0.1	o	12.5	abcde	Rawhide	0.1	hijkl	15.75	abcde
Solid Heart	0.1	no	15	abcde	Blue Rock	0.1	hijk	18.5	abcd
Valencia	0.1	no	19.5	abc	Momentus	0.1	ghij	17.25	abcde
Arroyo	0.1	mno	9.5	abcde	Farmin RZ	0.1	fghi	14.75	abcde
Sunland	0.1	mno	15.25	abcde	Laredo	0.1	fgh	7	bcde
Cardinal	0.1	mno	14	abcde	Jammin RZ	0.1	efg	15.75	abcde
Holbrook	0.2	mno	25.25	a	Carbine	0.2	ef	18.75	abcd
Golden Forest	0.2	lmno	18.75	abcd	Fort Romie	0.2	de	0	e
Deuquesne	0.2	klmno	17.75	abcd	Vicious	0.2	de	6.5	bcde
Inferno	0.2	klmno	17	abcde	Klondike	0.2	d	3	cde
Boranda	0.2	klmno	23.5	ab	Sunbelt	0.2	c	0	e

<sup>z</sup> 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.

<sup>y</sup> 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.

<sup>x</sup> Cultivars with the same letter are not significantly different.