PERFORMANCE OF ONION CULTIVARS IN THE COLUMBIA BASIN

TEN YEARS OF CULTIVAR TRIAL RESULTS

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WHY DO WE HAVE ONION CULTIVAR TRIALS?

Onion Cultivars Have Different Traits

- Onion cultivars vary in their responses to day length and temperature, and differ in traits like color and shape, yield, bulb size distribution, storability, and susceptibility to defects, diseases and pests.

Assess Performance in Trials First

- Improved onion cultivars can mean increased profits. But, before investing in a new cultivar, it should be assessed for regional fitness and trait expression using smaller trials.

CULTIVARS HAVE DIFFERENT TRAITS

- Yield, Bulb Size & Size Distribution
- Color and Shape
- Days to Maturity
- Pest and Disease Tolerances
- Storability
- Processing Qualities – like single centers

SOME FACTORS THAT IMPACT CHOICE

- Location
- Length of Growing Season
- Market Timing Strategies
- Fresh vs. Processing Markets
- Domestic vs. Export
- Direct Sales or Storage
- Previous Issues (e.g. pink root disease)

WSU EXTENSION ONION CUTIVAR TRIAL & STORAGE EVALUATION

- Initiated by Gary Pelter in 1984.
- 45-60 onion cultivars and experimental lines.
- Cultivars planted in three replicate plots.
- Hosted by a different onion grower each year.

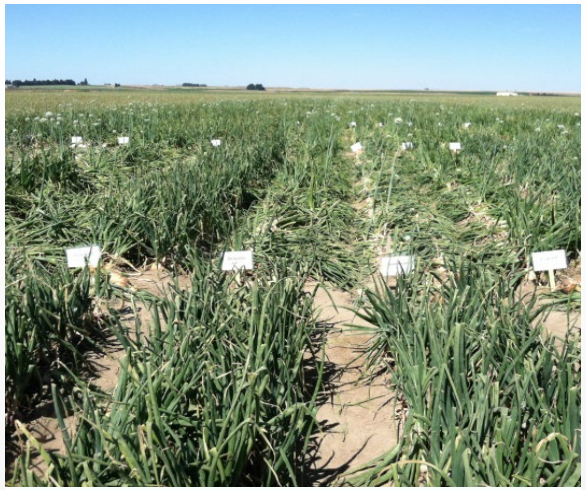
- <u>Harvest Evaluations</u>:
  - Yield, Bulb Size Profile, Defects
- <u>Storage Evaluations</u> (after 4 months in storage):
  - Shape, Firmness, Scale Retention, Single Centers, and Various Storage Rots.

SOME TRIAL HIGHLIGHTS & TRENDS: 1984-2023

- In 40 years, 309 cultivars have been evaluated.
- Trial Average for Total Marketable Yield:
  - 1984-1992 – 25.3 T/A
  - 1993-2001 – 33.2 T/A
  - 2002-2012 – 43.8 T/A
  - 2013-2023 – 48.8 T/A
- Trial Average for Single Centers:
  - 1984-1992 – 28%
  - 1993-2001 – 40%
  - 2002-2012 – 57%
  - 2013-2022 – 59%

PERFORMANCE OF ONION CULTIVARS IN THE COLUMBIA BASIN

TEN YEARS OF CULTIVAR TRIAL RESULTS: 2013 to 2023



ONION CULTIVAR TRIAL LOCATIONS: 2013-2023

- 2013 – Hartley Farms
  - **Sprinkler**, 88” beds, (S Prosser)
- 2014 – Carr Farms
  - **Sprinkler**, 68” beds, (E Pasco)
- 2015 – Grigg and Sons Farm
  - **Sprinker**, 68” beds, (SE Quincy)
- 2016 – Skone & Connors
  - **Drip**, 68” beds, (NE Othello)
- 2017 – Weyns Farms
  - **Drip**, 68” beds, (E Othello)
- 2018 – Hartley Farms
  - **Sprinkler**, 88” beds, (S Prosser)
- 2019 – L&L Ag. Production,
  - **Drip**, 80” beds, (NW Connell)
- 2020 – Olsen Onion
  - **Sprinkler**, 34” beds, (E Pasco)
- 2021 – No Trial
- 2022 – Grigg and Sons Farm
  - **Sprinkler**, 68” beds, (SW Quincy)
- 2023 – Skone & Connors
  - **Drip**, 68” beds, (E Moses Lake)

ONION CULTIVAR TRIAL ENTRIES: 2013-2023

10-YEAR ENTRIES

1. **Arcero** – Nunhems
2. **Highlander** – American Takii
3. **Legend** – Bejo
4. **Montero** – Nunhems
5. **Oloroso** – Nunhems
6. **Purple Haze** – Crookham
7. **Scout** – Crookham
8. **Vaquero** – Nunhems

9-YEAR ENTRIES

9. **XP 16000** – Seminis
10. **Anillo** – Nunhems
11. **Frontier** – American Takii
12. **Granero** – Nunhems
13. **Joaquin** – Nunhems
14. **Milestone** – American Takii

8-YEAR ENTRIES

15. **Brundage** – Crookham
16. **Hamilton** – Bejo
17. **Marenge** – Nunhems
18. **SV4643NT** – Nunhems
19. **Tamara** – Bejo

7-YEAR ENTRIES

20. **Centerstone** – American Takii
21. **Grand Perfection** – American Takii
22. **Red Beret** – Crookham
23. **Red Carpet** – Bejo
24. **Tucannon** – Seminis
25. **White Cloud**– Crookham

6-YEAR ENTRIES

26. **Airoso** – Nunhems
27. **Calibra** – Bejo
28. **Cometa** – Nunhems
29. **Crockett** – Bejo
30. **Swale** – Seminis
31. **Traverse** – American Takii

5-YEAR ENTRIES

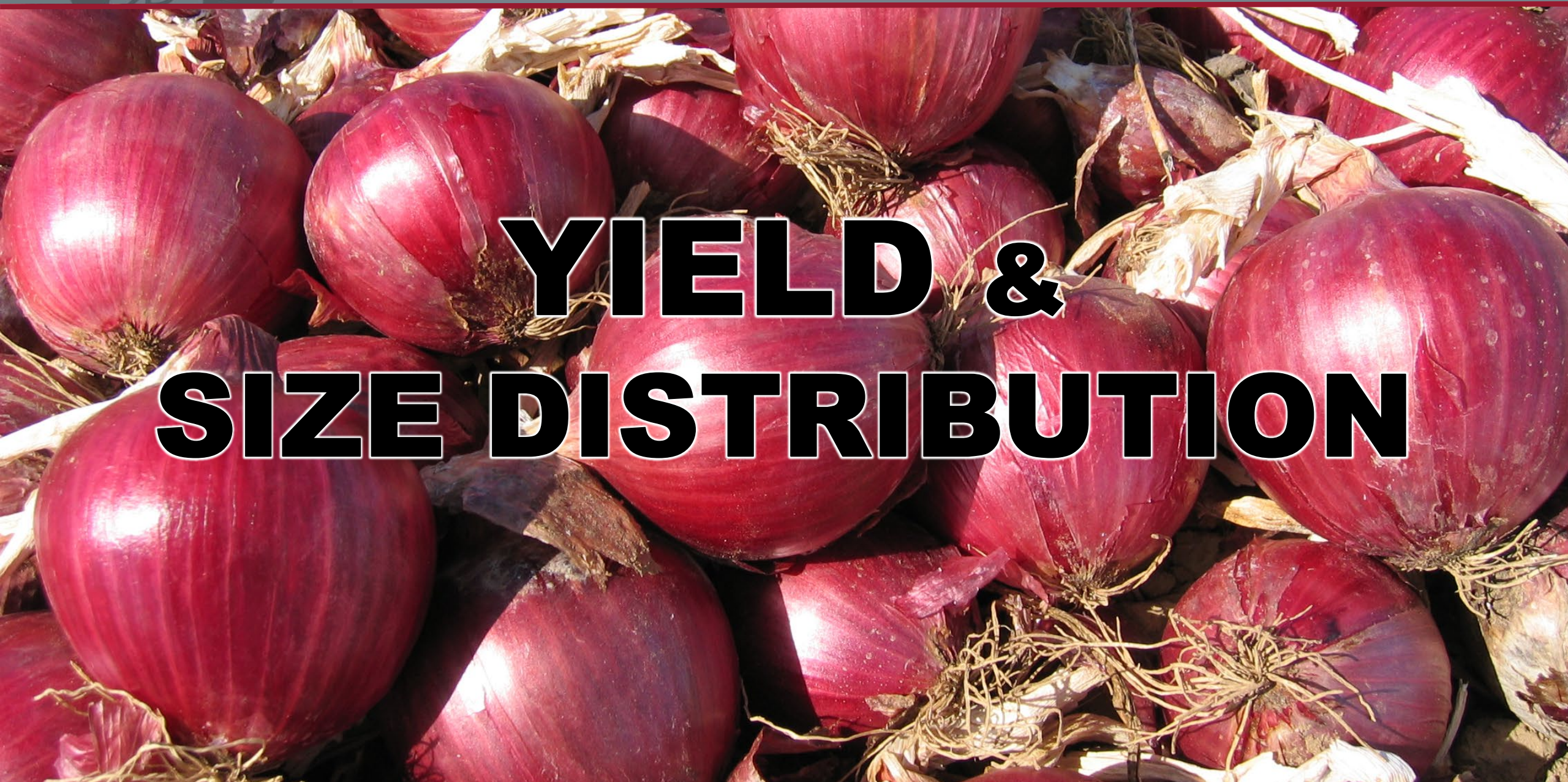
32. **Cruiser** – Hazera
33. **Ranchero** – Nunhems
34. **Redwing** – Bejo
35. **Rhea** – Nunhems
36. **Talon** – Bejo
37. **White Cap**– Crookham

ONION CULTIVAR TRIAL ENTRIES: 2013-2023

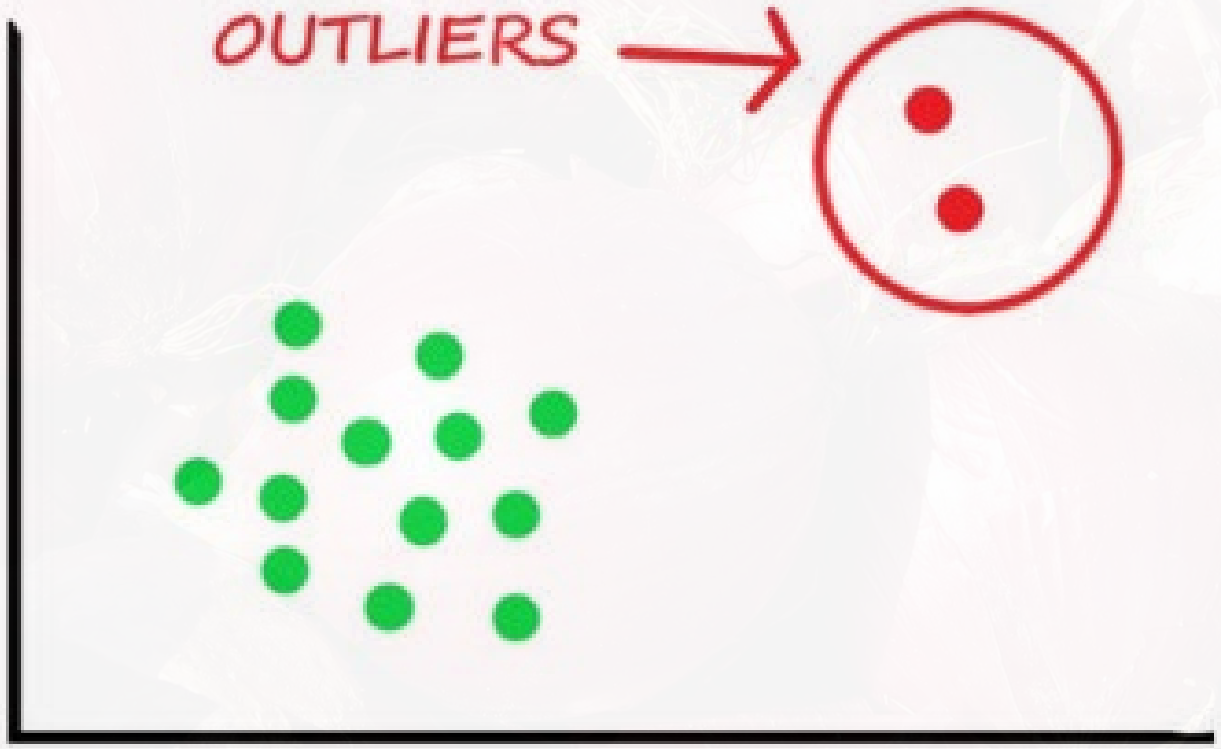
26

6

5



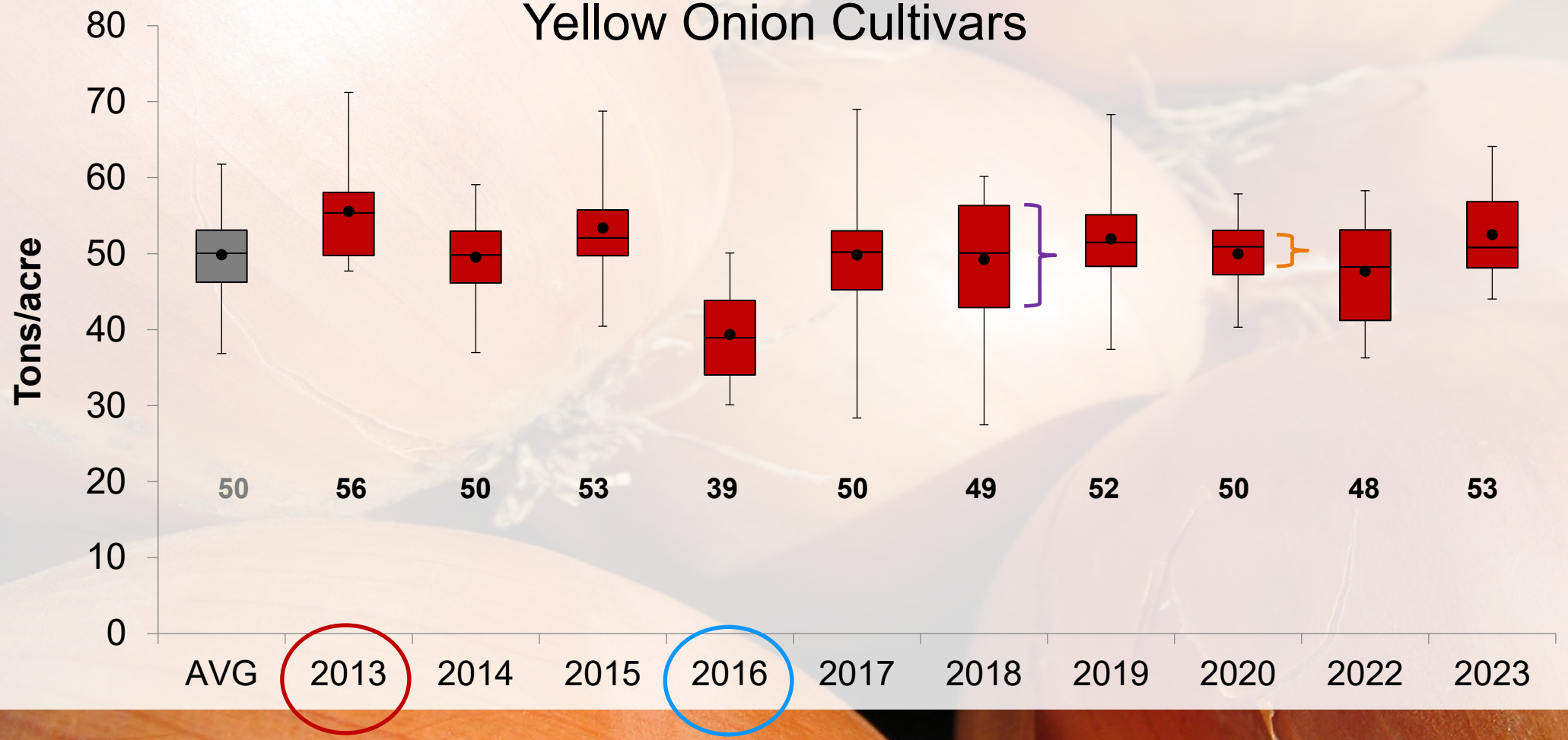
YIELD & SIZE DISTRIBUTION


OUTLIERS

26 Yellow Cultivars

TOTAL USABLE YIELD: 2013-2023

Yellow Onion Cultivars



SIZE DISTRIBUTION

COLOSSAL (>4”)

JUMBO (3”- 4”)

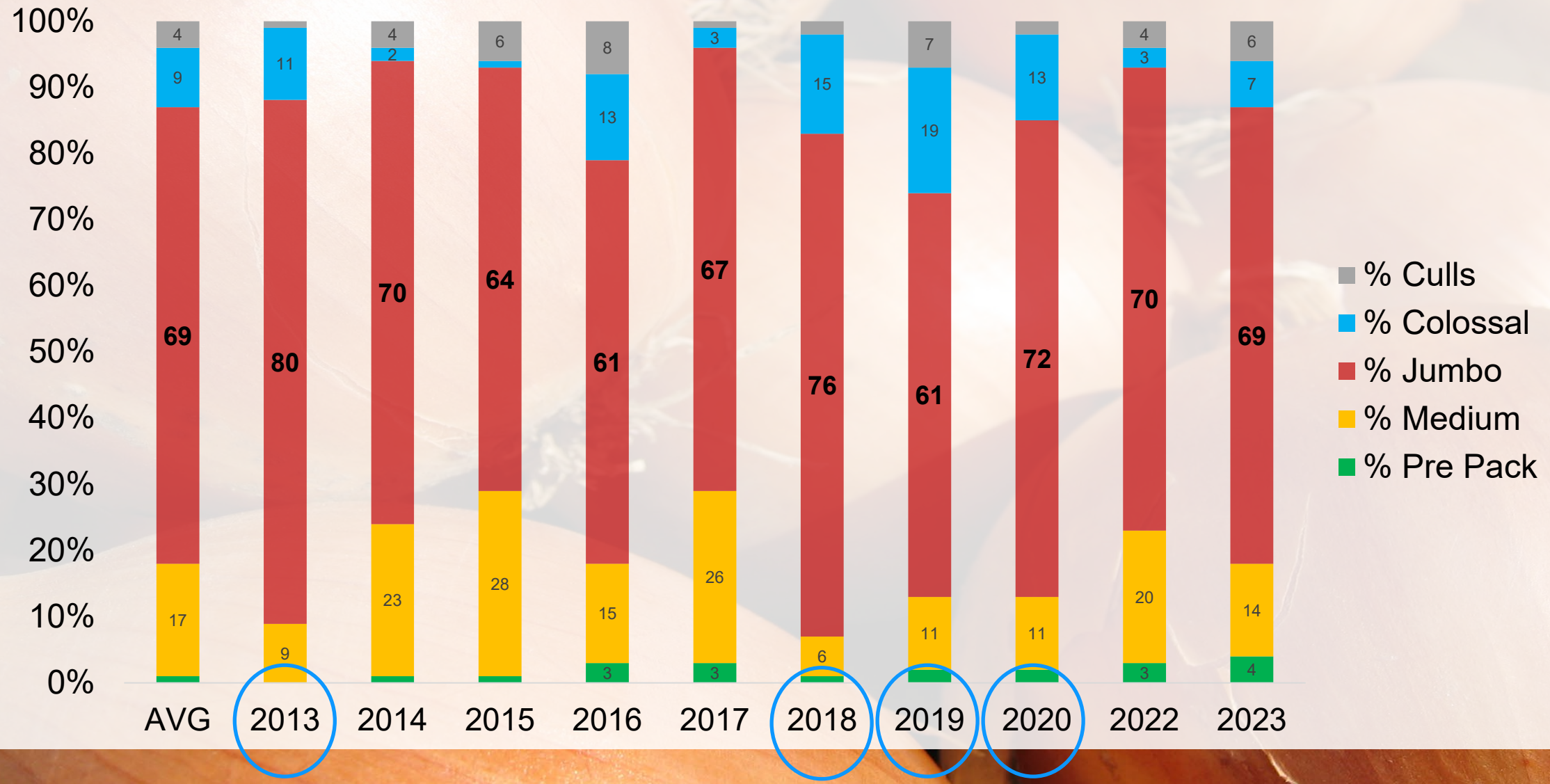
MEDIUM (2.25” – 3”)

PRE-PACK (<2.25”)

G. Q. Pelter, 2004

ONION SIZE DISTRIBUTION: 2013-2023

Yellow Onion Cultivars



%TOPS DOWN

% TOPS DOWN – RANKED "EARLY" TO "LATE"

Highlander	98.1	a	10-yrs	Legend	34.2	f-k	10-yrs
Traverse	80.3	ab	6-yrs	XP 16000	33.2	e-k	9-yrs
Frontier	77.9	ab	9-yrs	Vaquero	30.8	f-k	10-yrs
Talon	68.1	abc	5-yrs	Anillo	30.0	f-k	9-yrs
Montero	66.2	a-d	10-yrs	Crockett	29.4	e-k	6-yrs
Cruiser	60.8	b-e	5-yrs	Oloroso	25.8	g-k	10-yrs
Calibra	56.9	b-f	6-yrs	Granero	24.8	g-k	9-yrs
Milestone	53.6	b-g	9-yrs	Grand Perfection	24.4	h-k	7-yrs
Scout	51.6	b-h	10-yrs	Arcero	23.1	h-k	10-yrs
Swale	40.6	c-l	6-yrs	Ranchero	21.0	ijk	5-yrs
Tucannon	36.7	f-k	7-yrs	Airoso	17.3	ijk	6-yrs
Centerstone	35.8	d-j	7-yrs	Joaquin	12.6	k	9-yrs
Tamara	34.3	d-k	8-yrs	Hamilton	9.5	jk	8-yrs

*Tukey's HSD P=0.05 - SIGNIFICANT YEAR x CULTIVAR INTERACTION

Year	Total Usable (T/A)	% Medium	% Jumbo	% Colossal	% Culls
2013	55.6	9	80	11	1
2014	49.5	23	70	2	4
2015	39.4	28	64	1	6
2016	53.4	15	61	13	8
2017	49.8	26	67	3	1
2018	51.9	6	76	15	2
2019	49.3	11	61	19	7
2020	50.0	11	72	13	2
2022	47.7	20	70	3	4
2023	52.5	14	69	7	6
GRAND MEAN	**49.9**	**17**	**69**	**9**	**4**
Year	0.0001	0.0001	0.0001	0.0001	0.0001
Cultivar	0.0001	0.0001	0.0241	0.0001	0.0100
YR x CV	NS	0.0001	NS	0.0001	0.0001

FACTORS THAT DETERMINE YIELD

IS NOT
GROWER MODIFIABLE
POTENTIAL YIELD

1. **Frost-free Period**
2. **Day Length**
3. **Light Intensity** (Cloudy vs. Sunny)
4. **Air Temperatures**
5. **Soil Temperatures**
6. **Wind**
7. **Humidity**
8. **Soil Types**
9. **Precipitation**

GROWER MODIFIABLE
ACTUAL YIELD

1. **Cultivar Choice**
2. **Planting Date**
3. **Seed Quality**
4. **Soil pH**
5. **Soil Tilth**
6. **Physical Barriers**
7. **Plant Population**
8. **Nutrient Supply/Fertility**
9. **Pests** (Diseases, Weeds, Insects & Nematodes)
10. **Harvest Date**
11. **Timeliness of Operations**
12. **Soil Moisture/Irrigation**

TOTAL USABLE YIELD – RANKED

CULTIVAR	T/A*		StDev	YRS
Ranchero	61.8	a	5.7	5
Scout	61.2	a	10.1	10
XP 16000	56.9	ab	11.1	9
Montero	56.6	abc	7.6	10
Granero	53.9	bcd	5.6	9
Swale	53.2	b-e	6.2	6
Vaquero	53.2	b-e	6.1	10
Tucannon	52.9	b-e	9.9	7
Arcero	52.6	b-f	7.5	10
Grand Perfection	51.4	b-g	6.2	7
Anillo	51.3	b-g	8.2	9
Joaquin	50.9	b-g	7.4	9
Traverse	50.3	b-g	8.6	6

CULTIVAR	T/A*		StDev	YRS
Crockett	49.8	c-g	6.3	6
Legend	48.5	d-h	6.8	10
Talon	47.7	d-i	7.6	5
Airoso	47.6	d-i	5.3	6
Calibra	47.5	d-i	9.4	6
Hamilton	46.9	e-i	7	8
Oloroso	46.1	f-i	6.2	10
Highlander	45.5	ghi	11.3	10
Cruiser	45.3	ghi	8.4	5
Centerstone	44.8	ghi	8.3	7
Milestone	42.7	hij	8	9
Tamara	40.8	ij	6.7	8
Frontier	36.9	j	7.6	9

*Tukey's HSD P=0.05 - Year x Cultivar Interaction was Not Significant - **Average 50 T/A**

TOTAL USABLE YIELD – RANKED – "EARLY CVs"

CULTIVAR	T/A*		StDev	YRS
Ranchero	61.8	a	5.7	5
Scout	61.2	a	10.1	10
XP 16000	56.9	ab	11.1	9
Montero	56.6	abc	7.6	10
Granero	53.9	bcd	5.6	9
Swale	53.2	b-e	6.2	6
Vaquero	53.2	b-e	6.1	10
Tucannon	52.9	b-e	9.9	7
Arcero	52.6	b-f	7.5	10
Grand Perfection	51.4	b-g	6.2	7
Anillo	51.3	b-g	8.2	9
Joaquin	50.9	b-g	7.4	9
Traverse	50.3	b-g	8.6	6

CULTIVAR	T/A*		StDev	YRS
Crockett	49.8	c-g	6.3	6
Legend	48.5	d-h	6.8	10
Talon	47.7	d-i	7.6	5
Airoso	47.6	d-i	5.3	6
Calibra	47.5	d-i	9.4	6
Hamilton	46.9	e-i	7	8
Oloroso	46.1	f-i	6.2	10
Highlander	45.5	ghi	11.3	10
Cruiser	45.3	ghi	8.4	5
Centerstone	44.8	ghi	8.3	7
Milestone	42.7	hij	8	9
Tamara	40.8	ij	6.7	8
Frontier	36.9	j	7.6	9

*Tukey's HSD P=0.05 - Year x Cultivar Interaction was Not Significant - **Average 50 T/A**

TOTAL USABLE YIELD – RANKED – "LATE CVs"

CULTIVAR	T/A*		StDev	YRS
Ranchero	61. 8	a	5.7	5
Scout	61.2	a	10.1	10
XP 16000	56.9	ab	11.1	9
Montero	56.6	abc	7.6	10
Granero	53.9	bcd	5.6	9
Swale	53.2	b-e	6.2	6
Vaquero	53.2	b-e	6.1	10
Tucannon	52.9	b-e	9.9	7
Arcero	52.6	b-f	7.5	10
Grand Perfection	51.4	b-g	6.2	7
Anillo	51.3	b-g	8.2	9
Joaquin	50.9	b-g	7.4	9
Traverse	50.3	b-g	8.6	6

CULTIVAR	T/A*		StDev	YRS
Crockett	49.8	c-g	6.3	6
Legend	48.5	d-h	6.8	10
Talon	47.7	d-i	7.6	5
Airoso	47.6	d-i	5.3	6
Calibra	47.5	d-i	9.4	6
Hamilton	46.9	e-i	7	8
Oloroso	46.1	f-i	6.2	10
Highlander	45.5	ghi	11.3	10
Cruiser	45.3	ghi	8.4	5
Centerstone	44.8	ghi	8.3	7
Milestone	42.7	hij	8	9
Tamara	40.8	ij	6.7	8
Frontier	36.9	j	7.6	9

*Tukey's HSD P=0.05 - Year x Cultivar Interaction was Not Significant - **Average 50 T/A**

BULB SIZE DISTRIBUTION – RANKED BY JUMBOS

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL		CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Granero	11.3	def	**76.4**	a	7.7	c-f	**Milestone**	23.8	ab	**70.1**	ab	2.3	ef
Traverse	13.4	c-f	**74.5**	ab	5.3	def	**Calibra**	18.7	b-e	**68.7**	ab	6.5	def
Arcero	12.0	def	**74.4**	ab	9.0	c-f	**Highlander**	19.7	bcd	**68.2**	ab	6.7	c-f
Crockett	18.9	bcd	**74.0**	ab	2.1	ef	**Tucannon**	13.4	c-f	**68.0**	ab	10.4	b-e
Swale	11.4	def	**72.1**	ab	10.2	c-f	**Vaquero**	12.1	def	**67.8**	ab	14.2	a-d
Talon	22.5	abc	**71.6**	ab	2.9	ef	**Joaquin**	14.1	c-f	**67.4**	ab	9.8	c-f
Anillo	17.3	b-f	**71.5**	ab	5.0	def	**Montero**	9.3	ef	**65.6**	ab	20.1	ab
Tamara	24.1	ab	**71.5**	ab	0.5	f	**Cruiser**	26.1	ab	**64.6**	ab	2.0	ef
Airoso	20.1	bcd	**71.3**	ab	3.1	ef	**Ranchero**	7.9	f	**63.5**	ab	23.9	a
Centerstone	16.9	b-f	**71.3**	ab	5.6	def	**XP 16000**	13.0	c-f	**63.4**	ab	16.4	abc
Hamilton	16.7	b-f	**70.6**	ab	4.1	ef	**Frontier**	32.0	a	**62.8**	ab	0.5	f
Oloroso	19.6	bcd	**70.4**	ab	4.3	ef	**Grand Perfection**	11.7	def	**61.8**	b	17.9	ab
Legend	17.8	b-e	**70.1**	ab	6.8	c-f	**Scout**	7.8	f	**61.3**	b	23.1	a

*Tukey's HSD P=0.05 - Year x Cultivar Interaction was NOT SIGNIFICANT for % Jumbos - **Average % Jumbos = 69%**

BULB SIZE DISTRIBUTION – RANKED BY COLOSSALS

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Ranchero	7.9	f	63.5	ab	**23.9**	**a**
Scout	7.8	f	61.3	b	**23.1**	**a**
Montero	9.3	ef	65.6	ab	**20.1**	**ab**
Grand Perfection	11.7	def	61.8	b	**17.9**	**ab**
XP 16000	13.0	c-f	63.4	ab	**16.4**	**abc**
Vaquero	12.1	def	67.8	ab	**14.2**	**a-d**
Tucannon	13.4	c-f	68.0	ab	10.4	b-e
Swale	11.4	def	72.1	ab	10.2	c-f
Joaquin	14.1	c-f	67.4	ab	9.8	c-f
Arcero	12.0	def	74.4	ab	9.0	c-f
Granero	11.3	def	76.4	a	7.7	c-f
Legend	17.8	b-e	70.1	ab	6.8	c-f
Highlander	19.7	bcd	68.2	ab	6.7	c-f

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Calibra	18.7	b-e	68.7	ab	6.5	def
Centerstone	16.9	b-f	71.3	ab	5.6	def
Traverse	13.4	c-f	74.5	ab	5.3	def
Anillo	17.3	b-f	71.5	ab	5.0	def
Oloroso	19.6	bcd	70.4	ab	4.3	ef
Hamilton	16.7	b-f	70.6	ab	4.1	ef
Airoso	20.1	bcd	71.3	ab	3.1	ef
Talon	22.5	abc	71.6	ab	2.9	ef
Milestone	23.8	ab	70.1	ab	2.3	ef
Crockett	18.9	bcd	74.0	ab	2.1	ef
Cruiser	26.1	ab	64.6	ab	2.0	ef
Tamara	24.1	ab	71.5	ab	0.5	f
Frontier	32.0	a	62.8	ab	0.5	f

*Tukey's HSD P=0.05 - SIGNIFICANT YEAR x CV Interaction for % Colossal - **Average % Colossal = 8%**

BULB SIZE DISTRIBUTION – RANKED BY MEDIUMS

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL		CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Frontier	32.0	a	62.8	ab	0.5	f	**Hamilton**	16.7	b-f	70.6	ab	4.1	ef
Cruiser	26.1	ab	64.6	ab	2.0	ef	**Joaquin**	14.1	c-f	67.4	ab	9.8	c-f
Tamara	24.1	ab	71.5	ab	0.5	f	**Tucannon**	13.4	c-f	68.0	ab	10.4	b-e
Milestone	23.8	ab	70.1	ab	2.3	ef	**Traverse**	13.4	c-f	74.5	ab	5.3	def
Talon	22.5	abc	71.6	ab	2.9	ef	**16000**	13.0	c-f	63.4	ab	16.4	abc
Airoso	20.1	bcd	71.3	ab	3.1	ef	**Vaquero**	12.1	def	67.8	ab	14.2	a-d
Highlander	19.7	bcd	68.2	ab	6.7	c-f	**Arcero**	12.0	def	74.4	ab	9.0	c-f
Oloroso	19.6	bcd	70.4	ab	4.3	ef	**Grand Perfection**	11.7	def	61.8	b	17.9	ab
Crockett	18.9	bcd	74.0	ab	2.1	ef	**Swale**	11.4	def	72.1	ab	10.2	c-f
Calibra	18.7	b-e	68.7	ab	6.5	def	**Granero**	11.3	def	76.4	a	7.7	c-f
Legend	17.8	b-e	70.1	ab	6.8	c-f	**Montero**	9.3	ef	65.6	ab	20.1	ab
Anillo	17.3	b-f	71.5	ab	5.0	def	**Ranchero**	7.9	f	63.5	ab	23.9	a
Centerstone	16.9	b-f	71.3	ab	5.6	def	**Scout**	7.8	f	61.3	b	23.1	a

*Tukey's HSD P=0.05 - SIGNIFICANT YEAR x CV Interaction for % Medium - **Average % Medium = 17%**

6 Red Cultivars

% TOPS DOWN
RANKED “EARLY” TO “LATE”

SV4643NT	68.5	a	8-yrs
Purple Haze	35.2	b	10-yrs
Marenge	31.5	bc	8-yrs
Red Beret	22.4	cd	7-yrs
Redwing	21.9	cd	5-yrs
Red Carpet	4.4	d	7-yrs

*Tukey’s HSD P=0.05
Year x Cultivar Interaction NS

TOTAL USABLE YIELD

CULTIVAR	T/A*		StDev	YRS
SV4643NT	48.4	a	3.7	8
Redwing	45.7	a	5.6	5
Red Carpet	43.8	ab	7.4	7
Marenge	38.7	bc	8.0	8
Purple Haze	37.3	c	6.2	10
Red Beret	36.8	c	7.0	7

*Tukey's HSD P=0.05, Yr. x Cv. Interaction Not Significant
Average 42 T/A

BULB SIZE DISTRIBUTION – RANKED BY JUMBOS

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Redwing	24.1	bc	**71.5**	a	0.1	b
Red Carpet	25.0	bc	**69.6**	a	1.3	b
SV4643NT	15.4	c	**69.1**	a	10.1	a
Marenge	17.0	c	**67.5**	ab	4.0	b
Red Beret	31.3	ab	**56.9**	bc	3.3	b
Purple Haze	38.0	a	**53.6**	c	2.0	b

*Tukey's HSD P=0.05, Yr. x Cv. Interactions for % Med, % Jumbo NS

TOTAL USABLE YIELD

CULTIVAR	T/A*		StDev	YRS
SV4643NT	48.4	a	3.7	8
Redwing	45.7	a	5.6	5
Red Carpet	43.8	ab	7.4	7
Marenge	38.7	bc	8.0	8
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*Tukey's HSD P=0.05, Yr. x Cv. Interaction Not Significant
Average 42 T/A

BULB SIZE DISTRIBUTION – RANKED BY JUMBOS

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Redwing	24.1	bc	**71.5**	a	0.1	b
Red Carpet	25.0	bc	**69.6**	a	1.3	b
SV4643NT	15.4	c	**69.1**	a	10.1	a
Marenge	17.0	c	**67.5**	ab	4.0	b
Red Beret	31.3	ab	**56.9**	bc	3.3	b
Purple Haze	38.0	a	**53.6**	c	2.0	b

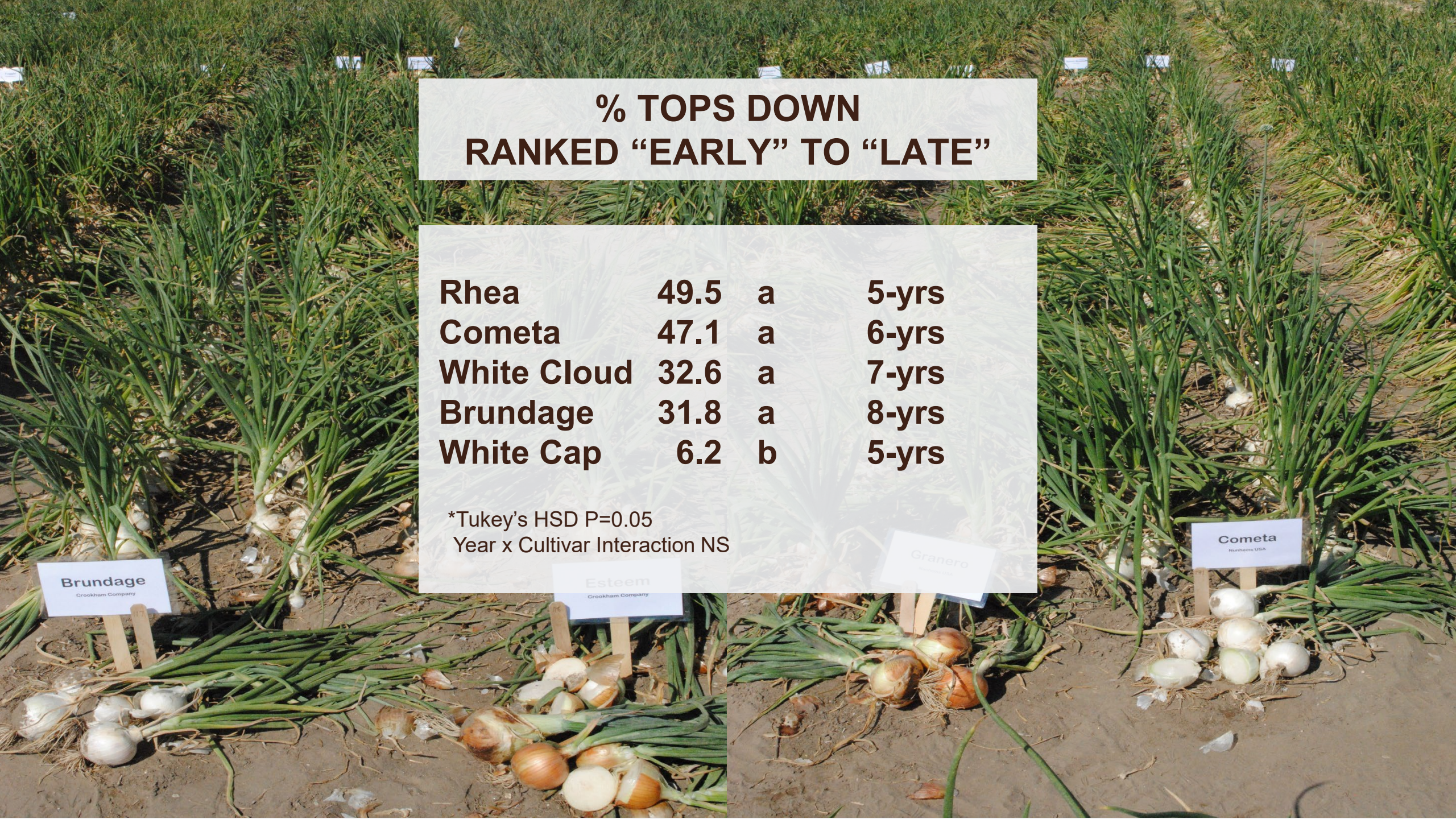
*Tukey's HSD P=0.05, Yr. x Cv. Interactions for % Med, % Jumbo NS

5 White Cultivars

% TOPS DOWN
RANKED “EARLY” TO “LATE”

Rhea	49.5	a	5-yrs
Cometa	47.1	a	6-yrs
White Cloud	32.6	a	7-yrs
Brundage	31.8	a	8-yrs
White Cap	6.2	b	5-yrs

*Tukey’s HSD P=0.05
Year x Cultivar Interaction NS



TOTAL USABLE YIELD

CULTIVAR	T/A*		StDev	YRS
Brundage	47.4	NS	7.3	7
Cometa	50.6	NS	9.0	6
Rhea	52.9	NS	6.1	5
White Cap	49.3	NS	8.1	5
White Cloud	53.1	NS	10.6	7

*Tukey's HSD P=0.05, Yr. x Cv. Interaction Not Significant
Average 50 T/A

BULB SIZE DISTRIBUTION – ALPHABETICAL

CULTIVAR	% MEDIUM		% JUMBO		% COLOSSAL	
Brundage	18.5	a	**72.3**	NS	4.5	c
Cometa	18.5	a	**73.4**	NS	3.1	c
Rhea	18.1	a	**73.3**	NS	4.7	bc
White Cap	15.1	a	**68.5**	NS	10.2	ab
White Cloud	11.8	b	**62.2**	NS	14.8	a

*Tukey's HSD P=0.05, Yr. x Cv. Interactions for % Med, % Jumbo NS

TOTAL USABLE YIELD

CULTIVAR	T/A*		StDev	YRS
Brundage	47.4	NS	7.3	7
Cometa	50.6	NS	9.0	6
Rhea	52.9	NS	6.1	5
White Cap	49.3	NS	8.1	5
White Cloud	53.1	NS	10.6	7

*Tukey's HSD P=0.05, Yr. x Cv. Interaction Not Significant
Average 50 T/A

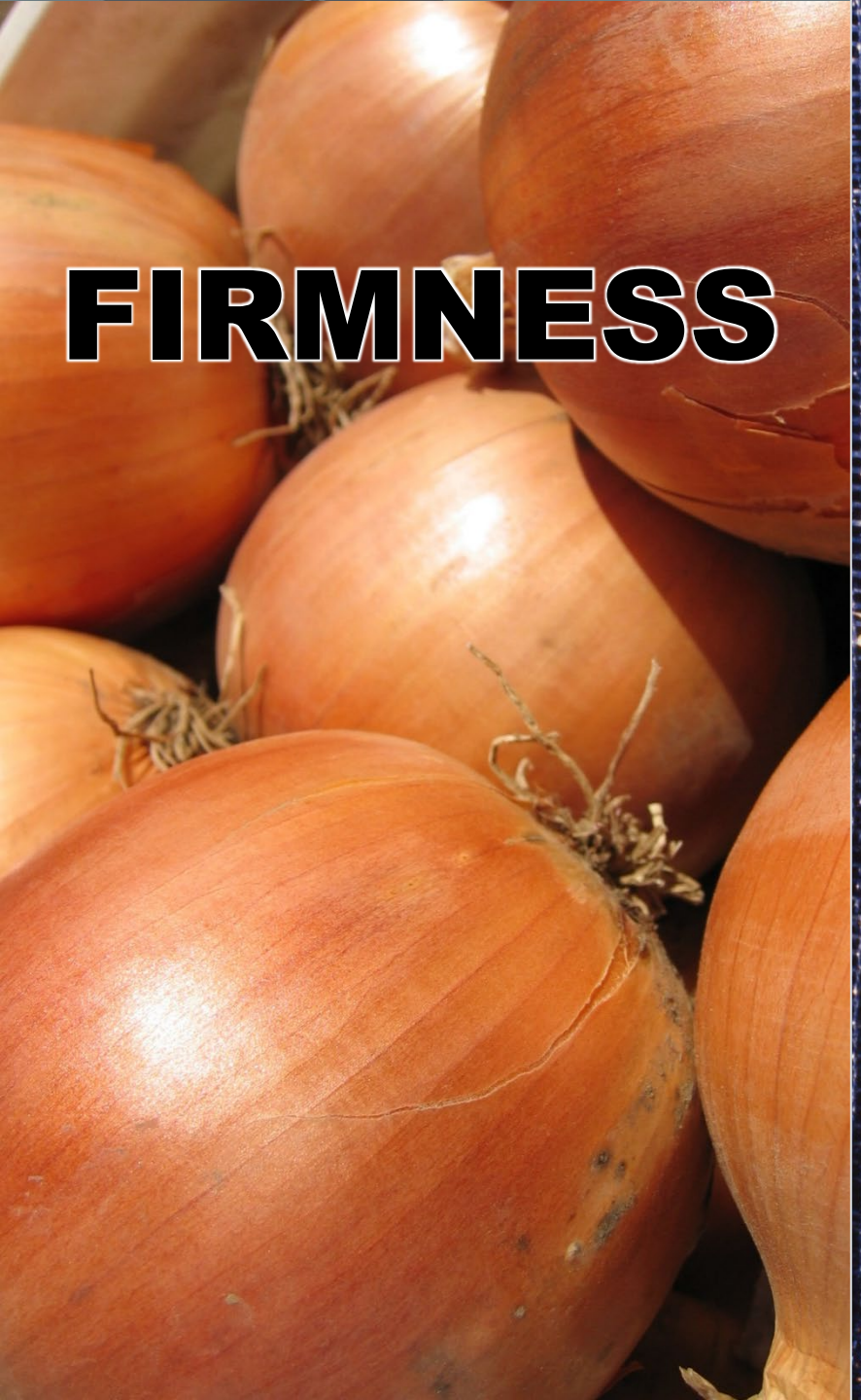
BULB SIZE DISTRIBUTION – ALPHABETICAL

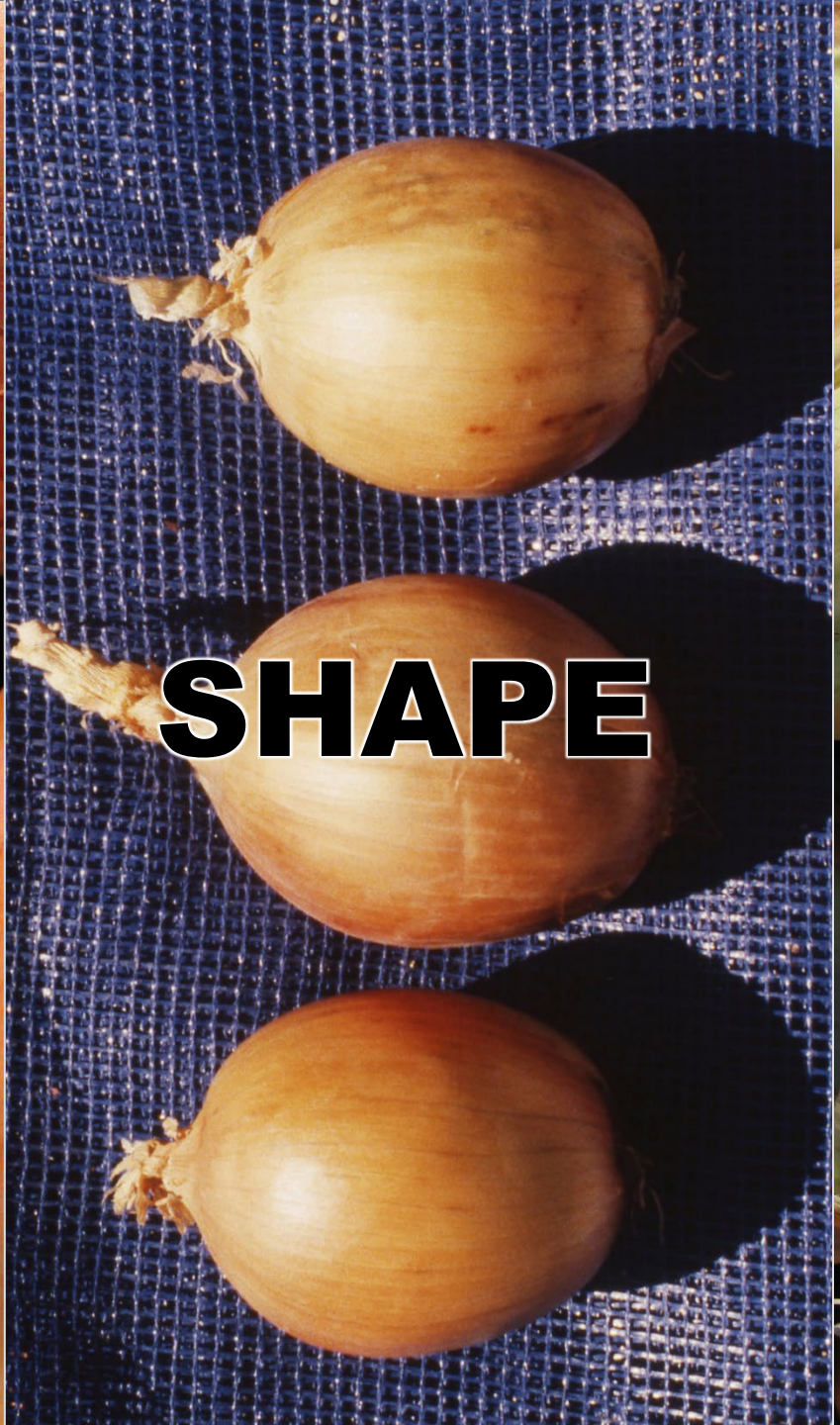
CULTIVAR	% MEDIUM	% JUMBO	% COLOSSAL
Brundage	18.5 a	**72.3** NS	4.5 c
Cometa	18.5 a	**73.4** NS	3.1 c
Rhea	18.1 a	**73.3** NS	4.7 bc
White Cap	15.1 a	**68.5** NS	10.2 ab
White Cloud	11.8 b	**62.2** NS	14.8 a

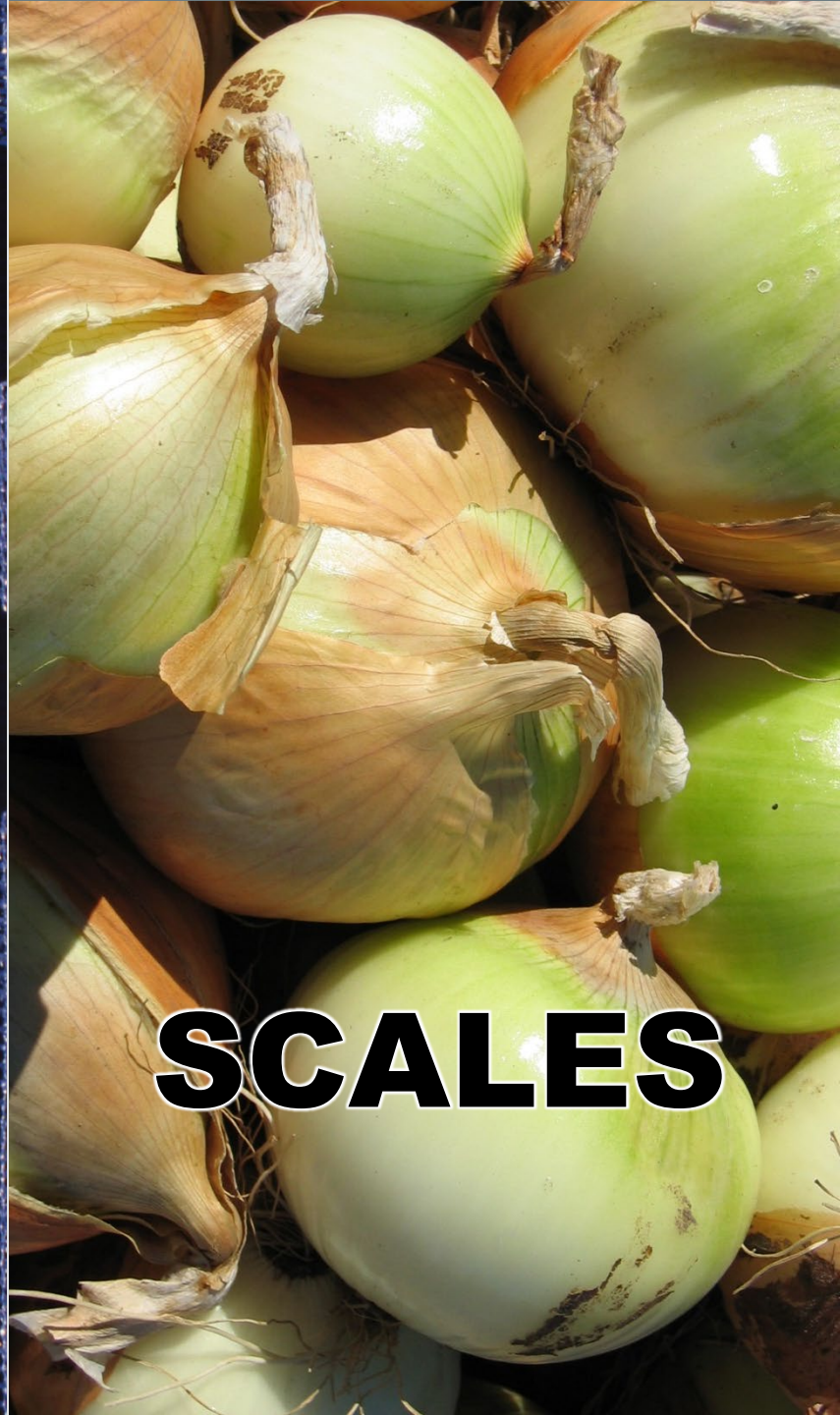
*Tukey's HSD P=0.05, Yr. x Cv. Interactions for % Med, % Jumbo NS

STORAGE EVALUATIONS

Photo by Casey Crookham


FIRMNESS


SHAPE


SCALES

QUALITY – RANKED BY SCORE ACROSS CATEGORIES

CULTIVAR	FIRMNESS		SHAPE		SCALES		SCORE
Hamilton	4.6	a	4.0	abc	4.6	ab	13.1
Legend	4.5	a-d	3.9	abc	4.6	a	13.0
Airoso	4.6	ab	4.2	ab	4.1	a-f	12.9
Tamara	4.5	a	3.9	abc	4.5	a-d	12.9
Crockett	4.5	ab	3.9	abc	4.5	abc	12.9
Granero	4.2	a-e	4.2	a	4.3	a-f	12.6
Oloroso	4.0	b-g	4.1	ab	4.6	ab	12.6
Talon	4.4	abc	4.0	abc	4.1	a-f	12.5
Calibra	3.9	b-g	3.9	abc	4.2	a-e	12.1
Tucannon	4.1	a-f	3.7	a-d	4.2	a-g	12.0
Joaquin	3.8	c-g	3.7	a-d	4.1	a-f	11.7
Anillo	3.7	e-i	3.6	a-d	4.2	a-e	11.5
Arcero	3.6	f-j	4.0	abc	3.9	a-h	11.4

CULTIVAR	FIRMNESS		SHAPE		SCALES		SCORE
Cruiser	3.8	d-h	3.6	a-d	3.8	b-i	11.3
Milestone	3.6	f-i	3.8	abc	3.7	e-i	11.2
Swale	3.6	f-i	3.8	a-d	3.7	e-i	11.1
Frontier	3.9	b-g	3.9	abc	3.2	hij	11.1
Vaquero	3.5	f-k	3.7	a-d	3.8	d-i	11.0
Traverse	3.6	e-i	4.0	abc	3.4	hij	11.0
Ranchero	3.3	h-k	3.5	a-d	3.9	c-i	10.7
Centerstone	3.8	d-i	3.5	bcd	3.4	ghi	10.6
Grand Perfection	3.3	g-k	3.4	cde	3.7	d-i	10.4
Montero	3.2	ijk	3.4	bcd	3.5	f-i	10.2
XP 16000	3.0	k	3.2	de	3.2	ij	9.3
Scout	3.0	jk	3.4	bcd	2.7	j	9.2
Highlander	2.1	l	2.7	e	1.7	k	6.4

*Tukey's HSD P=0.05 , Yr. x Cv. Interactions for Scales Rating Not Significant

QUALITY – RANKED BY SCORE "EARLY CVs"

CULTIVAR	FIRMNESS		SHAPE		SCALES		SCORE
Hamilton	4.6	a	4.0	abc	4.6	ab	13.1
Legend	4.5	a-d	3.9	abc	4.6	a	13.0
Airoso	4.6	ab	4.2	ab	4.1	a-f	12.9
Tamara	4.5	a	3.9	abc	4.5	a-d	12.9
Crockett	4.5	ab	3.9	abc	4.5	abc	12.9
Granero	4.2	a-e	4.2	a	4.3	a-f	12.6
Oloroso	4.0	b-g	4.1	ab	4.6	ab	12.6
Talon	**4.4**	**abc**	**4.0**	**abc**	**4.1**	**a-f**	**12.5**
Calibra	3.9	b-g	3.9	abc	4.2	a-e	12.1
Tucannon	4.1	a-f	3.7	a-d	4.2	a-g	12.0
Joaquin	3.8	c-g	3.7	a-d	4.1	a-f	11.7
Anillo	3.7	e-i	3.6	a-d	4.2	a-e	11.5
Arcero	3.6	f-j	4.0	abc	3.9	a-h	11.4

CULTIVAR	FIRMNESS		SHAPE		SCALES		SCORE
Cruiser	3.8	d-h	3.6	a-d	3.8	b-i	11.3
Milestone	3.6	f-i	3.8	abc	3.7	e-i	11.2
Swale	3.6	f-i	3.8	a-d	3.7	e-i	11.1
Frontier	**3.9**	**b-g**	**3.9**	**abc**	**3.2**	**hij**	**11.1**
Vaquero	3.5	f-k	3.7	a-d	3.8	d-i	11.0
Traverse	**3.6**	**e-i**	**4.0**	**abc**	**3.4**	**hij**	**11.0**
Ranchero	3.3	h-k	3.5	a-d	3.9	c-i	10.7
Centerstone	3.8	d-i	3.5	bcd	3.4	ghi	10.6
Grand Perfection	3.3	g-k	3.4	cde	3.7	d-i	10.4
Montero	**3.2**	**ijk**	**3.4**	**bcd**	**3.5**	**f-i**	**10.2**
XP 16000	3.0	k	3.2	de	3.2	ij	9.3
Scout	3.0	jk	3.4	bcd	2.7	j	9.2
Highlander	**2.1**	**l**	**2.7**	**e**	**1.7**	**k**	**6.4**

*Tukey's HSD P=0.05 , Yr. x Cv. Interactions for Scales Rating Not Significant

SINGLE
CENTERS

% SINGLE CENTERS – RANKED

CULTIVAR	% SINGLES		StDev	YRS
Oloroso	**87.2**	a	10.6	9
Joaquin	**85.1**	a	13.6	8
Arcero	**84.9**	a	14.4	9
Anillo	**84.7**	a	12.0	8
Airoso	**75.9**	ab	10.9	4
Swale	**74.5**	abc	16.3	6
16000	**74.5**	abc	11.2	9
Vaquero	**74.5**	abc	17.8	9
Granero	**74.0**	a-d	14.9	8
Montero	**73.9**	a-d	14.2	9
Hamilton	**73.4**	abc	15.6	7
Tucannon	**73.2**	a-d	14.6	6
Ranchero	**73.0**	a-d	12.6	5

CULTIVAR	% SINGLES		StDev	YRS
Cruiser	64.6	b-e	17.8	5
Crockett	60.4	c-g	16.8	6
Grand Perfection	57.9	c-f	21.6	6
Traverse	57.4	b-f	26.3	5
Scout	55.4	d-g	13.2	9
Talon	48.9	e-h	17.9	5
Tamara	46.5	fgh	21.6	8
Milestone	42.4	gh	17.1	8
Centerstone	36.7	hi	12.0	7
Calibra	34.9	hi	23.7	6
Legend	34.4	hi	17.8	9
Frontier	18.7	ij	17.4	8
Highlander	6.1	j	6.6	8

*Tukey's HSD P=0.05 , Yr. x Cv. Interactions for % Single Centers were NOT SIGNIFICANT

QUALITY
RANKED BY SCORE

CULTIVAR	FIRMNESS	SHAPE	SCALES	SCORE
Redwing	4.3 a	3.5 a	4.3 a	12.1
Red Carpet	3.7 b	3.3 a	3.9 ab	10.9
Marenge	3.1 c	3.4 a	3.0 c	9.6
Purple Haze	3.4 bc	2.6 b	3.1 c	9.1
Red Beret	3.2 bc	2.5 b	3.2 bc	8.9
SV4643NT	3.0 c	2.8 ab	3.1 c	8.8

*Tukey's HSD P=0.05, Yr. x Cv. Interactions for All Rating NS

% SINGLE CENTERS

CULTIVAR	% SINGLES	StDev	YRS
Purple Haze	66.4 a	10.7	9
Red Beret	56.7 b	17.3	6
Redwing	46.0 bc	14.9	4
Marenge	45.5 bc	15.8	7
Red Carpet	43.7 bc	14.9	6
SV4643NT	35.5 c	15.6	5

*Tukey's HSD P=0.05 , Yr. x Cv. Interaction NS

QUALITY
RANKED BY SCORE

CULTIVAR	FIRMNESS	SHAPE	SCALES	SCORE
Rhea	3.5 NS	4.0 NS	3.5 NS	11.0
White Cap	3.7 NS	3.3 NS	3.6 NS	10.5
Cometa	3.2 NS	3.5 NS	3.2 NS	10.0
Brundage	3.0 NS	3.2 NS	3.3 NS	9.4
White Cloud	3.2 NS	3.2 NS	2.9 NS	9.3

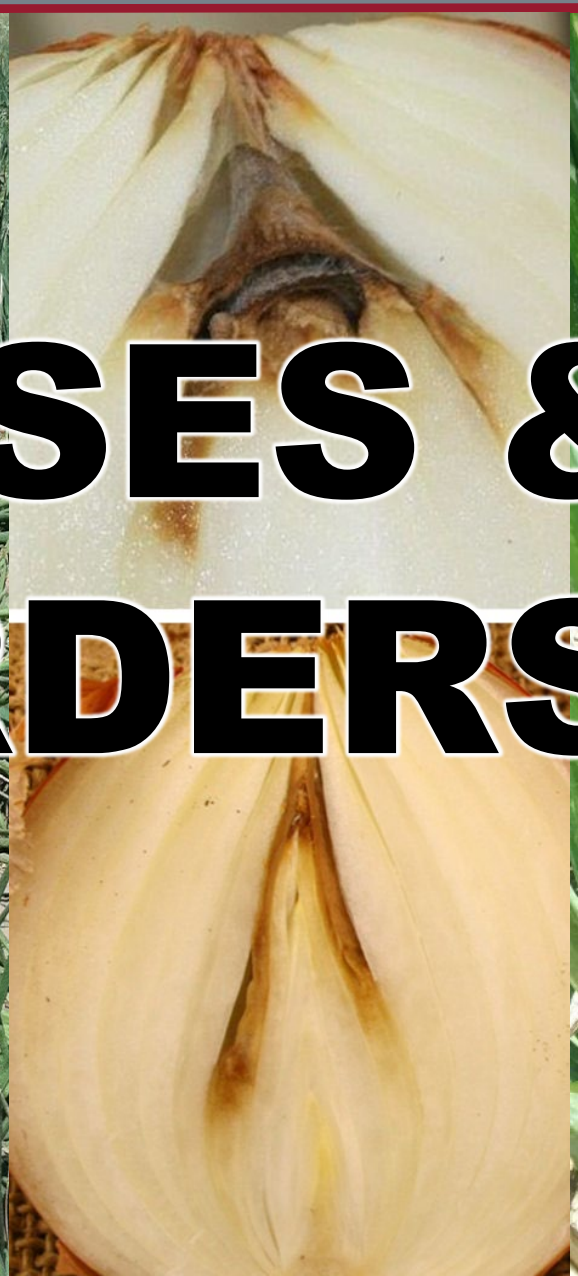
*Tukey's HSD P=0.05, Yr. x Cv. Interactions for All Rating NS

% SINGLE CENTERS

CULTIVAR	% SINGLES	StDev	YRS
Rhea	86.7 a	6.0	4
Brundage	81.6 a	9.0	6
Cometa	80.3 a	7.7	5
White Cap	78.1 a	8.6	4
White Cloud	47.6 b	18.0	6

*Tukey's HSD P=0.05

DISEASES & DISORDERS



NECK
ROT

2016 NECK ROT – YELLOWS, REDS, WHITES RANKED

CULTIVAR	% NECK ROT	
Arcero	0.0	c
Crockett	0.0	c
Legend	0.0	c
Montero	0.0	c
Cruiser	0.7	c
Hamilton	1.6	bc
Ranchero	2.0	bc
Frontier	2.2	bc
Tamara	2.3	bc
Calibra	2.3	bc
Talon	2.7	bc
Tucannon	2.9	bc
Traverse	3.0	bc

CULTIVAR	% NECK ROT	
Granero	3.4	bc
Swale	3.5	bc
Centerstone	3.5	bc
Scout	3.5	bc
Anillo	3.5	bc
Milestone	3.7	bc
Joaquin	4.0	bc
Highlander	5.5	bc
Oloroso	6.6	bc
XP 16000	8.3	abc
Vaquero	11.7	abc
Grand Perfection	17.5	ab
Airoso		

RED CULTIVAR	% NECK ROT	
Purple Haze	0.7	c
Red Carpet	1.3	c
Marenge	3.1	bc
Red Beret	5.3	bc
Redwing		
SV4643NT		

WHITE CULTIVAR	% NECK ROT	
White Cloud	24.0	a
Brundage		
Cometa		
Rhea		
White Cap		

*Tukey's HSD P=0.05, ONLY 2015 had significant cv. differences for % NECK ROT

DRY
SCALE
Photos By Lindsey du Toit, WSU

2015 DRY SCALE – YELLOWS, REDS, WHITES RANKED

CULTIVAR	% DRY SCALE	
Arcero	33.1	cd
Legend	34.6	bcd
Hamilton	36.3	bcd
Joaquin	39.3	bcd
16000	41.8	bcd
Calibra	42.5	bcd
Highlander	43.1	bcd
Centerstone	43.5	bcd
Anillo	45.1	bcd
Grand Perfection	45.3	bcd
Milestone	45.6	bcd
Vaquero	46.0	a-d
Oloroso	48.6	a-d

CULTIVAR	% DRY SCALE	
Swale	48.7	a-d
Montero	51.3	abc
Cruiser	52.3	abc
Scout	58.3	abc
Tamara	61.9	ab
Granero	66.0	a
Frontier	67.1	a
Airoso		
Crockett		
Ranchero		
Talon		
Traverse		
Tucannon		

RED CULTIVAR	% DRY SCALE	
Red Beret	39.9	bcd
Red Carpet	42.0	bcd
Marenge	48.2	a-d
Purple Haze	55.6	abc
Redwing		
SV4643NT		

WHITE CULTIVAR	% DRY SCALE	
Cometa	26.9	d
White Cloud	29.9	cd
Brundage	34.7	bcd
Rhea		
White Cap		

*Tukey's HSD P=0.05, ONLY 2015 had significant cv. differences for DRY SCALE

POWDERY MILDEW

MILD

MODERATE

SEVERE

MILD
1
MODERATE
2

SEVERE
3

SEVERE-FUNGUS
4

2019 POWDERY MILDEW – ALL CULTIVARS RANKED

CULTIVAR	RANK 1-4	
Vaquero	1.0	c
Airoso	1.3	c
Grand Perfection	1.3	c
Legend	1.3	c
Tamara	1.3	c
XP 16000	1.7	bc
Frontier	1.7	bc
Hamilton	1.7	bc
Joaquin	1.7	bc
Montero	1.7	bc
Oloroso	1.7	bc
Highlander	1.9	bc
Centerstone	2.0	bc

CULTIVAR	RANK 1-4	
Crockett	2.0	bc
Granero	2.3	abc
Arcero	3.0	ab
Scout	3.0	ab
Tucannon	3.7	a
Anillo		
Calibra		
Cruiser		
Milestone		
Swale		
Talon		
Traverse		

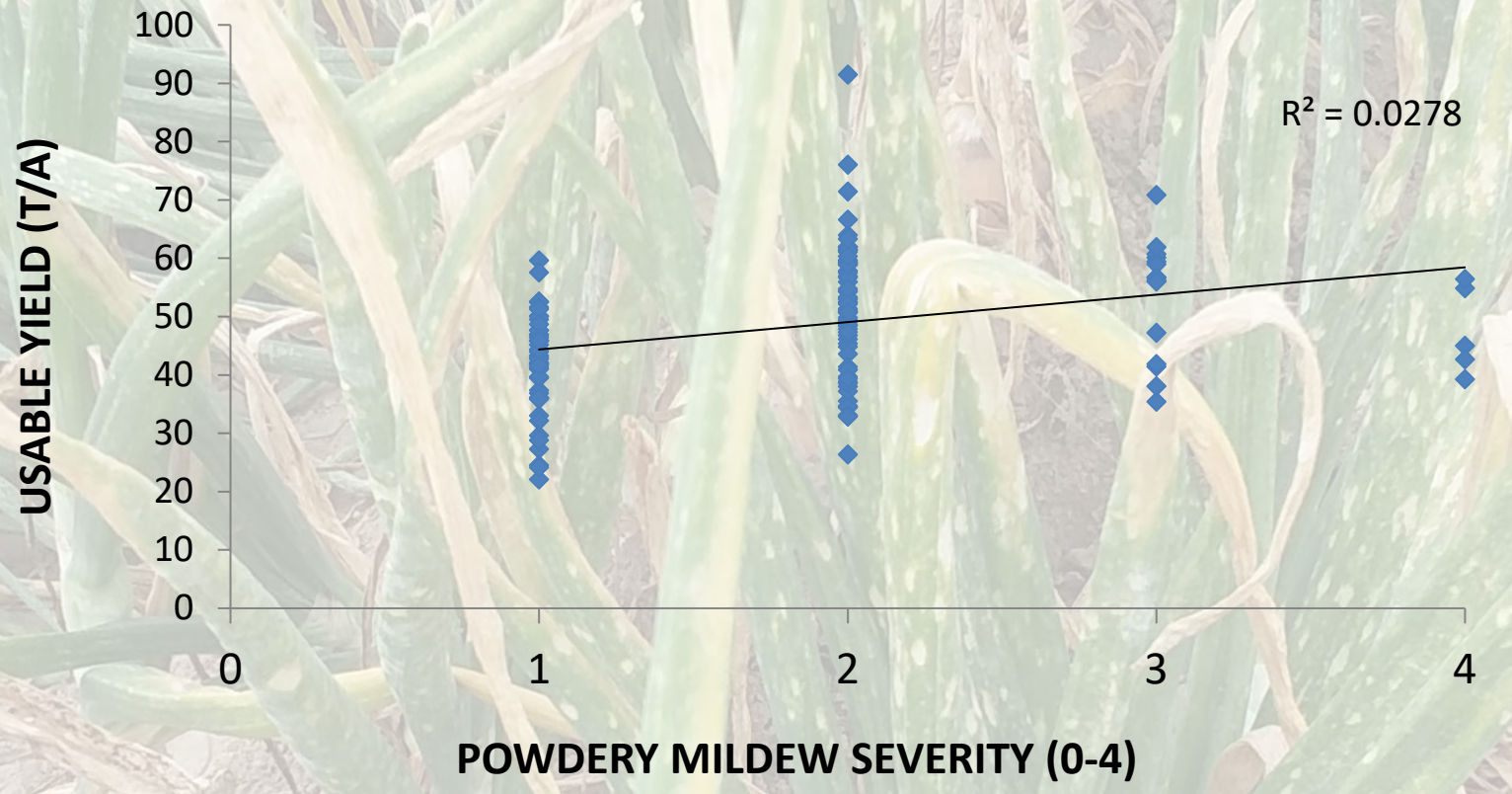
RED CULTIVAR	RANK 1-4	
SV4643NT	1.3	c
Redwing	1.7	bc
Purple Haze	2.0	bc
Marenge	2.3	abc
Red Beret		
Red Carpet		

WHITE CULTIVAR	RANK 1-4	
White Cap	1.7	bc
Brundage		
Cometa		
Rhea		
White Cloud		

*Tukey's HSD P=0.05, ONLY 2019 had significant cv. differences for POWDERY MILDEW RATING

2019 WSU ONION CULTIVAR TRIAL

POWDERY MILDEW & TOTAL USABLE YIELD



BOLTERS

2014 BOLTING – ALL CULTIVARS RANKED

CULTIVAR	# BOLTED	
Frontier	0	c
Highlander	0	c
Legend	0	c
Milestone	0	c
Centerstone	0.3	c
Cruiser	0.3	c
Vaquero	0.7	c
Calibra	1.0	c
Oloroso	1.0	c
Talon	1.0	c
Crockett	1.7	c
Arcero	3.3	bc
Anillo	5.0	bc

CULTIVAR	# BOLTED	
XP 16000	6.3	bc
Grand Perfection	6.3	bc
Scout	6.3	bc
Swale	6.3	bc
Montero	7.7	abc
Joaquin	12.3	ab
Airoso		
Granero		
Hamilton		
Ranchero		
Tamara		
Traverse		
Tucannon		

RED CULTIVAR	# BOLTED	
Redwing	0	c
Marenge	0.3	c
SV4643NT	0.3	c
Purple Haze	1.0	c
Red Beret		
Red Carpet		

WHITE CULTIVAR	# BOLTED	
Rhea	0.3	c
Brundage	4.3	bc
Cometa	16.7	a
White Cap		
White Cloud		

*Tukey's HSD P=0.05

IN CONCLUSION

LIMITS OF THE WSU ONION CULTIVAR TRIALS

- The trial is managed for the surrounding onion crop.
  - Earlier cultivars may get more water than is ideal at the end of the season. Later cultivars may be cut off too early.
- Incidences of diseases and physiological disorders are rare or irregular, so identifying differences in cultivar susceptibility is limited.
- Multi-year assessments can be difficult because entries change each year.
  - Some cultivars are entered for many consecutive seasons, some just a few years, others are entered only once.

WSU ONION FIELD DAY

HARVEST
CHAMPION SEED COMPANY
WSU WATERS
Photo by Casey Crookham

PNVA CONFERENCE ONION CULTIVAR DISPLAY

STORAGE EVALUATION

Photo by Casey Crookham

Thanks

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WASHINGTON STATE UNIVERSITY
EXTENSION