Anthracnose-resistant cultivars

Name	Season
Sweet Charlie - UFla	VE
Earliglow - USDA	E
Galletta -UNC	E-M
Flavorfest - USDA	M
Keepsake - USDA	M
Allstar - USDA	M-L

'Keepsake' (B1806)

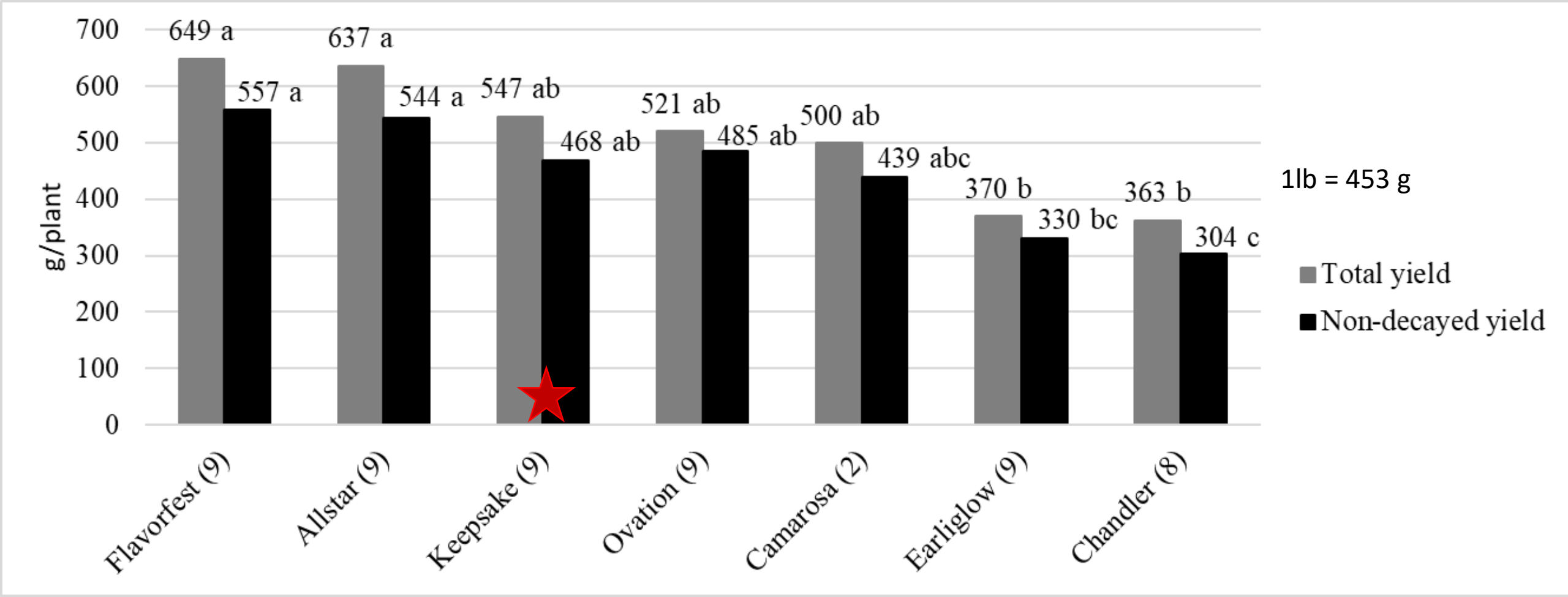
- Excellent post-harvest storage
- Sweet!
- Outstanding quality
- Big beautiful fruit
- Rain tolerant
- Good yield, midseason
- Anthracnose resistant
  - *C. acutatum*

BRIX = sugar and flavor

pH = tartness

Measuring yield, berry size, and percent rotted fruit.

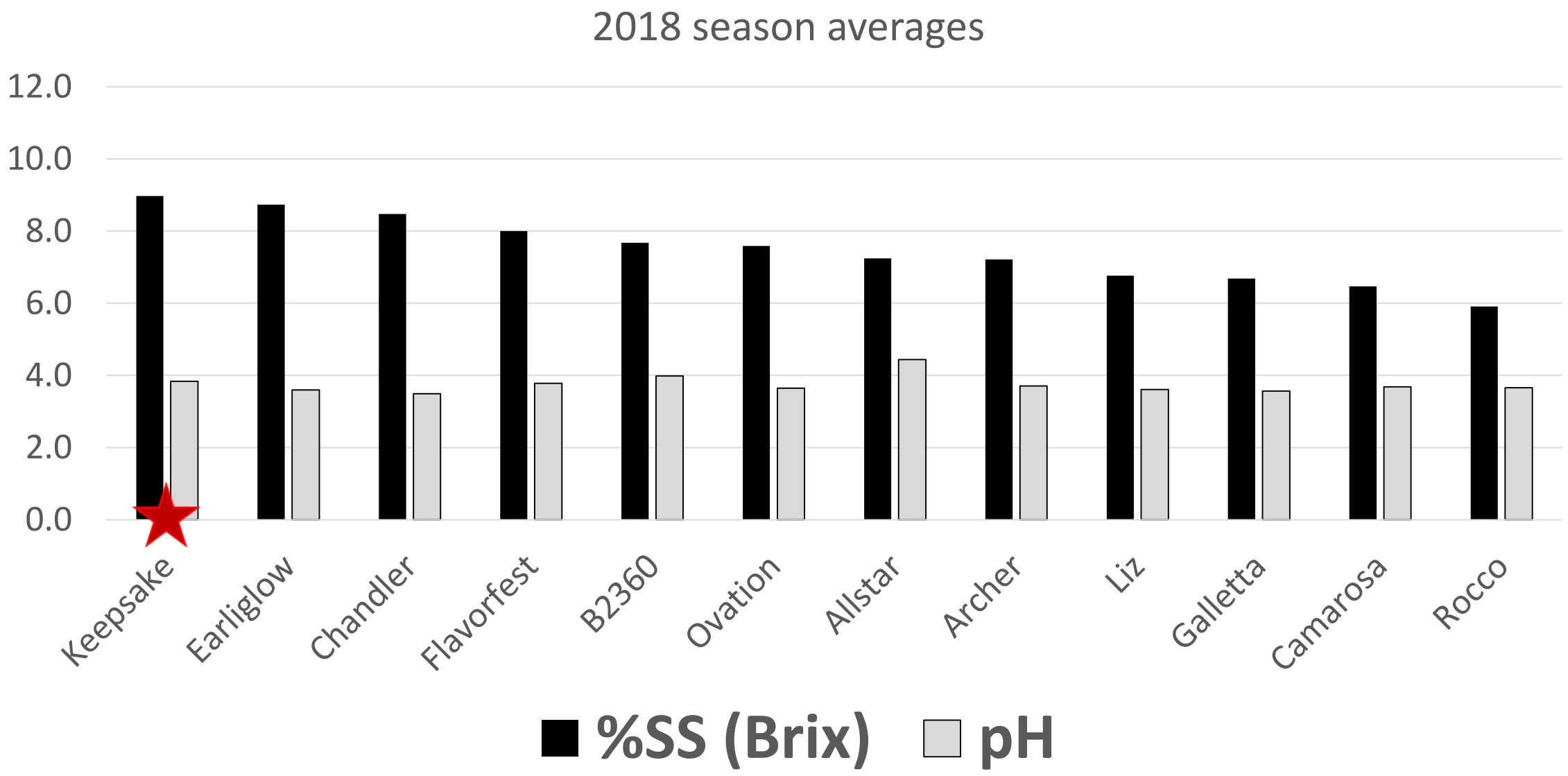
2010 – 2018 yields from plasticulture

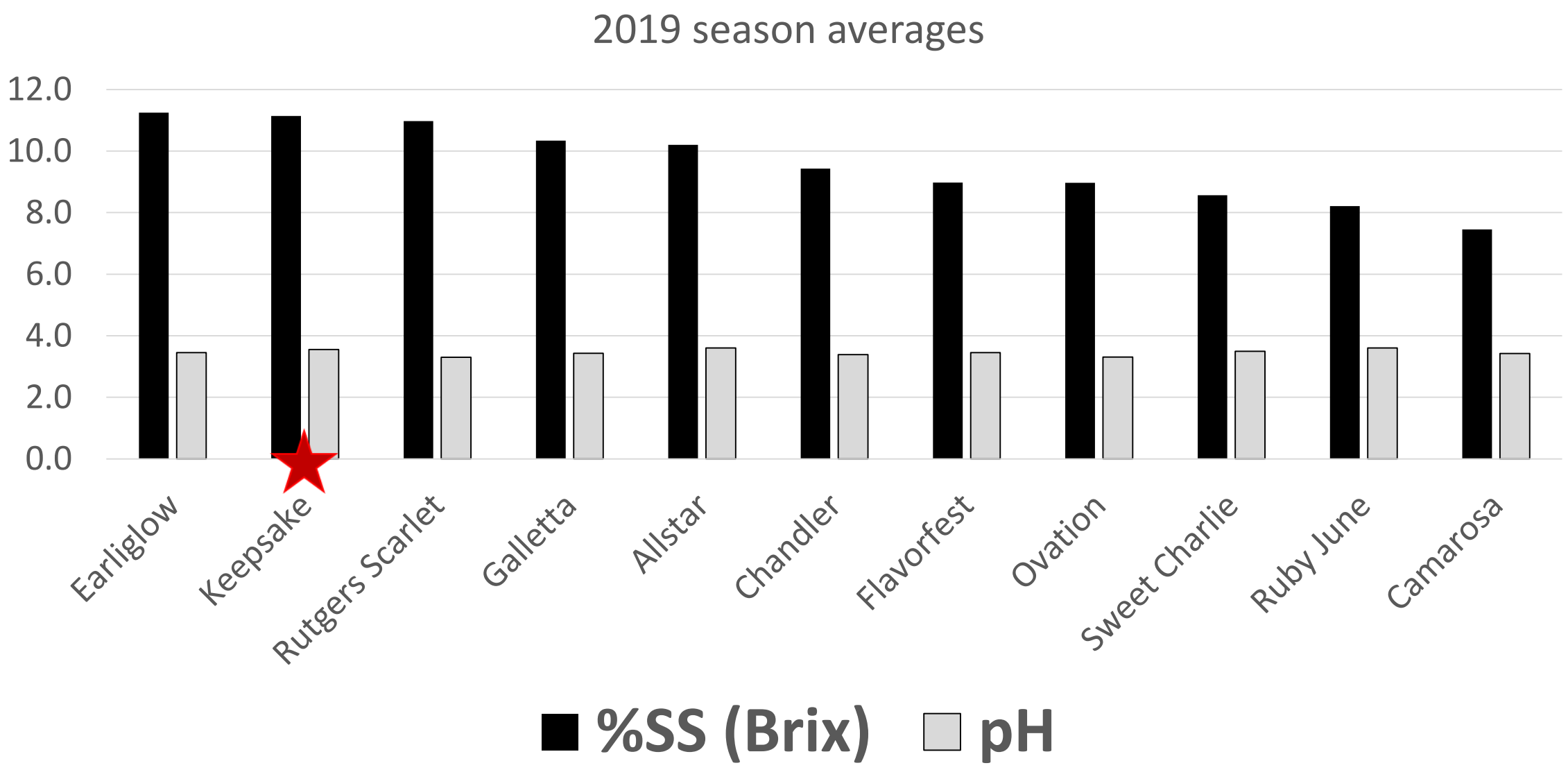


1lb = 453 g

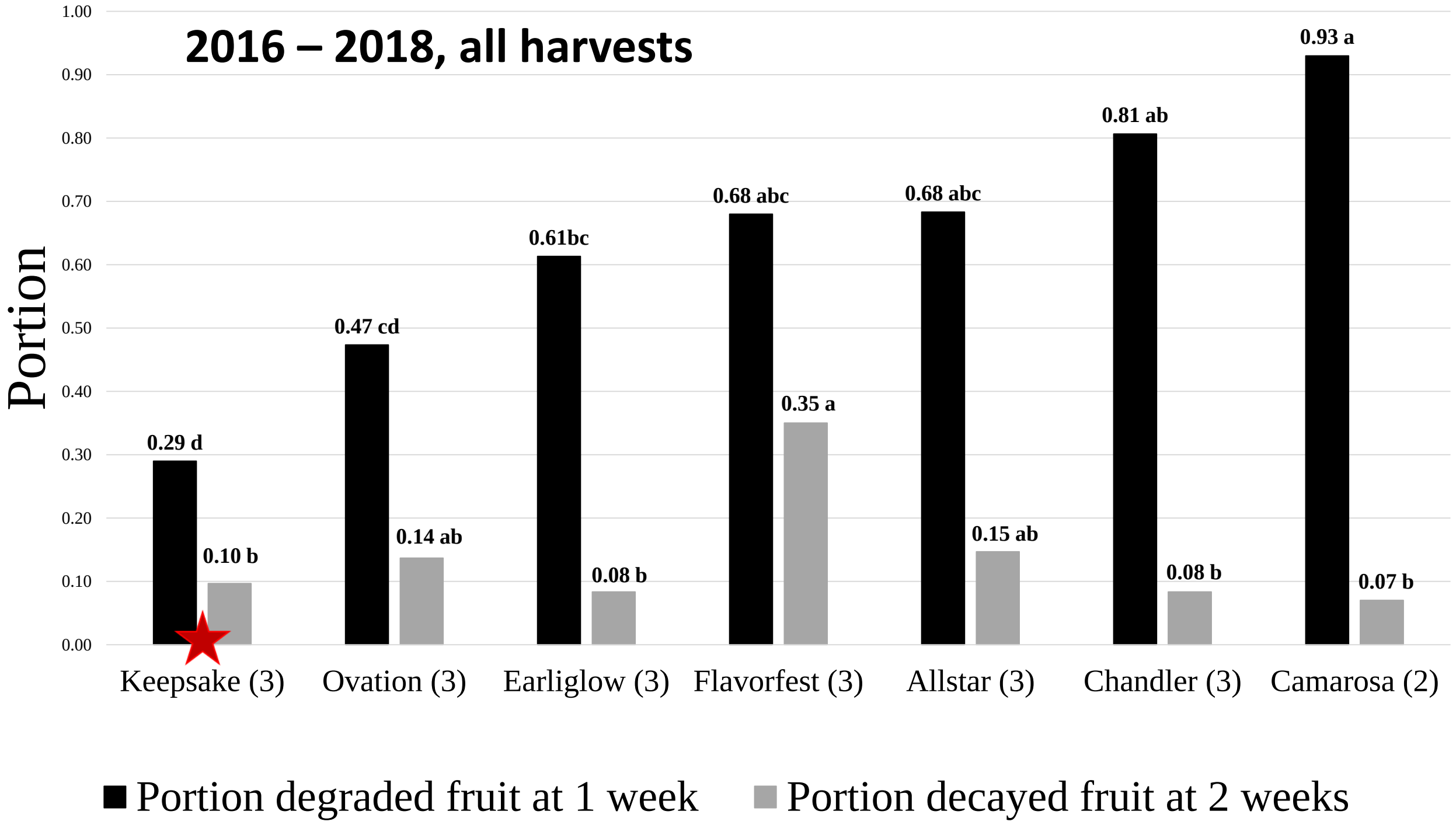
14%	15%	14%	7%	12%	11%	16%	Percent rot in field

BRIX = sugar and flavor **pH = tartness**


2018 season averages
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Keepsake
Earliglow
Chandler
Flavorfest
B2360
Ovation
Allstar
Archer
Liz
Galletta
Camarosa
Rocco
%SS (Brix)
pH


2019 season averages
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Earliglow
Keepsake
Rutgers Scarlet
Galletta
Allstar
Chandler
Flavorfest
Ovation
Sweet Charlie
Ruby June
Camarosa
%SS (Brix)
pH

DELL

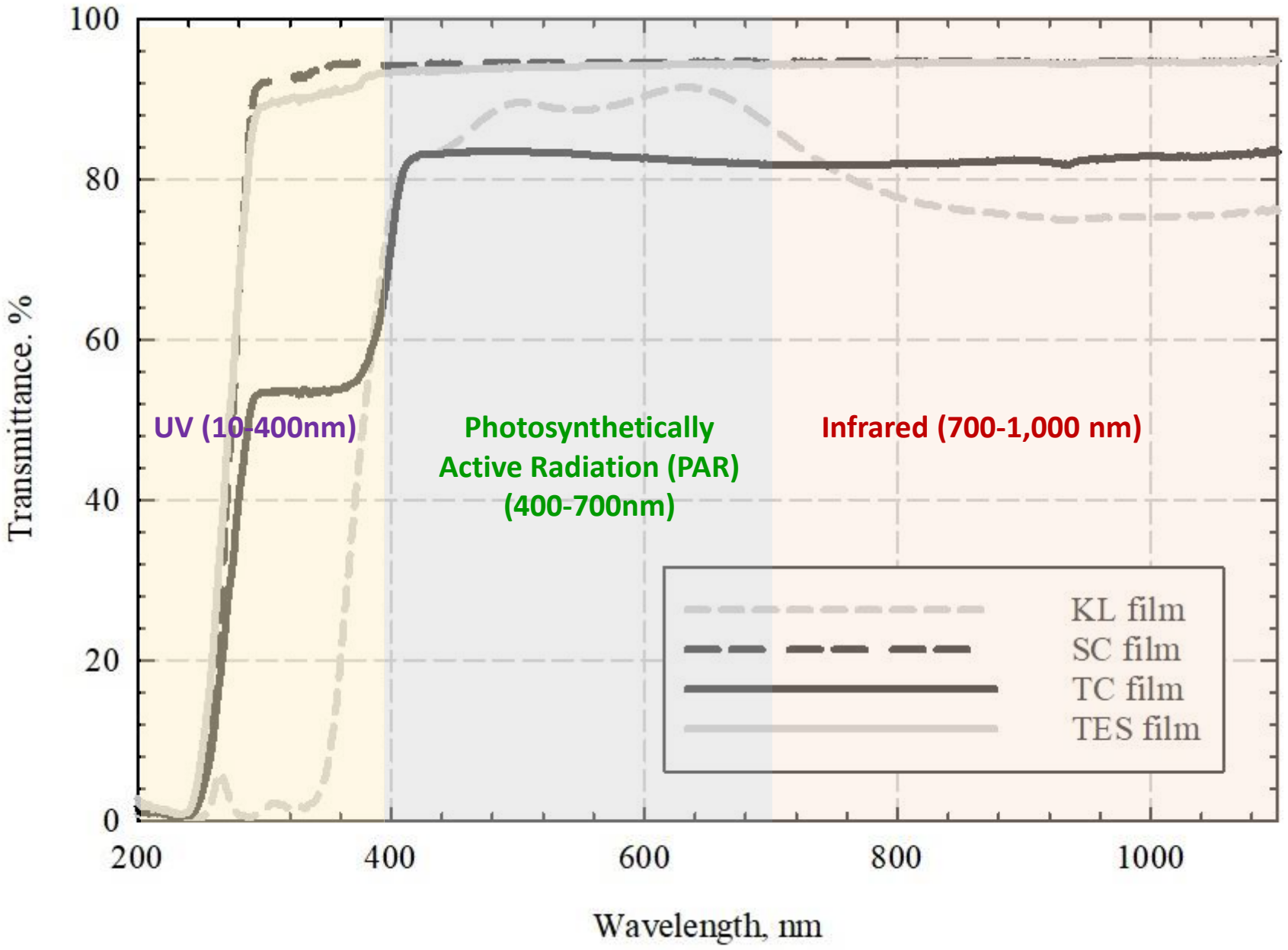

2016 – 2018, all harvests
Portion
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.29 d
0.10 b
0.47 cd
0.14 ab
0.61bc
0.08 b
0.68 abc
0.35 a
0.68 abc
0.15 ab
0.81 ab
0.08 b
0.93 a
0.07 b
Keepsake (3)
Ovation (3)
Earliglow (3)
Flavorfest (3)
Allstar (3)
Chandler (3)
Camarosa (2)
Portion degraded fruit at 1 week
Portion decayed fruit at 2 weeks

	Soluble solids (%)		Acidity (pH)		Flavor		Firmness		Skin toughness	
	Ave.	Range	Ave.	Range	Ave.	Range	Ave.	Range	Ave.	Range
Allstar	7.3	6.1 to 8.6	3.6	3.2 to 4.0	7.4	7.0 to 8.0	7.7	7.0 to 8.0	7.7	7.5 to 8.0
Camarosa	6.9	6.4 to 7.3	3.4	3.4	7.3	7.0 to 7.5	7.8	7.5 to 8.0	7.5	7.0 to 8.0
Chandler	7.4	5.0 to 9.1	3.5	3.4 to 3.8	7.4	7.0 to 8.0	7.1	7.0 to 7.5	7.5	7.0 to 8.0
Earliglow	8.2	5.7 to 10.7	3.5	3.3 to 3.8	7.8	7.5 to 8.5	7.2	7.0 to 7.5	7.3	7.0 to 8.0
Flavorfest	7.6	6.3 to 10.3	3.6	3.2 to 4.0	7.8	7.0 to 8.0	7.6	7.0 to 8.0	7.6	7.0 to 8.0
Keepsake	**8.7**	**6.6 to 10.5**	**3.6**	**3.3 to 3.8**	**8.1**	**7.5 to 8.5**	**7.8**	**7.5 to 8.0**	**8.1**	**8.0 to 8.5**
Ovation	8.3	7.1 to 10.0	3.5	3.1 to 3.8	7.5	6.5 to 8.0	7.5	7.0 to 7.5	7.2	7.0 to 7.5

Please ask your favorite nursery for ‘Flavorfest’ and ‘Keepsake’

29 October 2015

Standard
IR diffusing
IR blocking
IR diffusing
Standard
IR blocking



Standard "clear" film

TES film (IR diffusing)

TempCool and Kool-Lite
(IR blocking films)

Dr. Craig Daughtry, USDA-ARS Beltsville MD

Six cultivars under three films/year for four years

‘Albion’
‘Monterey’
‘Portola’
‘San Andreas’
‘Seascape’
‘Sweet Ann’

2014/2015 and 2015/2016

Standard Clear
TES (infrared diffusing)
Temp-Cool (infrared blocking)

2016/2017 and 2017/2018

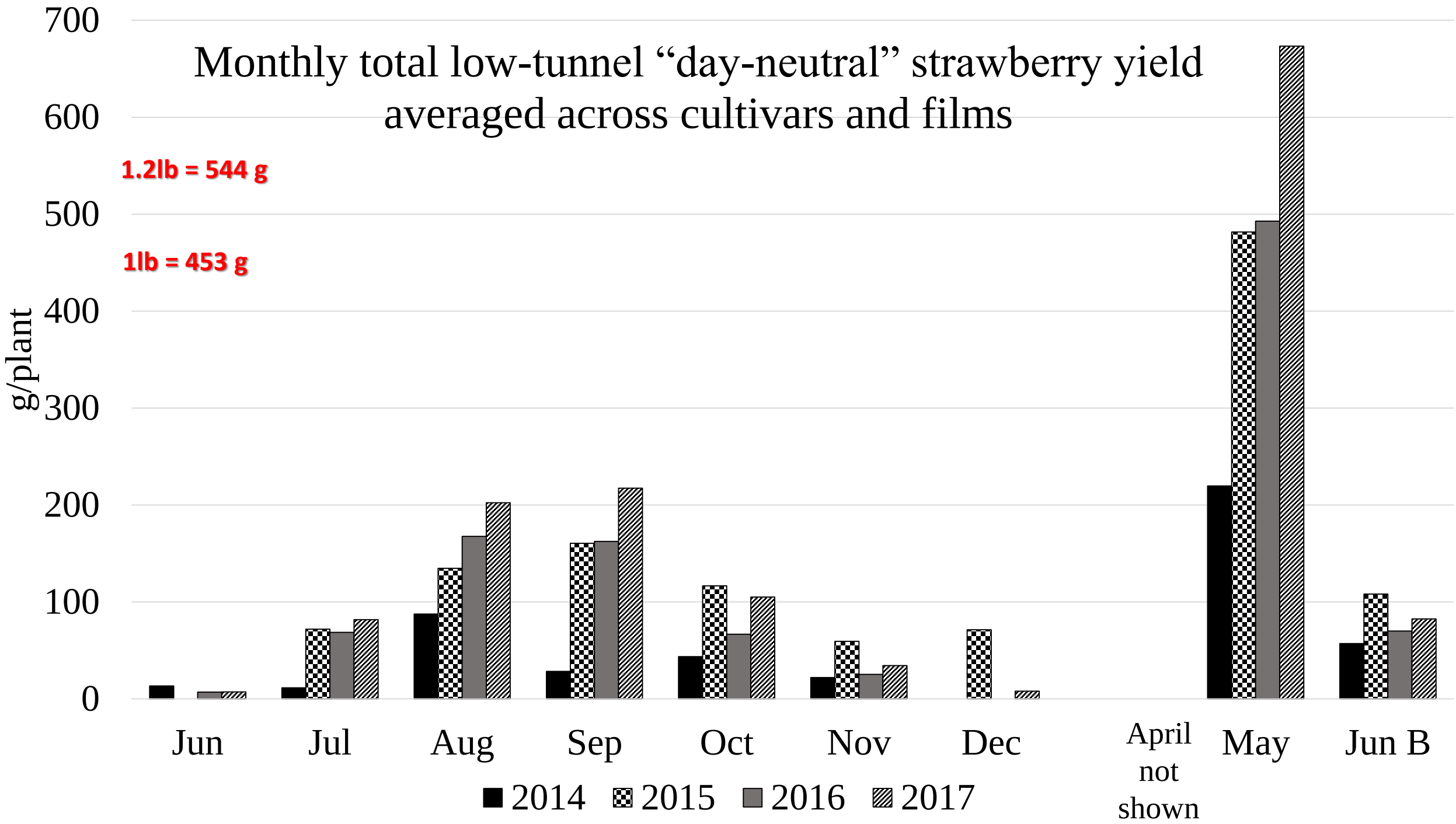
Standard Clear
TES (infrared diffusing)
Kool-Lite (infrared blocking)

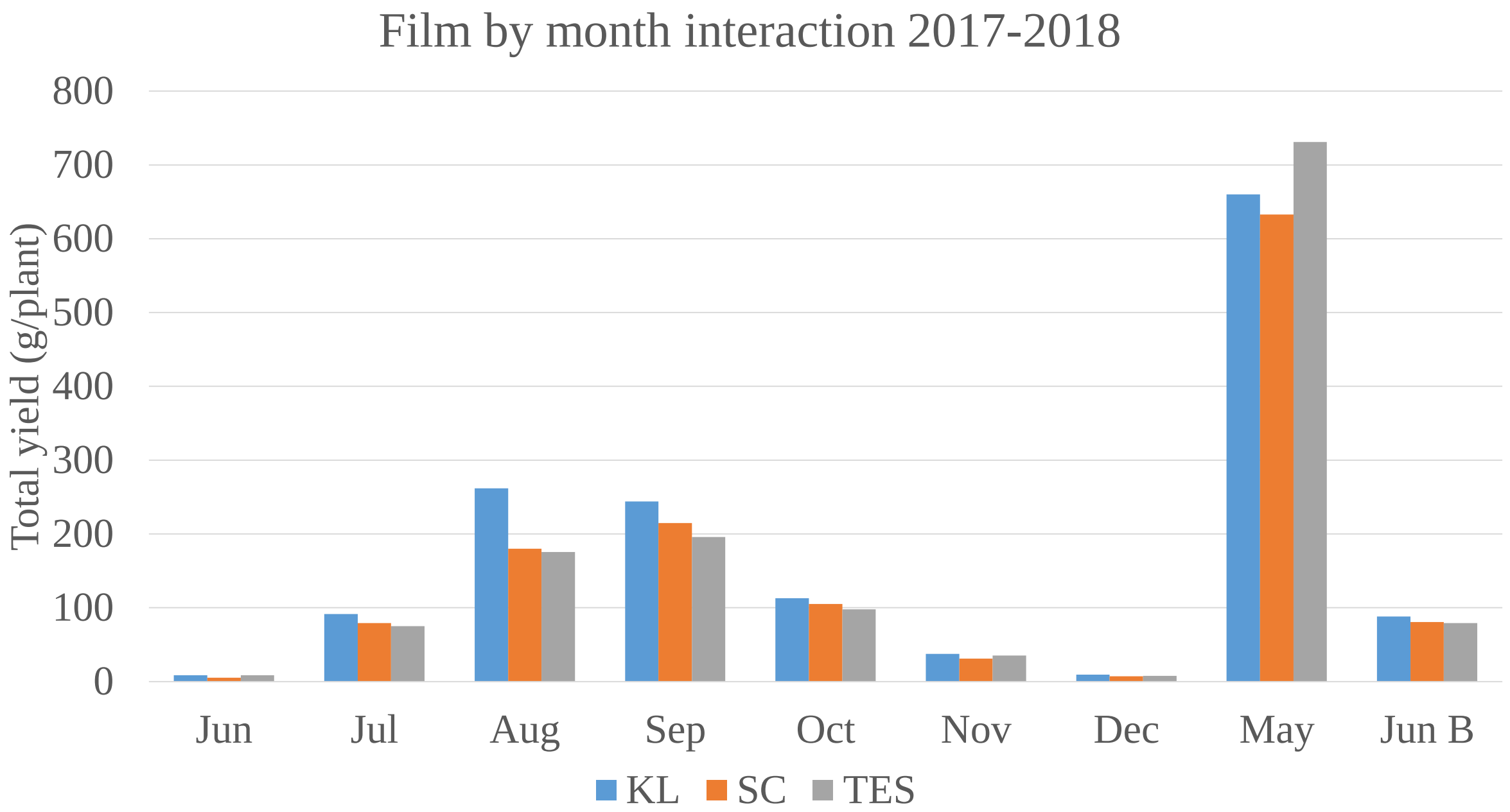
Which was the best film to choose?
Which was the best cultivar to choose?

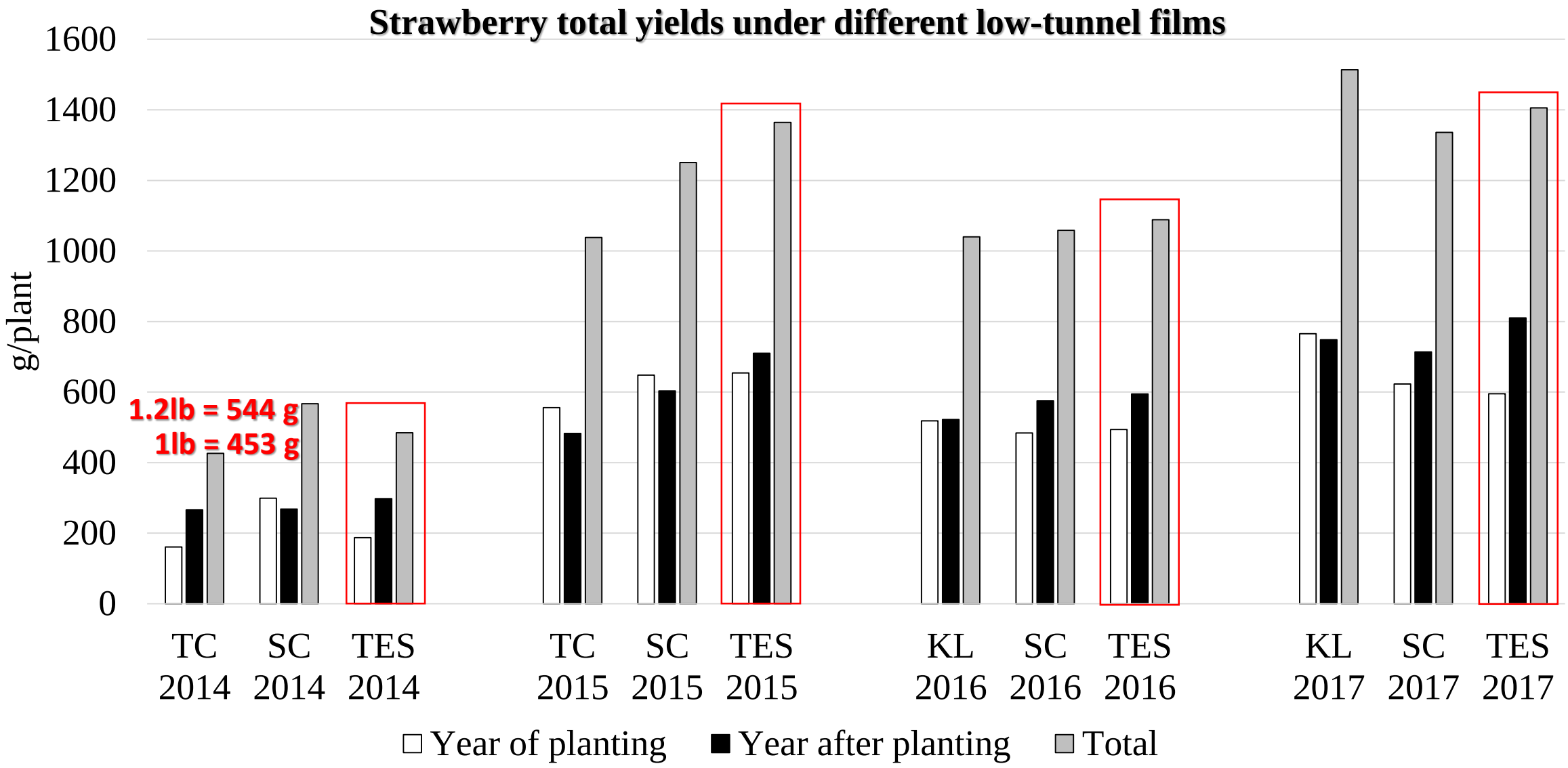
Traits analyzed

- Yield
- Percent rotted yield
- Market score
- Percent marketable yield
- Berry weight

Which was the best film to choose?
Which was the best cultivar to choose?
“It depends…”


Monthly total low-tunnel "day-neutral" strawberry yield averaged across cultivars and films
1.2lb = 544 g
1lb = 453 g
g/plant
700
600
500
400
300
200
100
0
Jun
Jul
Aug
Sep
Oct
Nov
Dec
April not shown
May
Jun B
2014
2015
2016
2017

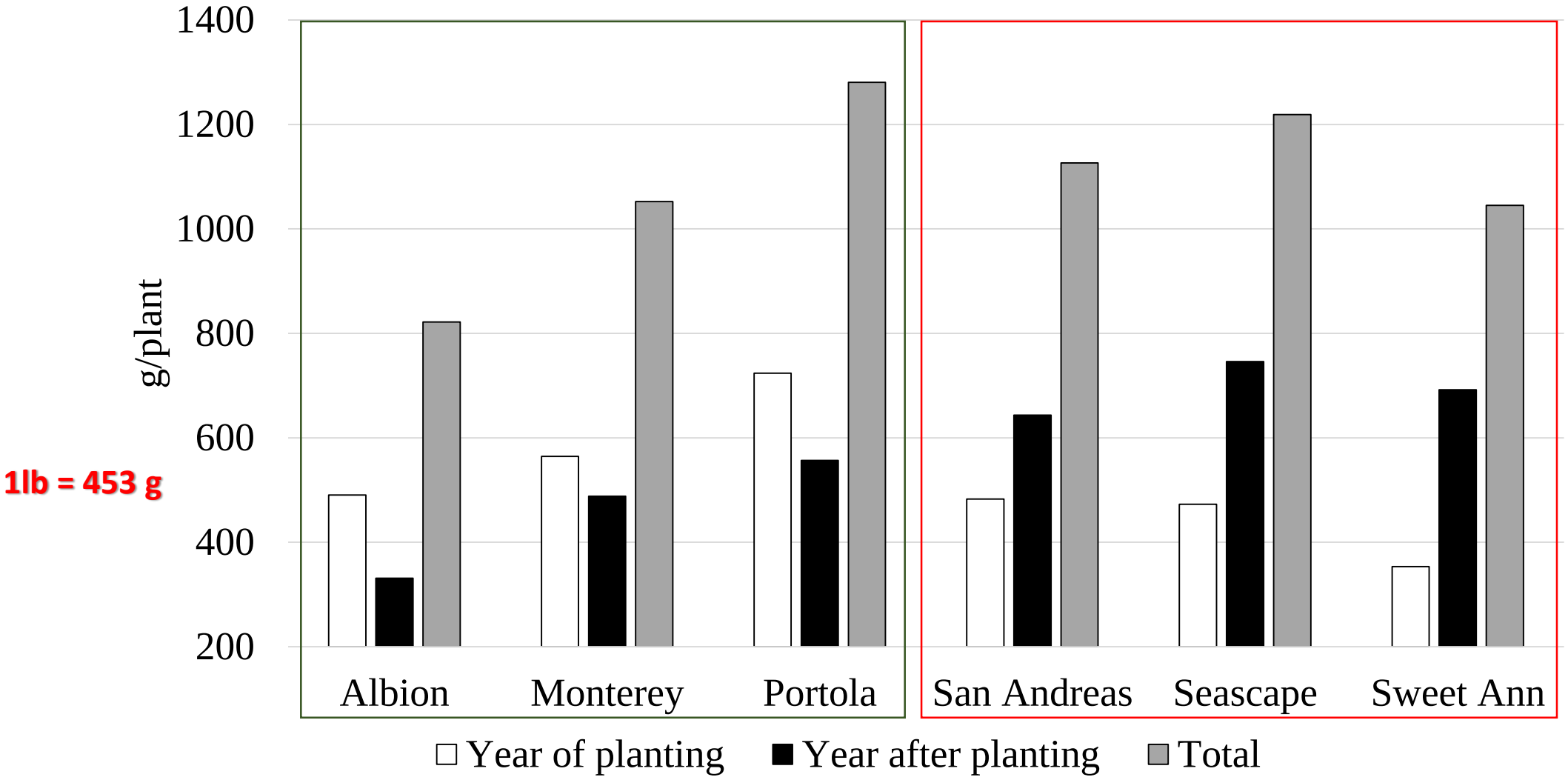

Film by month interaction 2017-2018
Total yield (g/plant)
800
700
600
500
400
300
200
100
0
Jun
Jul
Aug
Sep
Oct
Nov
Dec
May
Jun B
KL
SC
TES



Strawberry plants under TES film consistently produced more yield the year after planting.

- Strawberries under Temp-Cool film did not yield as well as under Standard Clear or TES films.
- Strawberries under Kool-Lite film yielded more in hot months.
- Strawberries under TES film yielded more in cold months and after winter.

Cultivar?



‘Albion’, ‘Monterey’, and ‘Portola’ produced greater yield in the year of planting.
‘San Andreas’, ‘Seascape’, and ‘Sweet Ann’ produced more the year after planting.

Above average performance for multiple traits

Index of all traits	Yld	PR	BW	PM	MS	Total
Albion		1	1	1	1	**4**
Monterey	1	1	1	1	1	**5**
Portola	1		1	1	1	**4**
San Andreas			1	1		2
Seascape		1				1
Sweet Ann			1			1
Average						3

‘Monterey’

- ✓ Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

‘Albion’

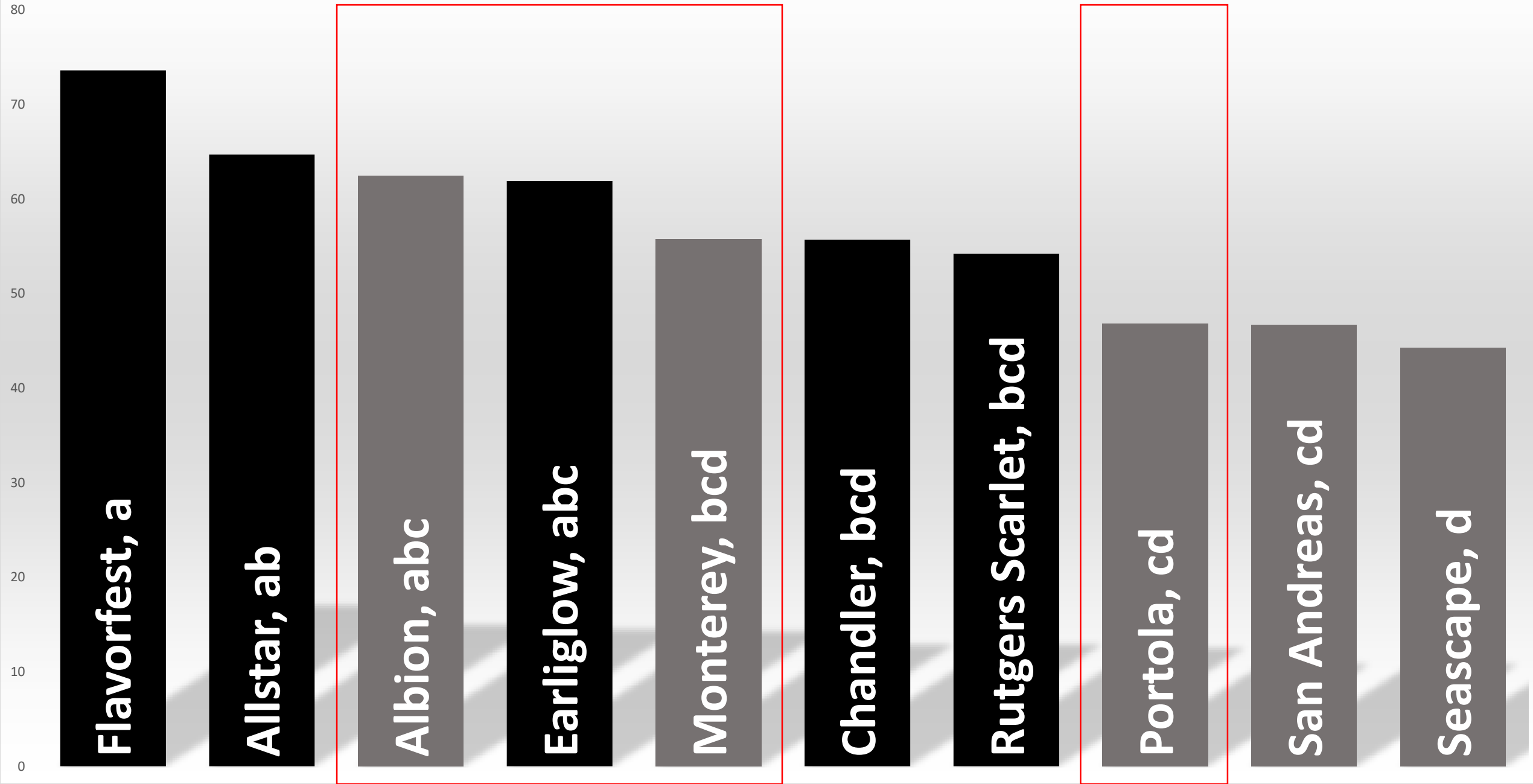
- Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

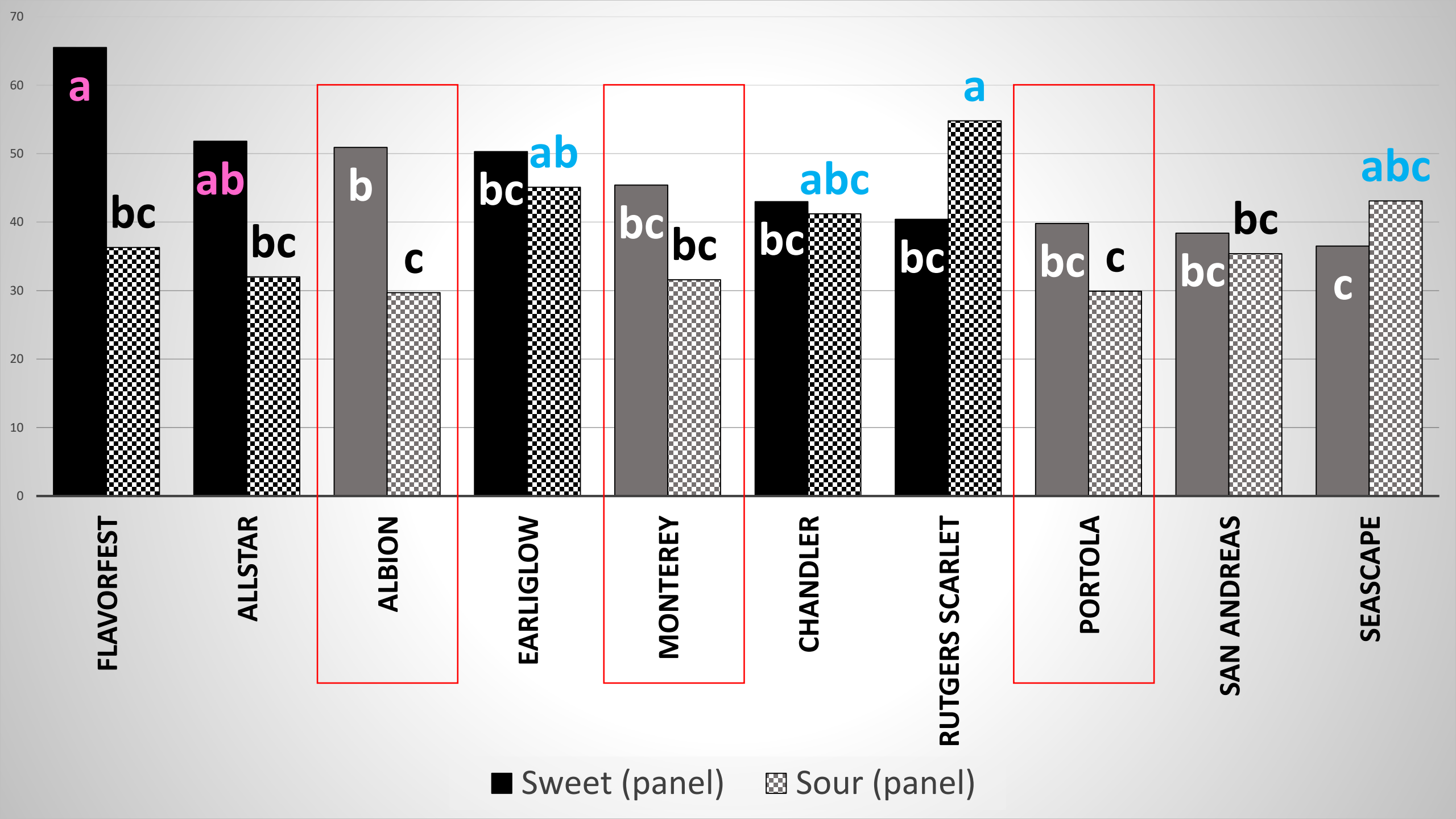
‘Portola’

- ✓ Yield
- Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

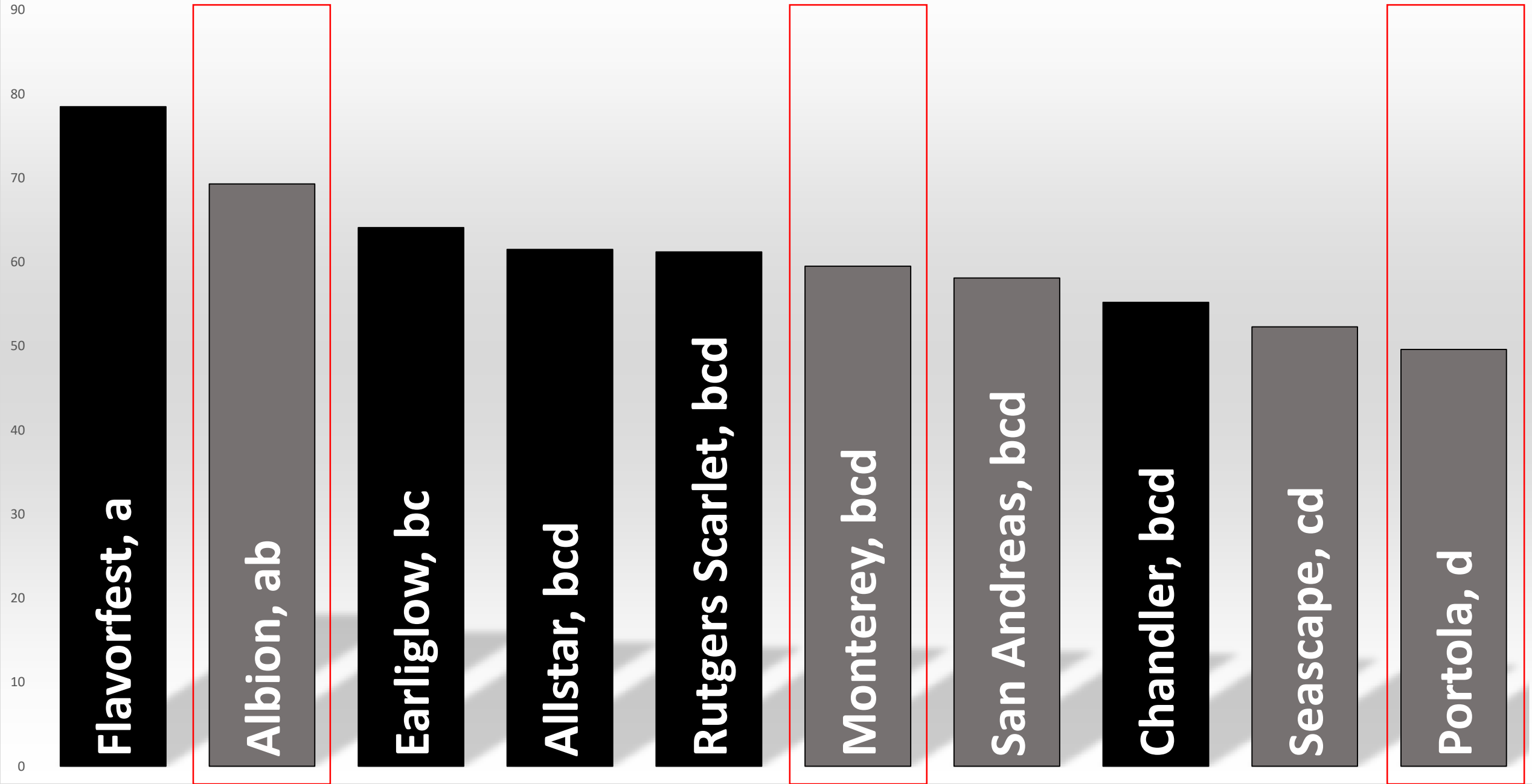
447
199
231
776
245

Overall quality (panel)

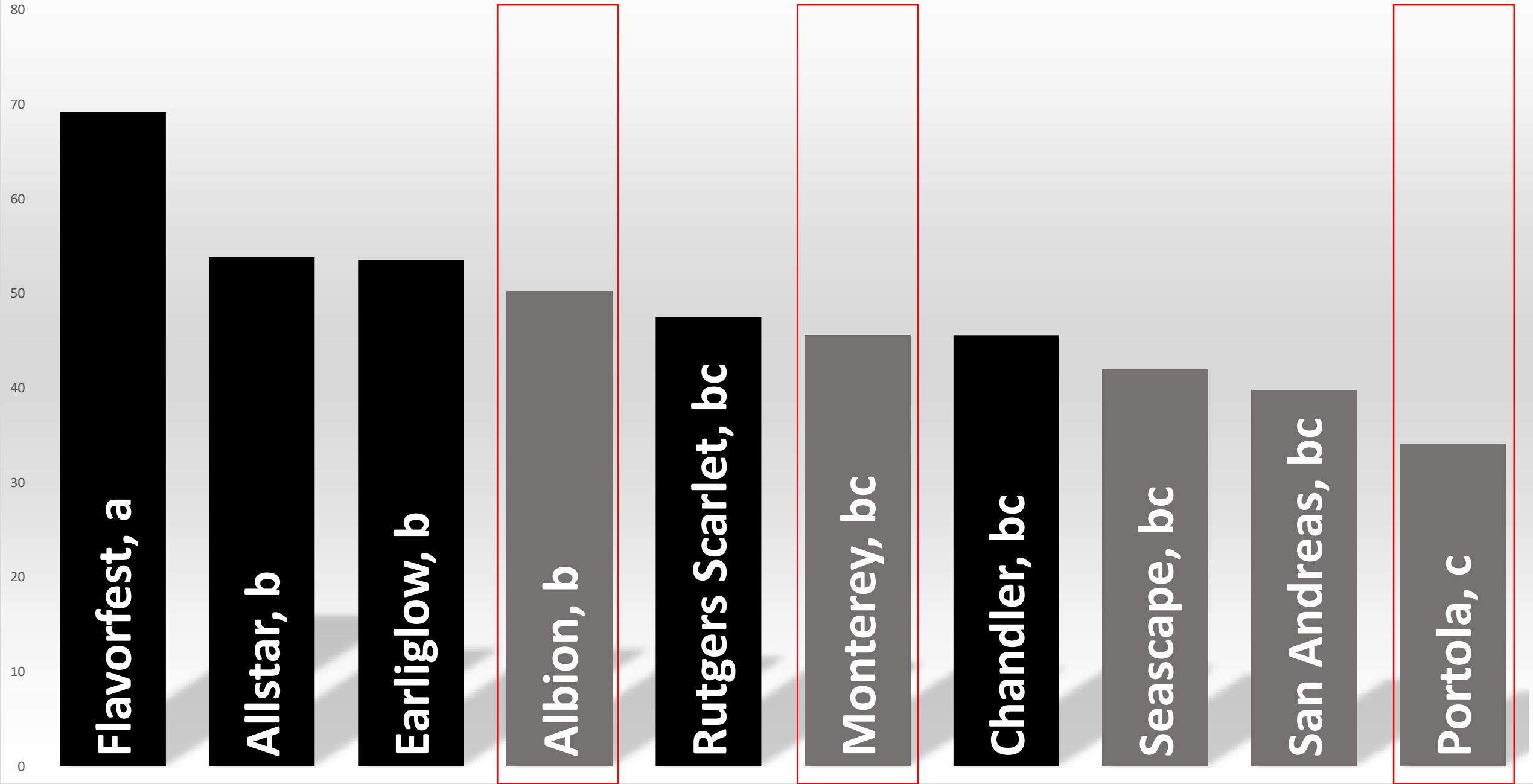



70
60
50
40
30
20
10
0
a
bc
ab
bc
b
c
bc
ab
bc
bc
bc
abc
bc
a
bc
c
bc
bc
c
abc
FLAVORFEST
ALLSTAR
ALBION
EARLIGLOW
MONTEREY
CHANDLER
RUTGERS SCARLET
PORTOLA
SAN ANDREAS
SEASCAPE
Sweet (panel)
Sour (panel)

Overall flavor intensity (panel)



Strawberry flavor intensity (panel)



‘Monterey’

- ✓ Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

‘Albion’

- Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

‘Portola’

- ✓ Yield
- Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

Which film for these cultivars?

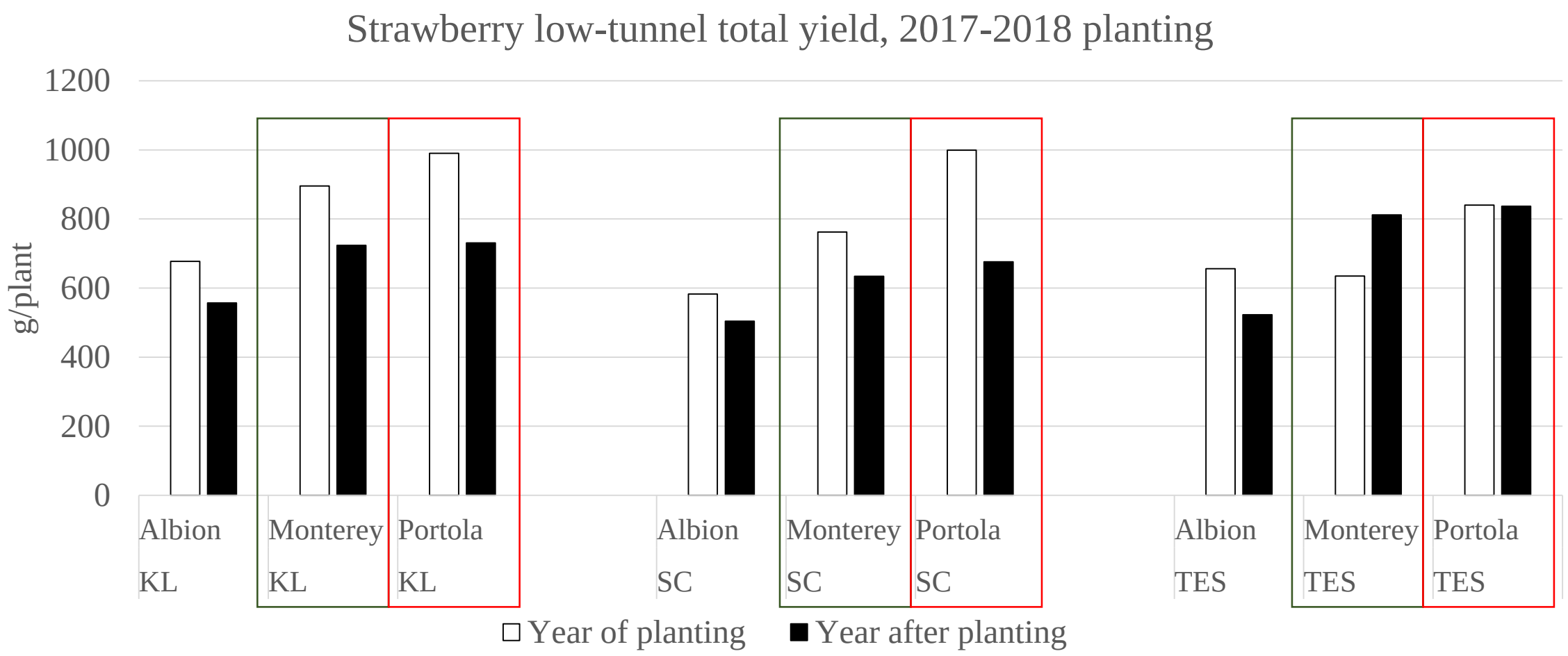
Total yield expressed as average g/plot per month: film x cultivar, sliced by cultivar

2014-2015			
Film	Cultivar	Total yield	
SC	Monterey	69	a
SC	Seascape	65	a
SC	Portola	57	a
SC	San Andreas	54	a
TES	Monterey	44	ab
TES	San Andreas	40	ab
TC	Monterey	38	b
TC	Albion	37	a
TES	Portola	37	ab
SC	Albion	35	a
TES	Seascape	35	b
TES	Sweet Ann	34	a
TES	Albion	33	a
TC	Seascape	32	b
TC	Sweet Ann	28	a
TC	Portola	28	b
TC	San Andreas	27	b
SC	Sweet Ann	26	a

2015-2016			
Film	Cultivar	Total yield	
TES	Sweet Ann	145	a
SC	Sweet Ann	141	a
TES	Monterey	138	a
TES	Seascape	136	a
SC	San Andreas	135	a
TES	Portola	135	a
SC	Albion	126	a
TC	Seascape	126	a
TC	Portola	125	a
TES	San Andreas	122	a
SC	Portola	119	a
SC	Monterey	119	ab
TC	Sweet Ann	116	a
SC	Seascape	108	a
TES	Albion	107	ab
TC	San Andreas	103	a
TC	Monterey	91	b
TC	Albion	76	b

2016-2017			
Film	Cultivar	Total yield	
TES	Portola	129	a
KL	Portola	122	ab
SC	Portola	106	b
KL	Seascape	79	a
SC	Monterey	77	a
TES	Seascape	72	a
TES	Albion	70	a
KL	San Andreas	69	a
TES	Monterey	68	a
TES	San Andreas	66	a
SC	Albion	66	a
KL	Albion	64	a
SC	San Andreas	63	a
KL	Monterey	62	a
SC	Seascape	61	a
SC	Sweet Ann	58	a
TES	Sweet Ann	58	a
KL	Sweet Ann	54	a

2017-2018			
Film	Cultivar	Total yield	
KL	Monterey	86	a
TES	Portola	84	a
KL	Portola	84	a
SC	Portola	78	a
KL	San Andreas	78	a
TES	Monterey	75	a
KL	Albion	74	a
KL	Seascape	72	a
SC	San Andreas	68	a
TES	Albion	67	a
SC	Seascape	65	a
TES	San Andreas	65	a
SC	Monterey	61	a
TES	Seascape	55	a
SC	Albion	52	a



Although ‘Monterey’, ‘Albion’, and ‘Portola’ consistently produced greater yield in the year of planting than in the year after planting, **TES film** compensated some by supporting increased yield in the year after planting for ‘Monterey’ and ‘Portola’.

Above-average cultivar-by-film yields in grey boxes

Yield (g/plant)

	Albion		Monterey		Portola		San Andreas		Seascape		Sweet Ann	
2014												
TC	**37**	a	38	b	28	b	27	b	32	b	28	a
SC	**35**	a	**69**	a	**57**	a	**54**	a	**65**	a	26	a
TES	33	a	44	ab	37	ab	40	ab	35	b	**34**	a
2015												
TC	76	b	91	b	125	a	103	a	**126**	a	116	a
SC	**126**	a	**119**	ab	119	a	**135**	a	108	a	**141**	a
TES	**107**	ab	**138**	a	**135**	a	**122**	a	**136**	a	**145**	a
2016												
KL	64	a	62	a	106	b	63	a	61	a	54	a
SC	66	a	68	a	**122**	ab	66	a	**72**	a	**58**	a
TES	**70**	a	**77**	a	**129**	a	**69**	a	**79**	a	**58**	a
2017												
KL	**74**	a	**86**	a	**84**	a	**78**	a	**72**	a		
SC	52	a	61	a	78	a	65	a	55	a		
TES	**67**	a	**75**	a	**84**	a	68	a	**65**	a		

Index

2014, 2015	Albion	Monterey	Portola	San Andreas	Seascape	Sweet Ann	
TC	3	3	1	2	2	**5**	2.67
SC	**6**	**5**	**6**	**8**	**5**	4	5.67
TES	**8**	**7**	**5**	4	**6**	**6**	6.00
2016, 2017							
KL	4	**6**	**6**	**5**	**6**		5.40
SC	3	3	4	3	2		3.00
TES	**6**	**6**	**5**	**5**	**8**		6.00
							4.79

‘Monterey’

- ✓ Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

Better under **TES or KL** films.

‘Albion’

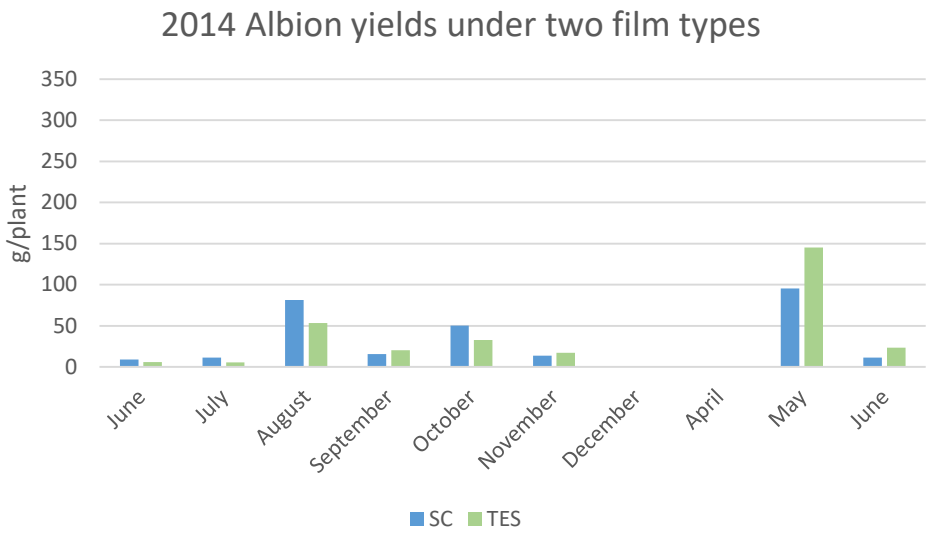
- Yield
- ✓ Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

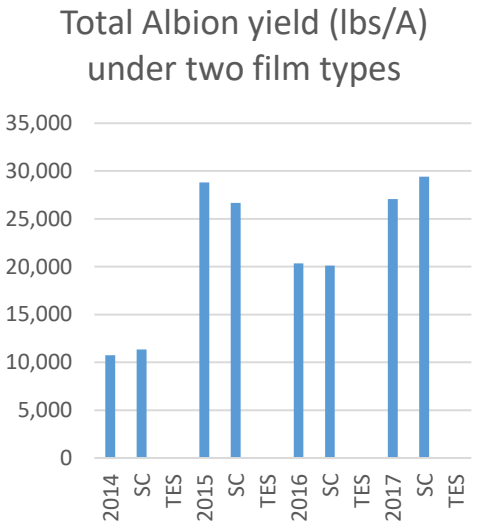
Better under **SC or TES** films, neither of which provided an advantage over the other in compensating for ‘Albion’s low yield.

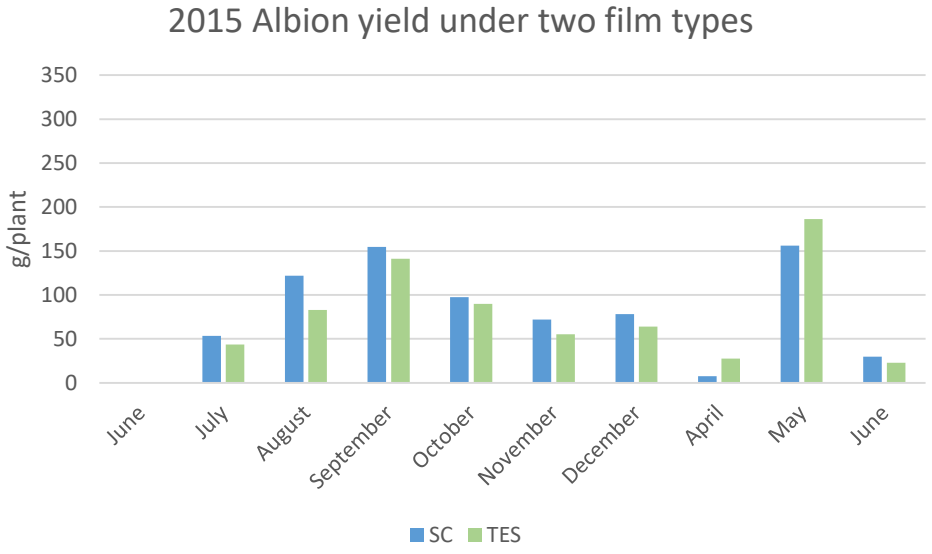
‘Portola’

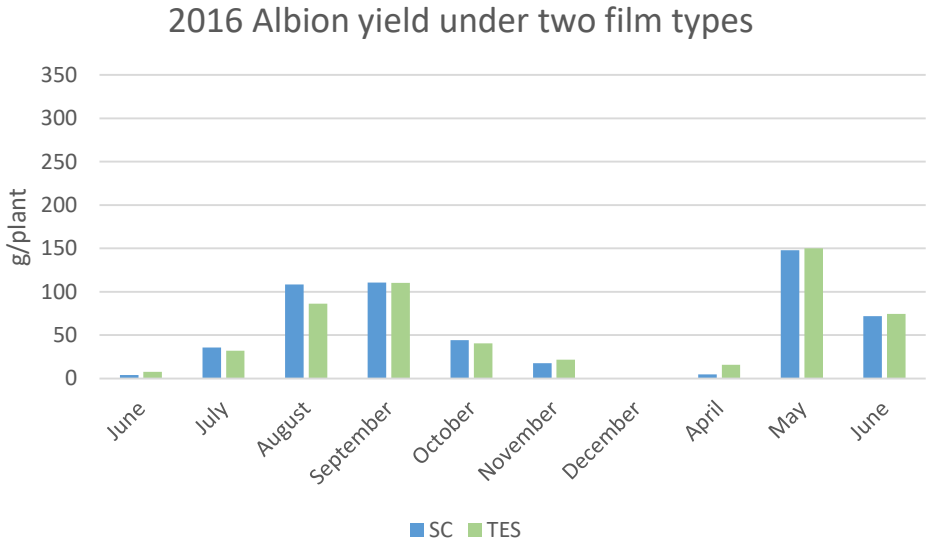
- ✓ Yield
- Percent rotted yield
- ✓ Market score
- ✓ Percent marketable yield
- ✓ Berry weight

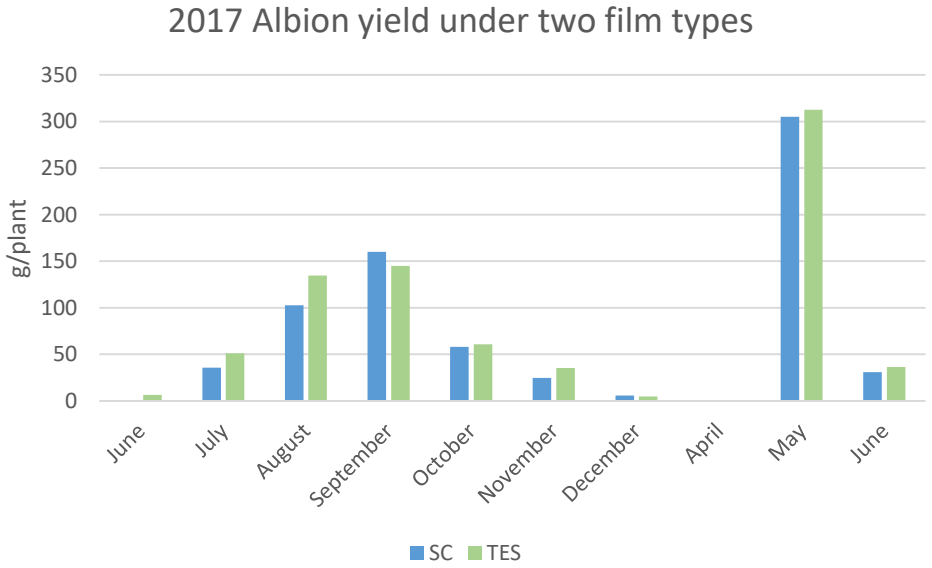
Better under **SC, KL, and TES** films with the TES film providing an advantage over the others in compensating for ‘Portola’s above average percent rotted yield.


2014 Albion yields under two film types
g/plant
350
300
250
200
150
100
50
0
June
July
August
September
October
November
December
April
May
June
SC
TES


Total Albion yield (lbs/A) under two film types
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2014
SC
TES
2015
SC
TES
2016
SC
TES
2017
SC
TES


2015 Albion yield under two film types
g/plant
350
300
250
200
150
100
50
0
June
July
August
September
October
November
December
April
May
June
SC
TES


2016 Albion yield under two film types
g/plant
350
300
250
200
150
100
50
0
June
July
August
September
October
November
December
April
May
June
SC
TES


2017 Albion yield under two film types
g/plant
350
300
250
200
150
100
50
0
June
July
August
September
October
November
December
April
May
June
SC
TES

Kim Lewers, USDA-Agricultural Research Service
Beltsville, Maryland Kim.Lewers@USDA.gov