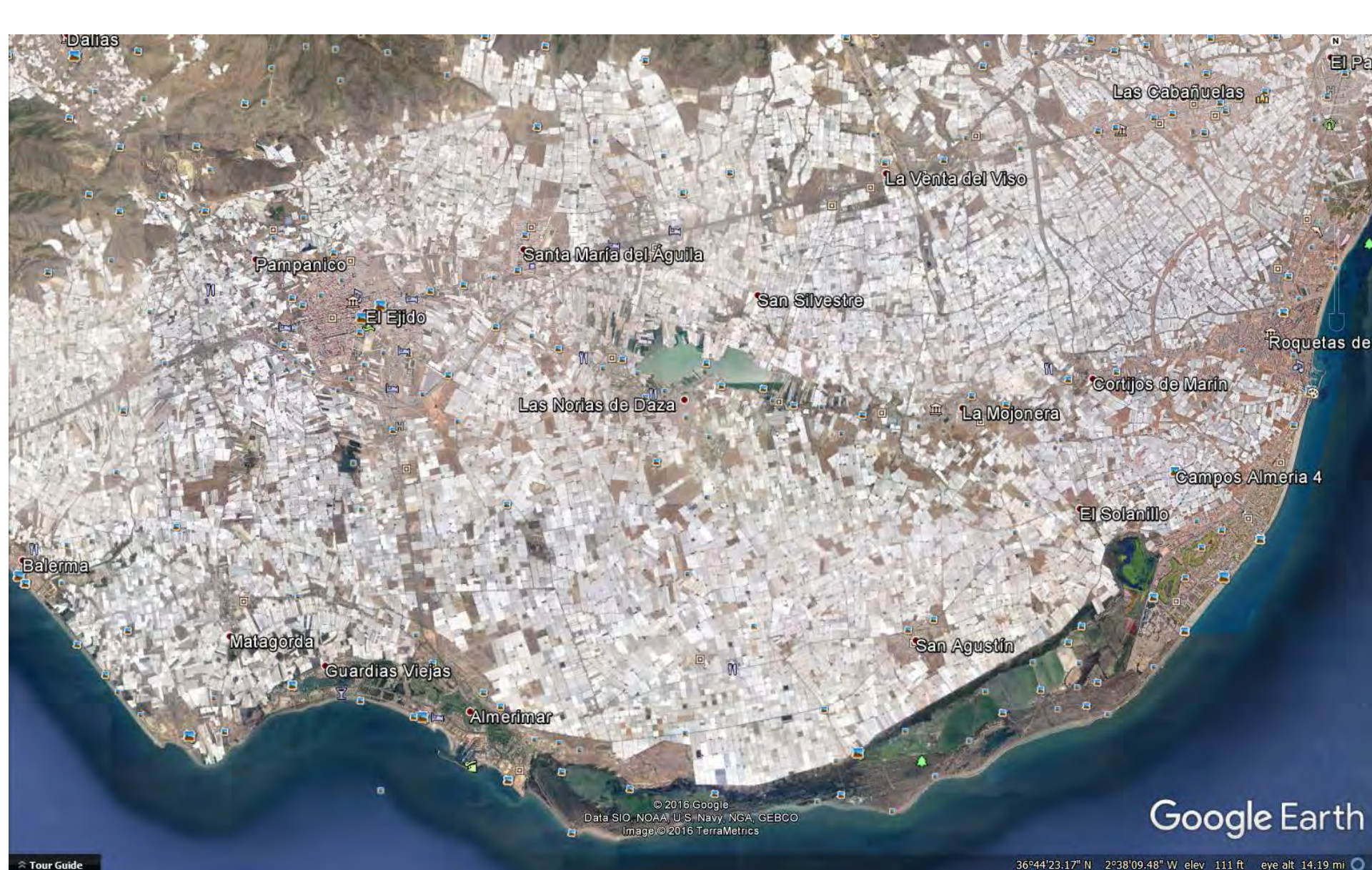


# Low Tunnels for Strawberry Production









Tour Guide

© 2016 Google  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image © 2016 TerraMetrics

Google Earth

36°44'23.17" N 2°38'09.48" W elev 111 ft eye alt 14.19 mi



San Silvestre

El Ejido

Las Norias  
Las Norias de Daza

La Mojonera  
Llanos de Viscar

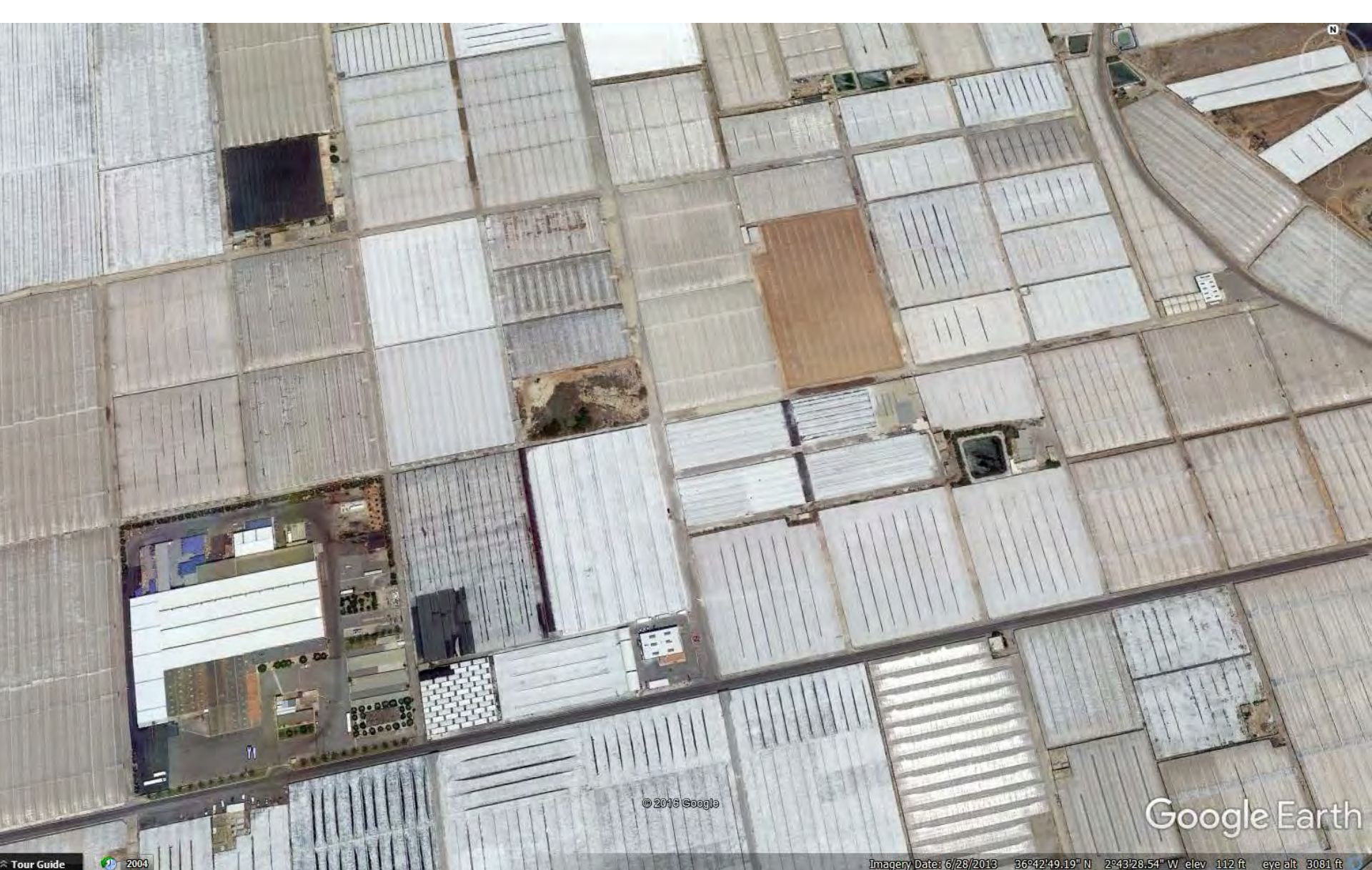
San Agustín

Almerimar

© 2013 Google

Google Earth

Imagery Date: 6/28/2013 36°46'09.35" N - 2°44'52.12" W elev 112 ft eye alt 40483 ft



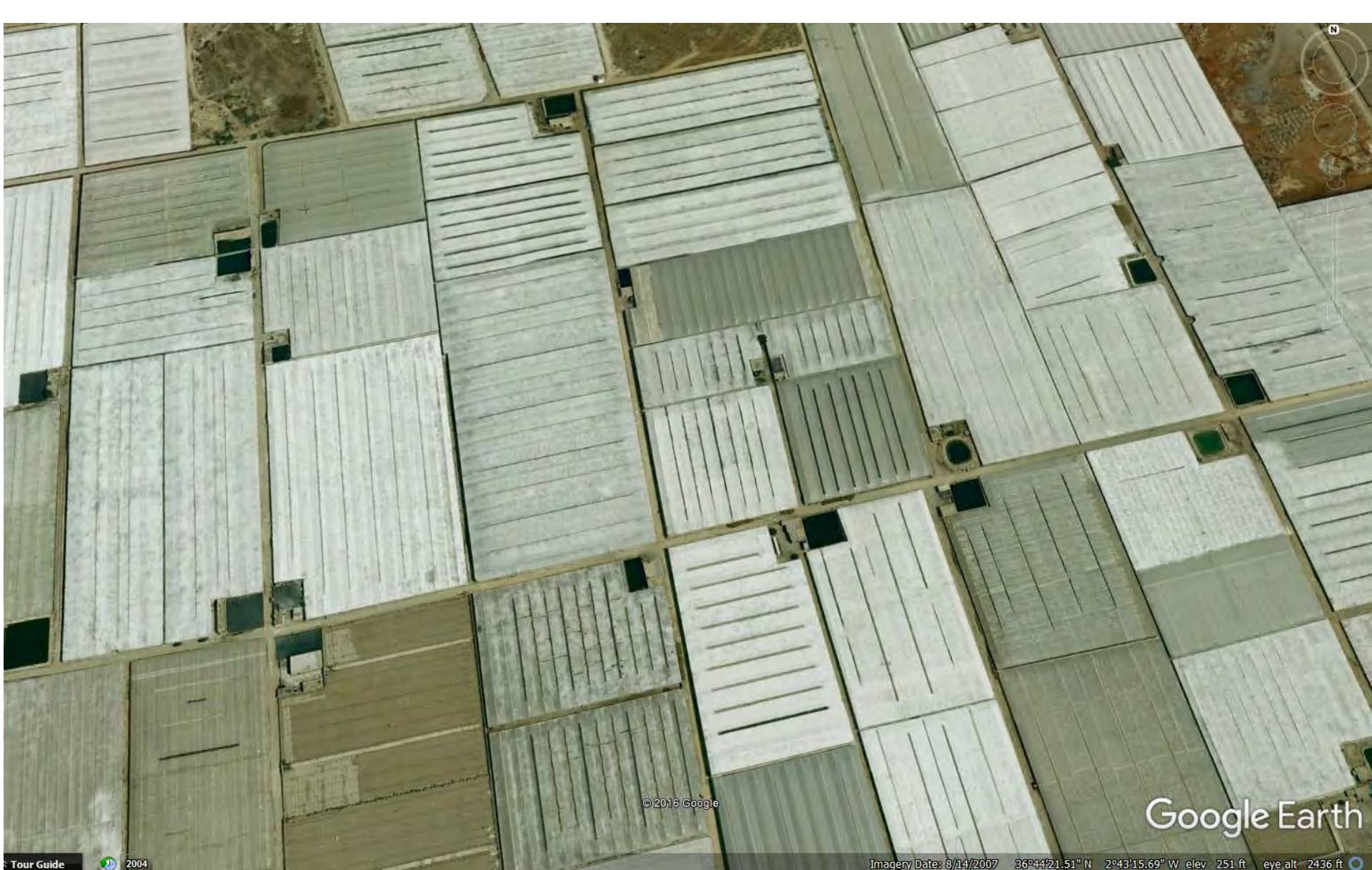
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Google Earth

Tour Guide

2004

Imagery Date: 6/28/2013 36°42'49.19" N 2°43'28.54" W elev 112 ft eye alt 3081 ft



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Tour Guide

Imagery Date: 8/14/2007 36°44'21.51" N 2°43'15.69" W elev 251 ft eye alt 2436 ft









08.28.2015 04:45

# Dramatic impact on disease under tunnels

- No gray mold
- No powdery mildew





November 10  
2014

# Questions needing answers . . .

- When should day neutral plants be planted?
- What planting design works best?
- What mulch works best?
- Should flowers be removed and, if so, for how long after planting?
- Should runners be removed?
- Are low tunnels beneficial for day neutral strawberries?
- What type of plastic cover works best?
- How should the cover be managed?
- What variety(ies) works best in a day neutral production system?
- What is a good fertility level for day neutral strawberries?
- Should plants be held over into a second year?
- If so, what is the best way to overwinter them?
- What pests are of greatest concern?

**Seascape**



**Albion**



**Monterey**



**Portola**



## First fall, Day neutral strawberries

Cultivar	Yield (tunnel)	% good	Yield (open)	% good
Seascape	652 g/foot	62	468	59
San Andreas	378	61	252	53
Portola	788	60	588	44
Monterey	414	59	382	50
Albion	428	62	412	57
AVERAGE*	532	61	420	53

**\*27% higher yields; 15% higher marketable fruit under low tunnels;**

**Planting date: 5/29**

**Harvest dates: 8/17 – 11/5**

**2 plants per linear foot of row**

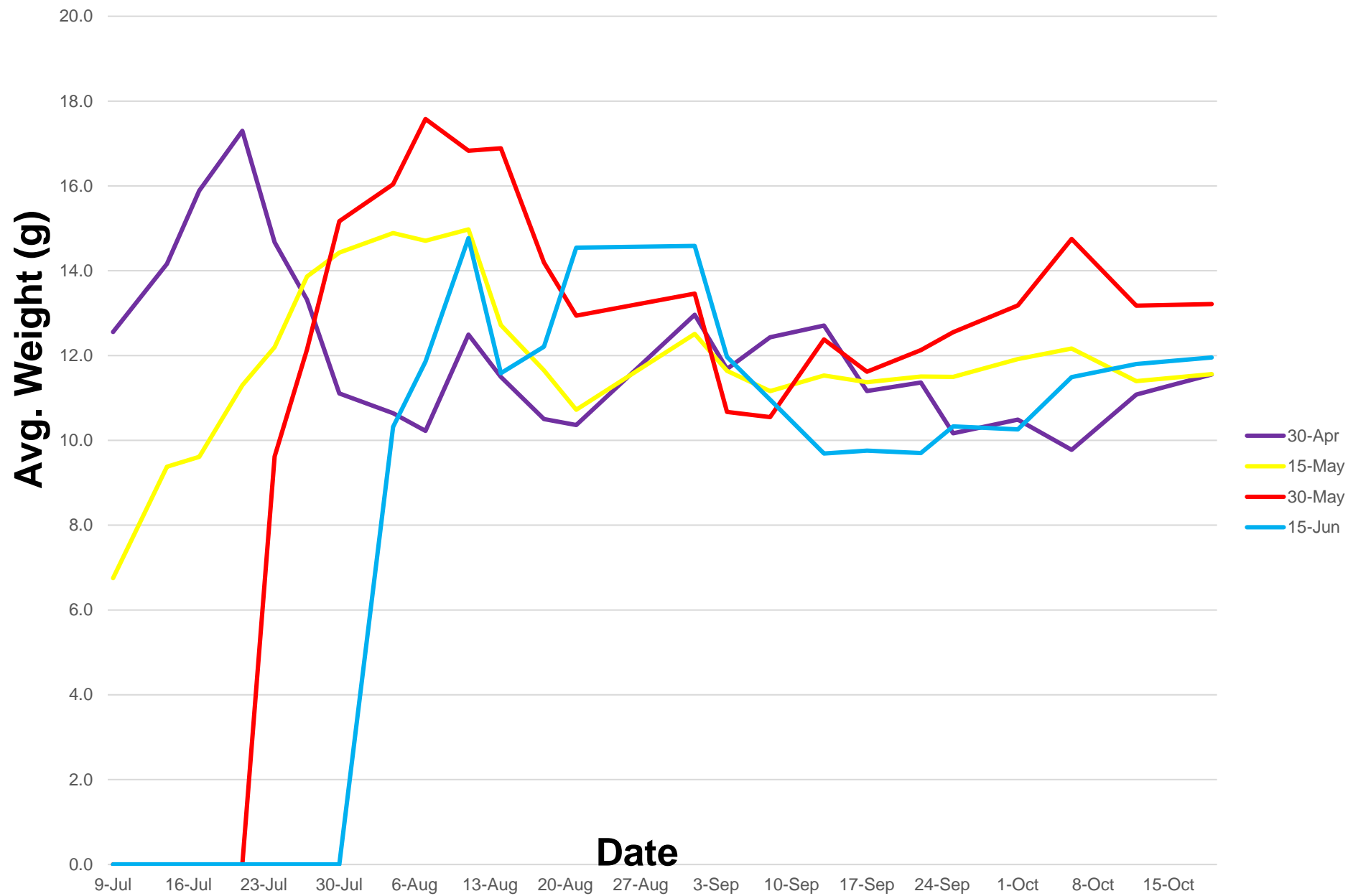
## Second year spring, Day neutral strawberries

Cultivar	Yield (tunnel)	% good	Yield (open)	% good
Seascape	1104 g/foot	87	445	69
San Andreas	1168	73	305	55
Portola	854	73	234	52
Monterey	568	86	140	57
Albion	494	86	112	62
AVERAGE*	838	81	247	59

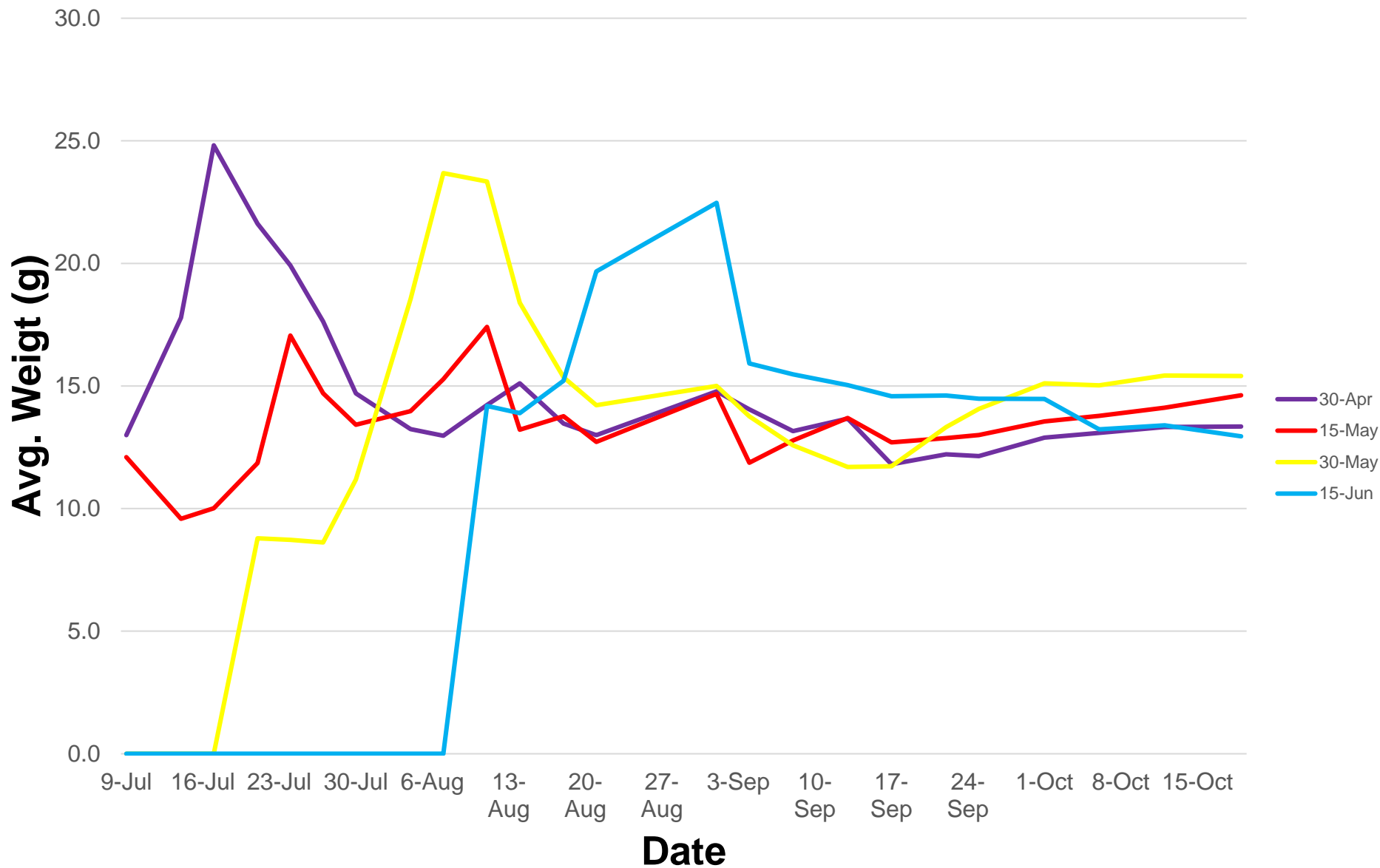
**\*239% higher yields; 37% higher marketable fruit under low tunnels;**

**Harvest dates: 6/4 – 7/8**

# Seascape's Average Fruit Weight

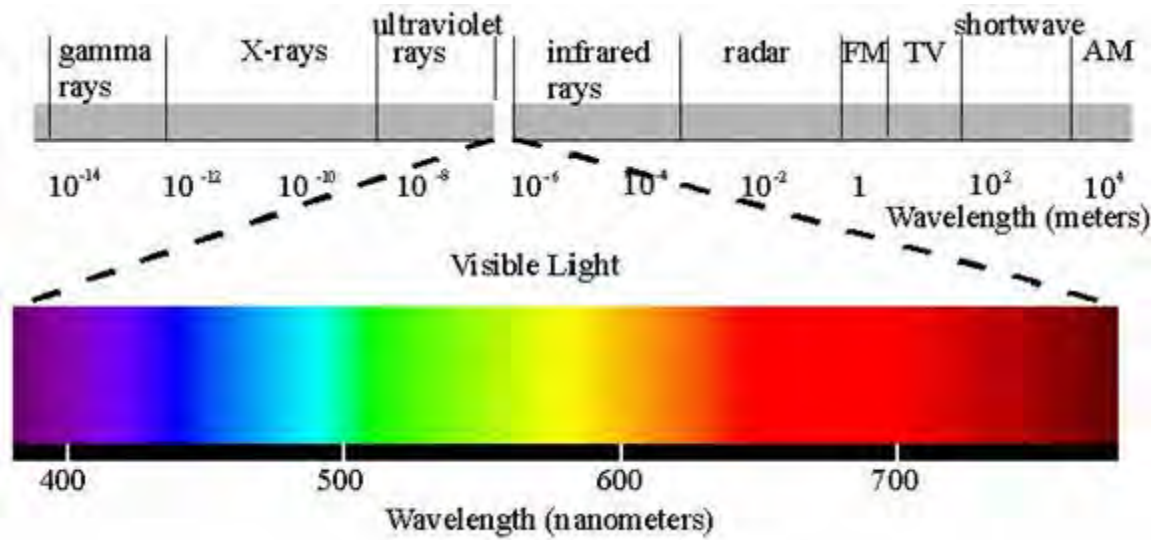


# Albion's Average Fruit Weight



## Plastic type





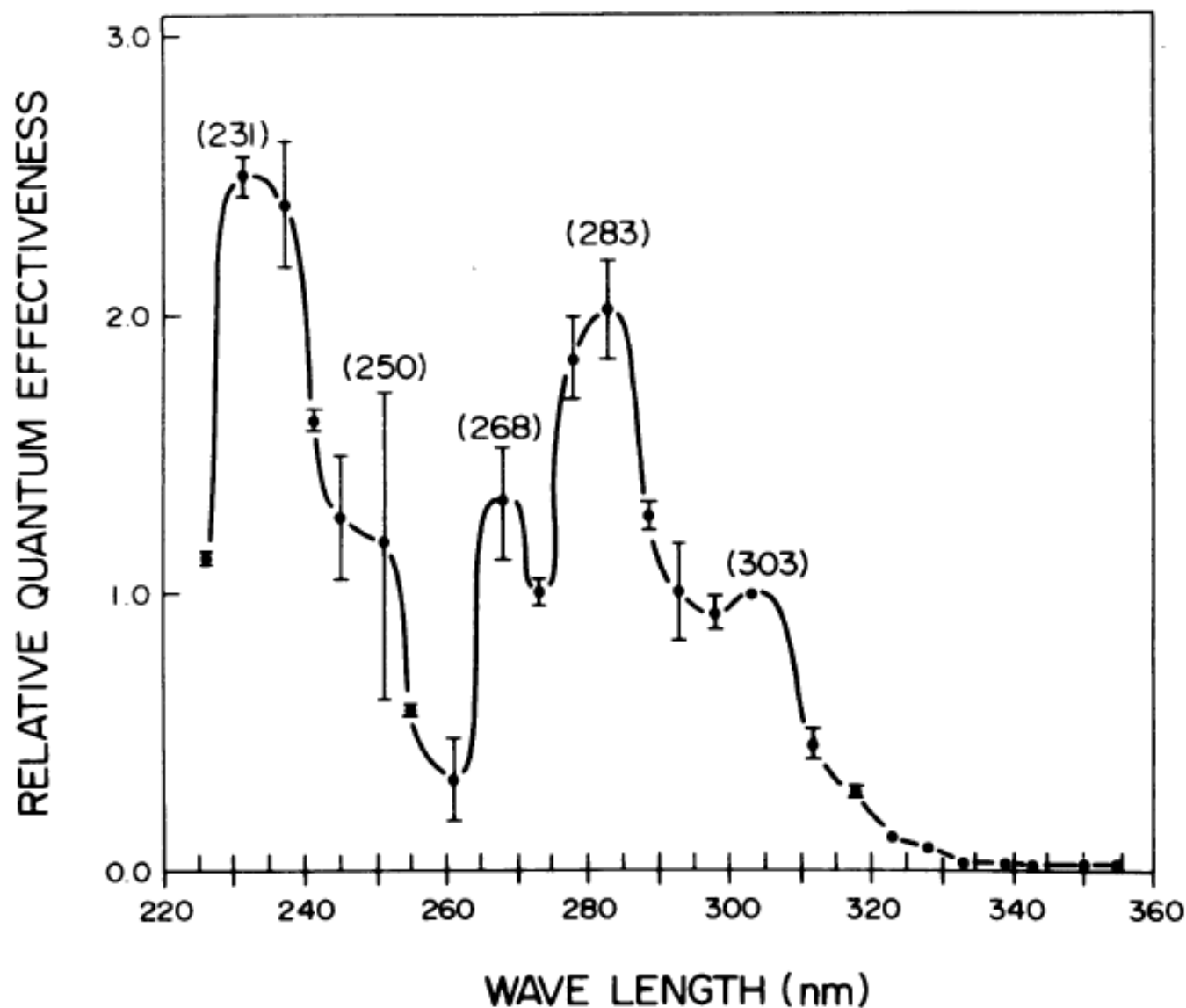
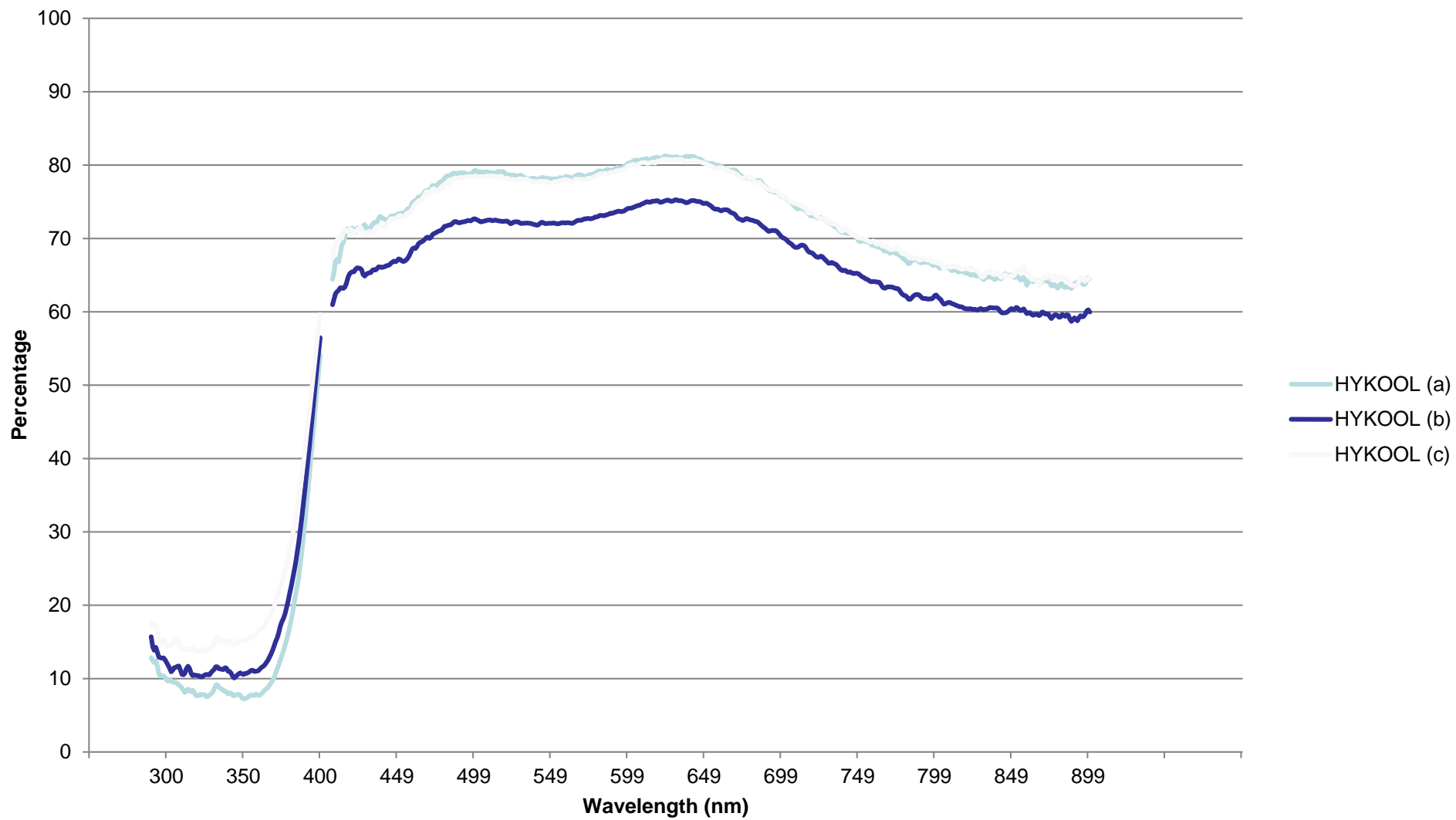


FIG. 3. Action spectrum for photosporogenesis in *B. cinerea*. Each point represents the mean relative quantum effectiveness against the 303 nm value which was derived from two independent dose response experiments. SD is indicated for each mean.

# HYKOOL 11



**Figure 1: Albion harvest dates and marketable fruit**

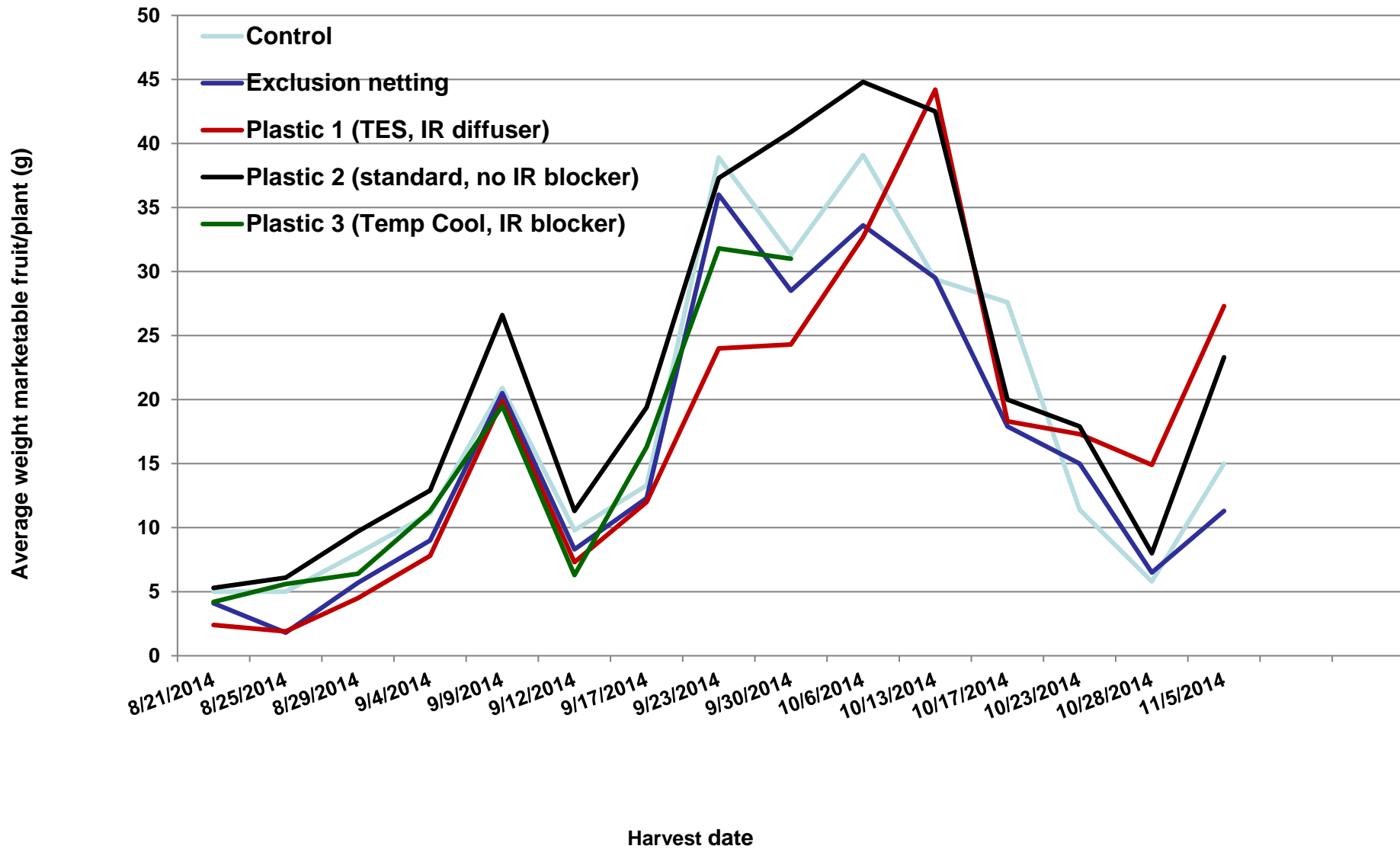
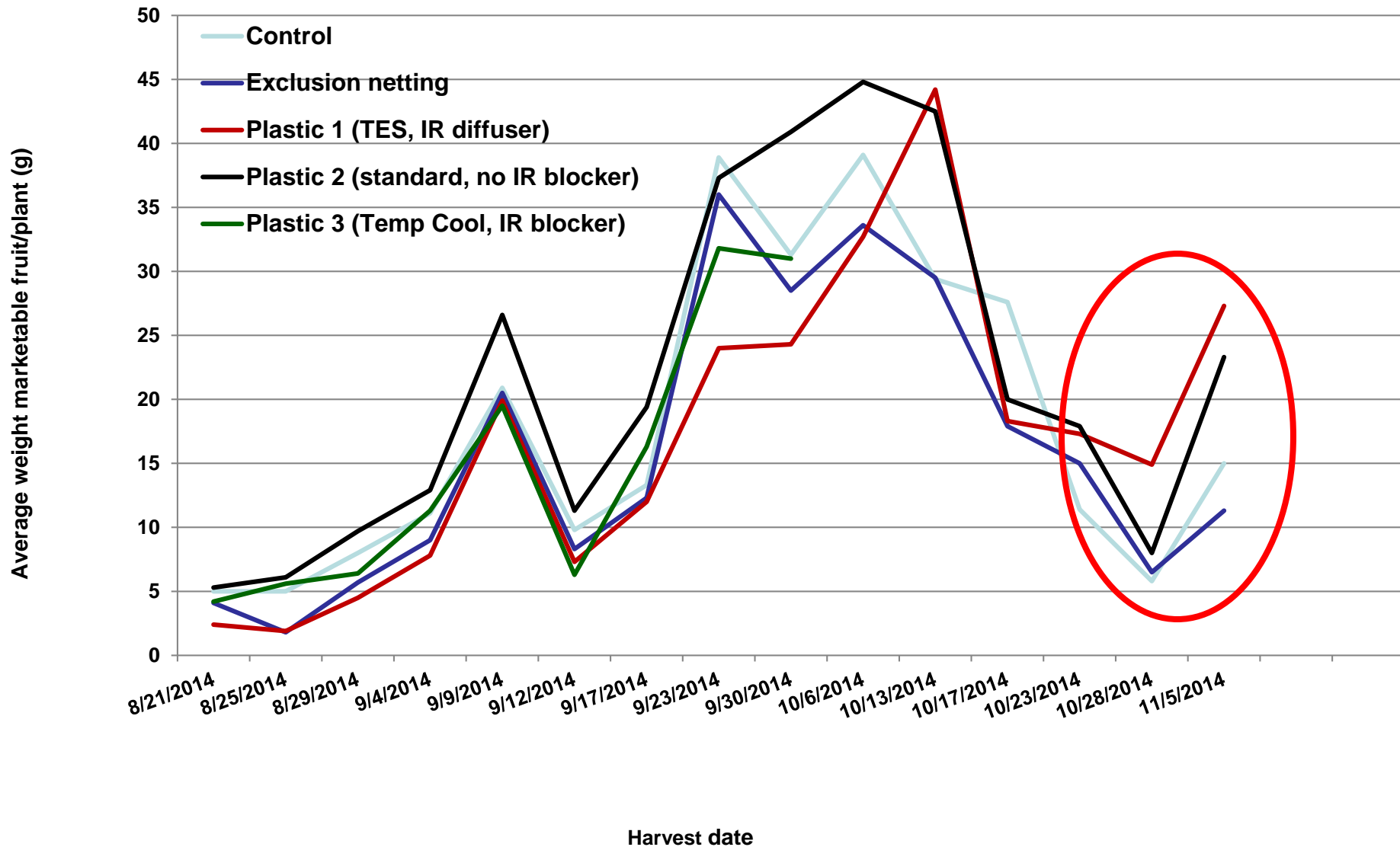
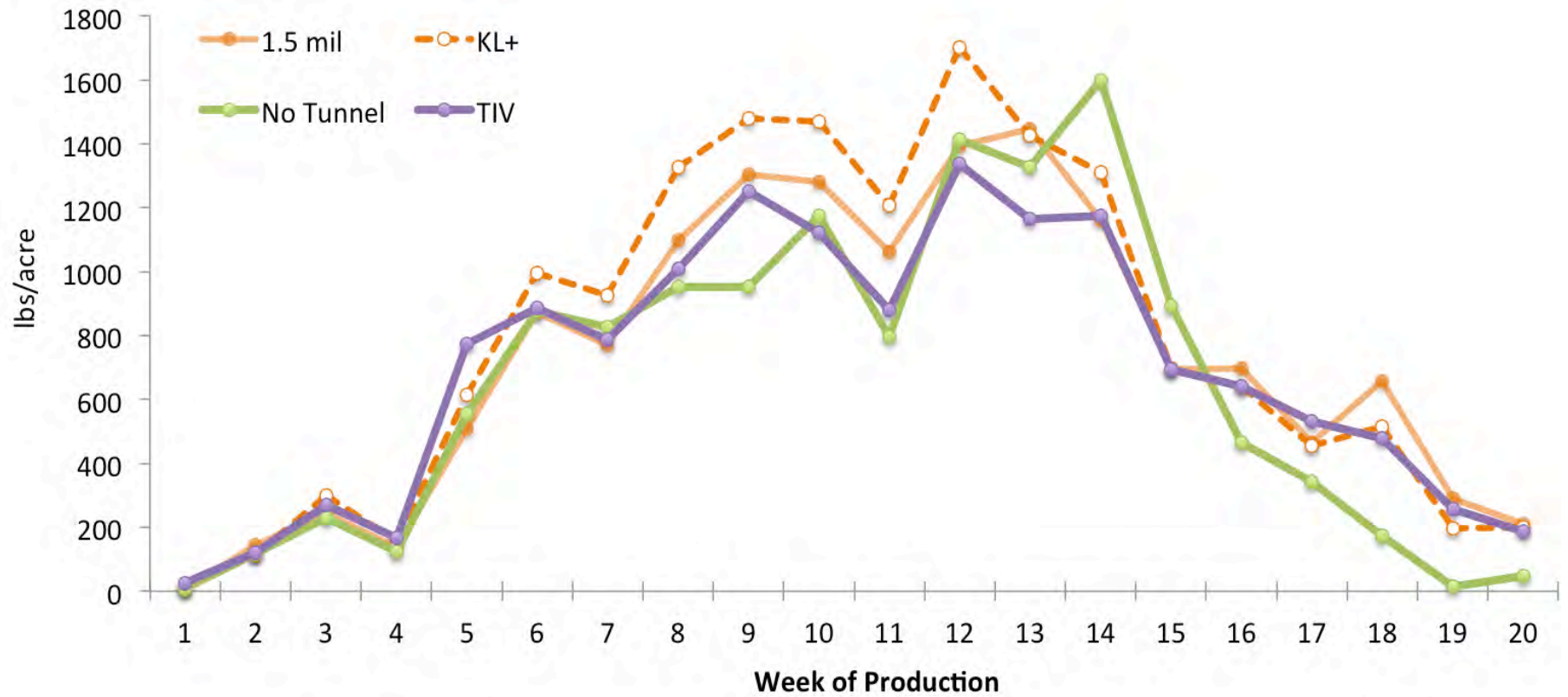


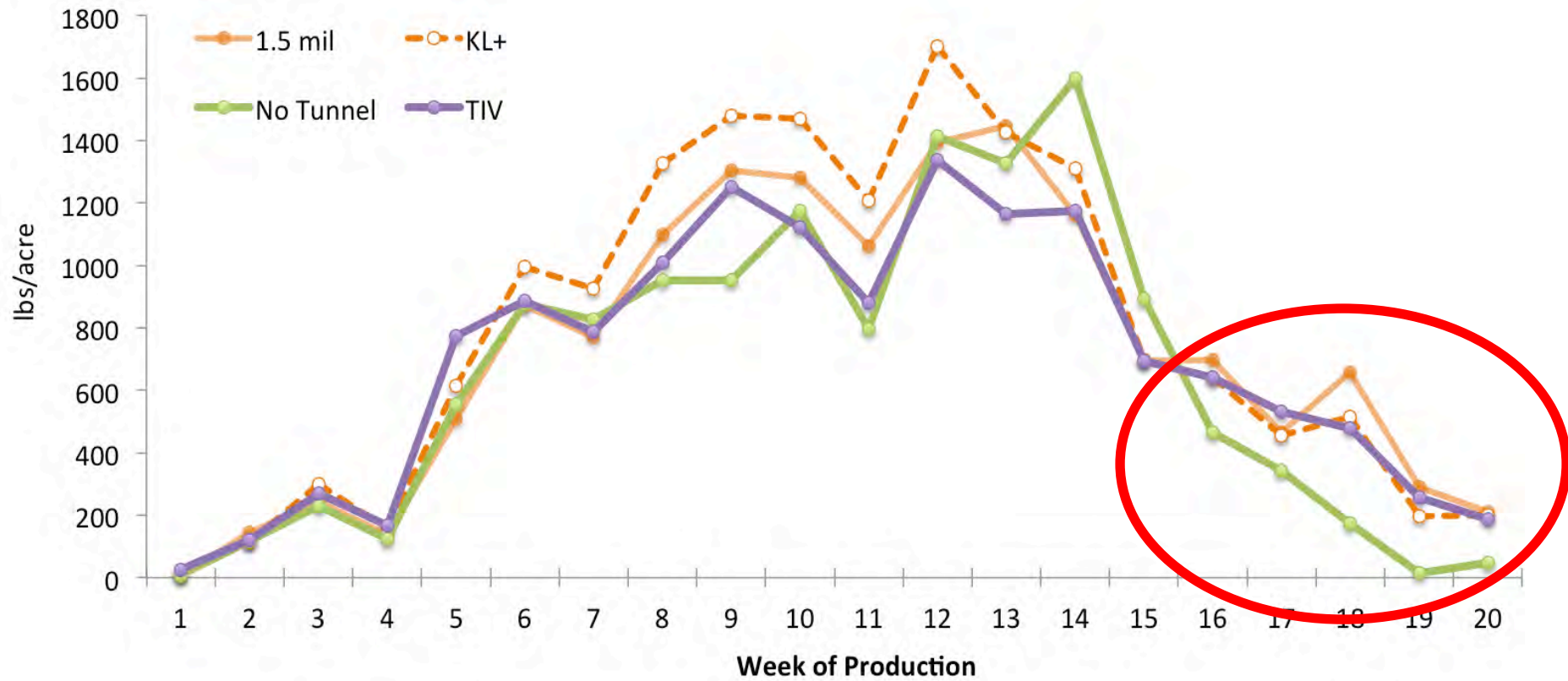
Figure 1: Albion harvest dates and marketable fruit



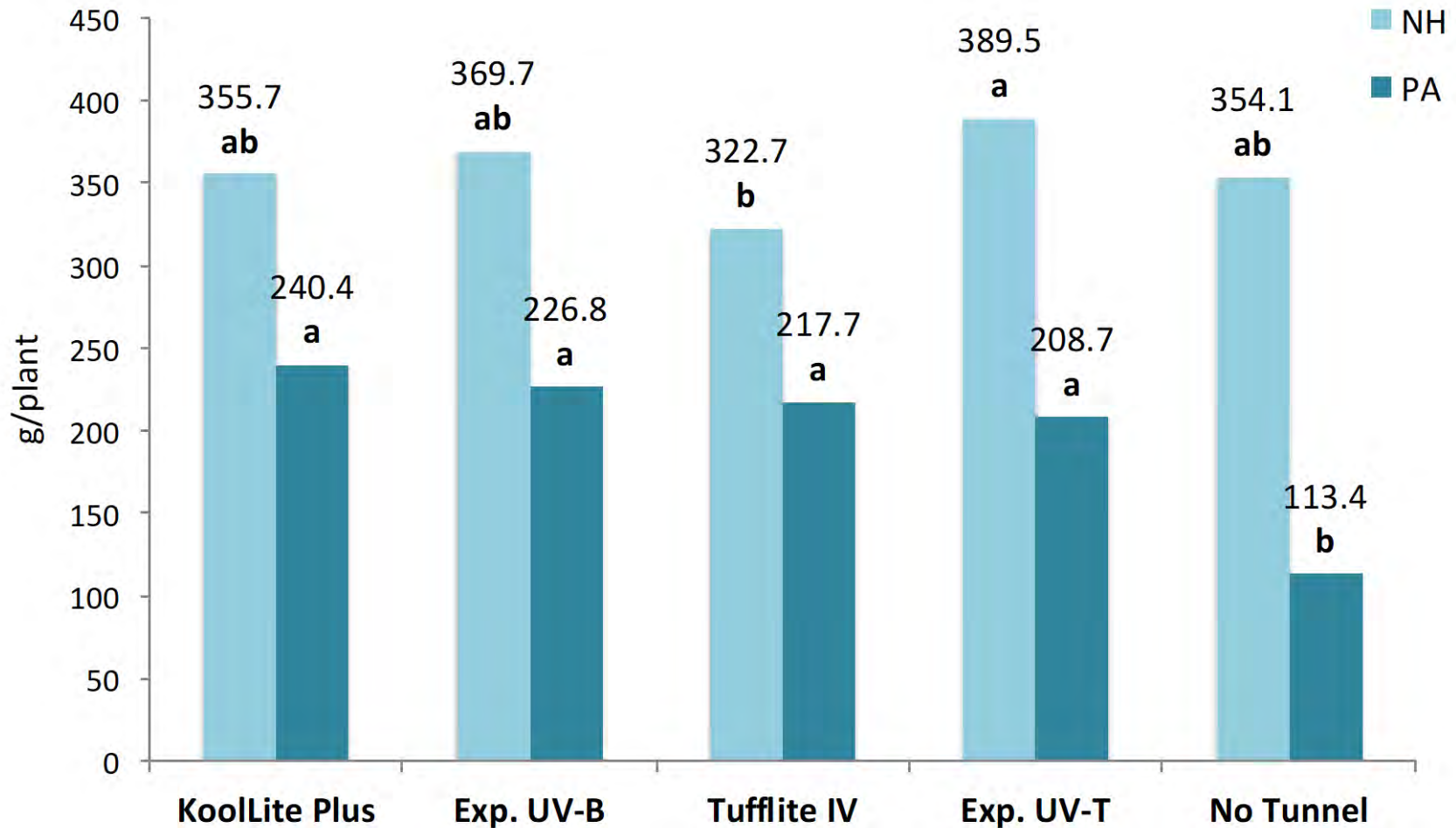
# New Hampshire



# New Hampshire

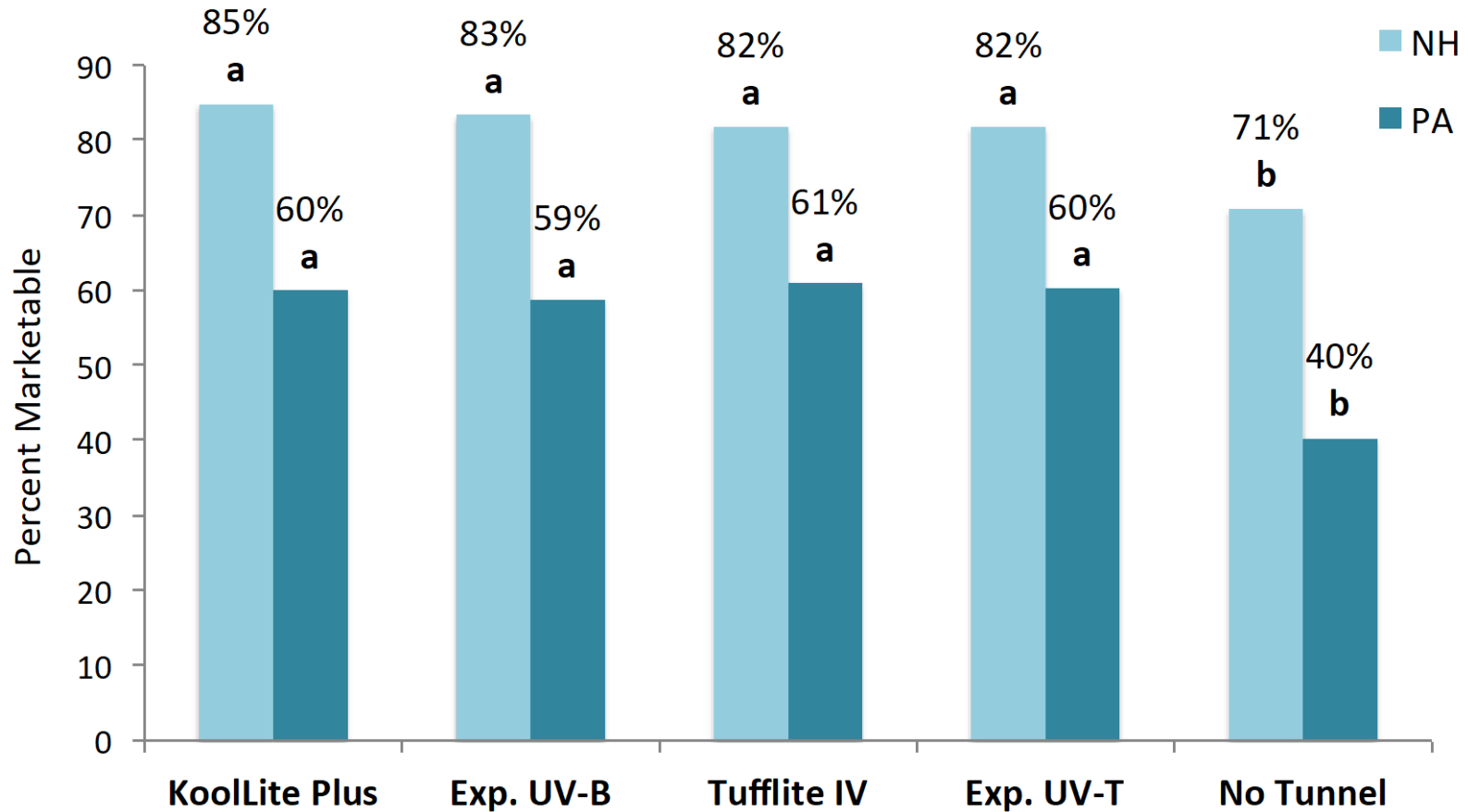


# Cover Treatment, g/plant



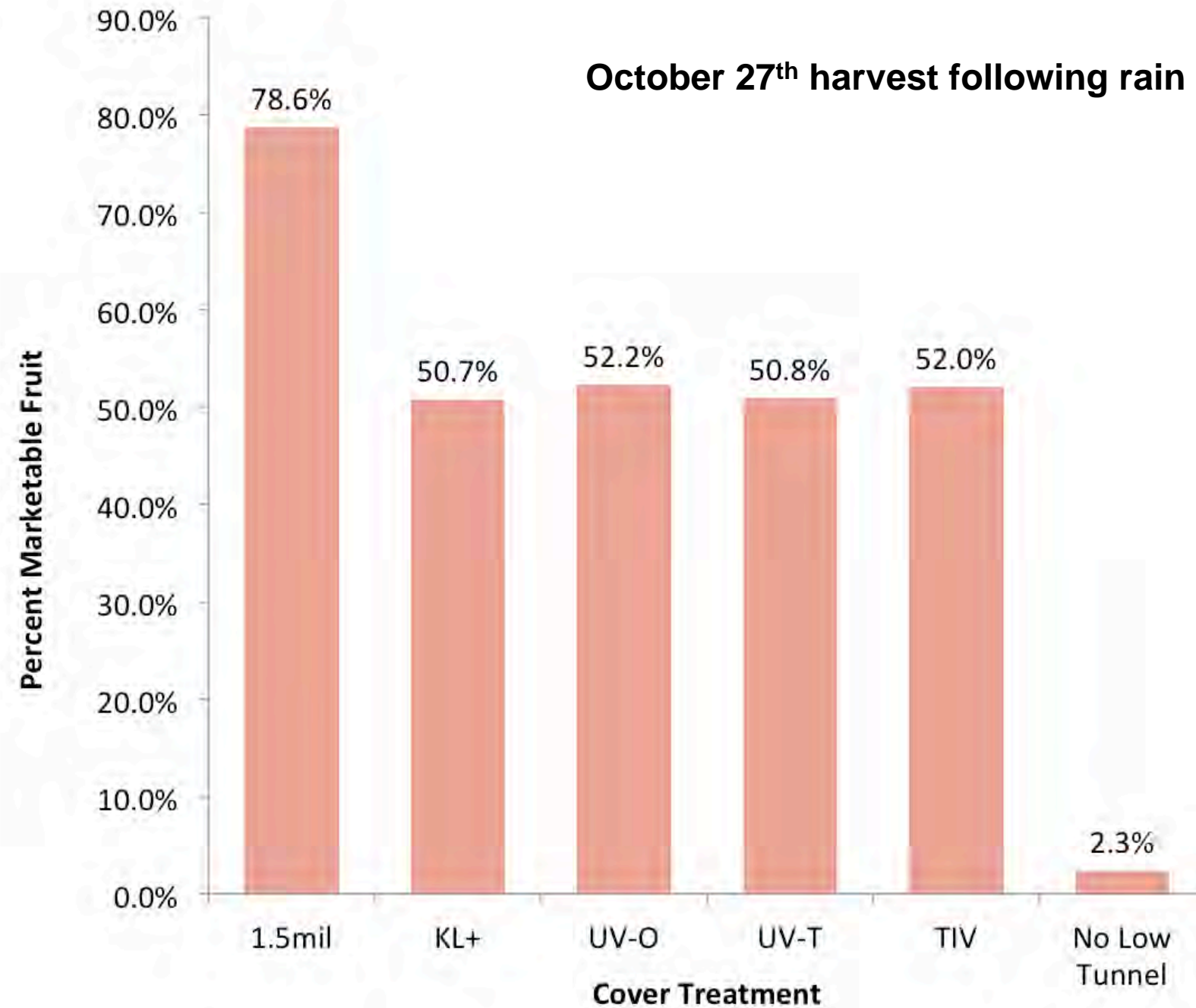
Total marketable yield (g/plant) by cover treatment for 2016 in Durham, NH and Rock Springs, PA. Means separation by Tukey's HSD at  $p \leq 0.05$ , analyzed separately by location.

# Cover Treatment, % Marketable Fruit



Percent marketable fruit for each cover treatment for the 2016 season in Durham, NH and Rock Springs, PA. Means separation by Tukey's HSD at  $p \leq 0.05$ , analyzed separately by location.

## October 27<sup>th</sup> harvest following rain (NH)



# Planting date trial (2015)

- Two cultivars
  - Seascape
  - Albion
- Four planting dates
  - April 30
  - May 15
  - May 30
  - June 15



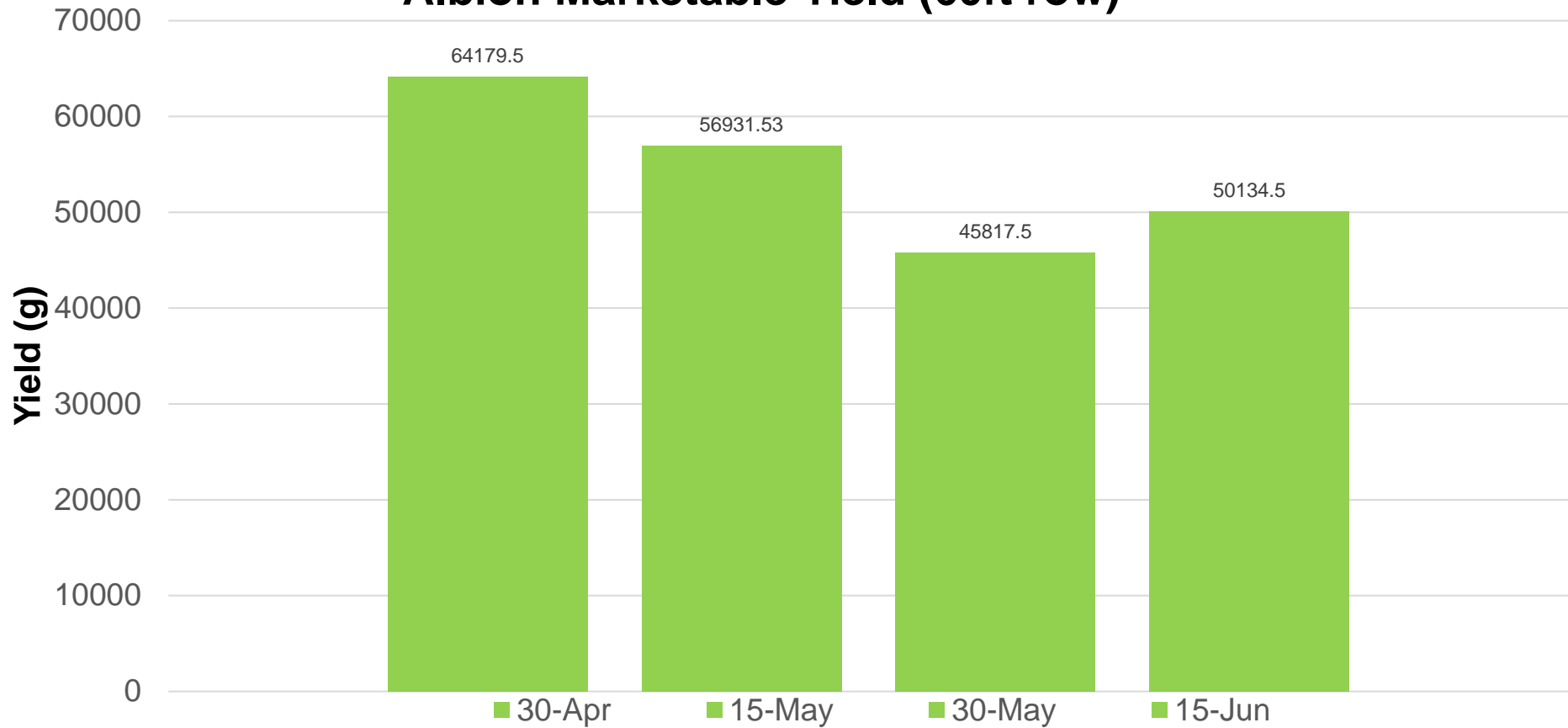
07.05.2015 20:43



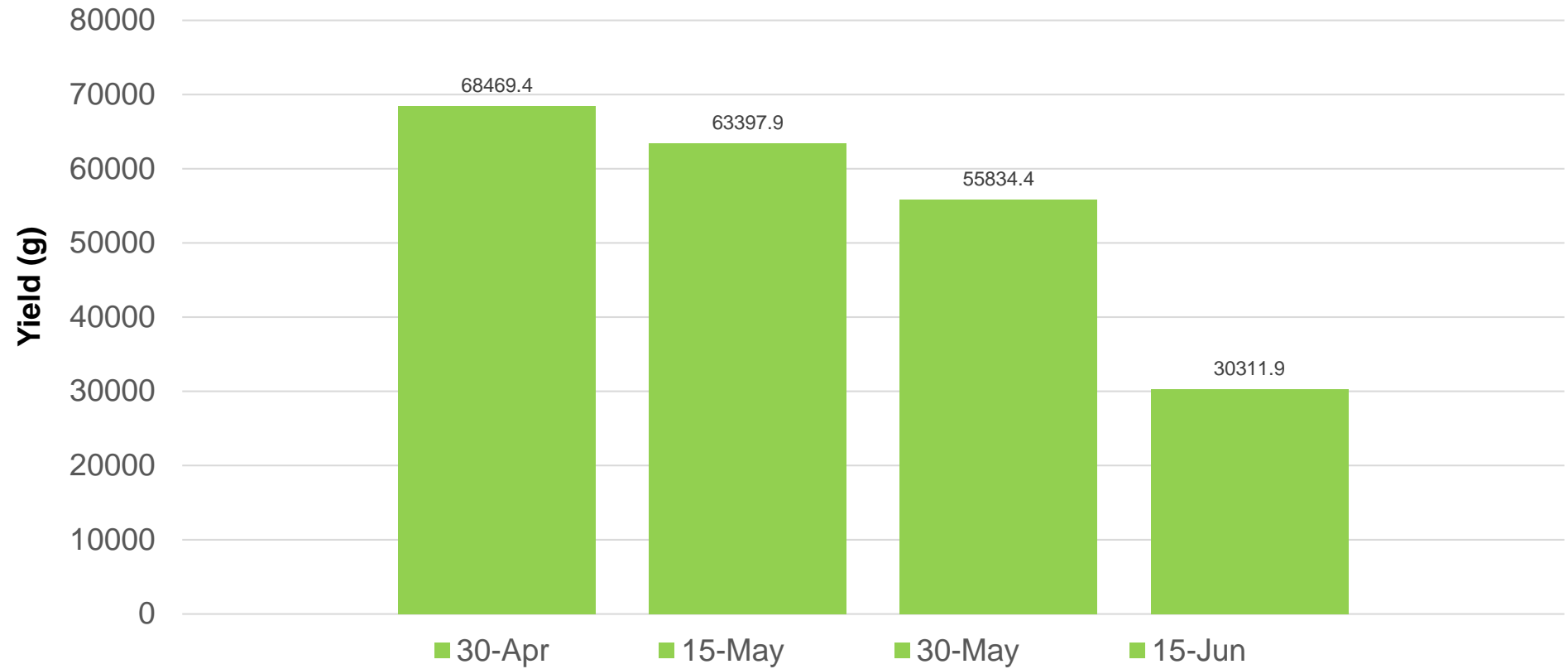


08.28.2015 04:45

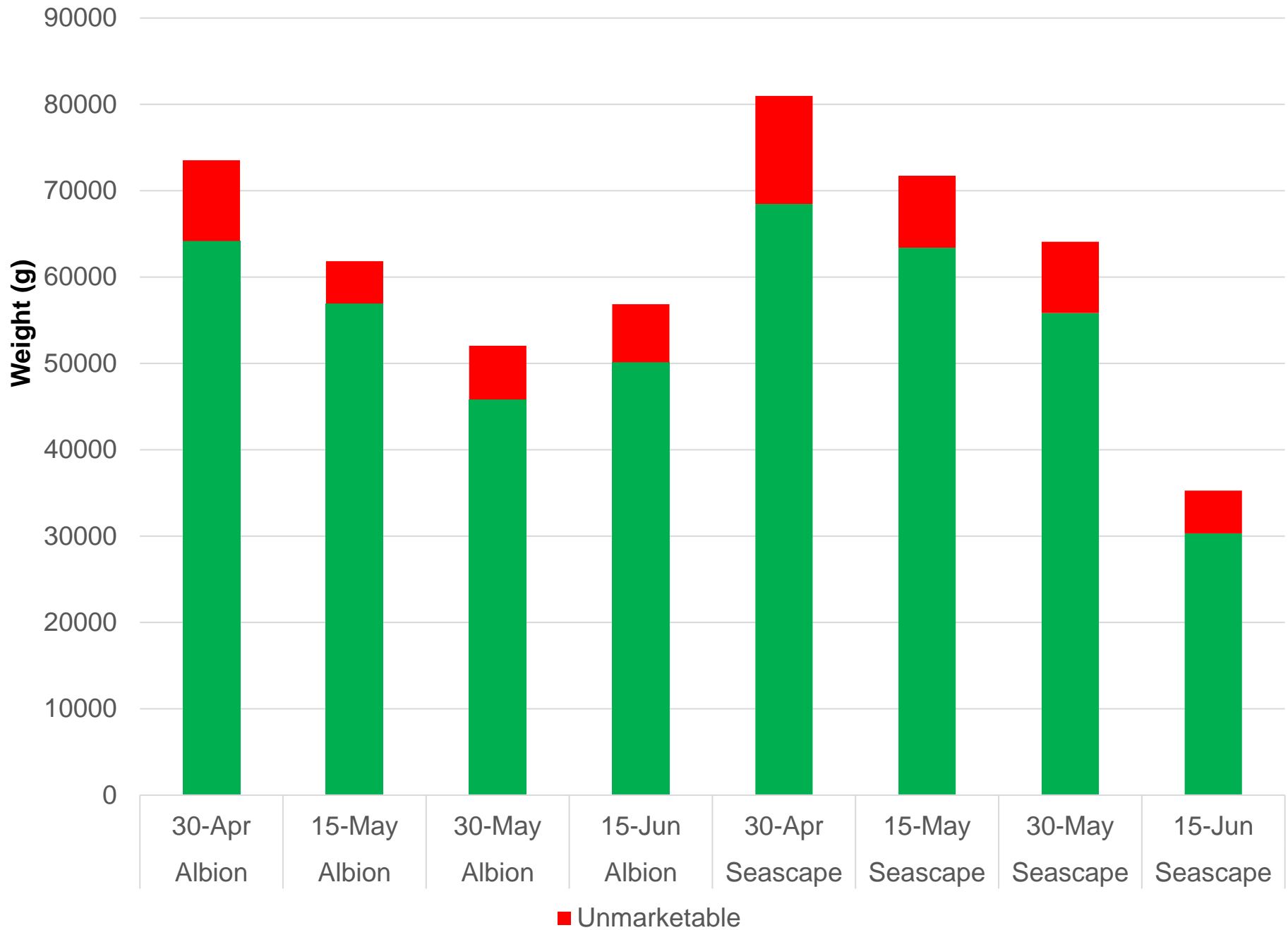
## Albion Marketable Yield (60ft row)



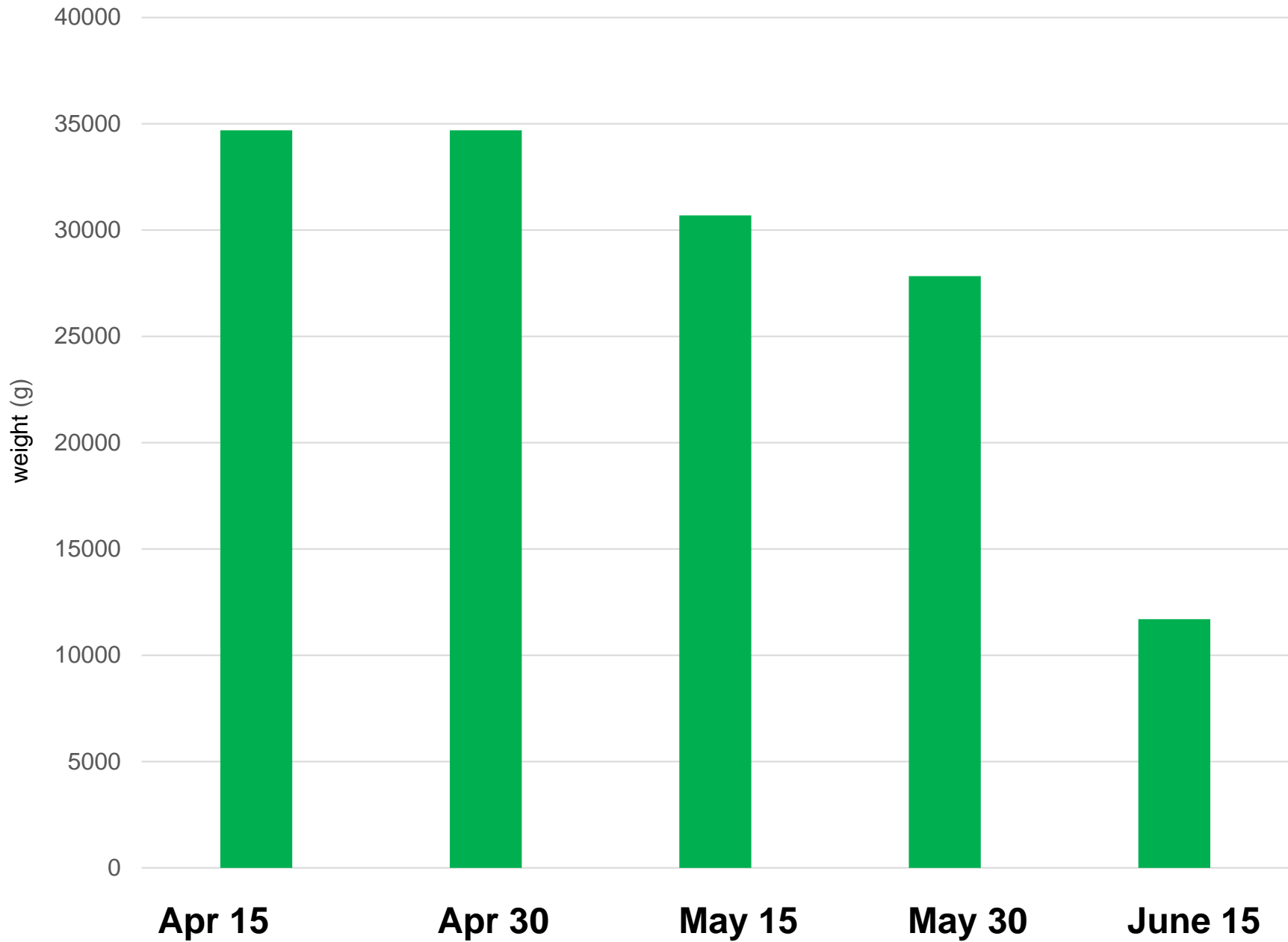
## Seascape Marketable Yield (60ft row)



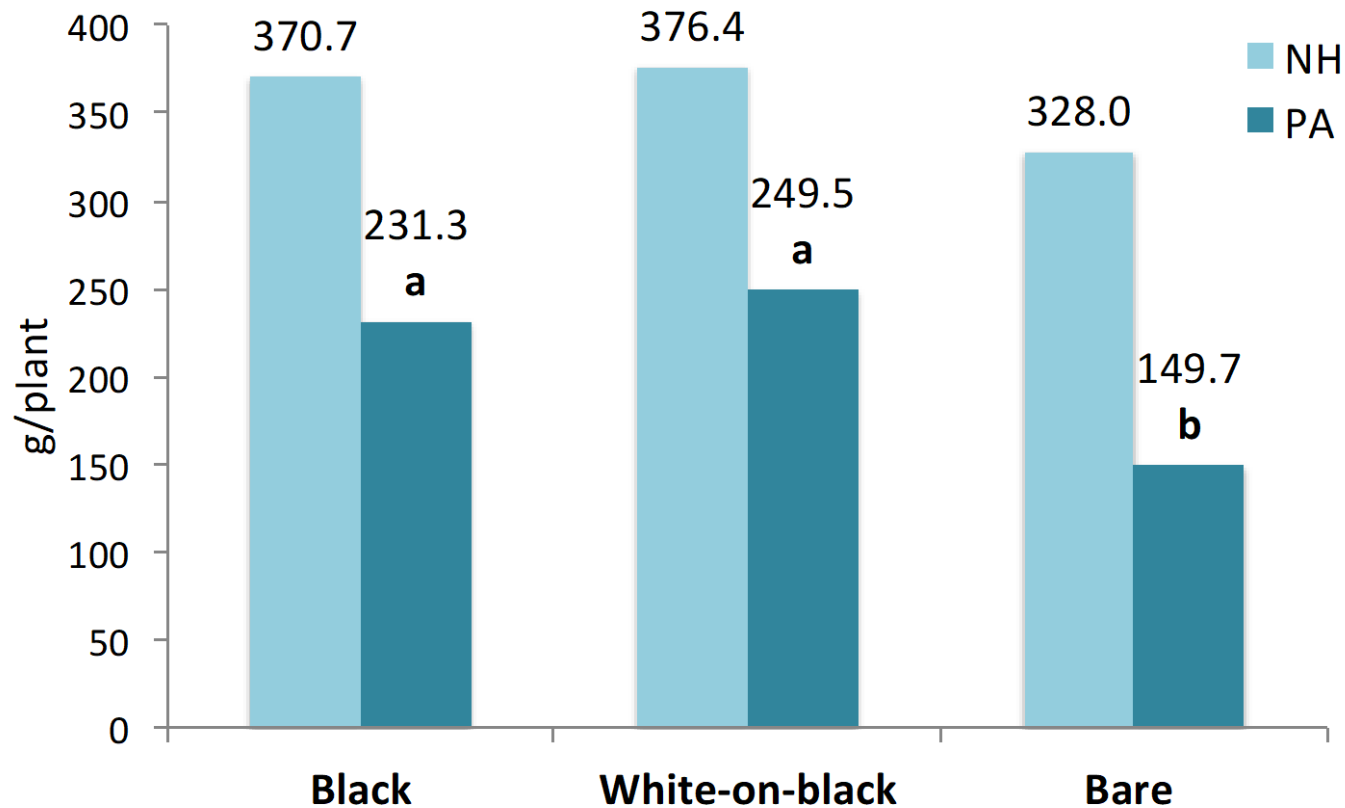
# Total Yields (60ft row)



**Albion total marketable weight by planting date (Geneva)**

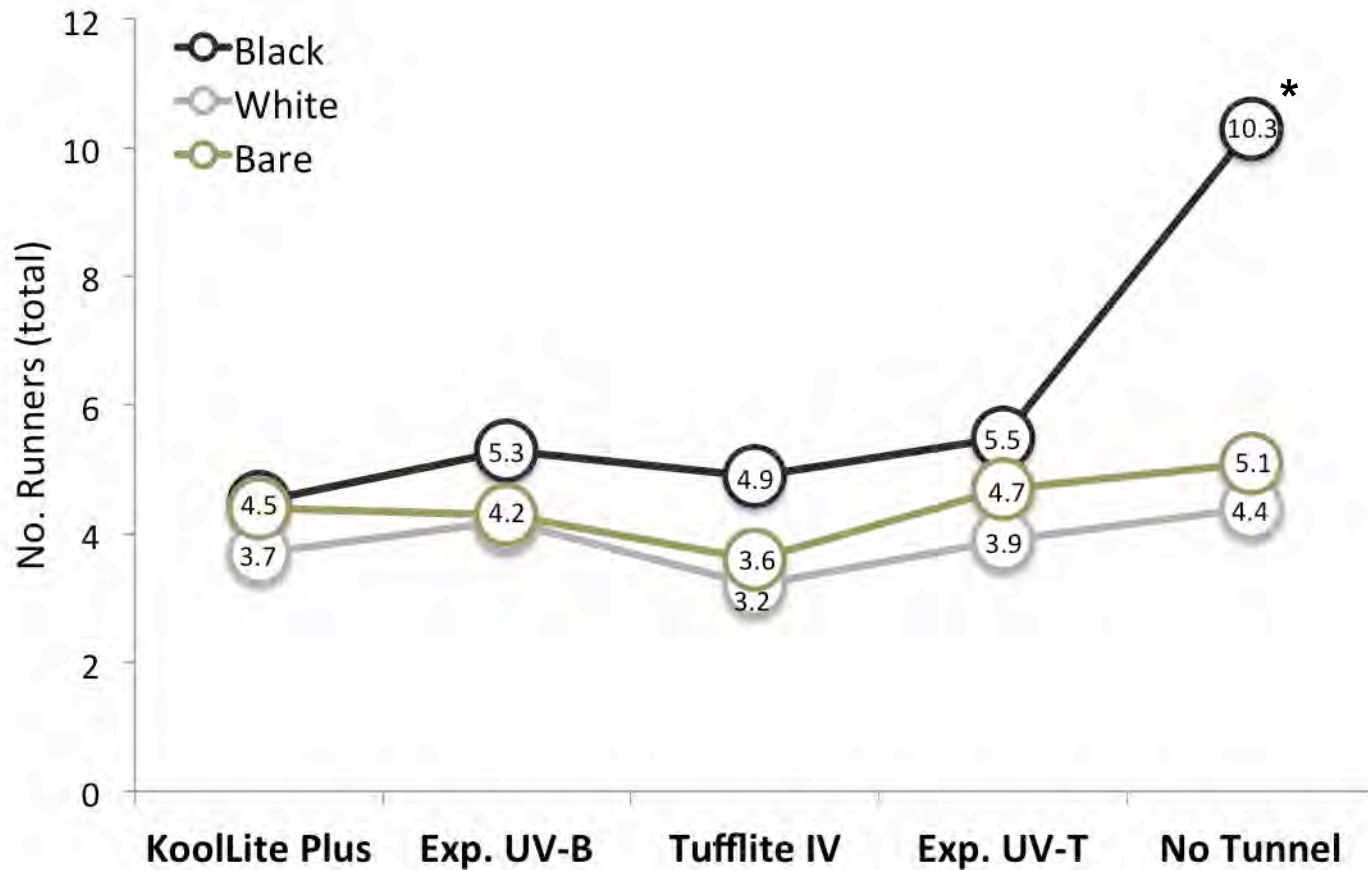


# Mulch Treatment, g/plant



Total marketable yield (g/plant) by mulch treatment for 2016 in Durham, NH and Rock Springs, PA. Means separation by Tukey's HSD at  $p \leq 0.05$ , analyzed separately by location.

# Runner Production, NH



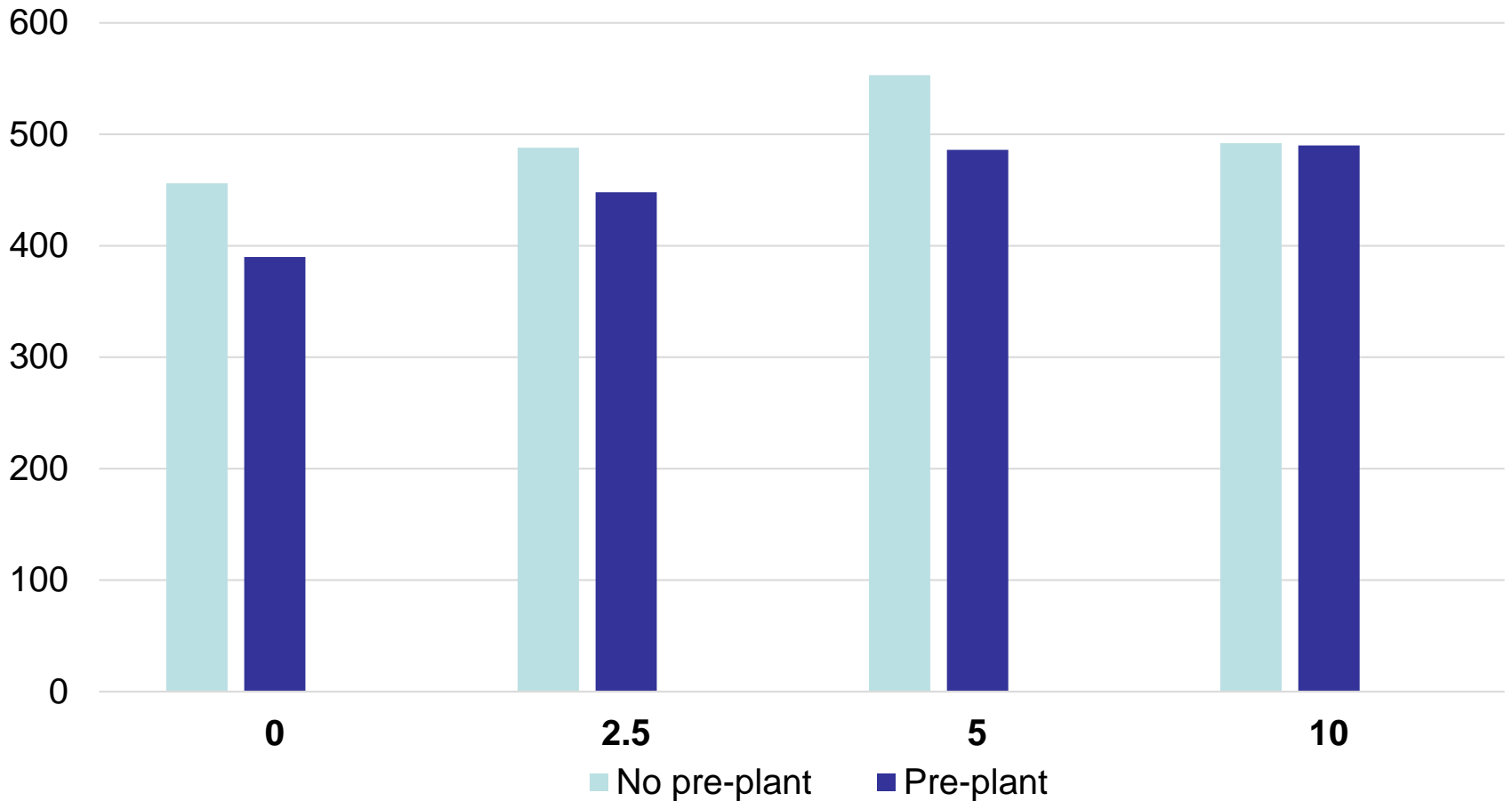
Total number runners per plant for 2016 season in Durham,  
NH.

# Fertigation trial



# Fertigation trial results

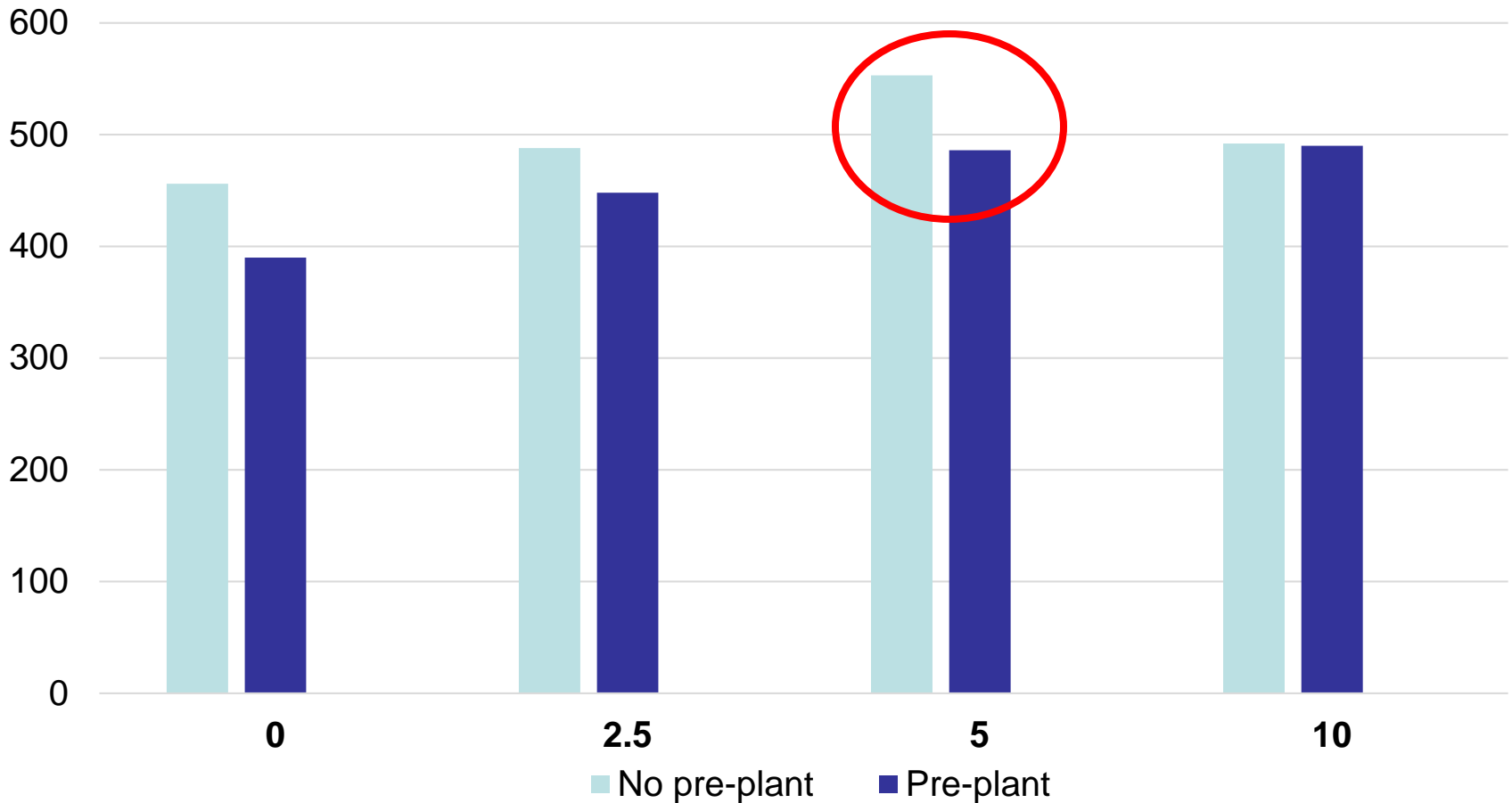
g/plant



lbs/A-week; pre-plant of 60 lbs/A

# Fertigation trial results

g/plant



lbs/A-week; pre-plant of 60 lbs/A

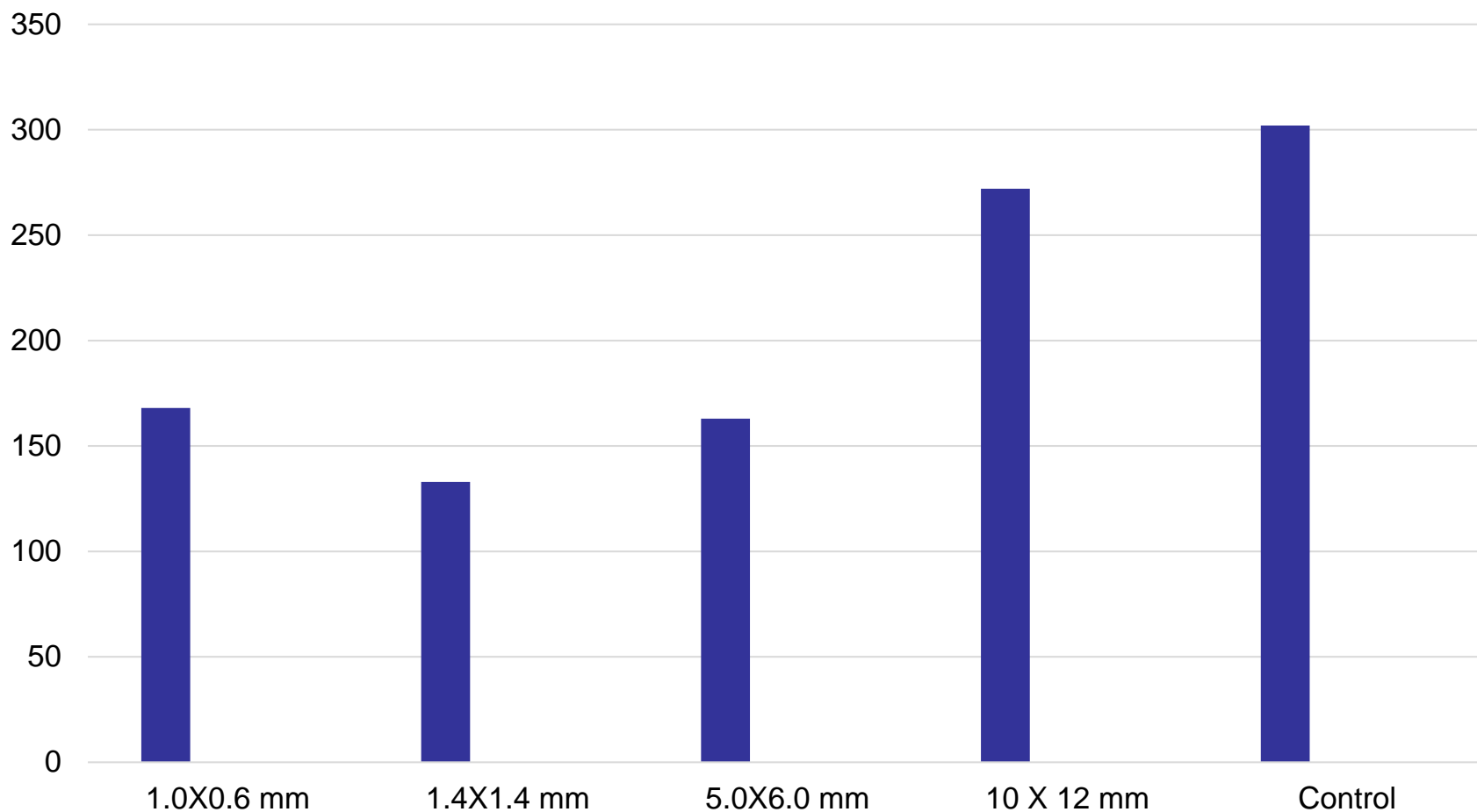






# Exclusion netting on yield – 2<sup>nd</sup> half of season

**g/plant**



**Mesh size**

**“Good morning. I had a wonderful year utilizing the low tunnel system from Agrinovation. I invested in enough to cover 5000 row feet. Thanks so much.”**

**Sincerely,  
Guin Panek  
Albion, NY**



## Visit with Wegmans buyers



# Geneva Fruit Field Day







09.16.2015 03:22

# Stanton trial results

(lbs/acre)

Farm	Covered	Uncovered
Eastern	9497	5205

# Economics (first year)

• Income	
– 20,000 lbs/A X \$4.00/lb =	\$80,000
• Expense	
– Tunnel materials	39,200
– Mulch/irrigate beds	2,000
– Plants	2,420
– Fertilizer/Pesticides	180
– Labor (30 wk X 15 hr/wk X 15/hr)	6,750
– Harvest (\$0.50/pint)	13,300
– Containers	3,650
Net revenue	\$12,500

# Economics (second year)

- Income
  - $15,000 \text{ lbs/A} \times \$2.50/\text{lb} =$   $\$37,500$
- Expense
  - Tunnel materials
  - Mulch/irrigate beds
  - Plants
  - Fertilizer/Pesticide
  - Labor ( $10 \text{ wk} \times 10 \text{ hr/wk} \times 15/\text{hr}$ )  $1,500$
  - Harvest ( $\$0.50/\text{pint}$ )  $10,000$
  - Net revenue  $\$26,000$

# Economics (first year with tunnel purchased)

- Income
  - 20,000 lbs/A X \$4.00/lb = \$80,000
- Expense
  - Tunnel plastic replacement 1,000
  - Mulch/irrigate beds 2,000
  - Plants 2,420
  - Fertilizer 180
  - Labor (30 wk X 15 hr/wk X 15/hr) 6,750
  - Harvest (\$0.50/pint) 13,300
  - Containers 3,650
  - Net revenue \$50,700

# Lessons learned from grower trials

- Difficult to “fit in” a crop like this on top of other responsibilities
- Attention must be paid to nutrient management (weekly applications of N, 2- 5 lbs/acre)
- Overwintering is more challenging
- Expensive and intensive, but economically feasible

Late October 2017





**Special thanks to:**

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Tim Stanton