

LOW TUNNELS FOR STRAWBERRY PRODUCTION

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Opportunities for extended fresh market production in the PNW

- Oregon traditionally focused on conventional processed market
- In recent years, decrease in growers and packers for processed fruit, and slight increase in fresh market growers – resulted in fresh market growers representing 27% (26/98) of OSC growers in 2011, and 43% (27/62) in 2017¹
- Organic growers mostly fresh market (45-60 estimate), mostly small and mid size and with diverse production farms.
- Oregon Tilth reported that current level of organic fresh production in Oregon doesn't meet consumer demand²
- Higher price premiums with fresh, organic, and off-season fruit

¹Oregon Strawberry Commission. 2018. Strawberry Assessment Update - Preliminary Report.

²Murray T. 2016. Analysis of the Organic Market in Oregon. Oregon Tilth.



What are low tunnels?

- Miniature 'greenhouse' structures
- Essentially long sheets of plastic laid over hoops to cover a single bed
- Moveable
- Can have ventilation to control temperature and humidity

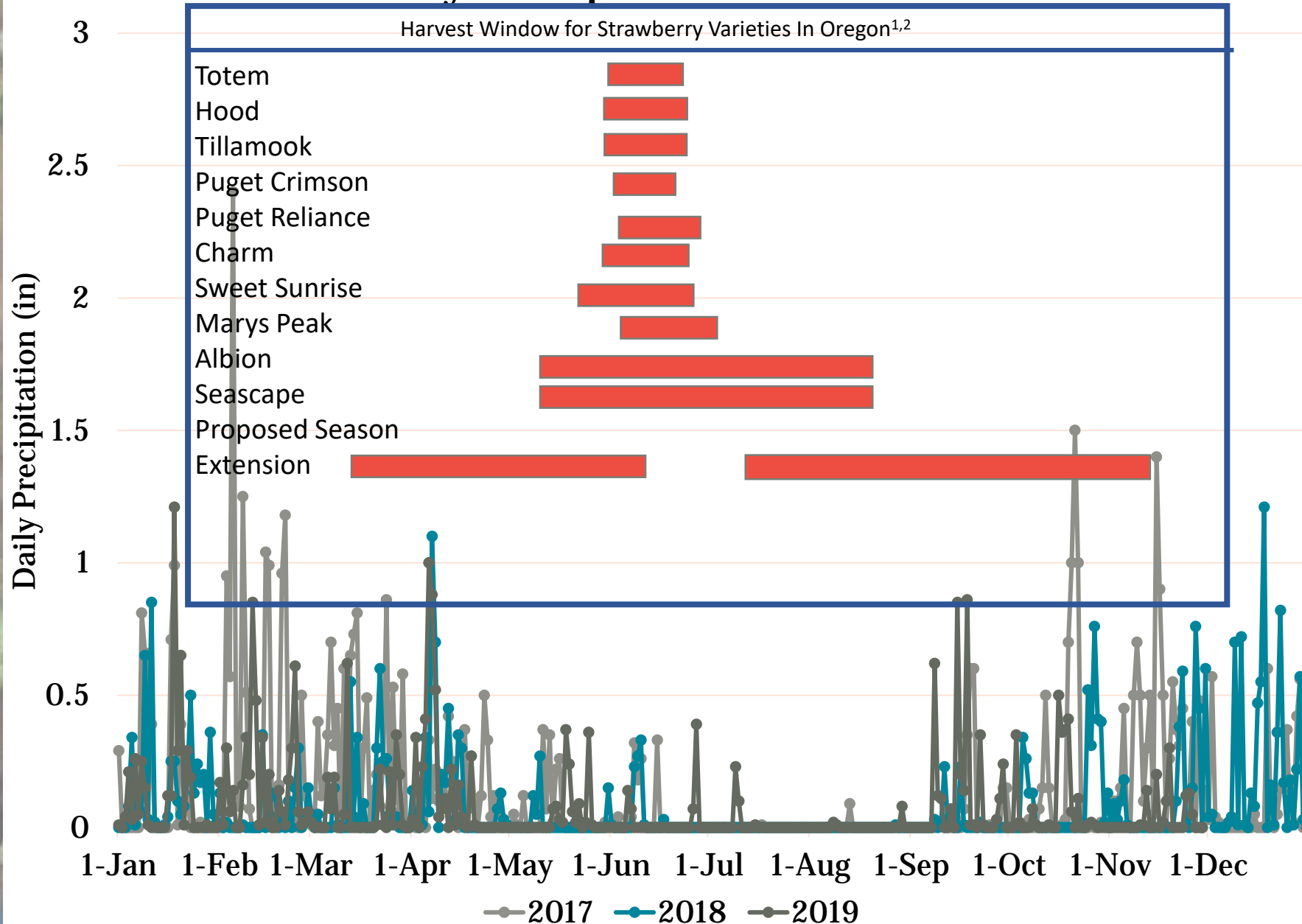


Advantages of Low Tunnels

- **Season extension**
- **Fruit is protected from the elements**
- **Reduces disease incidence**
- **Increases yield and fruit size**
- **Better fruit quality**
- **East coast has reported reduction in runner production**



Daily Precipitation 2017-2019



Harvest Rang

- **Tunnels allow for season extension**
 - Protection from the elements
- **Late season harvest (October-November)**



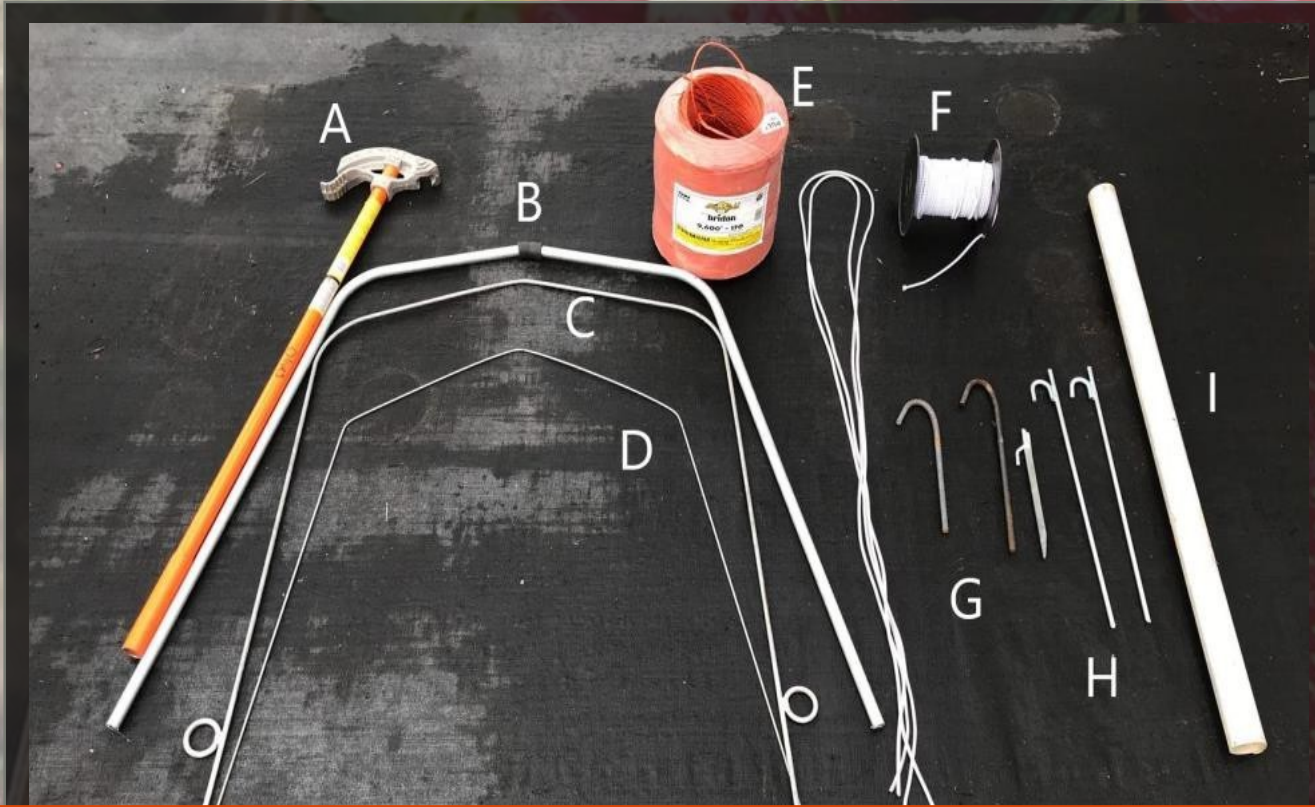
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Management

- Plastic can be easily lowered or raised depending on season, weather, or time of day
- Allows for easy harvest once raised
- Raise for spraying, vacuuming for lygus, effective control
- May provide UV protection in the summer



Constructing the Tunnels



Supplies (from left): *A) conduit bender, B) conduit hoop (top), C) DuBois hoop, D) galvanized wire hoop (bottom). E) bailing twine roll, F) bungee cord (length for a hoop and spool), G) rebar stakes, H) metal stakes (different lengths and types), I) aluminum anchor pipe.*

- **Ready for use KITS available. High cost**
- **Make your own with local materials. Our 1st year trial focused on material evaluation**



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Parts and Costs

	Materials	Cost/100 ft
Thin Plastic (Mixed 2)	Metal stakes, 21 wire & 3 conduit hoops, punched plastic, twine	\$44.31
Thin Plastic (Mixed 1)	Metal stakes, 21 wire & 9 conduit hoops, punched plastic, twine	\$48.77
Thick Plastic (Mostly wire)	Metal stakes, 21 wire & 3 conduit hoops, greenhouse plastic, twine	\$55.24
Thin Plastic (All conduit)	Metal stakes, 16 conduit hoops, slitted plastic, twine	\$57.76
Thick Plastic (Mixed 2)	Metal stakes, 19 wire hoops & 4 conduit hoops, greenhouse plastic, twine	\$58.05
Thick Plastic (All conduit)	Metal stakes, 13 conduit hoops, greenhouse plastic, twine	\$71.11
Thin Plastic (Mostly wire)	Metal stakes, 27 wire & 3 conduit hoops, slitted plastic, bungee cord	\$73.13
Thick Plastic (Mixed 1)	Rebar stakes, 16 wire & 7 conduit hoops, greenhouse plastic, bungee cord	\$104.85

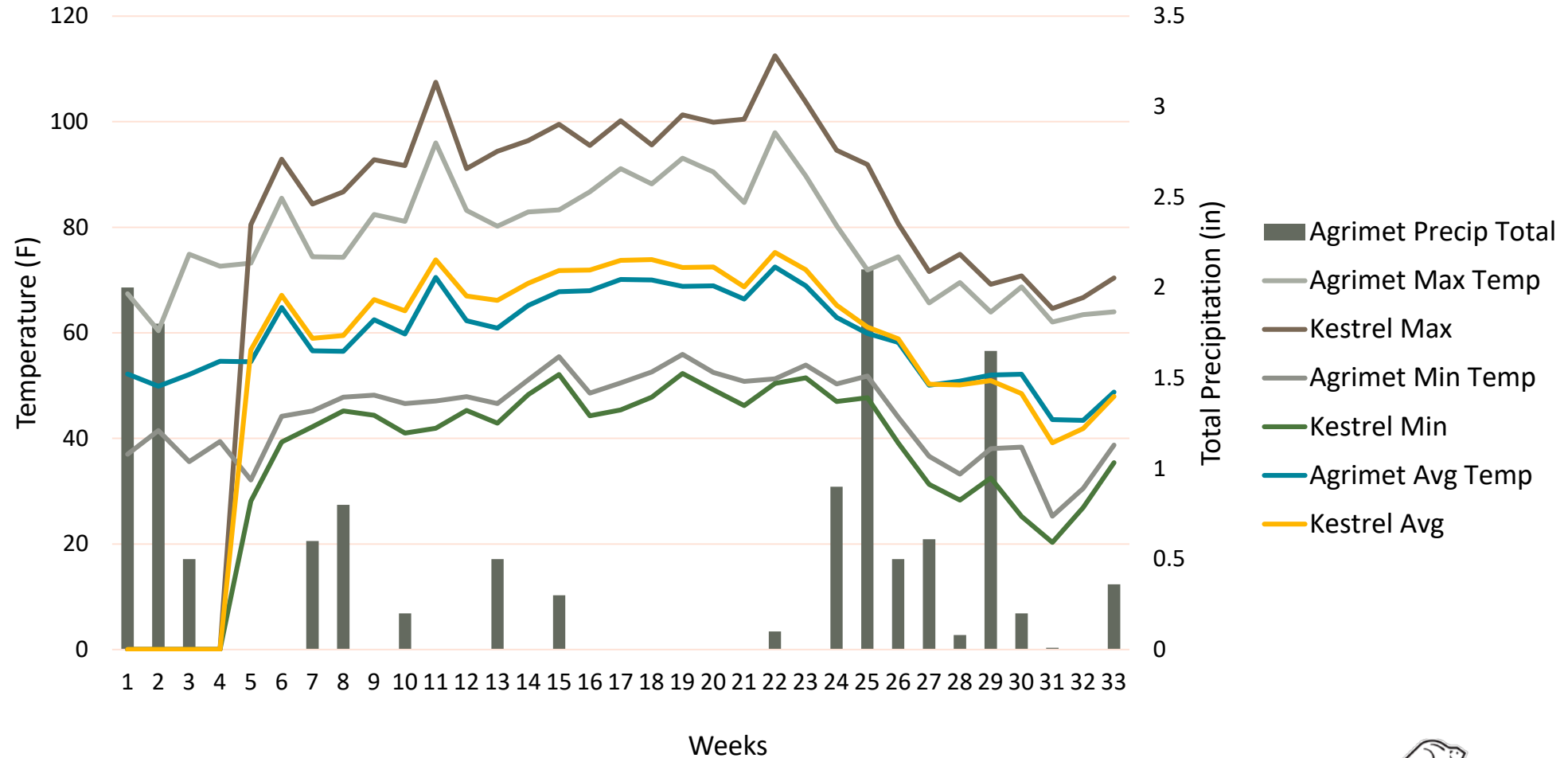
Ready made kits up from \$300-500 /100ft. Evaluated for wind tolerance and usable life.



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Temperature and precipitation

Weekly Temperatures & Precipitation During the 2019 Growing Season in Aurora, OR



Temperature higher (3 to 15F) in tunnels. Complete rain/hail protection.

2019 Yield Comparison for Low Tunnel Experiment

	Full Season Marketable Yield (g/plant)	Full Season Total Yield (g/plant)	Full Season Marketable Yield (%)	Main Season Marketable Yield (g)	Late-Season Marketable Yield (g)
Cultivar (C)					
Albion	351.9 b	503.1 b	70.02 a	327.3	24.6 a
Seascape	432.4 a	737.8 a	58.71 b	418.8	13.6 b
Sweet Ann	358.9 b	565.8 b	63.32 b	332.9	26.0 a
Crop Coverage Type (CCT)					
No Tunnel	337.6 b	525.5 b	65.10	335.1 b	2.5 b
Slitted	399.1 ab	615.2 a	65.30	381.7 ab	17.4 ab
Solid	406.5 a	666.0 a	61.64	362.2 b	44.3 a
Significance					
C	0.0060	<0.001	<0.001	NS	0.0060
CCT	0.0213	<0.001	NS	<0.001	0.0213
CXCCT	NS	NS	NS	NS	NS

Cultivar differences, and low tunnels increased full and late season yield

Growth Comparison- 2019 Renovation Data

Treatments

	Leaf Dry Weight (g)		
Cultivar	Albion	Seascape	Sweet Anne
Crop Coverage Type (CCT)			
No Tunnel	32.4 b	31.1 b	42.9 a
Slitted	35.5 b	31.3 b	46.5 a
Solid	31.2 b	34.9 b	44.4 a

Significance

Cultivar (C)	<0.00001
Crop Coverage Type (CCT)	NS
C x CCT	0.02130

Supplies (from left): A) conduit bender, B) conduit hoop (top), C) DuBois hoop,



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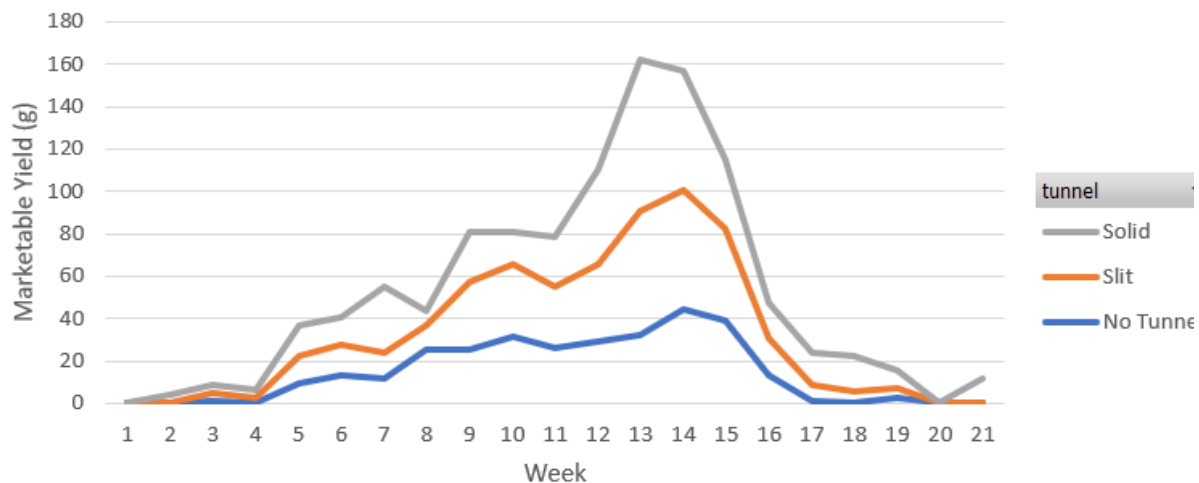
Growth Comparison- Crown Data

Treatments	Crown Diameter mm	Crown Number
Cultivar		
Sweet Anne	47.6 a	2.92 a
Albion	44.8 ab	2.35 b
Seascape	43.3 b	2.49 b
Crop Coverage Type (CCT)		
Slit	46.1	2.69 a
Solid	45.9	2.58 ab
Control	43.6	2.49 b
Significance		
Cultivar (C)	0.00283	<0.00001
Crop Coverage Type (CCT)	NS	0.0429
C x CCT	NS	NS

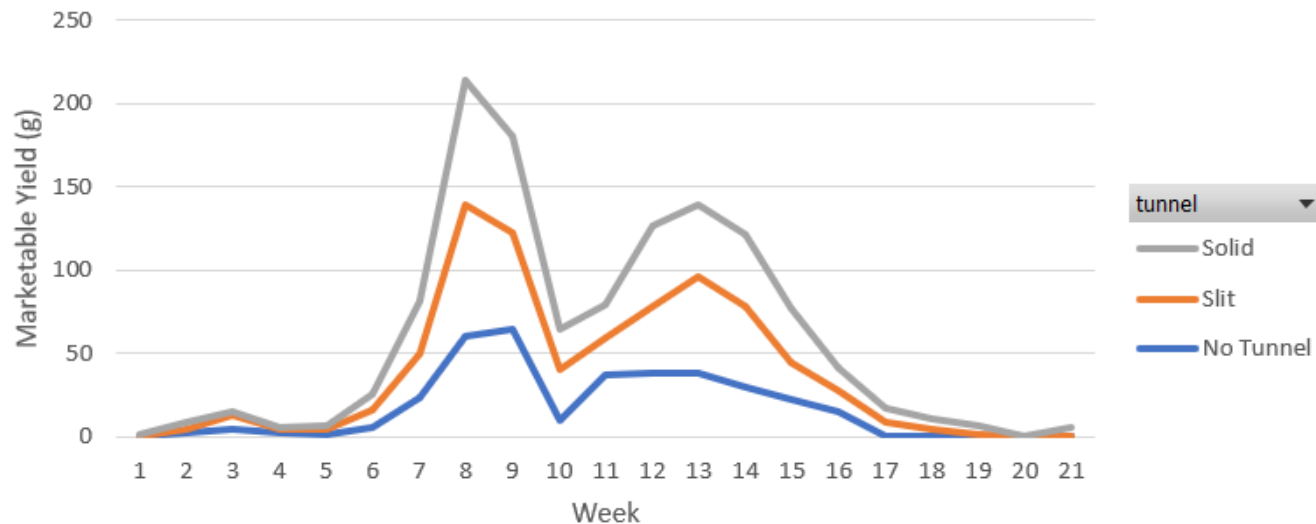


Cultivar weekly yield under tunnel treatments

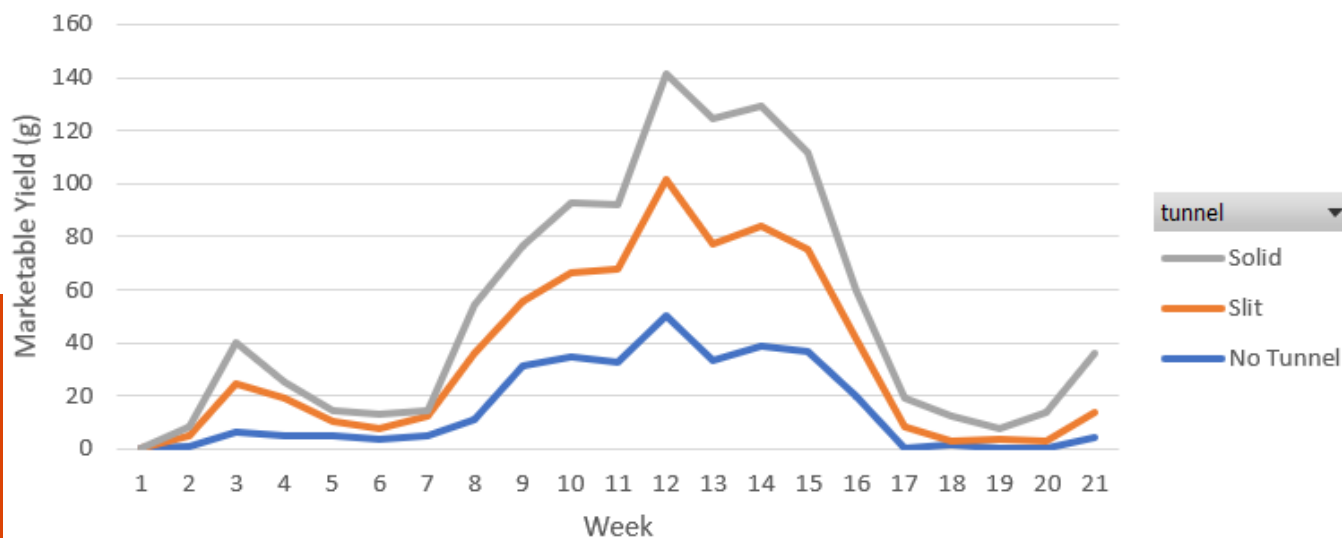
Albion



Seascape



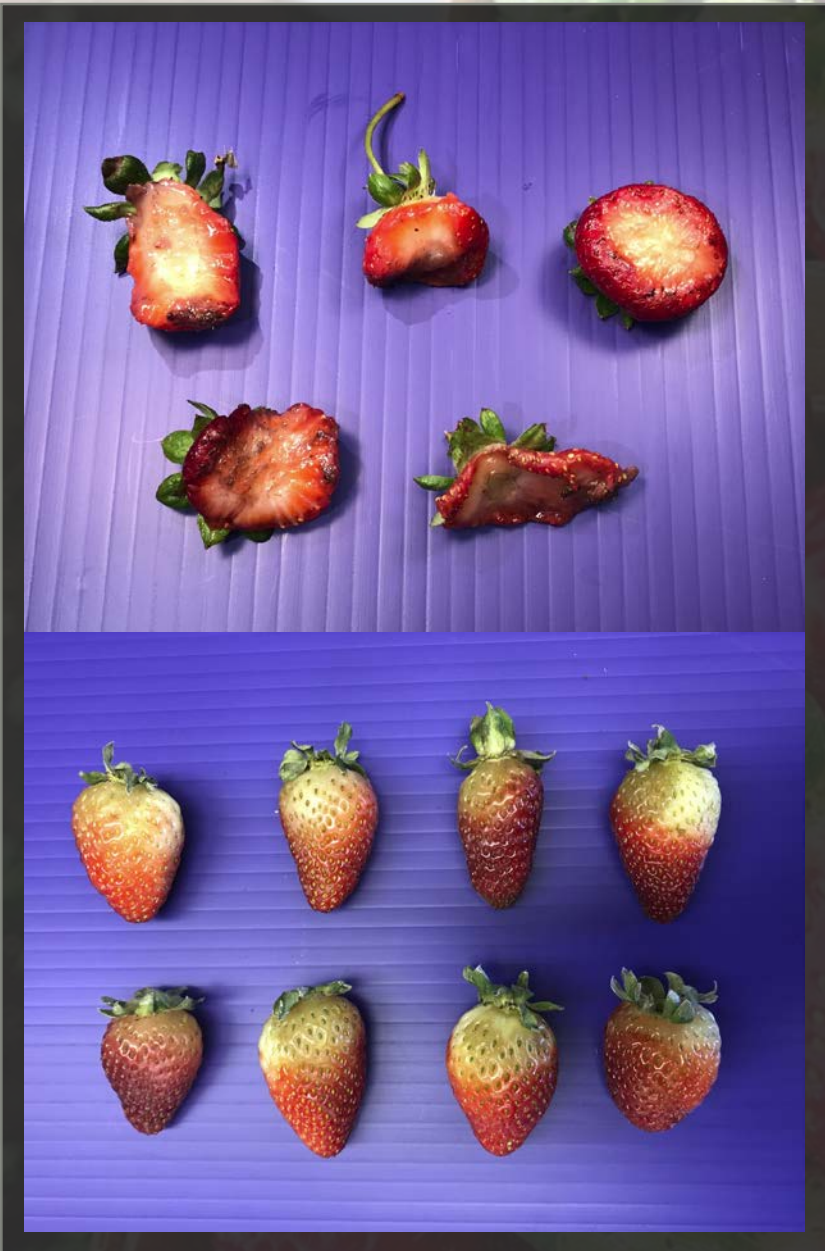
Sweet Ann



Fruit Quality

Marketable Fruit

Cull Fruit



The background of the slide features a close-up of several cardboard boxes for strawberries. The boxes are light brown and have images of red strawberries on them. Some text is visible on the boxes, including "PRODUIT DES É.U.", "POIDS NET 454g", and "Strawberries".

Thank you! Questions?

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Research updates on Instagram:

 **@javifernandezsalvador**

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