Dry Farming Melons and Watermelons in Western Oregon

Melons (*Cucumis melo*) and watermelons (*Citrullus vulgaris*) are annual fruit crops that can be grown in the Willamette Valley of Oregon without irrigation. Depending on their genetics, melons can be sweet or bland, aromatic or odorless, ephemeral or highly storable. Market class is a common way of categorizing the diversity of melons, and is in part a reflection of genetics and horticultural properties.

Market classes often share similar traits. For example, some, like cantaloupe, are very easy to judge as ripe, while others, like honeydew and watermelons, are more challenging. Understanding how these market classes differ will help farmers identify the cultivars that are most suitable for their farm system.

Glossary:

Climacteric – Climacteric melons continue to ripen after they are removed from the plant. They are usually more aromatic but have shorter shelf lives. Ripening after harvest can result in changes in color, texture, and aroma, but sugar accumulation stops after harvest (Goldman, 2019). Because sugar accumulation stops after harvest, the best quality climacteric melons are picked when they are ripe and then sold quickly, before they become overripe.

Non-Climacteric – Non-climacteric melons do not ripen after harvest (or at least ripen much more slowly). They are generally less aromatic and can be stored for a longer period of time after harvest. The increased storability of non-climacteric melons may be especially appropriate when dry farming because the harvest season is compressed.

Market class: Reticulatus – American Cantaloupe

American style cantaloupes are a ubiquitous melon in PNW farmers markets. This class is climacteric and is characterized by its strong fragrance, netted rind, high sugar content, and medium to short shelf life.

Ripeness - Many cultivars slip off (or fall off) the vine when they are ripe, and must be sold soon after to prevent spoilage. Additional signs of ripeness in the field include a change in color and strong fragrance.

Table 1: High Performing Reticulatus Cultivars

	Cultivar	Where to buy	Tons/acre	Ripening
American cantaloupe	Grafted Ambrosia	Log House Plants	22.5	Color, aroma, full slip
	Thunderstruck	Osborne	18.3	Color, aroma
	Ambrosia	Osborne	15.9	Color, aroma, full slip
	True Love	High Mowing	15.3	Color, aroma, full slip
	Hannah's Choice	Johnny's	13.1	Color, aroma, full slip
	Sugar Cube	Johnny's	12.6	Color, aroma, full slip
	Oregon Delicious	Adaptive Seeds	12.3	Color, aroma, full slip
	Athena	Johnny's	12.1	Color, aroma, full slip
Tuscan cantaloupe	Tirreno	Osborne	12.2	Color, aroma

Off flavors – Some of the cultivars of cantaloupe and charentais melons developed off flavors/aromas in our trial, including Sugar Cube and Anna's Charentais. We only noticed this towards the end of the growing season and did not collect thorough data on this problem. Future trials will screen for these off flavors and attempt to determine if they relate to dry farming and/or drought stress.

Grafting – Melons and watermelons can be grafted onto appropriate rootstocks for improved disease resistance and yield. As part of the project, we grew grafted Ambrosia and were able to compare its yield to the ungrafted version. Fruit weight was similar, however grafting resulted in increased fruit number, resulting in an increase in yield from 15.9 t/a to 22.5 t/a!

Market class: Cantalupensis – European Cantaloupe

In the fifteenth century, missionaries returning from Armenia introduced what would become know to the world as cantaloupes to the town of Cantalupo in Sabina, Italy. The most common European cantaloupe cultivars found in American seed catalogs are the charentais melons of French origin. Charentais can be either smooth or netted and are lightly ribbed with green vein tracts. They have high sugar content and a strong aroma. Charentais melons have a short shelf-life and also can develop off flavors, similar to American style cantaloupes like Sugar Cube. The fruits of charentais melons are often quite small. The charentais melons tended to have lower yields in our trial and were unrepresented in our high performing list. This may be due to their small fruit, we found a strong correlation between average fruit weight and total yield for melon.

Ripeness – Charentais melons can be identified as ripe based on color change of the rind and aroma. Also, the tendril closest to where the fruit stem attached to the vine will turn brown.

Market class: Galia Melons

Galia melons are Israeli melons that are a cross between a Cantalupensis and a Reticulatus melon cultivar. They are strongly aromatic, green fleshed, and with a yellow, netted rind. They can be identified as ripe by color change and strong aroma. They do not neatly fit into either the Reticulatus or the Cantalupensis market class.

Table 2: High Performing Galia Melon Cultivars

	Cultivar	Where to buy	Tons/acre	Ripening
Galia	Arava	Osborne	12.0	Color, aroma
	Visa	Osborne	14.4	Color, aroma

Market class: Inodorus – Honeydew, Piel de Sapo, Canary, and Crenshaw melons

Inodorus melons are characterized as being non-climacteric, meaning they do not ripen after harvest. Non-climacteric melons are less aromatic than climacteric melons like cantaloupes, thus the name "Inodorus". Some call Inodorus melons, "winter melons," because of their long shelf life. This long shelf life may be an important trait when dry farming as the harvest window is compressed (see continuous yield figures). Honeydews are perhaps the most recognizable members of the inodorous market class for American consumers, however this is a diverse market class with many different subclasses to enjoy, including Gaya, Piel de Sapo, Canary, and Crenshaw melons.

Ripeness – Because most Inodorus melons produce little fragrance and do not slip, it can be a bit trickier to judge them for ripeness. Common ripening traits include color change and softening of the blossom end. However, for some, like honeydew melons, this color change can be quite subtle. For honeydew, other ripening traits include a yellowing of the leaf closest to the fruit and a more waxy rind (as opposed to feeling fuzzy).

- **Honeydew melons** hail from the southern France and Algeria. They are very familiar to American consumers and have a very sweet flavor and a light aroma.
- **Gaya melons** are Japanese melons with a white rind speckled with green. They are similar to honeydews in flavor but are small. The cultivar we trialed, snow leopard, was incredibly prolific, producing an average of 10 fruit/plant on the day of their peak harvest. They are sometimes called "Dinosaur Melons" and may appeal to children.
- **Piel de Sapo (Santa Claus) and Amarillo (Canary) melons** are two popular Spanish melons. Both are very similar, with a long shelf life, very sweet flavor, a silky texture when ripe, and light aroma. When ripe the colors change, with the peel of Piel de Sapo becoming green with yellow speckles while Amarillo becomes a golden color. These melons should be harvested after they change color but while they are still firm, and then should be stored out of the sun (but not in a cooler) until they are ready to eat, which is when the blossom end is soft.
- **Crenshaw melons** are large teardrop shaped melons with good aromas and sweet and velvety flesh. One Crenshaw melon in particular, the Crane melon, has a long history of being dry farmed in Sonoma County, California. Because Crane has already received a great deal of public attention, dry farmed Crenshaw melons may be an easy sales pitch at the farmers market. Crenshaw melons can be identified as ripe by color change and softening at the stem and blossom end.

Table 3: High Performing Inodorus Cultivars

	Cultivar	Where to buy	Tons/acre	Ripening
Honeydew	Summer Dew	Osborne	18.8	Leaf yellowing, color change, waxy rind, blossom end softens
	Double Dew	Osborne	17.6	Leaf yellowing, color change, waxy rind, blossom end softens
Asian	Orange Sugar	Osborne	17.5	Color change, blossom end softens
Gaya	Snow Leopard	Johnny's	18.3	Color change (green to ivory), blossom end softens
Piel de Sapo	Lambkin	Johnny's	12.1	Color change (green to yellow background), blossom end softening
Canary	Amy	Osborne	17.3	Color change (yellow to gold), blossom end softening
Crenshaw	Lilly	Johnny's	18.1	Color change, blossom end softening

Market class Ameri:

Ameri melons hold great potential as a dry farmed crop. They are reportedly tolerant of drought and heat, and may contain genetics that are highly adapted to dry farm conditions. Ameri melons are from Uzbekistan and Turkmenistan. The cultivar 6131 performed well, yielding 18.5 tons/acre, however it is not commercially available.

Ripeness – For the two that we have trialed (6131 and San Juan) we were able to tell that they were ripe by aroma and color change. However, this group is very diverse, with four recognized subgroups, so this may not hold true for all cultivars.

Market class Makuwa:

The Makuwa melons are small sweet crisp melons from East Asia. They may have a unique market niche. We only trialed one cultivar, Torpedo, and it yielded many small fruit (10 ton/acre). We hope to trial more Makuwa melons in the future. Melons change from green to bright yellow as they ripen.

Watermelons:

Watermelons need no introduction. In 2022, we trialed seeded watermelons and had some success. Watermelon fruit size tended to decrease over the course of the harvest season, and many of the plants produced very tiny watermelons after their first set.

Ripeness – There are a number of methods that can be used in tandem to determine if a watermelon is ripe. First, farmers can examine the tendril closest to the fruit stem to see if it has turned brown and died back. In addition, the ground spot on the bottom of the watermelon will often turn from white to yellow. The rind will often be dull rather than shiny.

Table 4: High Performing Watermelon Cultivars

Cultivar	Where to buy	Tons/acre	Ripening
Grafted Sugar Baby	Log House Plants	34.1	Tendril dieback, ground spot, rind becomes dull
Winter King and Queen	Adaptive	15.0	Tendril dieback, ground spot, rind becomes dull
Cal Sweet Bush	Territorial	13.9	Tendril dieback, ground spot, rind becomes dull
Yellow Doll	Osborne	13.6	Tendril dieback, ground spot, rind becomes dull

Dry farming melons

Site and soil selection – In 2022, we trialed 41 melon and watermelon cultivars at the Oregon State University Vegetable Research Farm, outside of Corvallis, OR. The soil there is a Chehalis silt loam with more than 12 inches of available water holding capacity in the first five feet. We believe that this may be one of the best soils for dry farming in the Willamette Valley. However, a plowpan was present on the site and may have limited yields in the 2022 season (our tomato trial, planted in the same field, had much lower yields than in previous years).

Transplants – We had a lot of success starting melons indoors and then planting them out about a month later. Melons used for the trials were seeded on 4/13/2022, and a second "back-up" seeding occurred on 4/25/2022 (some of these plants were used as border plants and to fill plots if germination was low). We used 200 cell flats with cells that were 2 ¼" deep. Temperature of germination chamber was kept between 75 and 80°F. Plug mix used was Pro-Mix BX. Trays were subirrigated to prevent splashing and keep seedlings growing straight. Mike Hessel insisted that melon seeds be planted with the pointy end upright as this ensures that the cotyledons can easily break free from the seed coat.

Planting – Melons were planted on 5/27/2022. Soil was loosened using a garden fork and then transplants were planted using a Pottiputki. The ground was firmed up around the base of the transplant. Transplants were subirrigated prior to planting and then were watered in with about a liter of water after planting.

Spacing – We have found that 7 feet between rows and 4 feet in row spacing works really well for melons and watermelons. The 7 foot between row spacing is about as wide as you can go and still lay a layer of 12' row cover over them to protect them from striped and spotted cucumber beetle.

Fertilizer – Fertilizer was applied on 5/24/2022. Nutririch (4-3-2) was applied at 1100 lbs/acre and pelletized feathermeal (12-0-0) was applied at 630 lbs/acre. This was about half of the fertilizer that we had originally intended to apply. Fertilizer was incorporated using a powerharrow after it was applied.

Weeding – The field was kept clean using Allis-Chalmers Model G tractors, hoes, and wheel hoes.

Harvest – We harvested melons twice a week, on Monday and Thursday, starting on 8/15/2022 and ending on 9/26/2022. During the final harvest, melons that were almost ripe (would have ripened in the next week) were also collected. Harvest data for these melons was not included in the total yield data, however it was included in the continuous figures as a final harvest on 9/29/2022.

Handling and Storage – After harvest, melons should be moved to a cool, dark location to finish ripening. They should only be moved into the cooler once they are completely ripe, as moving them into a cooler will arrest the ripening process. This is especially true for inodorus melons and watermelons. Refrigerating melons for too long can affect their texture.

Sensory Evaluations – During the growing season we convened two different panels to evaluate melons, one of retailers/marketers and the other of farmers. Unfortunately we were not able to test more than five cultivars at each event as tomato sensory evaluations were the main objective of these panels. Data from these events is in Table 7.

Table 5: High Performing Melon and Watermelon Cultivars (>12 tons/acre)

Cultivar	Market class	Ripening	Total Yield (tons/acre)	Average fruit weight (lbs/fruit)	Incidence splitting	First set	Second set	Notes
6131	Ameri	Climacteric	18.5	5.7	5%	8/29-9/15		
Arava	Cantalupensis (Galia)	Climacteric	12.0	3.1	0%	8/18-8/29		Organic seed
Visa	Cantalupensis (Galia)	Climacteric	14.4	2.6	8%	8/15-8/22		
Lambkin	Inodorus (Piel de Sapo)	Non-climacteric	12.1	2.9	0%	8/18-9/26		Stores well
Amy Canary	Inodorus (Canary)	Non-climacteric	17.3	2.9	21%	8/22-9/1	9/15-9/26	Stores well
Orange Sugar	Inodorus (Asian)	Non-climacteric	17.5	1.6	17%	8/18-8/29	9/15-9/26	
Double Dew	Inodorus (Honeydew)	Non-climacteric	17.6	3.5	0%	8/22-8/29	9/26	
Lilly	Inodorus (Crenshaw)	Non-climacteric	18.1	5.8	0%	8/18-8/22	9/26	Matt's Favorite, stores well
Snow Leopard	Inodorus (Gaya)	Non-climacteric	18.3	1.8	15%	8/18-8/29	9/19-9/26	
Summer Dew	Inodorus (Honeydew)	Non-climacteric	18.8	4.4	5%	8/29-9/5	9/26	
Athena	Reticulatus	Climacteric	12.1	3.9	0%	8/22-9/1	9/12-9/26	
Oregon Delicious	Reticulatus	Climacteric	12.3	3.0	0%	8/22-9/1		Organic seed
Sugar Cube	Reticulatus	Climacteric	12.6	1.8	0%	8/22-9/1	9/8-9/26	Can develop off-flavors
Hannah's Choice	Reticulatus	Climacteric	13.1	3.0	0%	8/22-8/29		
True Love	Reticulatus	Climacteric	15.3	4.3	0%	8/18-9/5	9/26	Organic seed
Ambrosia	Reticulatus	Climacteric	15.9	3.5	0%	8/25-9/5	9/12-9/26	
Thunderstruck	Reticulatus	Climacteric	18.3	3.5	9%	8/25-9/5	9/19-9/26	Does not slip
Ambrosia (grafted)	Reticulatus	Climacteric	22.5	3.5	5%	8/25-9/22		
Tirreno	Reticulatus (Tuscan)	Climacteric	12.2	3.1	4%	8/25-8/29	9/8-9/19	Organic seed
Yellow Doll	Watermelon	Non-climacteric	13.6	4.0	0%	8/15-8/25	9/8-9/26	
Cal Sweet Bush	Watermelon	Non-climacteric	13.9	14.3	20%	8/25-9/5		
Winter King	Watermelon	Non-climacteric	15.0	9.7	0%	8/25-9/12	9/26	Organic seed, stores well
Sugar Baby (grafted)	Watermelon	Non-climacteric	34.1	8.8	0%	8/18-8/29	9/12-9/26	Organic seed

Table 6: Cultivars with <12 tons/acre

Cultivar	Market class	Distributor	Yield (tons/acre)	Average fruit weight (lbs)	Notes
Mini Love	Watermelon	Johnny's	4.1	4.4	
New Queen	Watermelon	Osborne	5.1	3.0	
Tom	Watermelon	High Mowing	6.1	4.4	
Halona	Reticulatus	Johnny's	6.6	2.2	
D'Artagnan	Cantalupensis (Charentais)	Johnny's	7.2	2.3	
Anna's Charentais	Cantalupensis (Charentais)	Johnny's	7.8	2.2	Many fruits had off flavors
Kazakh	Inodorus (Asian)	Adaptive Seeds	7.8	1.8	
HD093	Inodorus (Honeydew)	Osborne	9.4	2.4	
Cathay Belle	Watermelon	Osborne	10.0	5.9	
Torpedo	Makuwa (Korean)	Johnny's	10.1	0.8	
San Juan	Ameri	Osborne	10.3	3.7	
Milan	Reticulatus	Johnny's	11.1	2.6	
Dark Belle	Watermelon	Johnny's	11.2	6.0	
Divergent	Reticulatus	High Mowing	11.2	3.3	
Siven	Cantalupensis (Charentais)	High Mowing	11.8	2.0	

Table 7: Taste Test Results

Event	Cultivar	Appearance	Flavor	Texture	Willingness to Buy
Corvallis Farmer's Field Day (Sept 7)	6131	**1.3***	1.4	**1.3***	**1.4***
	Ambrosia	**1.3***	1.7	1.7	1.7
	Amy Canary	1.4	**1.3***	1.5	**1.4***
	Summer Dew	1.6	1.6	1.8	1.5
	True Love	1.6	2.0	1.6	1.8
Portland Marketer's Field Day (August 31)	6131	Display melons not available, but marketers agreed that they generally want a smaller melon	1.7	1.4	1.6
	Arava		1.5	1.2	1.4
	Sugar Cube		1.4	1.5	1.4
	True Love		**1.2***	**1.1***	**1.1***

Appendix 1: Photos of ripe and unripe melons from diverse market classes

Unripe Ripe

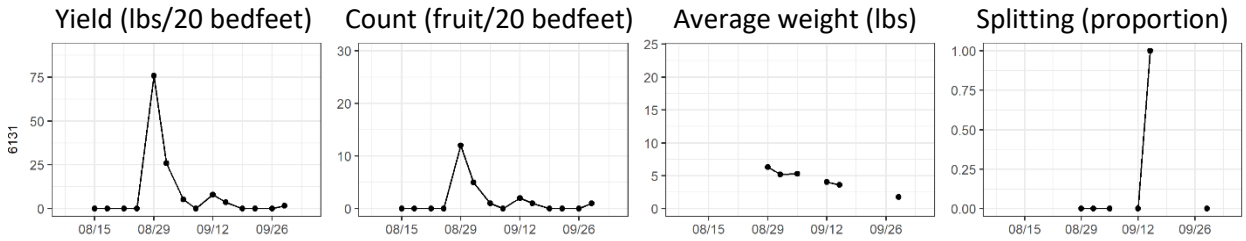
Unripe Ripe

Unripe Ripe

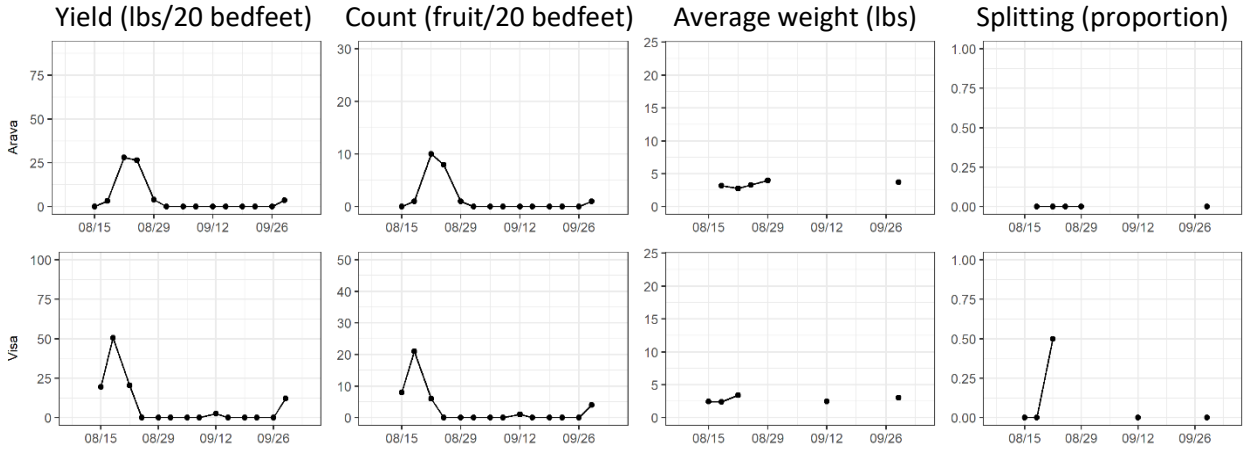
Unripe Ripe

Appendix 2: Continuous Yield Data

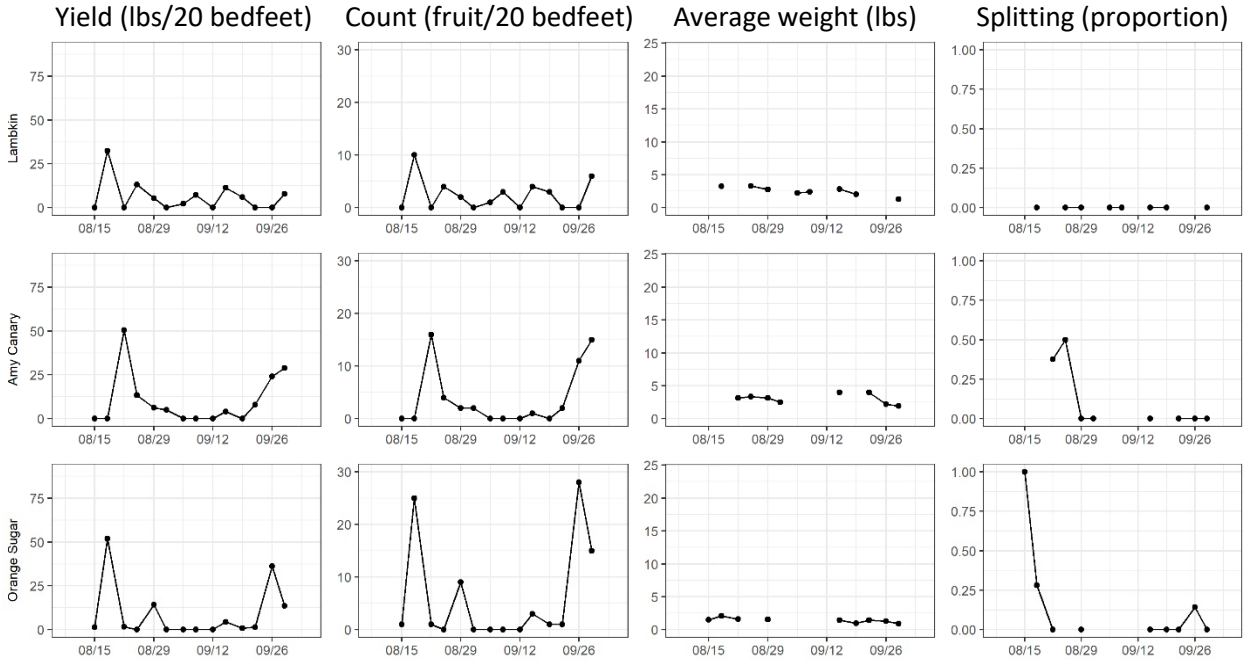
Ameri Melons

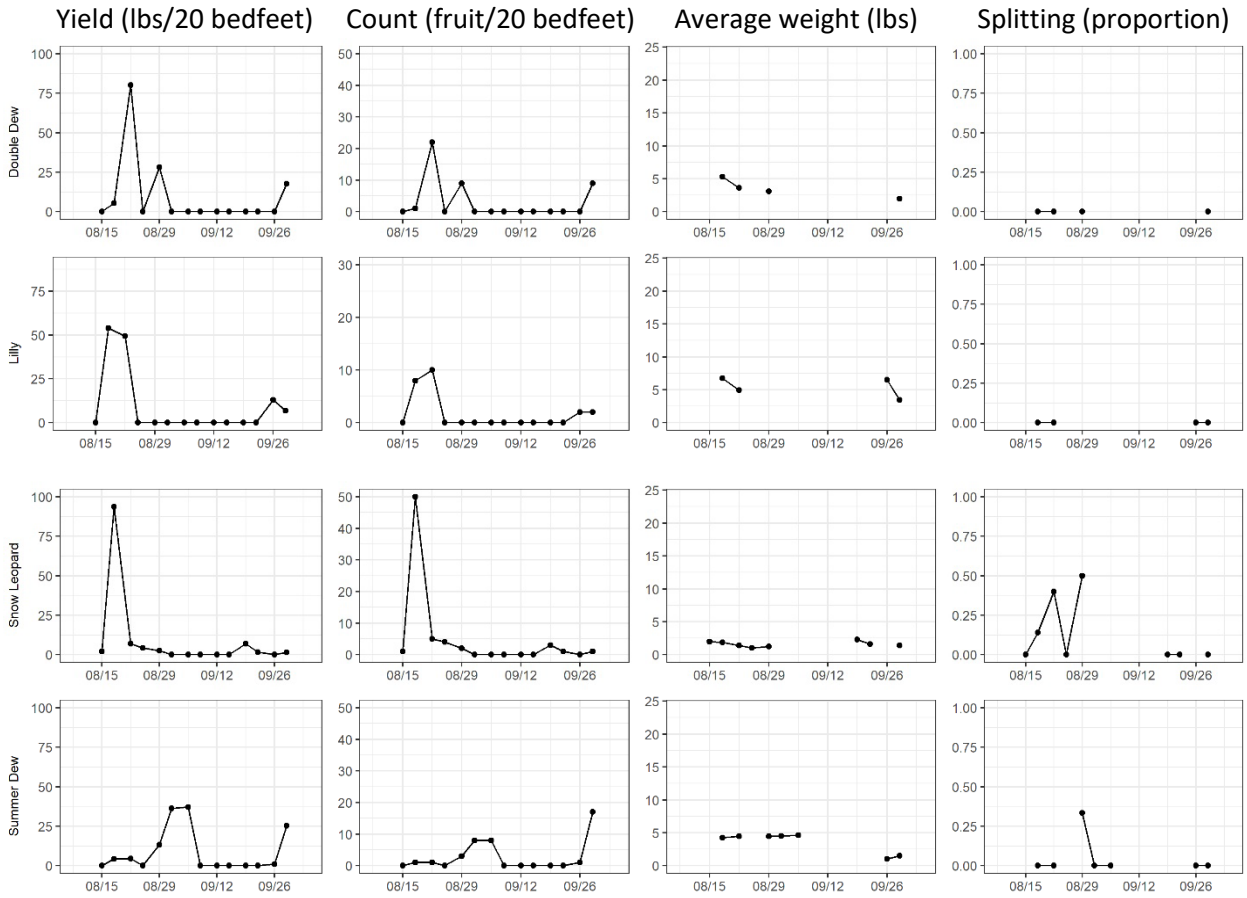


Galia Melons

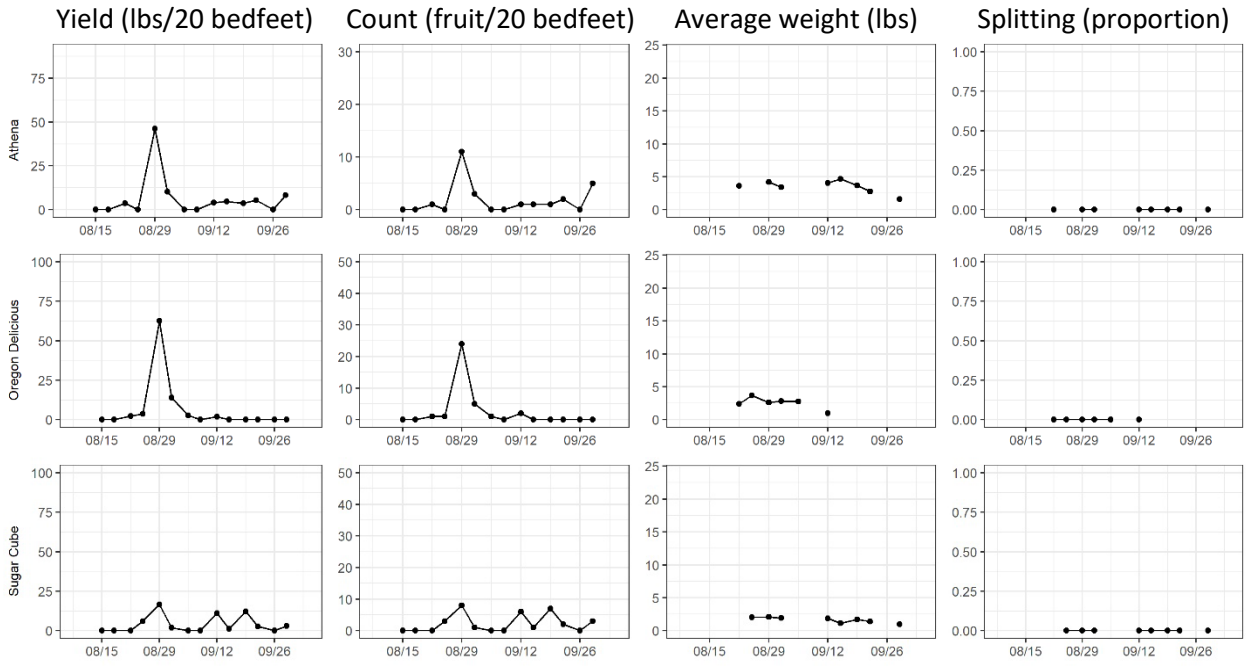


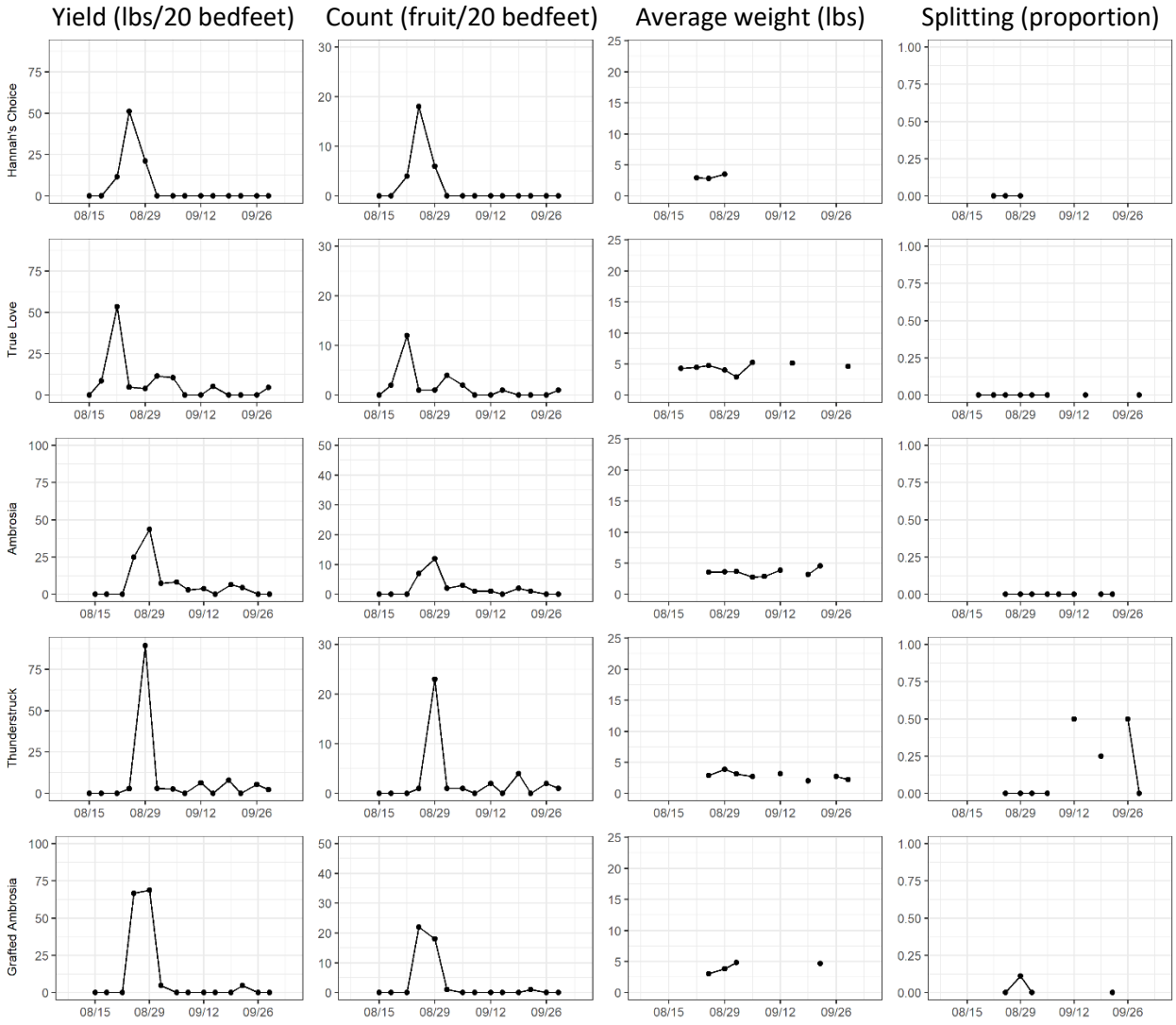
Inodorus Melons



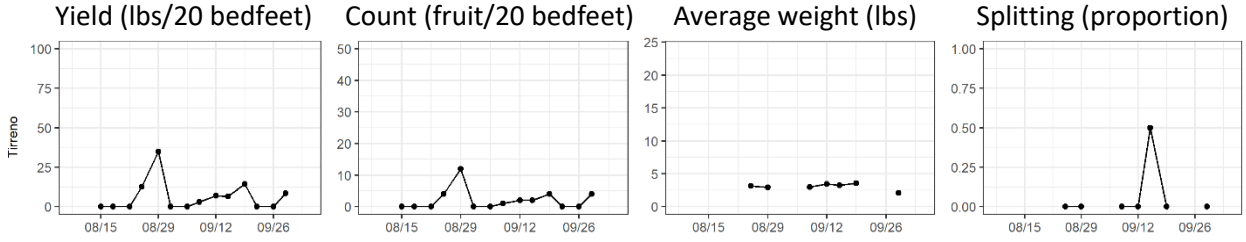


American Cantaloupe

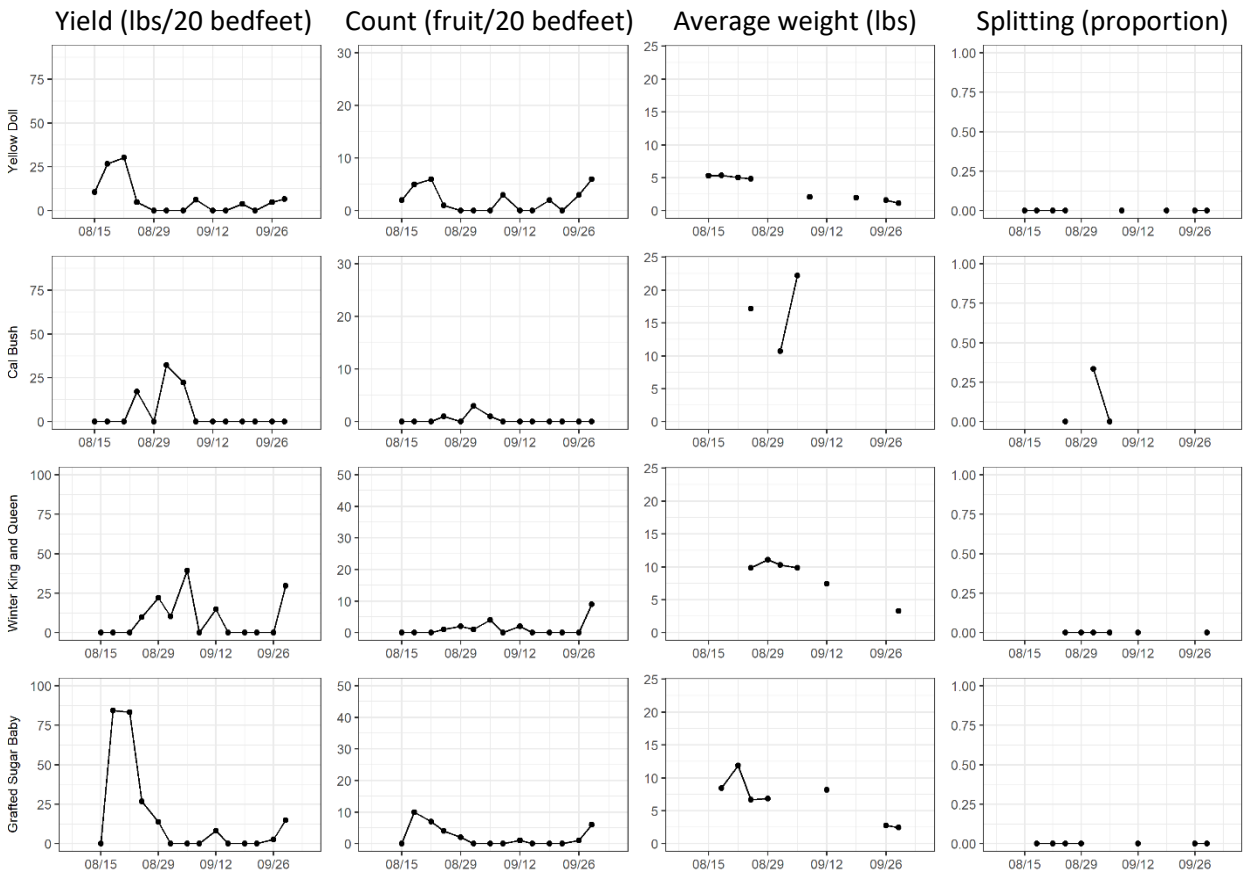




Tuscan Cantaloupe



Watermelons



Citations:

Goldman, A. 2019. The Melon. 1st ed. City Point Press, Westport, CT, USA.