Understanding Cold Conditioning in Strawberry 2023-2025

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CBC

Naturipe - UC

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Introduction

- Dormancy and cold conditioning of plants
- The two parts of cold conditioning in California strawberry
- Explanation of what we will be looking at together
- 2023-2024 CBC trial
- 2024-2025 Naturipe Trial

- Summary and concluding thoughts

What happens to the plant in dormancy and afterwards:

- Toward the end of the growing season, as temperatures drop and light decreases, the plant slows down and moves sugars into reserves as starch.
- Given that the plant once taken out of storage has no leaves, the plant must draw on its stored reserves to grow new leaves and recommence producing its own sugars through photosynthesis.

Definition of chill in strawberry

- In-ground, field chill: Temperatures between 33 and 45 degrees.
- Supplemental chill: Post harvest, boxed plants. Temperatures held at steady (or close to it) 34 degrees.

High elevation, MacDoel

October 7, 2021 245 hours of chill

Photo courtesy Doug Thomas, Crown Nursery

October 17, 2021, 305 hours of chill

Photo courtesy Doug Thomas, Crown Nursery

Harvest of strawberry transplants

Strawberry transplants shipped in boxes

Why is this important?

- What is the right amount of in-field chill?
- What is the right amount of supplemental chill?

- What are the mechanics of dormancy and dormancy breaking in strawberry?

2023-2024 CBC trial

- Varieties Monterey and Alturas
- Plants harvested 10/17/2023 (308 units chill)
- Final dig date on November 2 (449 units of chill) had Monterey taken.

Carbohydrate and Sugar Dynamics – Monterey 2023

Monterey	Glucose %	Fructose %		Starch %
17-Oct	3.7	2.4		15.9
1 wk hold	5.86*	4.1*		11.5
2 wk hold	5.28*	3.8*		8.8*
3 wk hold	4.3	3.9*		7.9*

* Significantly different from Oct 17 (receipt) sample at 95% confidence level.

Monterey	Glucose %	Fructose %		Starch %
Nov 9 – no supplemental	4.0	3.5		15.8

Carbohydrate and Sugar Dynamics – Alturas 2023

Alturas	Glucose %	Fructose %		Starch %
17-Oct	4.7	2.6		13.7
1 wk hold	6.3*	3.5*		8.3*
2 wk hold	5.8	4.3*		8.2*
3 wk hold	4.9	4.2*		7.5*

* Significantly different from Oct 17 (receipt) sample at 95% confidence level.

Harvest, first week, first month, first half and totals

	First Harvest	April total	First half thru June	Total yield
Monterey, 1 week sup	32	261	4108	9221
Monterey, 2 week sup	20	264	4897	9748
Monterey, 3 week sup	35.2	251	4211	8539

	First Harvest	April total	First half thru June	Total yield
Alturas, 1 week sup	61.2 a	534.5	5276.5 b	13433.3 b
Alturas, 2 week sup	94.2 a	683.5	6310.8 a	15512.5 a
Alturas, 3 week sup	31.8 b	480.0	6062.8 a	14775.8 ab

2024-2025 Naturipe Study

Introduction

- Evaluate the physiological changes the strawberry varieties Monterey, Eclipse, Golden Gate, Monarch and Keystone undergo during field and supplemental chill.

- 2024-2025: Evaluate the field performance of these varieties exposed to three variations of supplemental chill; 0 weeks chill (Nov 1,2024), 1 week of chill (Nov 7, 2024) and 2 weeks of chill (Nov 14, 2024). Chill accumulation at harvest (Oct 30)= 411 hours.

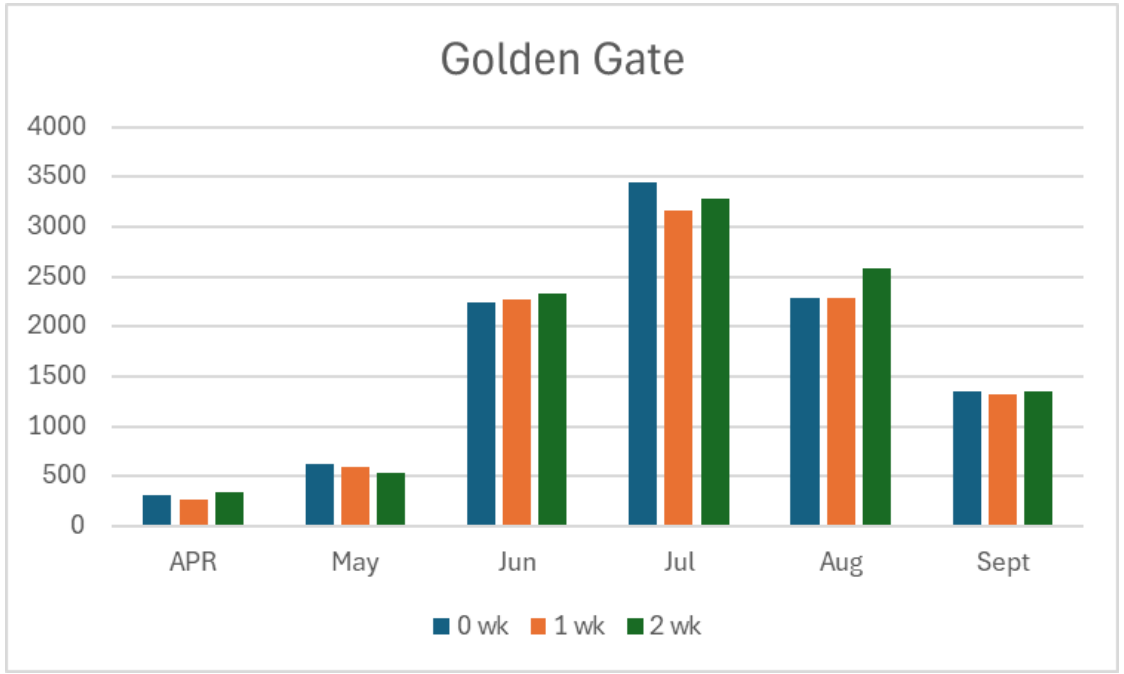
Test Plot: Naturipe Research Farm, Salinas

Variety 2024-2025	Weeks cold storage	Glucose (%)	Fructose (%)	Starch (%)
Golden Gate	0	3.0	3.0	10.9
Golden Gate	1	2.9	2.5	12.1
Golden Gate	2	3.5	3.3	6.4*
Eclipse	0	3.4	3.7	9.0
Eclipse	1	4.1*	3.8	5.2*
Eclipse	2	5.0*	5.1	5.5
Keystone	0	4.8	4.2	10.0
Keystone	1	3.7	3.3	10.8
Keystone	2	4.0	3.7	8.4
Monarch	0	4.3	3.9	15.6
Monarch	1	5.2*	4.6*	13.7
Monarch	2	4.4	3.3	11.1
Monterey	0	3.8	3.8	12.3
Monterey	1	3.1	4.0*	14.3
Monterey	2	4.8	4.4	11.5

Runner Production – Golden Gate & Eclipse

Variety	Weeks cold storage	4/16/2025	5/14/2025	6/11/2025	7/9/2025	8/15/2025
Golden Gate	0	0.0	34.7	71.3	53.7	14.3
Golden Gate	1	0.7	71.7	109.0	62.3	19.0
Golden Gate	2	2.3	81.3	110.7	49.0	38.3
Eclipse	0	14.3	76.7	70.3	36.3	17.3
Eclipse	1	19.0	113.3	87.3	35.3	19.0
Eclipse	2	38.3*	108.7	73.7	28.0	10.7

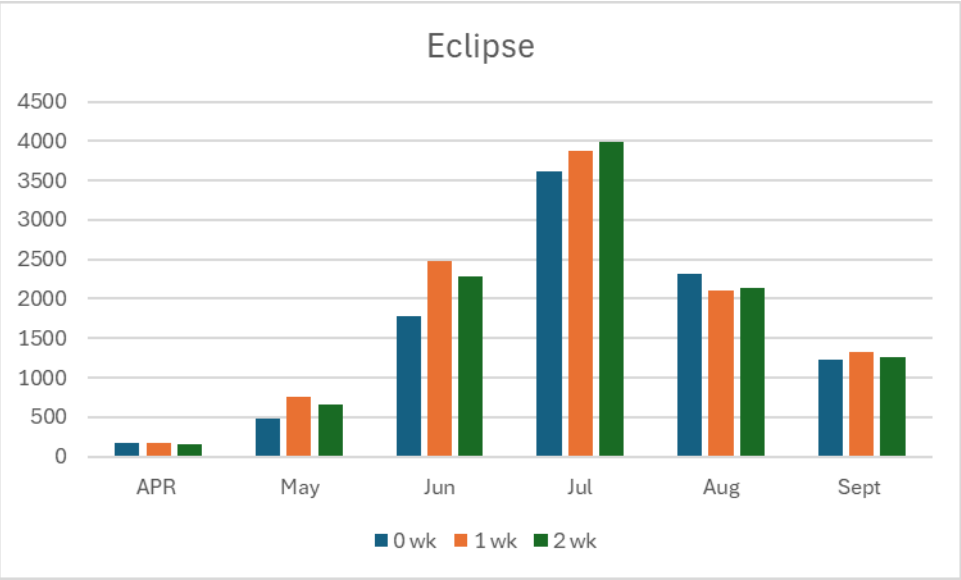
Yields by Month



Total season yields – Golden Gate

Supplemental Chill	Yield in 10# crate / acre
0 weeks	10262
1 week	9889
2 weeks	10428

Yields by month



Supplemental Chill	Yield in 10# crate / acre
0 weeks	9601 b
1 week	10687 a
2 weeks	10473 a

Concluding Slide

- The effects on the strawberry plant of field chill and supplemental chill are qualitatively different.
- The effects of chill on subsequent plant performance in the production field can affect certain varieties, others not so much.
- It would be interesting to do this work on short day varieties.

- Thank you to the many people involved in this work!