



USU Ranunculus and Anemone Trials

Shannon Rauter
Plant Science MS Student
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Ranunculus asiaticus and *Anemone coronaria*

- Native to eastern Mediterranean, adapted to avoid hot, dry summers¹
- Reproduce by seed and storage organs
- Perennials cultivated as annuals for cut flower production due to low tuber survival²



Ranunculus tuberosus roots



Anemone tubers

¹Meynet, 1993 ²Armitage & Laushman, 1990

Should We Plant in the Fall or Spring?

- Reliably winter hardy to Zone 7^{1,2,3}
- Flowering expected 3 months after planting⁴
- Springs freeze overnight, and daytime is hot and bright through summer, potentially delaying harvests and lowering flower quality.
- Can planting in the fall solve this problem?

¹Gill et al., 2012 ²Powell, 2004 ³Taylor, 1961

⁴Benzakein & Chai, 2017



Minimum Temp (F)	Zone
-60 to -50	1
-50 to -40	2
-40 to -30	3
-30 to -20	4
-20 to -10	5
-10 to 0	6
0 to 10	7
10 to 20	8
20 to 30	9
30 to 40	10
40 to 50	11
50 to 60	12
60 to 70	13

Ideal Growing Conditions

- Minimum temperature for growth 26°F¹
- Optimum air temperature for flowering^{2,3,4}:
 - Day: 60-68°F
 - Night: 40-55°F
- Long days (>13 hrs) accelerate flowering at low soil temps, trigger dormancy at higher soil temps (>77°F)⁴



Photo: Phoenixperennials.com

¹Sakai & Yoshie, 1984 ²Carillo et al., 2019 ³Horovitz, 1985 ⁴Meynet, 1993

Trial Goals

- Determine optimal practices to advance harvest and maximize yield:
 - High tunnel and field
 - Planting dates
 - Winter protection
 - Tuber preparation
 - Cultivar selection
- Work with 17 grower collaborators to investigate different microclimates



Trial Cultivars and Field Site

Field Site: Greenville Research Farm

- North Logan, UT (41.7665°, -111.811°)
- Elevation: 4635'
- USDA Hardiness Zone 5

Year 1 (2019-2020): Ranunculus only

- 'LaBelle', 'Amandine', 'Gigi', 'Tecolote'

Years 2 - 3 (2020-2022): Ranunculus and Anemone

- 'LaBelle' and 'Amandine'
- 'Galilee' and 'Carmel'



Year 1 Methods

High tunnel:

- Nov, Feb, Mar planting dates
- Winter protection:
 - HT only
 - Low tunnel (Ag-50 fabric) inside a high tunnel

Field:

- Nov, Mar, Apr planting dates
- Winter protection:
 - None
 - Mulch only (4" straw)
 - Low tunnel with mulch.
 - Ag-50 fabric, plastic, or plastic and fabric with 4" straw



Year 2 Methods

High tunnel:

- Nov, Jan, Feb, Mar planting dates
- Winter protection:
 - HT only
 - Low tunnel inside a high tunnel
- Presprouting

Field:

- Nov, Mar, Apr planting dates
- Winter protection:
 - None
 - Mulch only
 - Low tunnel only
 - Low tunnel with mulch
- Presprouting



High Tunnel/Field Prep

- Formed 4' wide beds in field and high tunnel
- Split application of N, P, and K fertilizer between fall and spring
- Installed low tunnels, mulch, and drip tape after planting

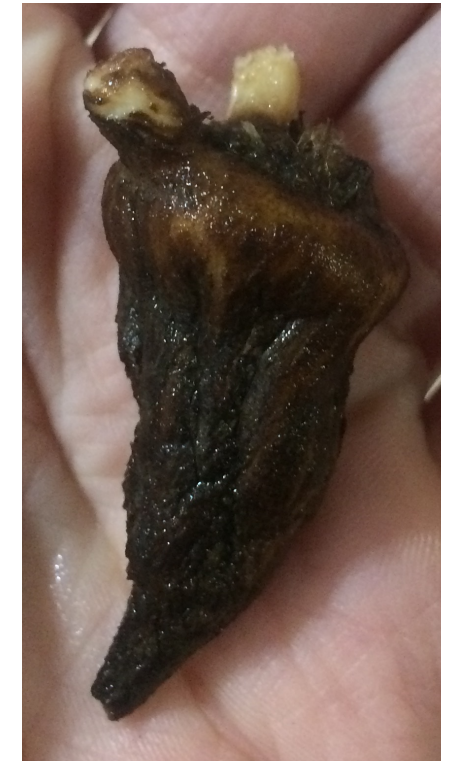
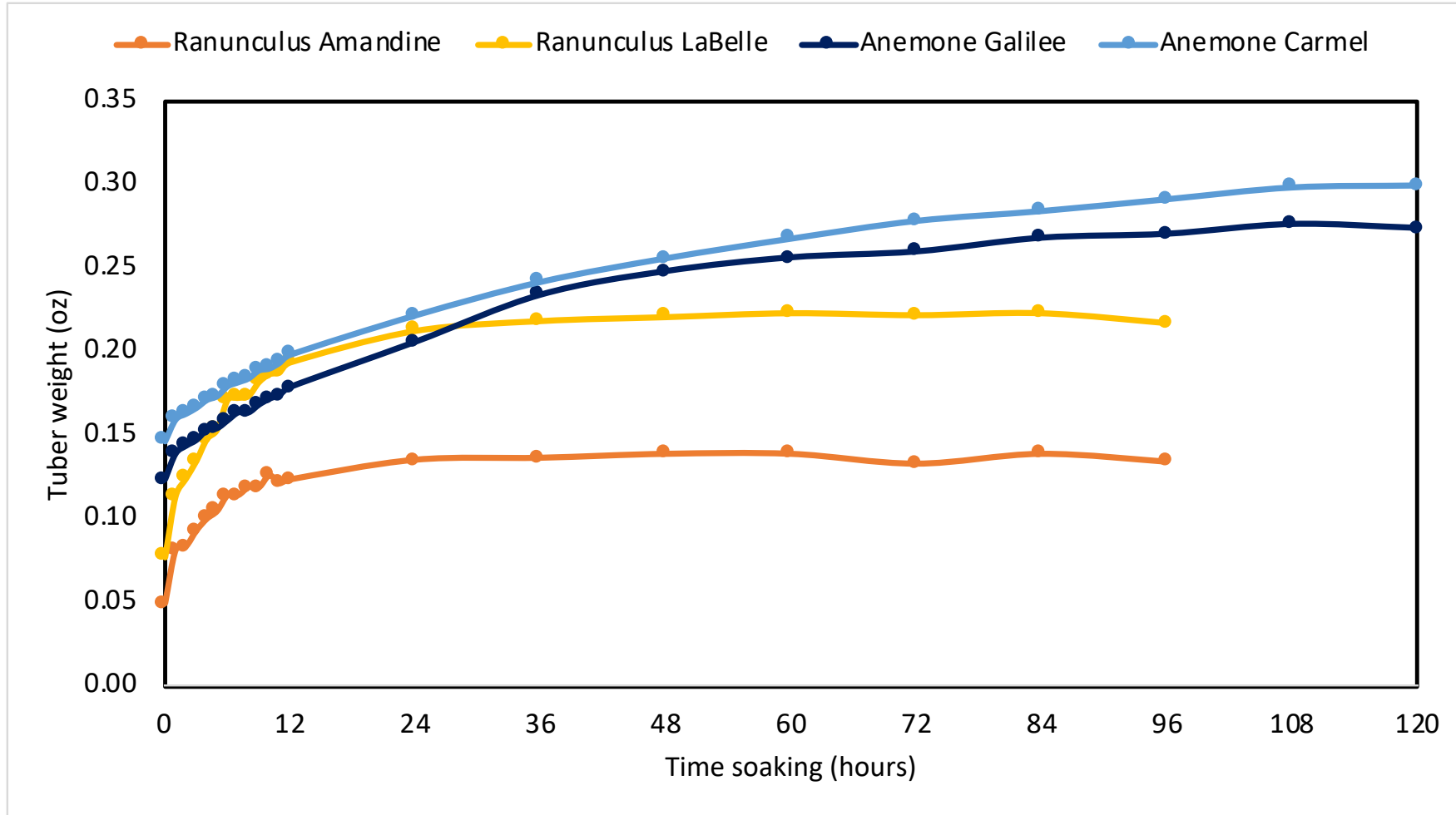


Presoaking and Presprouting

- Tubers soaked for 3-4 hours in room temp water, for last 20 min (60 min for anemone) drained and soaked in 0.3% Captan
- Presprouting: tubers placed in flats of moist potting soil, left in GH (~70°F) for 7 days and then garage (~40°F) for 7 days



Water Uptake by Tubers over Time



Planting: 6" x 6" spacing, 2" depth, staggered rows, pointy ends down





We measure:

- plant emergence
- soil temperature
- moisture content
- air temperature
- harvest season length and timing
- stem grade and quantity
 - Marketable stems are 10" long or more, straight, and otherwise unflawed. Anything else is a cull.



2019-2020 Results

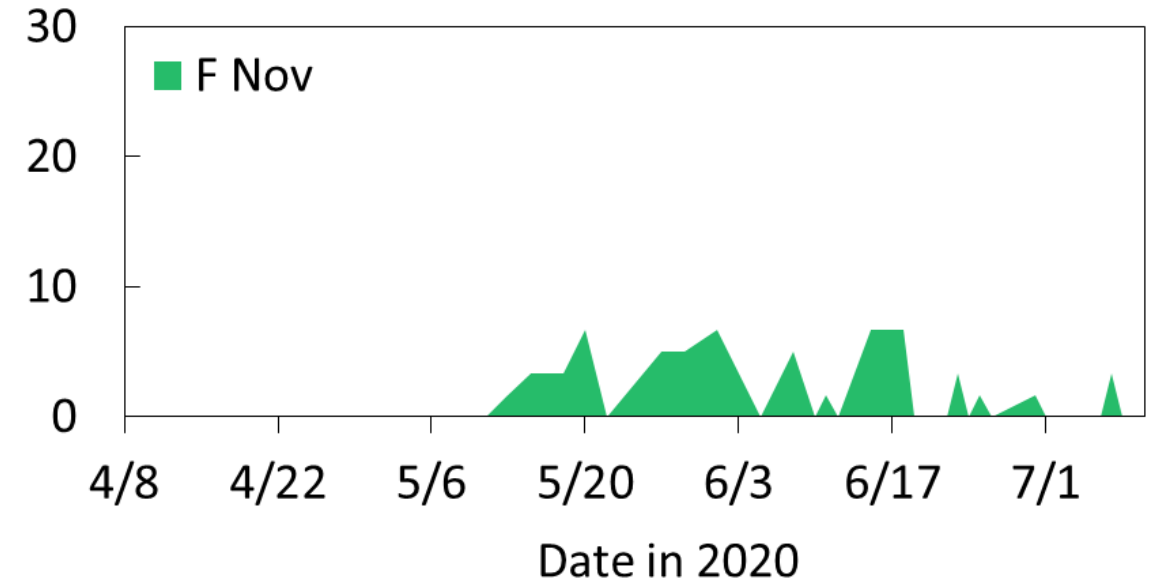
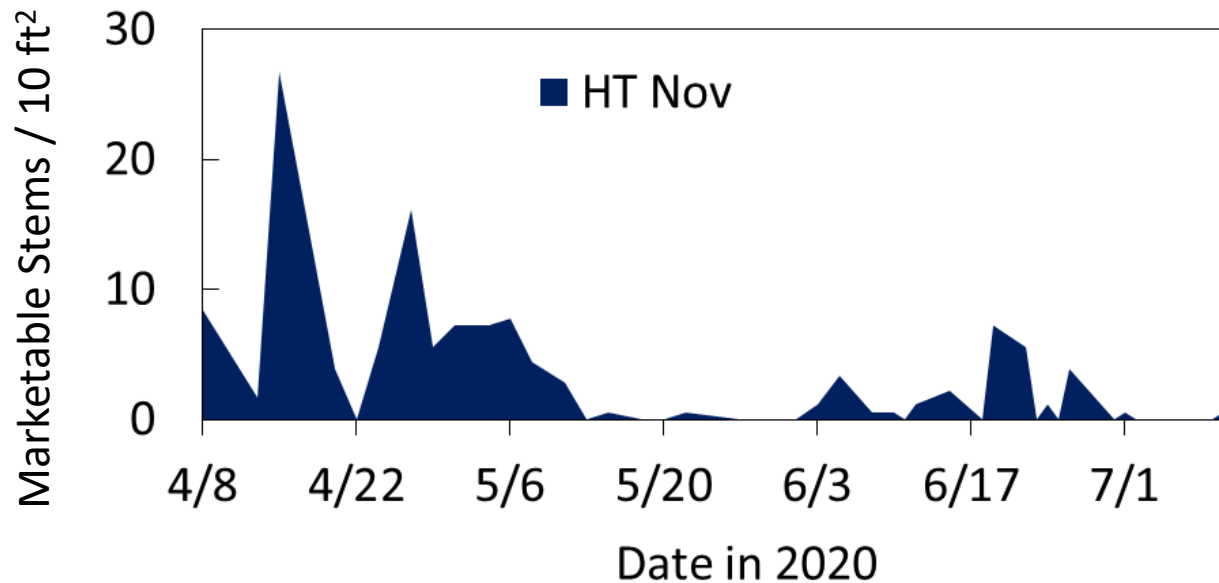


Plant survival – ‘La Belle’

Emergence (%) in a high tunnel and field, with (+) or without (-) low tunnel (Ag-50) and mulch (4” straw)

Location	Winter Protection		Planting Time	
	High Tunnel	+Low tunnel	93%	Nov
-Low tunnel		98%	Feb	96%
		Mar	93%	
Field	+Low tunnel + mulch	96%	Nov	90%
	-Low tunnel -mulch	90%	Mar	94%
			April	95%

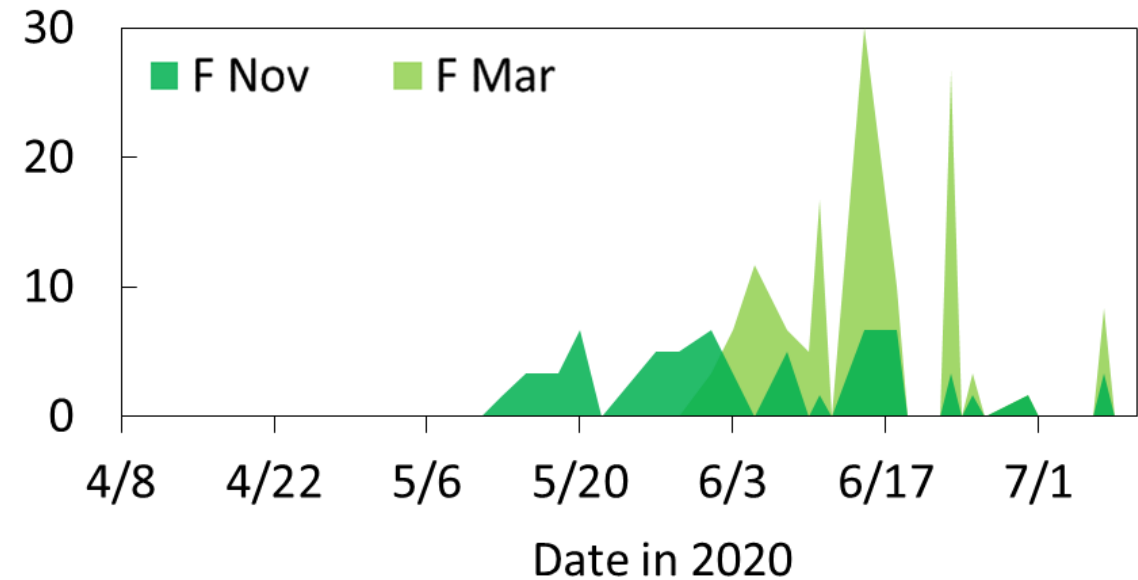
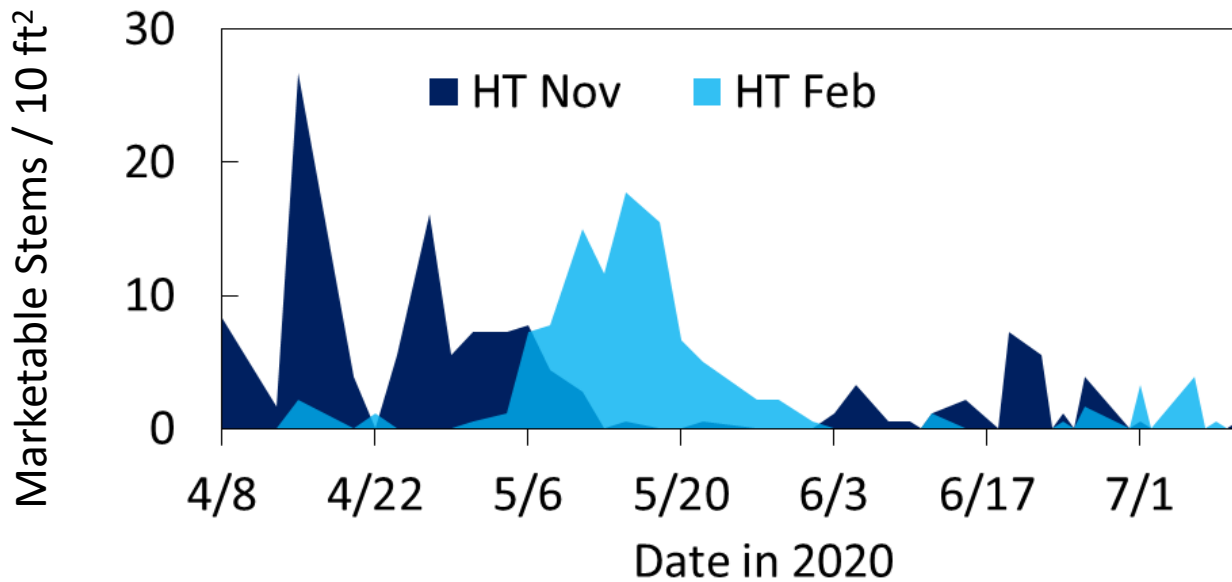
Daily Harvest – ‘La Belle’ – November (HT & F) Plantings



HT First harvest: 4/8
HT Peak Harvest: 4/15

F First Harvest: 5/13
F Peak Harvest: 6/1

Daily Harvest – ‘La Belle’ – February (HT) & March (F) Plantings



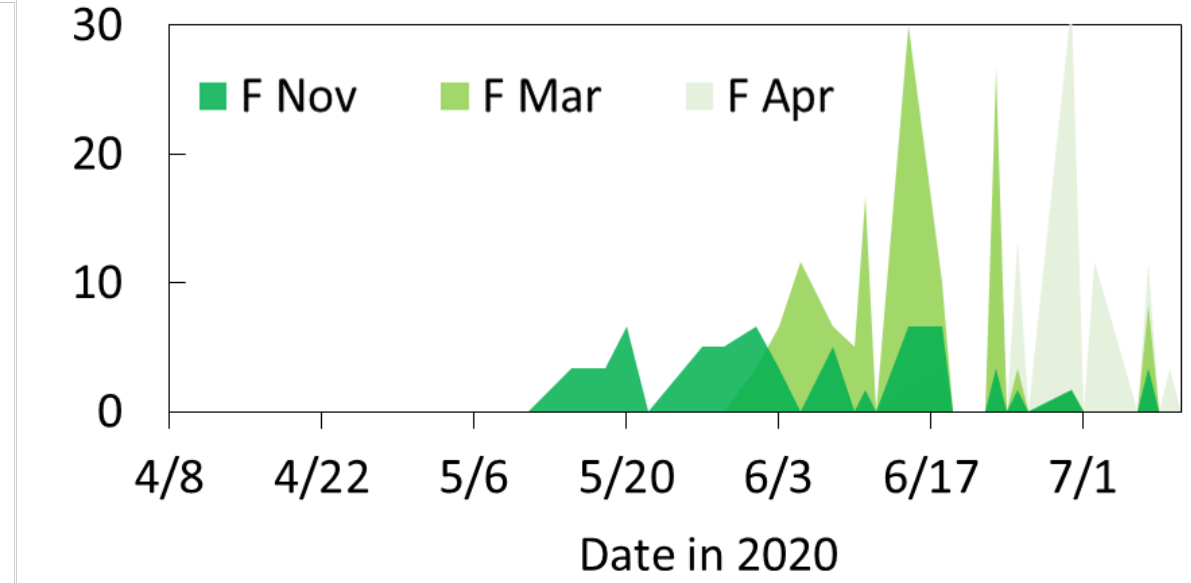
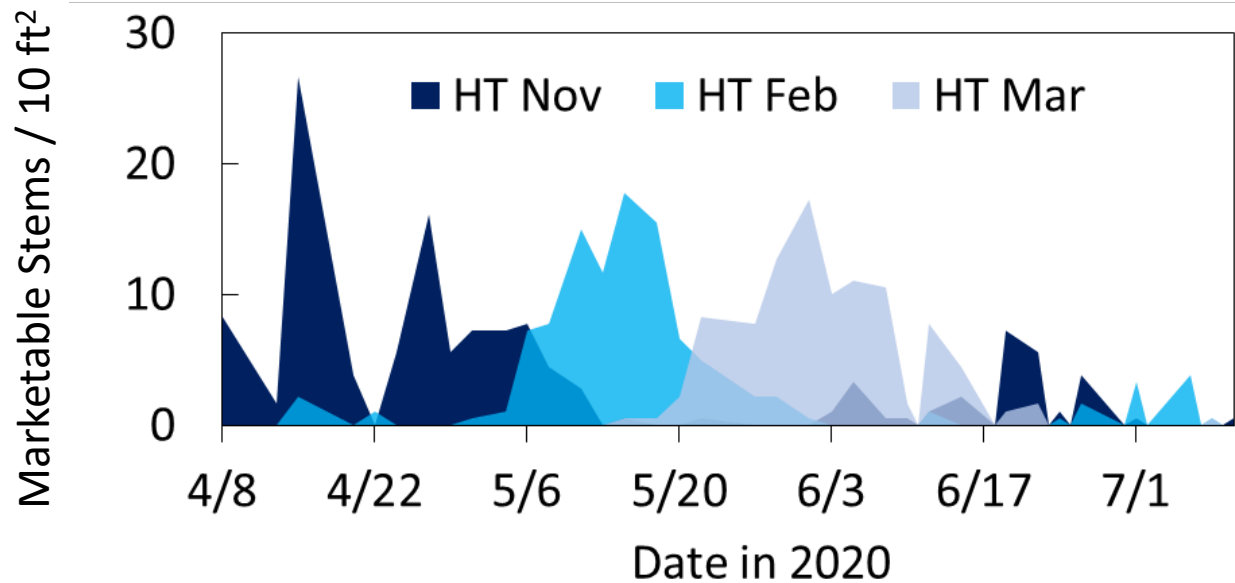
HT First harvest: 4/15

HT Peak Harvest: 5/15

F First Harvest: 6/1

F Peak Harvest: 6/15

Daily Harvest – ‘La Belle’ – March (HT) & April (F) Plantings



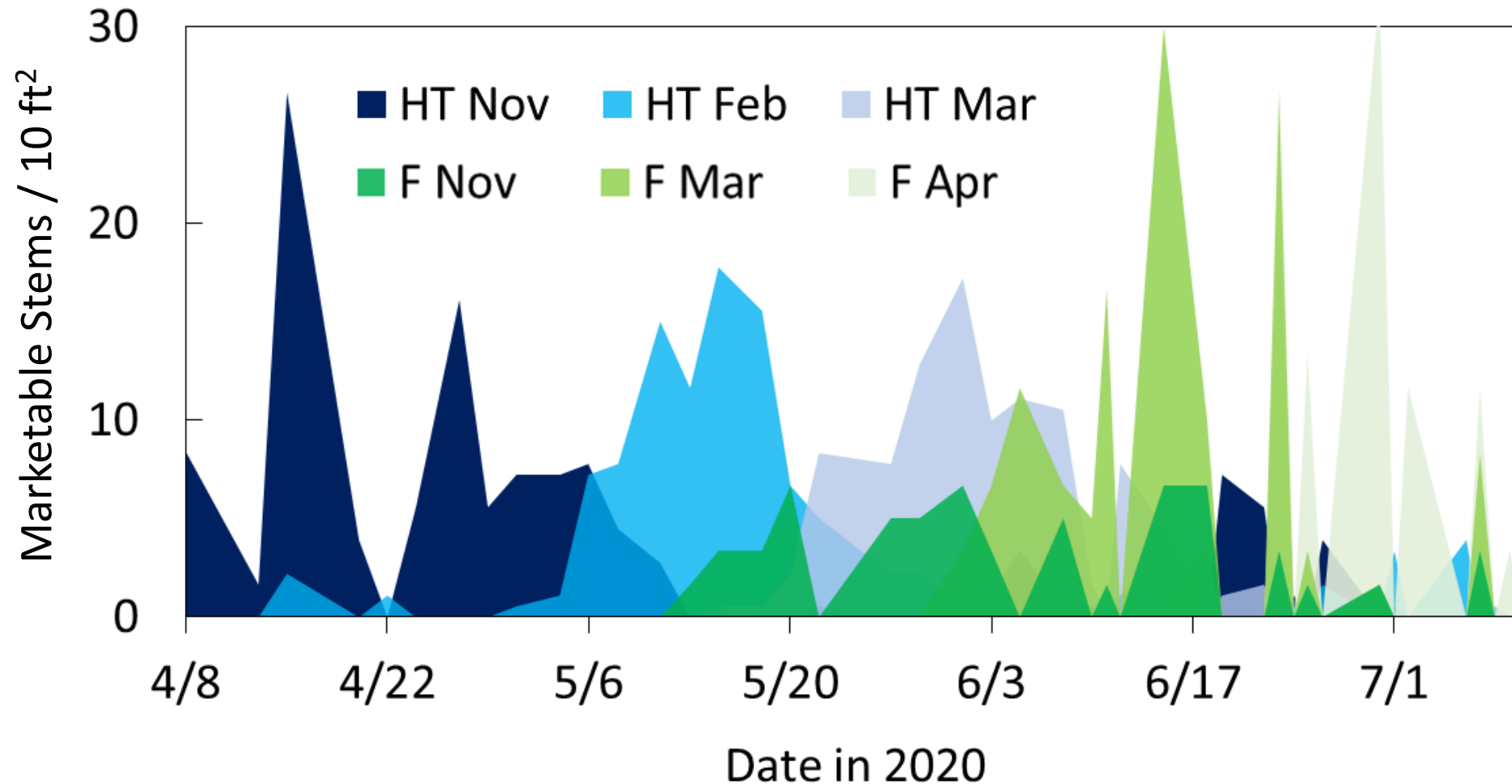
HT First harvest: 5/15

HT Peak Harvest: 6/1

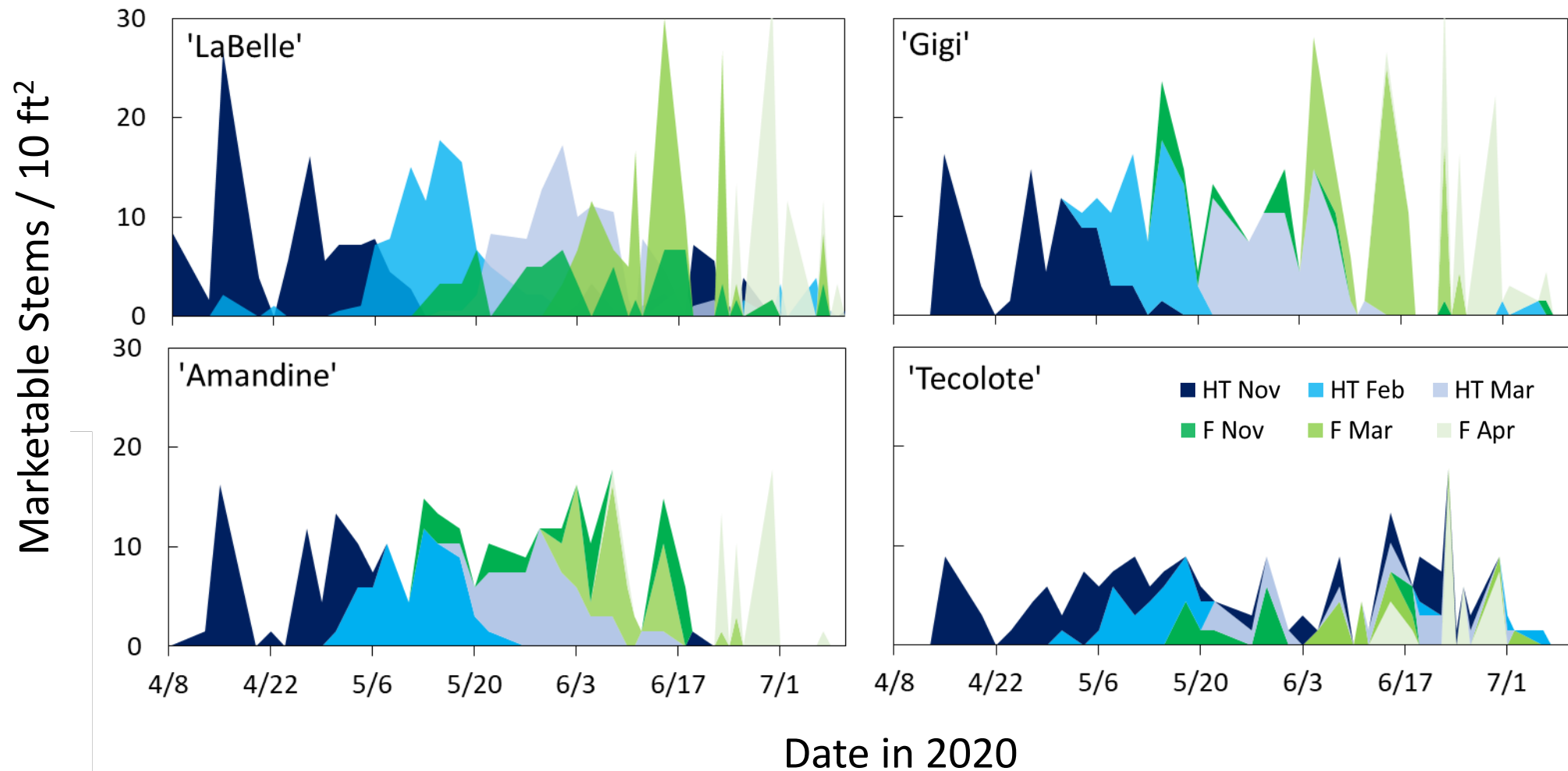
F First Harvest: 6/15

F Peak Harvest: 6/30

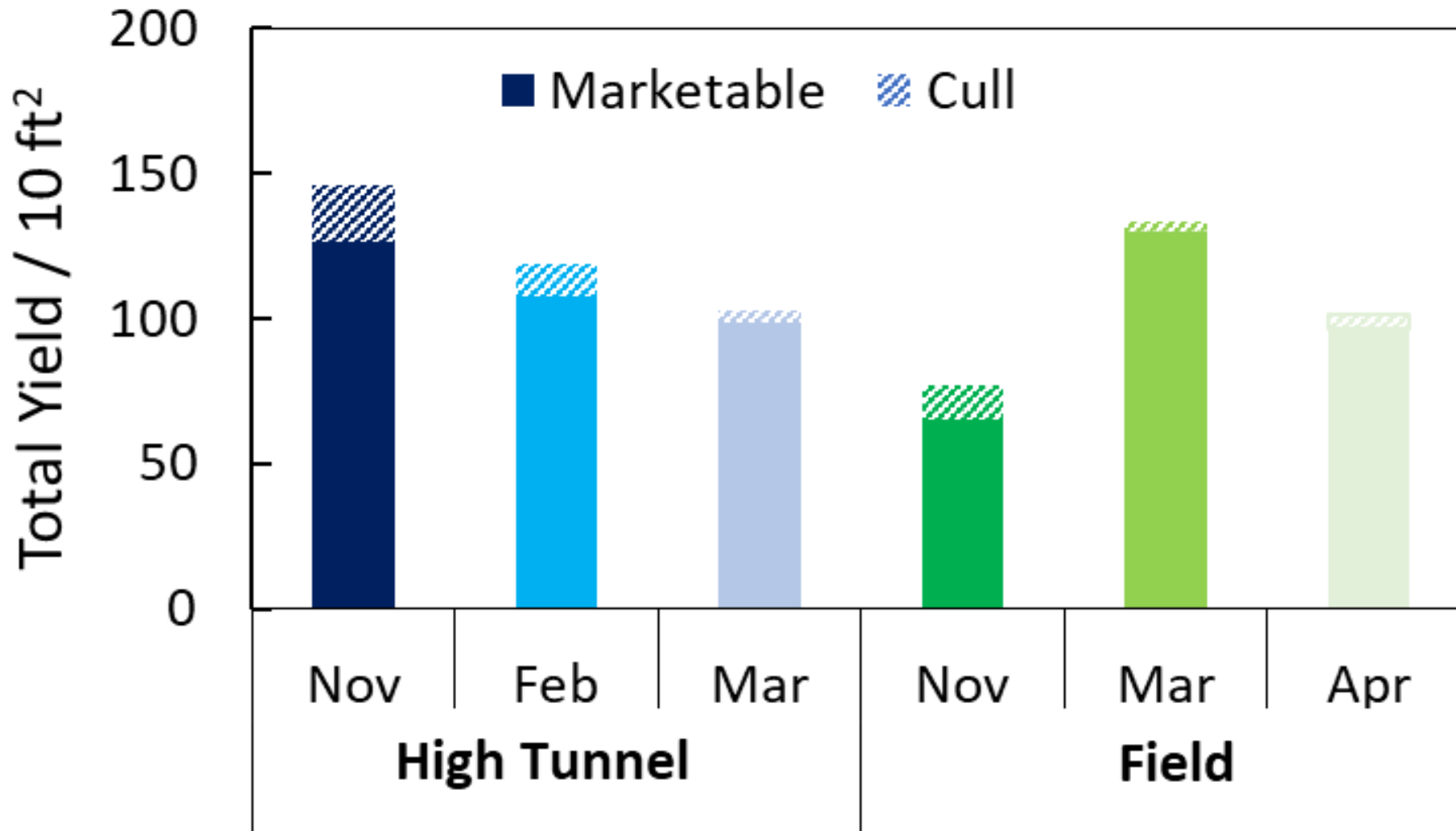
Daily Harvest – ‘La Belle’



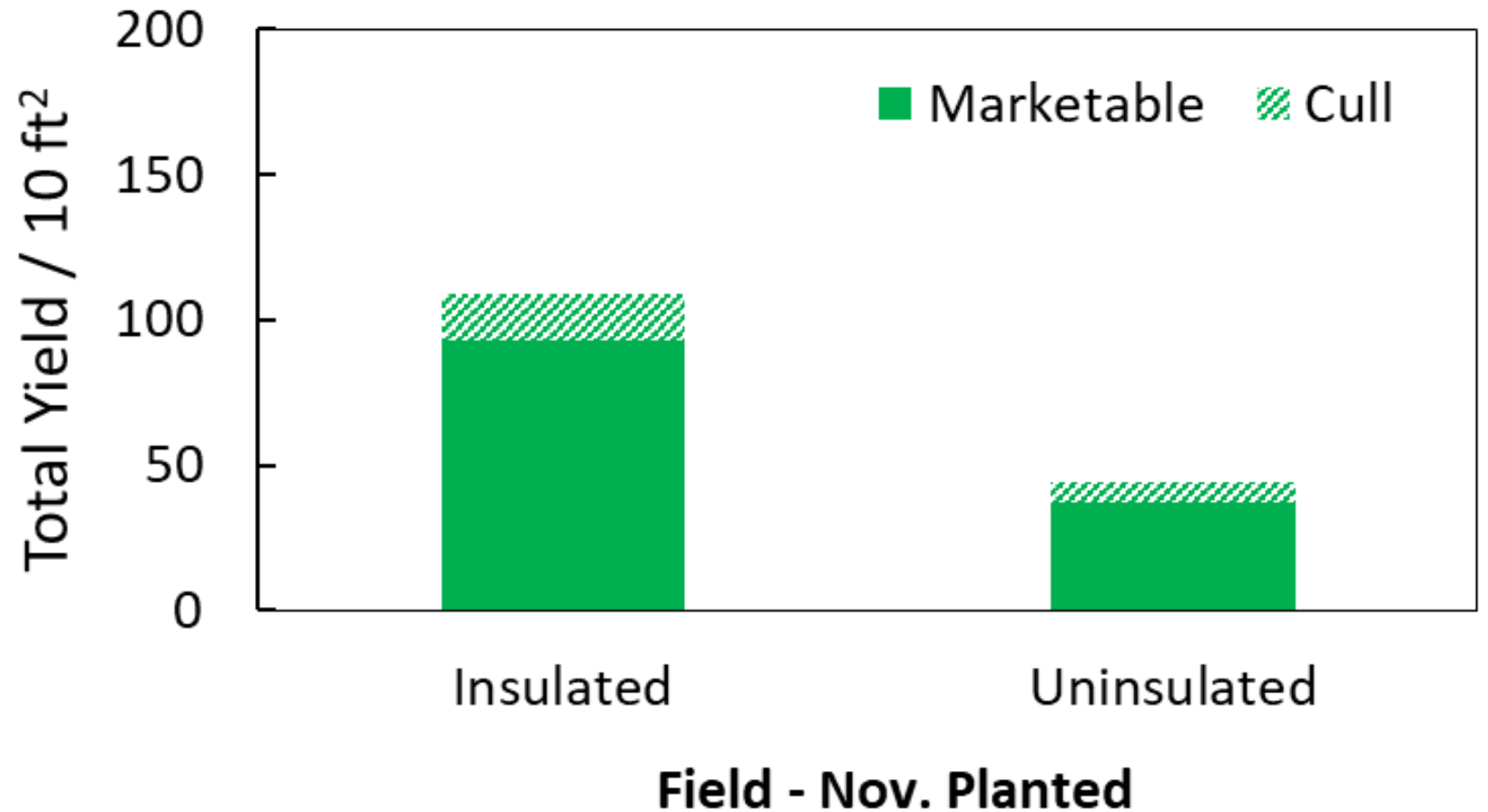
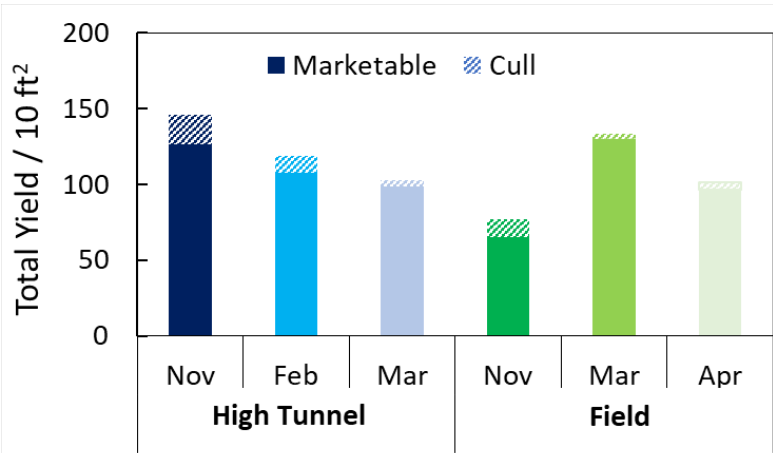
Daily Harvest – All Cultivars and All Planting Dates



Total Yield – ‘La Belle’



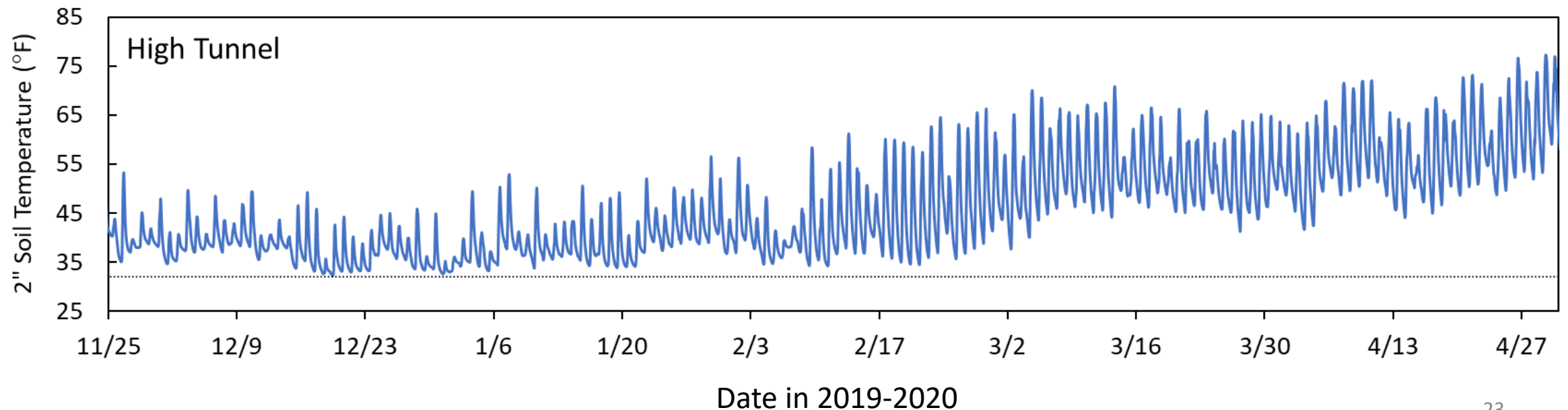
Total – ‘La Belle’ – November (Field planting)



Take home: winter protection is a good idea

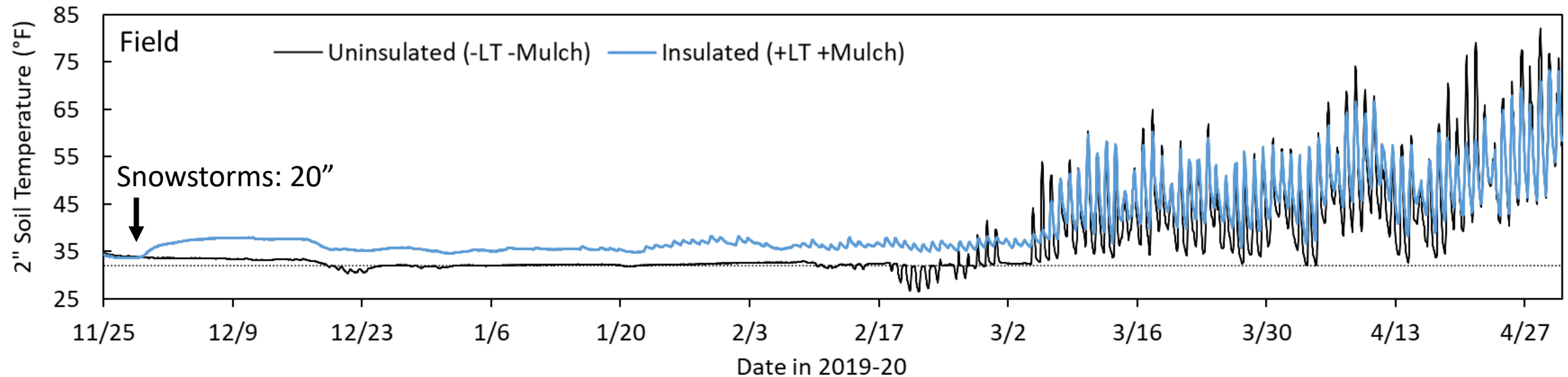
Here's what the tubers experienced overwinter in the high tunnel.

Our biggest challenge was voles. The soil did not freeze in the high tunnel at a 2" depth, and we could moderate high daily temperatures later in spring.



Here's what the tubers experienced in the field.

Soil without mulch or a low tunnel reached a low of 26.5°F in February. **Soil with mulch and a low tunnel** never froze. Soil quickly heated by end of April.



2019-2020 Results

Cultivar	Stems	Flower	Yield
'LaBelle'	Shorter, weaker	Full double	High
'Amandine'	Taller, sturdy	Fullest double	Medium
'Gigi'	Taller, sturdy	Fullest double	Medium
'Ticolote'	Shorter, weak	Weak, Single	Low

Summary

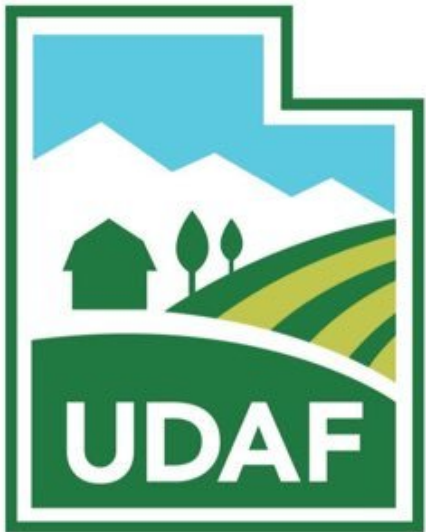
Year 1:

- High tunnel production greatest with November plantings and advanced peak harvest by 6 weeks.
- Field production greatest when spring planted, as soon as ground could be worked, and extended harvest 2-4 weeks later. Winter protection improved yield for fall plantings.

Continue to collect Year 2 data and wait for harvest, plan for Year 3



Thank you to the organizations who fund our research: Utah Department of Agriculture and Food, Association of Specialty Cut Flower Growers, and USDA National Institute of Food and Agriculture.



Thank you to all our grower collaborators from last year and this year!



S&K Blossoms, Kaysville Research Farm, Sheriden Hansen, Maren Nilsen, Missy Renshaw, Rachel Broadbent, Cynthia Stringham, and Jennifer Wright



Questions?

Contact Info:

Shannon Rauter



Email: srauter@aggiemail.usu.edu

Dr. Melanie Stock



Email: melanie.stock@usu.edu



Instagram: [usu_small farms](https://www.instagram.com/usu_small_farms)

