



## **BGWA Demonstration Vineyards trials:**

***Preliminary results from  
midrow-management trial***

***2020-2021 season***

## Outline

- ❑ Background & aims of this vineyard midrow-management trial
- ❑ Trial design & vineyard details
- ❑ 2020 – 2021 season overview
- ❑ Key results from the first season of this trial

## **Background and aims of this midrow trial**

- Midrow soil management is an often-discussed topic among growers
- Extend upon existing under-vine mulch trials
- Provide some quantification on common issues
- Run trial for a minimum of 3 seasons
- Add to knowledge base to support decision making

# Trial design

## ❑ Midrow Trial treatments, 2020-2021, first season of trial

- A. Cereal cover-cropped<sup>1,2</sup>, rotary hoed in Sep 2020, Cultivated in Nov 2020**
- B. Cereal cover-cropped<sup>1,2</sup>, mown & herbicided, Sep & Oct 2020**
- C. Cereal cover-cropped<sup>1,2</sup>, mown only, Sep, Oct & Nov 2020**
- D. Volunteer Grass, <sup>2</sup>, mown-only, Sep, Oct & Nov 2020** (the 'control' for this trial)

*This trial site also includes under-vine Straw & Duramulch treatment areas*

*2020 cover cropping<sup>1</sup> - durum wheat @ 120kg/sown ha, May 2020, sprayed & direct drill*

*2020 fertiliser inputs<sup>2</sup>*

- DAP @ 120kg/sown ha\* with cereal cover crop (A, B, C)*
- DAP @ 120kg/sown ha\* drilled-into grass midrows (D,E,F)*
- foliar ZM & multi-nutrient applied Oct 2020*
- no fertigation at any stage*

*No inorganic nitrogen applied for last 8 years – only some compost & mulch applications*

*\* This DAP rate equates to 10.8kg of inorganic nitrogen applied per vineyard hectare*

# Trial vineyard details

- **Rosenvale Vine Vale Vineyard**, 165 Research Rd
- **Shiraz**, planted 2013, clone R6WV28, Paulen 1103 rootstock
- **3.6m x 1.8m spacing**, E-W rows
- **single cordon spur pruned** ('Rosback'), 2prs moved foliage wires, **'non-trimmed VSP'**
- **Drip irrigated from bore and BIL**, **4L/hr per vine (0.62mm/hr)**
  - 2020-2021 irrigation: pre-budburst irrigated, 97mm from BB to harvest, 18 irrigations
- **Light-brown mixed\* loamy sand (0-40cms) over red-brown sandy clay loam**  
*\*NOTE: ~100mm local subsoil clay spread & surface incorporated prior to planting*
- **Undervine** - **previously 'knifed' 2-3 times/yr & undervine herbicided in July**
  - **will undervine herbicide in future for the period of this trial**
- **Midrow** - **volunteer grasses last 8yrs, mown 2-4 times/yr as required until dry**
  - **previous history of cereal & cultivation->fescue->volunteer grasses**

# Trial measurements

## Soil moisture & temp monitoring;

- vine row probes
- midrow probes
- 80cm Enviroprobes on MEA Plexus & Greenbrain system
- probes installed 24 August 2020

## Air temperature monitoring

- screened MEA temp probes installed at 1m cordon height
- connected to Plexus system

## Vine nutrition

- petiole tests

## Soil assessment

- assess chemical, physical & biological changes in future yrs

## Yield analysis

- bunch and berry weight dynamics
- harvest weights

## Grape analysis

- Be, pH, TA, ripening rates, colour, tannin, YAN, berry sensory

## Other analysis

- bud fruitfulness, pests & diseases, midrow biomass, cost-benefit

## General observations

- shoot growth, canopy architecture, leaf condition



## Mid-rows, 29 October 2020

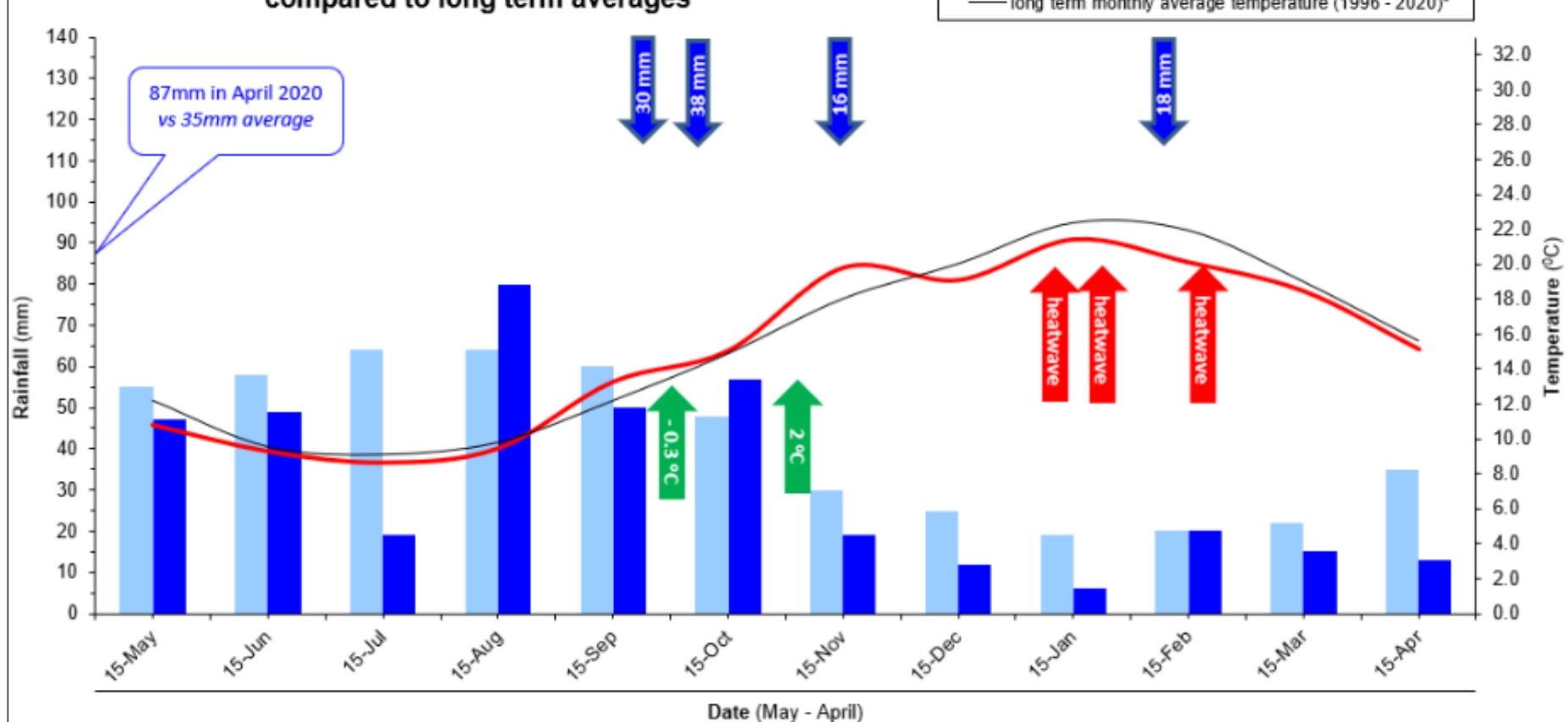


# 2020 – 2021 season overview

NURIOOTPA BOM

May 2020 - April 2021

average monthly temperature & monthly rainfall  
compared to long term averages\*



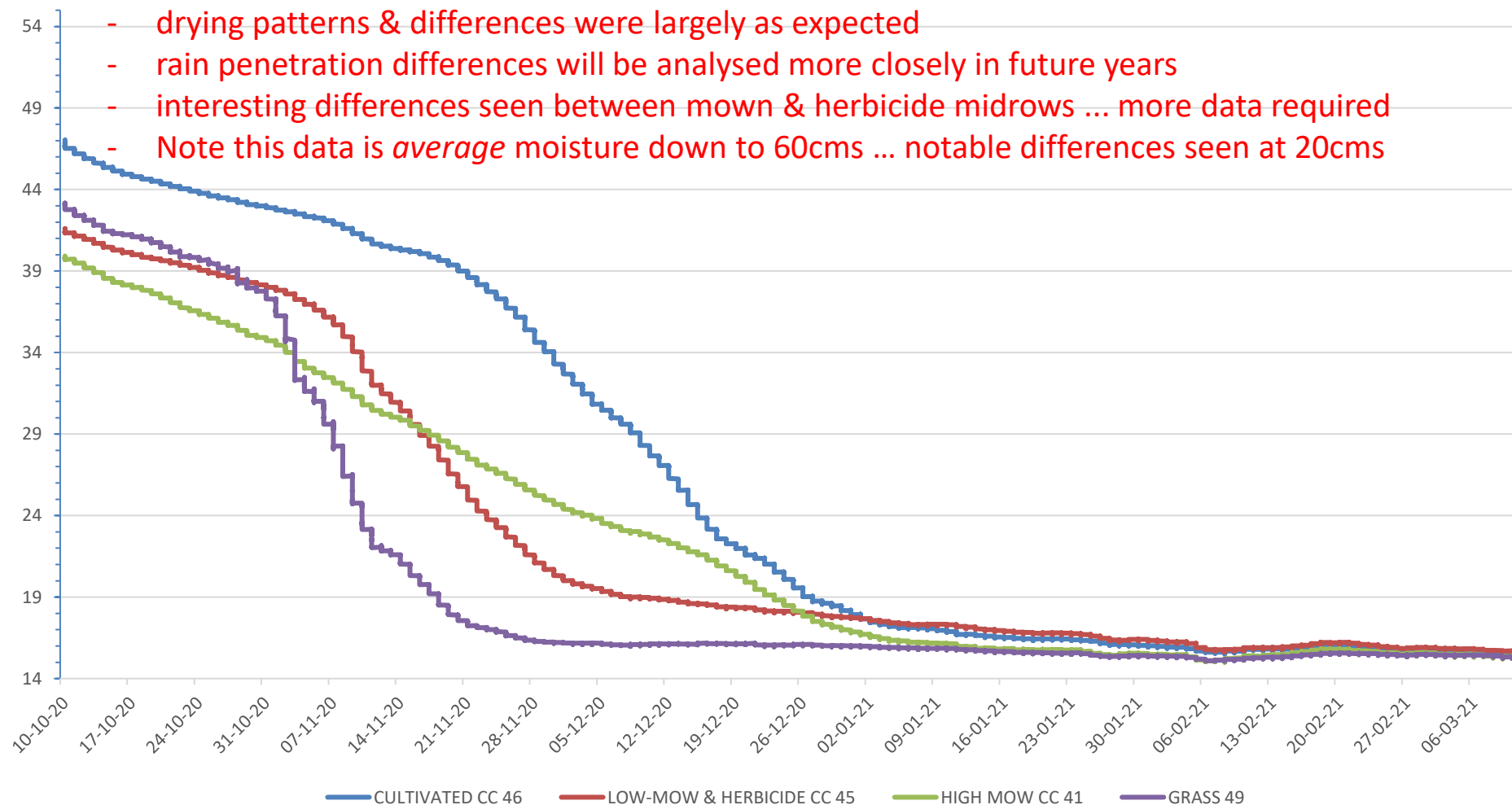
<b>Season notes:</b>	<b>Frost events:</b> frost 27 Sep (-0.3 Nuri). Minor damage in isolated pockets several cold nights (2-4°C Nuri) ; 19/10, 5/11, 17/11, 8/12. Frost fans averted damage in prone areas post-harvest frost in some lower-lying areas 21 April (-0.6 Nuri)
<b>Growing season significant rain events:</b> <b>Heatwaves (3+days &gt;35°C):</b>	27-28/11 (37-41.8°C), 9-11/1 (35-37.9 + 20°C nights), 21-24/1 (34-41.4°C + 24°C nights) 10-11/2 (36-37.7°C), 17-20/2 (34-37°C + 23°C night)
<b>May - Apr 12month rainfall (mm):</b> <b>Oct - Apr growing season rainfall (mm):</b> <b>Oct - Apr degree days:</b>	387 142 1786 (Longer term averages: 1952 - 1999 = 1703, 1996 - 2020 average = 1875)



# Preliminary findings ...

## Mid-row soil moisture

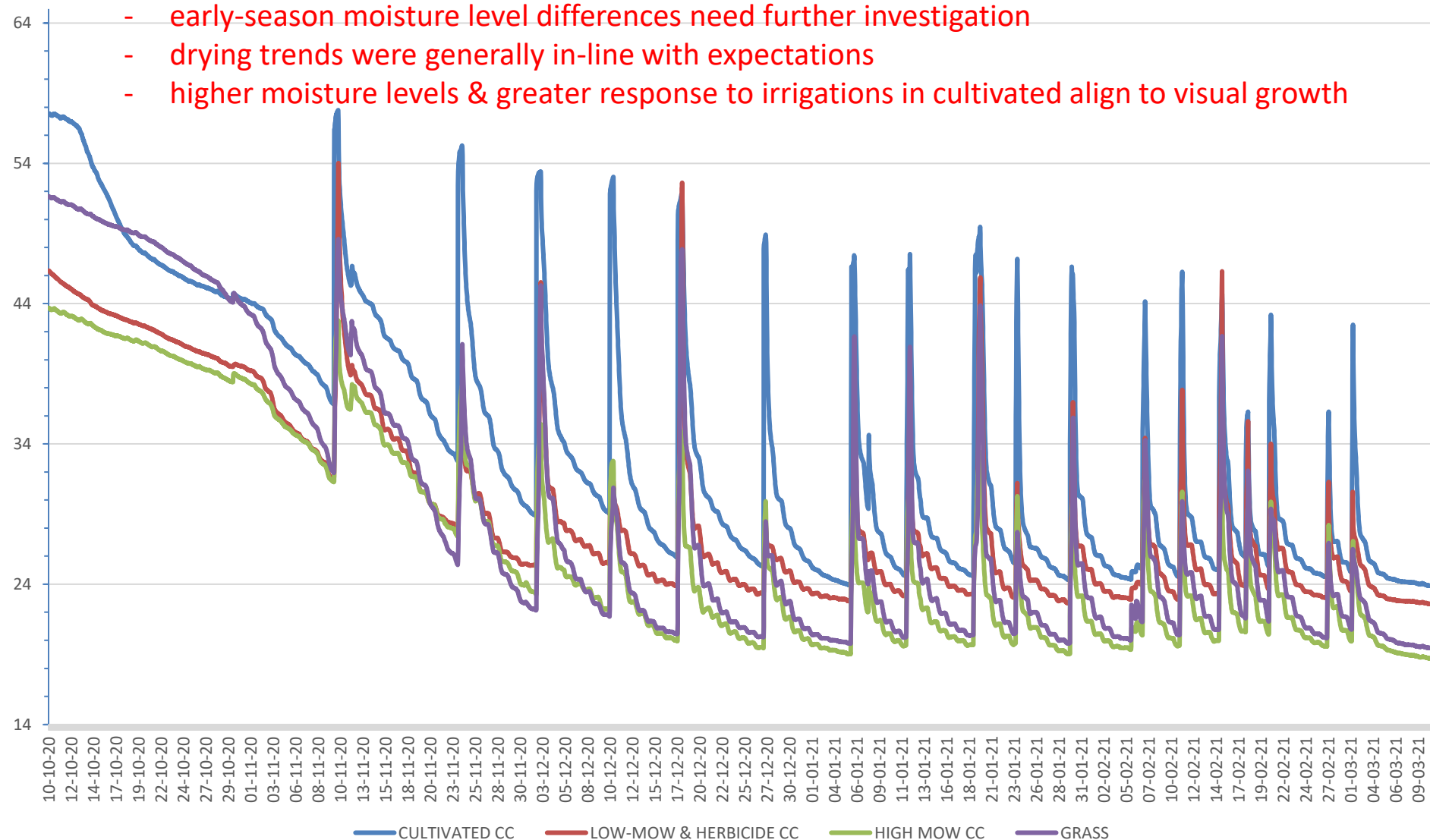
MID-ROW average soil moisture % for 20-60cm sensors  
for period 10 October 2020 – 10 March 2021



# Vine-row soil moisture

VINE-ROW average soil moisture % for 10-80cm sensors  
for period 10 October 2020 to 10 March 2021

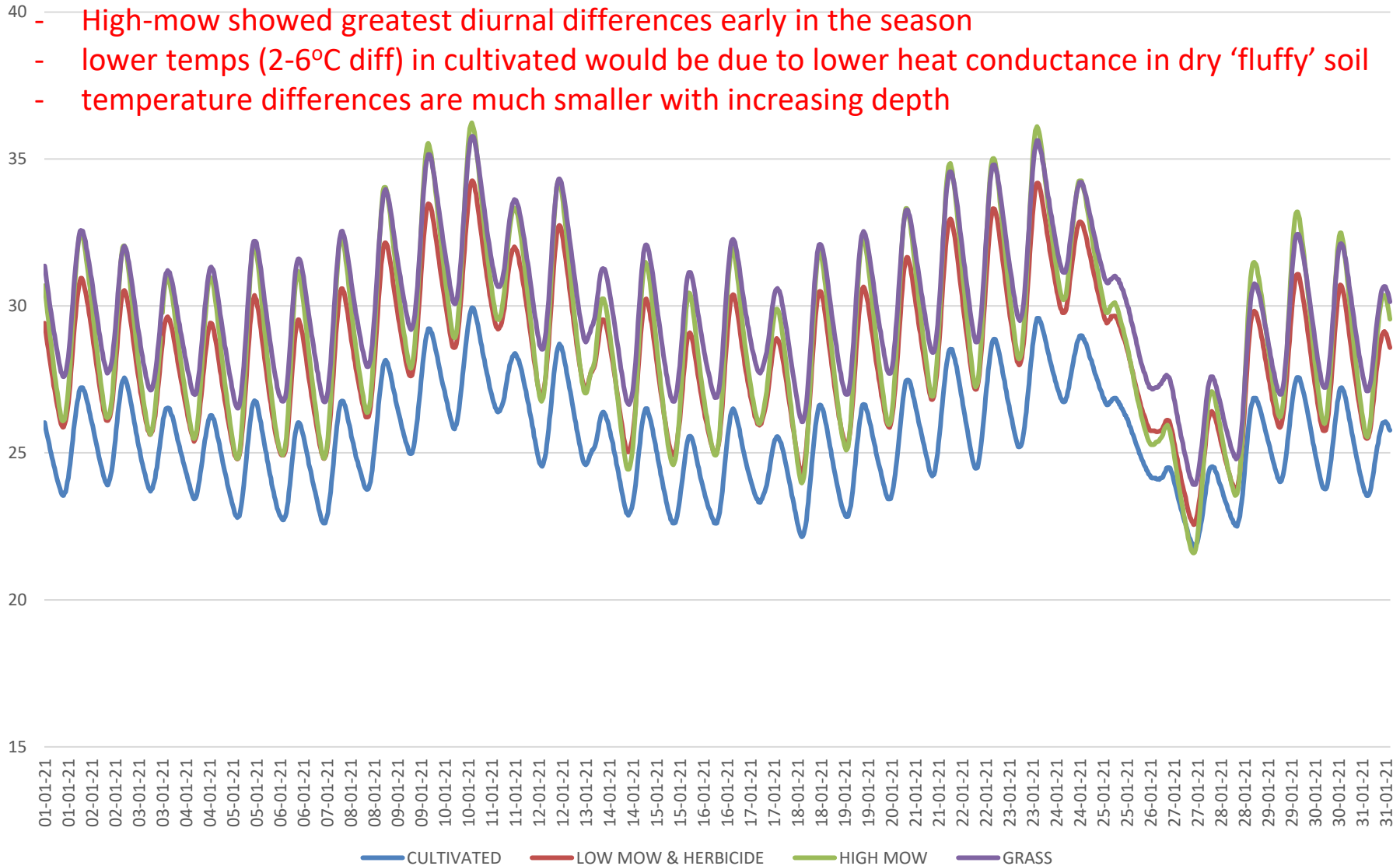
- early-season moisture level differences need further investigation
- drying trends were generally in-line with expectations
- higher moisture levels & greater response to irrigations in cultivated align to visual growth



# Mid-row soil temperature

Soil temperature at 20cms for period  
1 January 2021 – 30 January 2021

- High-mow showed greatest diurnal differences early in the season
- lower temps (2-6°C diff) in cultivated would be due to lower heat conductance in dry 'fluffy' soil
- temperature differences are much smaller with increasing depth

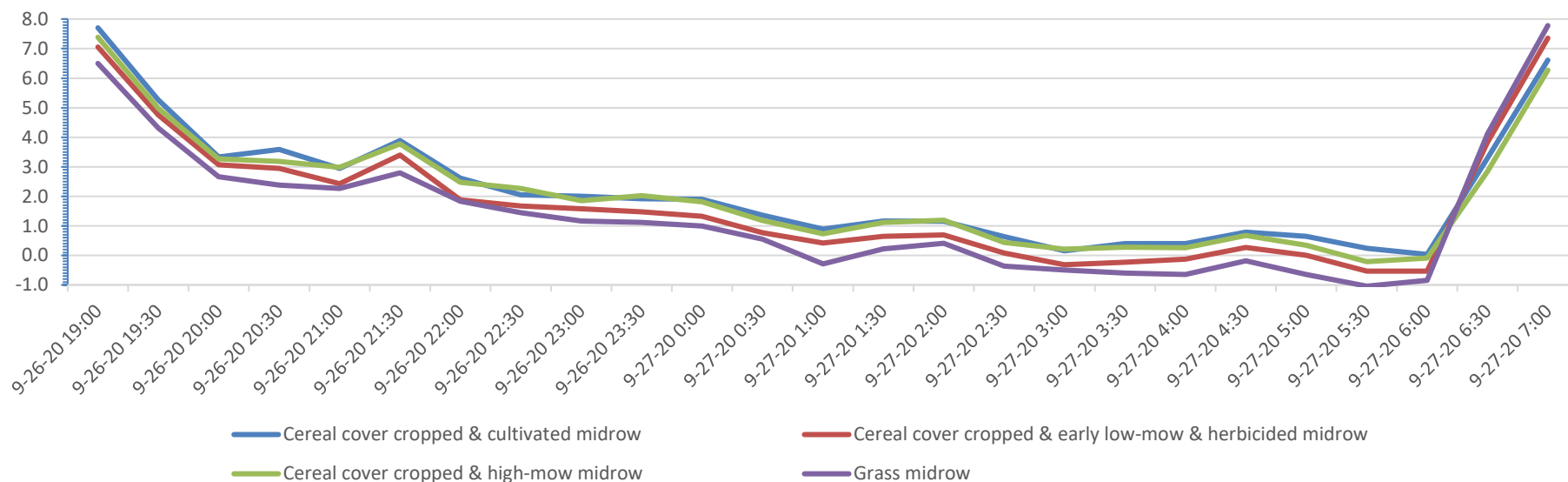


# Air temperature @ 1m cordon height

Air temperature at cordon height (1m) for different midrow treatments

LOW temperature period:

7pm 26 September to 7am 27 September 2020



**Lowest temperature on 27 September 2020**

Treatment	Cereal cover cropped & cultivated midrow	Cereal cover cropped & low-mow & herbicided midrow	Cereal cover cropped & high-mow midrow	Volunteer grass & mown midrow
Time	6:00 AM	5:30 AM	5:30 AM	5:30 AM
Temperature (°C)	0.03	-0.53	-0.21	-0.33
Hours duration less than 2°C (+/- 30mins)	5.5	6.5	5.5	5.5

# Vine nutrition – Petiole analysis

Treatment	Nitrate N mg/kg	Total N %	P %	K %	Ca %	Mg %	Bo mg/kg	Zn* mg/kg	Mn* mg/kg	Iron mg/kg	Moly mg/kg	Na %	Cl %
mow cereal	275	1.83	NSD	minor variance	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD	NSD
mow & herb cereal	366	1.86											
grass	30	1.72											
cultivated	2040	2.18											

\* Zn and Mn values and differences likely affected by foliar ZM fertiliser applied before flowering and petiole sampling

NSD = no significant difference between treatments

- **Highest nitrogen in cultivated treatment ....**
  - cultivation increases the rate of mineralisation of organic matter to plant-available N
  - the soils at this site have good biological function (due to history), so mineralisation was very rapid
  - cultivation can lead to a rapid 'flush' in plant N uptake especially with good biology & moisture
- **Lowest nitrogen in grass treatment ...** but still on higher side by typical standards in this case
- **No significant differences in other elements ...** but this is the first year of the trial



Vine canopies, 4 March 2021 (1 day before harvest)



**CULTIVATED**



**LOW-MOW & HERBICIDED**



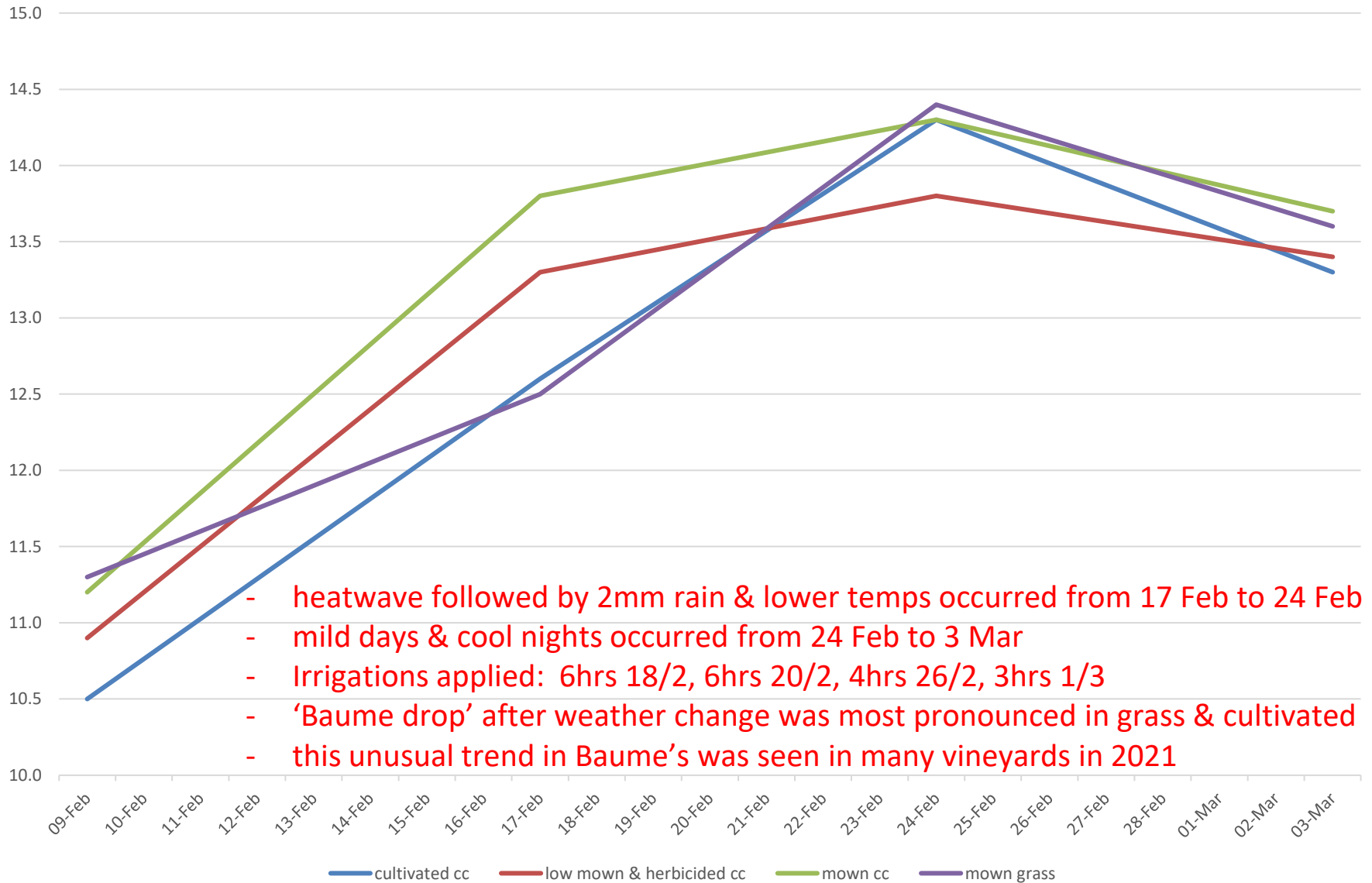
**VOLUNTEER GRASS**



**HIGH-MOW ONLY**

# Grape ripening

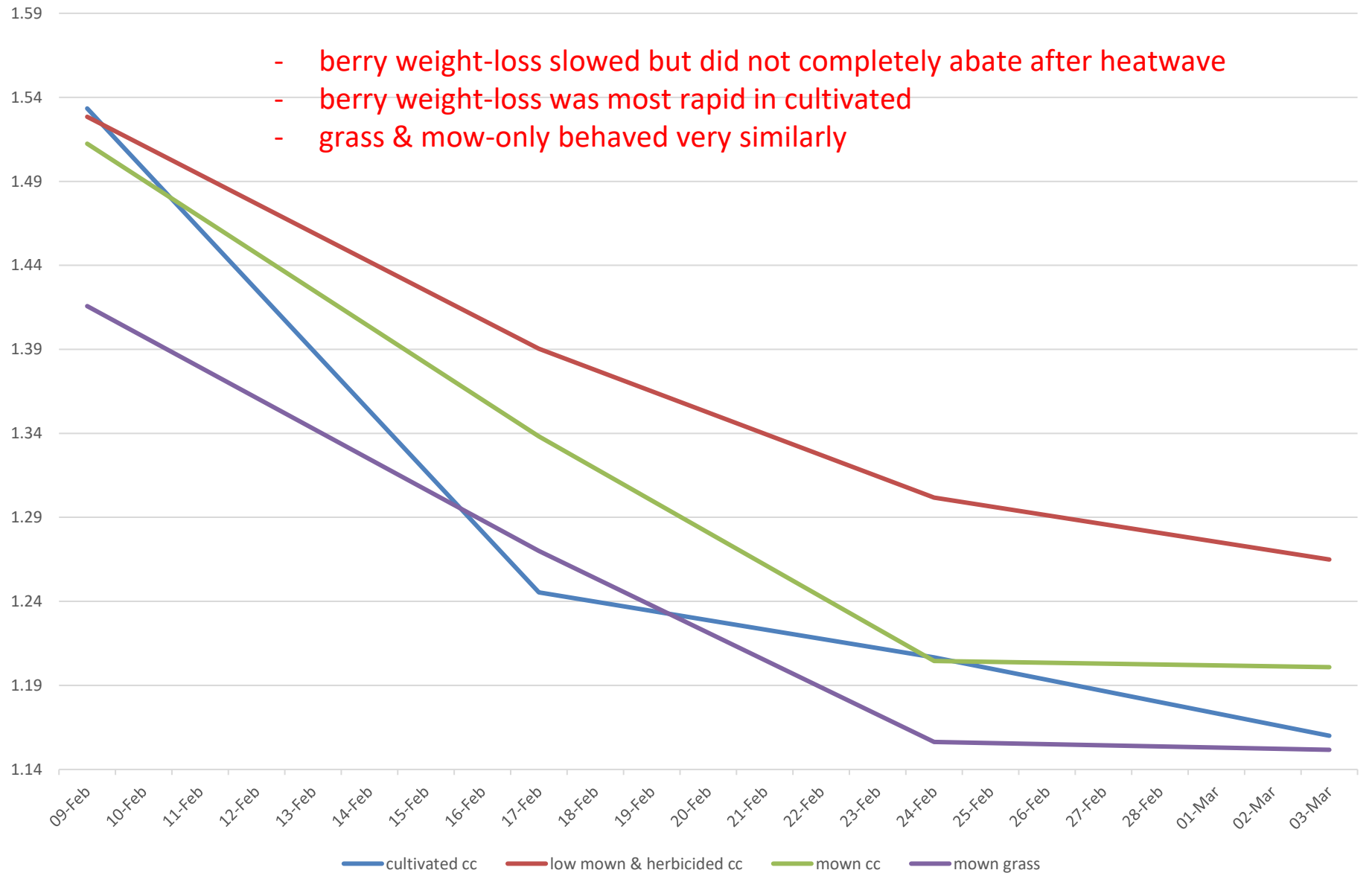
Baume chart for period 9 Feb – 3 Mar 2021



# Berry weight

Average berry weight (g) for period 9 Feb – 3 Mar 2021 (200-berry samples)

- berry weight-loss slowed but did not completely abate after heatwave
- berry weight-loss was most rapid in cultivated
- grass & mown-only behaved very similarly



# Yield data

Vineyard & Trial ID	Harvest date	2021					
		Bunch weight		Berry weight		Harvest yield	
		Bunch wt at harvest (g)	Diff vs Control (%)	Berry wt at harvest (g)	Diff vs Control (%)	Tonnes/ha	Diff vs Control (%)
volunteer grasses (control)	05-Mar	119		1.15		8.40	
cover crop & cultivated		134	+13%	1.16	+1%	9.08	+8%
cover-crop mown & herbicided		153	+29%	1.26	+10%	8.96	+7%
cover-crop mown only		147	+24%	1.20	+4%	9.44	+12%

- **Berry weight-loss dynamics play a major role in Shiraz yields at harvest**
- **berry weight-loss effect on yield parameters & harvest yield were most evident in cultivated**

# Grape composition

Vineyard & Trial ID	Vineyard sample date	Standards analysis			Ripening rate		Berry tasting comments (berry sensory assessment by Chris Rogers)
		Be'	pH	TA	Avg Baume increase per week	"Sugar Loading" Rate (average ug/g/day)	
volunteer grasses (control)	3-Mar	13.6	3.48	4.9	2.54	0.99	similar to mown but slightly higher flavour intensity
CCC & cultivated		13.3	3.54	5.4	1.21	3.11	thinner skins, lower tannin & flavour intensity & maturity
CCC, mown & herbicided		13.4	3.53	5.0	1.27	3.27	good flavour maturity & intensity. No discernable difference between mown-only & herbicided
CCC, mown only		13.7	3.51	5.2	2.54	0.99	

- Higher moisture deficit in grass & mow-only likely slowed Baume gain & 'sugar loading'
- Grass and mow-only behaved similarly & showed similar ripening curve & berry flavour
- Fastest ripening occurred in low-mow & herbicided treatment with good berry flavour
- Cultivated ripened at a good rate but showed thinner skins, less flavour & more shrivel

*Full grape composition analysis via AWRI will be conducted in future years*



## Some other preliminary observations

Treatment	Bud fruitfulness			Primary bud necrosis		
	Bud 1	Bud 2	1 & avg	Bud 1	Bud 2	1 & avg
Cultivated midrow	1.53	1.67	1.60	27%	23%	25%
Grass midrow	1.47	1.66	1.56	33%	7%	20%
Undervine straw Mulch	1.40	1.83	1.62	33%	7%	20%

### Bud fruitfulness assessment – May 2021

- **Elevated primary bud necrosis (PBN) in bud 2 in Cultivated treatment**
  - High/excessive plant nitrogen can lead to higher PBN, especially in Shiraz
  - PBN can increase with rising bud position/shoot development with high vine vigour
- **Higher fruitfulness in bud 2 in undervine Straw but similar across 1 & 2 in all treatments**
- **‘expression’ of bud fruitfulness is also a big factor in vineyard yield** (budburst %, frut-set, etc)

# SUMMARY

- ☐ First year of trial
- ☐ Effects of cultivation were mostly in-line with expectations, but the vines responded strongly to changes introduced by this trial vs previous practices
- ☐ Differences between treatments of midrow cereal cover-crop of High-Mow vs Low-Mow & Herbicide were relatively small, but not all in line with expectations in this first year of the trial
- ☐ Results show that midrow management practices can have a considerable effect on frost risk, vine growth, yield, ripening & grape composition
- ☐ Midrow & undervine management practices can interact on vine performance
- ☐ Impacts on soil attributes are yet to be assessed ...
- ☐ Soil & vineyard management is a 'long-game'

# PROJECT SPONSORS

- Wine Australia
- BGWA
- Rosenvale Vineyards (James Rosenzweig)
- Jeffries
- Farmer Johns
- LG Vineyard Services (Lincoln Grocke)
- Tractor Tread Vineyards (Steve Schiller)
- Dorrien Estate
- VineScout (Amanda Mader)



## DEMONSTRATION VINEYARD OWNERS

- James Rosenzweig

## PROJECT CONTRIBUTORS

- Nicki Robins, BGWA
- Kirsty Waller, Dorrien Estate & TAFE
- Anna Cameron
- Chris Rogers, Rogers Viticulture
- Adam Pietsch (Farmer Johns)
- BVTG Committee
- Australian Wine Research Institute
- Measurement Engineering Australia
- APAL Laboratories