Further Refining Planting Dates

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GRDC UPDATES

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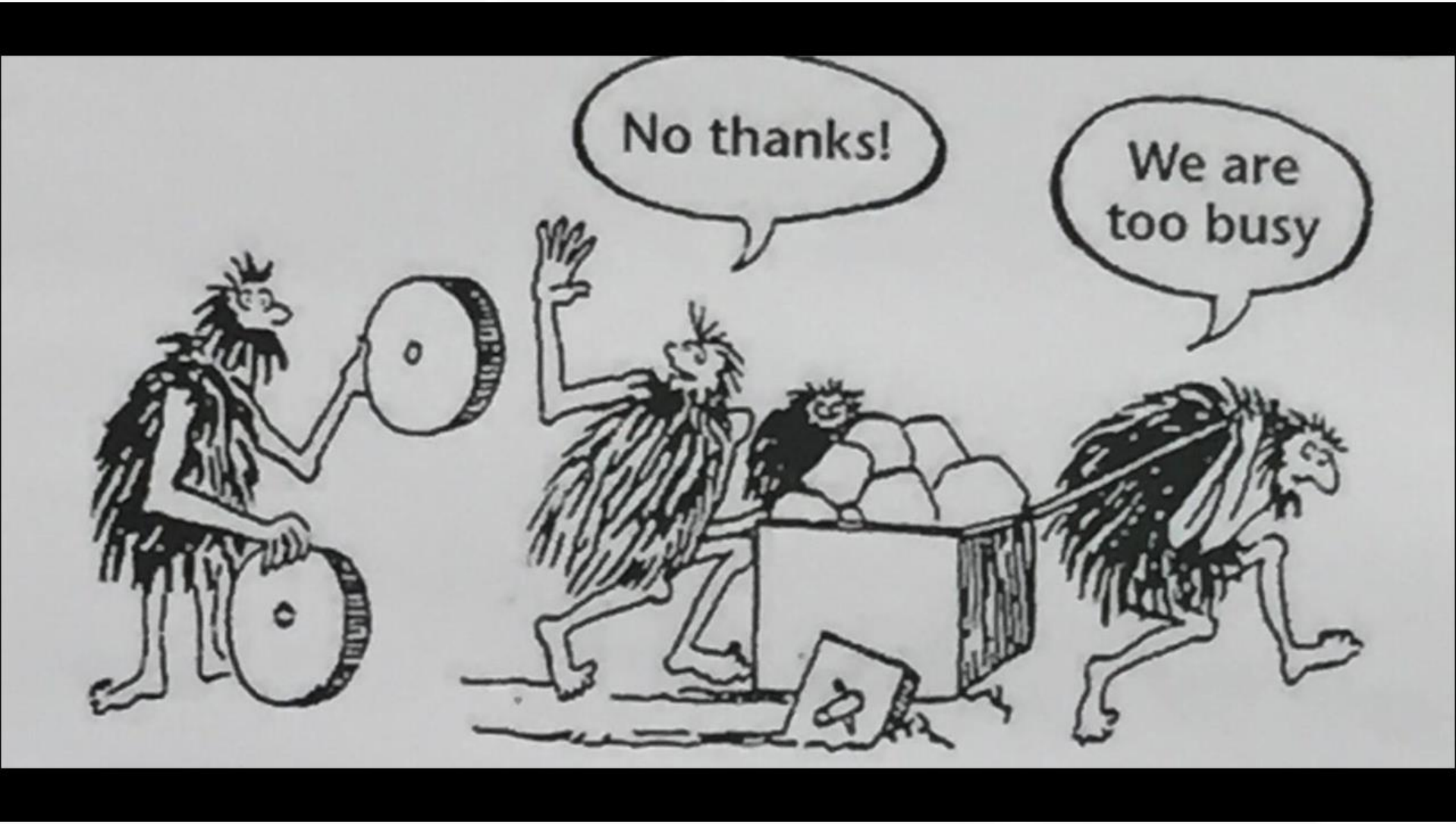


Can we refine planting dates and take some of the “gut feel” out?

Planting dates?

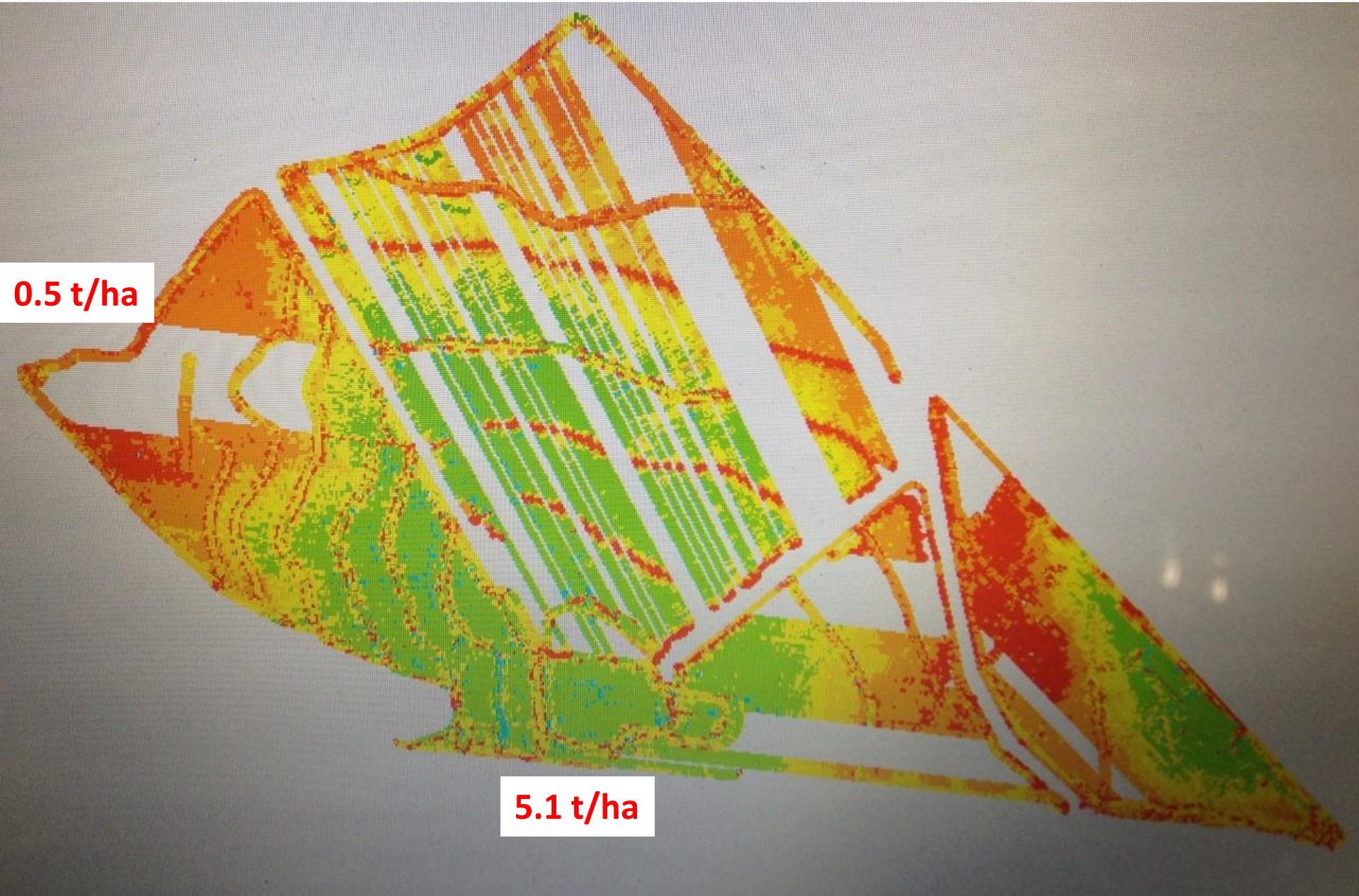
- Who remembers their last time they lost wheat yield to frost?

- Who remembers their last time they lost wheat yield to heat?

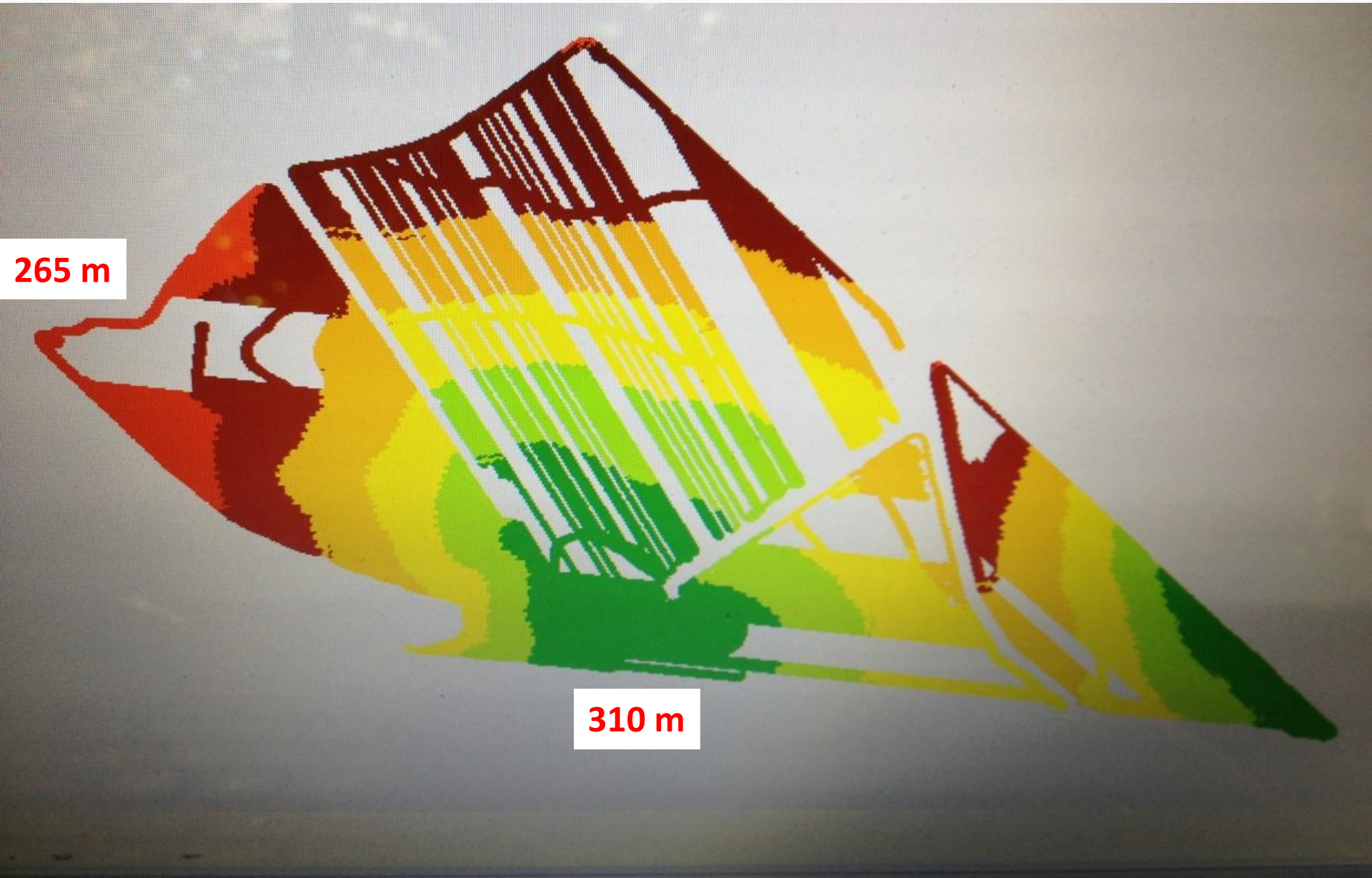
Planting date and landscape

- To what extent can we use elevation to determine frost risk on a farm or paddock level?
- How much earlier in your paddock?
  - Do you have enough info to set a target flowering date?

Yield Map from 2013 – Frost on 21st Aug



Elevation Map Same Paddock in 2013



What do the trials look like?

- Location: Spring Ridge and Moree x 3 yrs
- Paddocks: Contain significant elevation differences
  - Top slope and Bottom slope
  - 20-46 m elevation differences
- Planting dates: 3 times (Late Apr, Mid May, Early Jun)
- Varieties
  - EGA Eaglehawk, EGA Gregory, LPB Lancer, Suntop, LPB Spitfire, LPB Dart

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TOS Trials – Top and Bottom Slope

Site	Slope	Late April	Mid May	Early June
Premer 2014	Top	5.24a	4.28b	3.00c
	Bottom	4.68a	4.42b	3.16c
Gurley 2014	Top	-	1.56a	1.19b
	Bottom	1.26b	1.60a	1.42ab
Spring Ridge 2015	Top	5.37a	4.90b	4.33c
	Bottom	4.53b	5.18a	4.60b
Gurley 2015	Top	5.25a	4.56b	3.37c
	Bottom	4.62b	5.01a	3.62c
Premer 2016	Top	7.52a	7.25b	6.18c
	Bottom	7.01b	7.34a	6.05c
Gurley 2016	Top	6.32a	6.41a	6.57a
	Bottom	5.98b	6.56a	6.51a

TOS Trials – Top and Bottom Slope

Site	Slope	Late April	Mid May	Early June	Yield diff between TOS 1 and 2	Yield diff between TOS 1 and 3
Premer 2014	Top	5.24a	4.28b	3.00c	**-0.96**	**-2.24**
	Bottom	4.68a	4.42b	3.16c	**-0.26**	**-1.52**
Gurley 2014	Top	-	1.56a	1.19b	**-**	**-0.37**
	Bottom	1.26b	1.60a	1.42ab	**0.34**	**-0.18**
Spring Ridge 2015	Top	5.37a	4.90b	4.33c	**-0.47**	**-1.04**
	Bottom	4.53b	5.18a	4.60b	**0.65**	**0.07**
Gurley 2015	Top	5.25a	4.56b	3.37c	**-0.69**	**-1.88**
	Bottom	4.62b	5.01a	3.62c	**0.39**	**-1.00**
Premer 2016	Top	7.52a	7.25b	6.18c	**-0.27**	**-1.34**
	Bottom	7.01b	7.34a	6.05c	**0.33**	**-0.96**
Gurley 2016	Top	6.32a	6.41a	6.57a	**0.09**	**0.25**
	Bottom	5.98b	6.56a	6.51a	**0.58**	**0.53**

TOS Trials – Top and Bottom Slope

Site	Slope	Late April	Mid May	Early June	Yield diff between TOS 1 and 2	Yield diff between TOS 1 and 3
Premer 2014	Top	5.24a	4.28b	3.00c	-$259	-$605
	Bottom	4.68a	4.42b	3.16c	-$70	-$410
Gurley 2014	Top	-	1.56a	1.19b		-$100
	Bottom	1.26b	1.60a	1.42ab	$92	-$49
Spring Ridge 2015	Top	5.37a	4.90b	4.33c	-$127	-$281
	Bottom	4.53b	5.18a	4.60b	$176	$19
Gurley 2015	Top	5.25a	4.56b	3.37c	-$186	-$508
	Bottom	4.62b	5.01a	3.62c	$105	-$270
Premer 2016	Top	7.52a	7.25b	6.18c	-$57	-$281
	Bottom	7.01b	7.34a	6.05c	$69	-$202
Gurley 2016	Top	6.32a	6.41a	6.57a	$19	$53
	Bottom	5.98b	6.56a	6.51a	$122	$111

TOS Trials – Top Slope

Site	Slope	Late April	Mid May	Early June	Yield diff between TOS 1 and 2	Yield diff between TOS 1 and 3
Premer 2014	Top	5.24a	4.28b	3.00c	-$259	-$605
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TOS Trials – Bottom Slope

Site	Slope	Late April	Mid May	Early June	Yield diff between TOS 1 and 2	Yield diff between TOS 1 and 3
Premer 2014						
	Bottom	4.68a	4.42b	3.16c	-$70	-$410
Gurley 2014						
	Bottom	1.26b	1.60a	1.42ab	$92	-$49
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	Bottom	4.62b	5.01a	3.62c	$105	-$270
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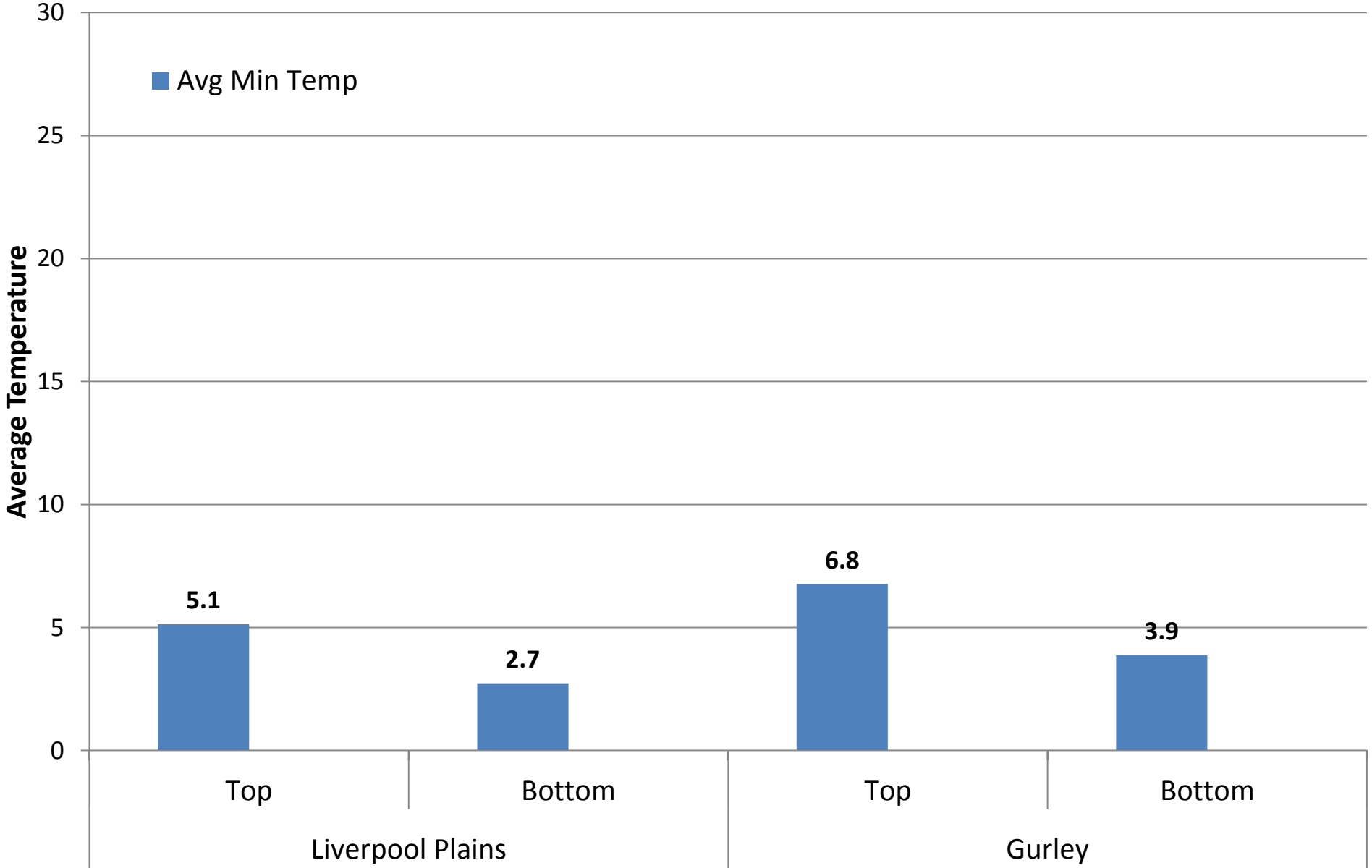
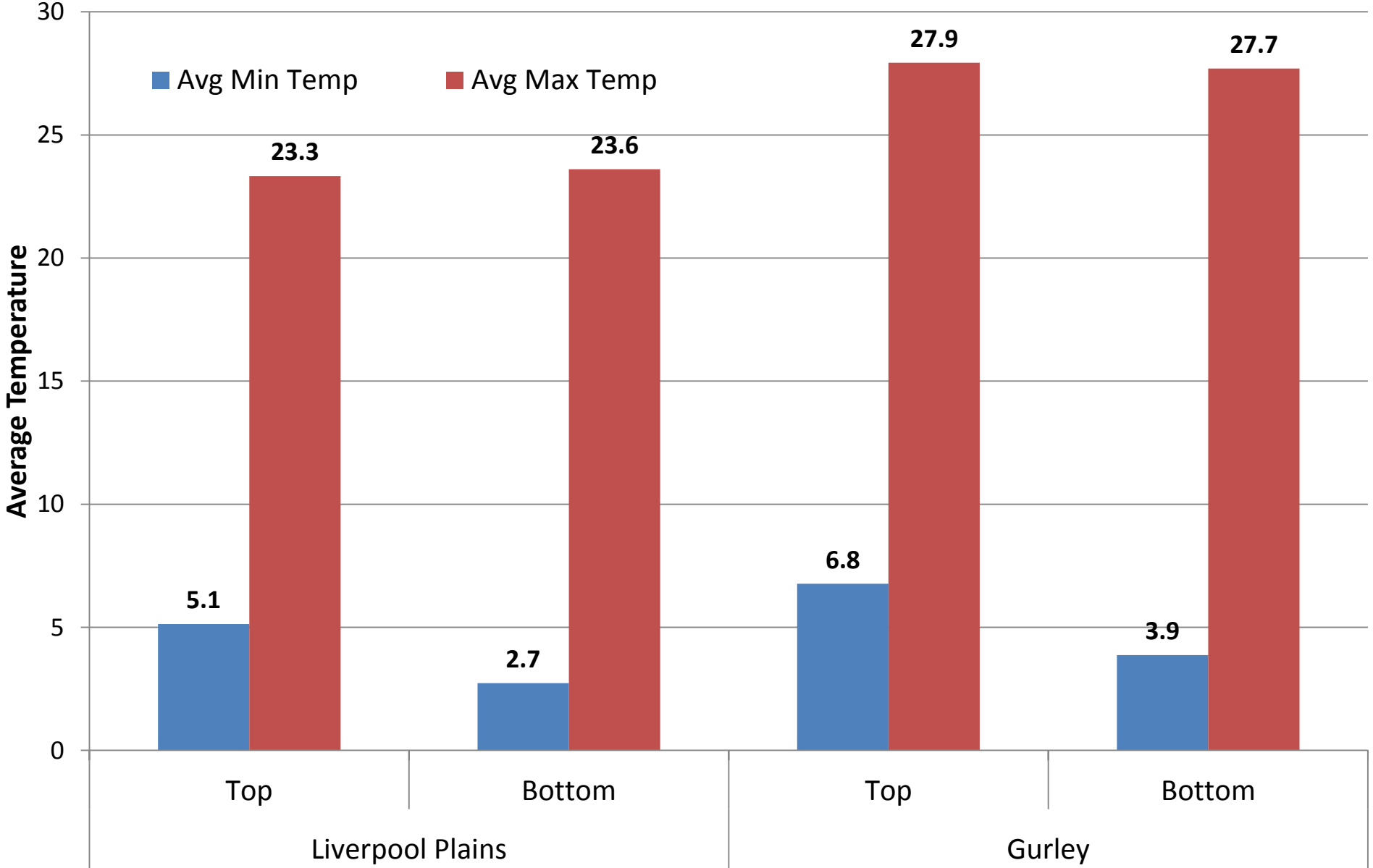
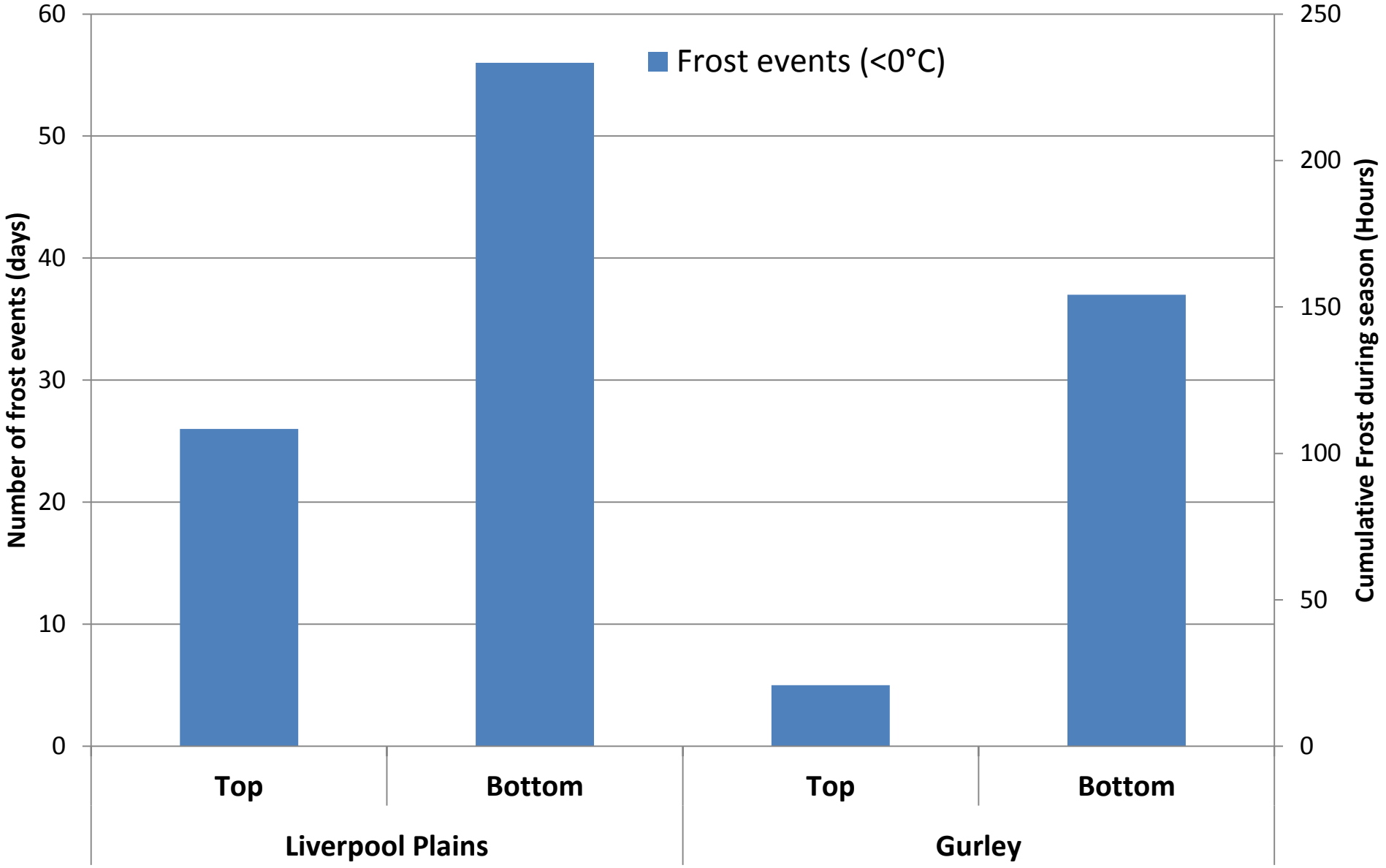
Average Temperatures



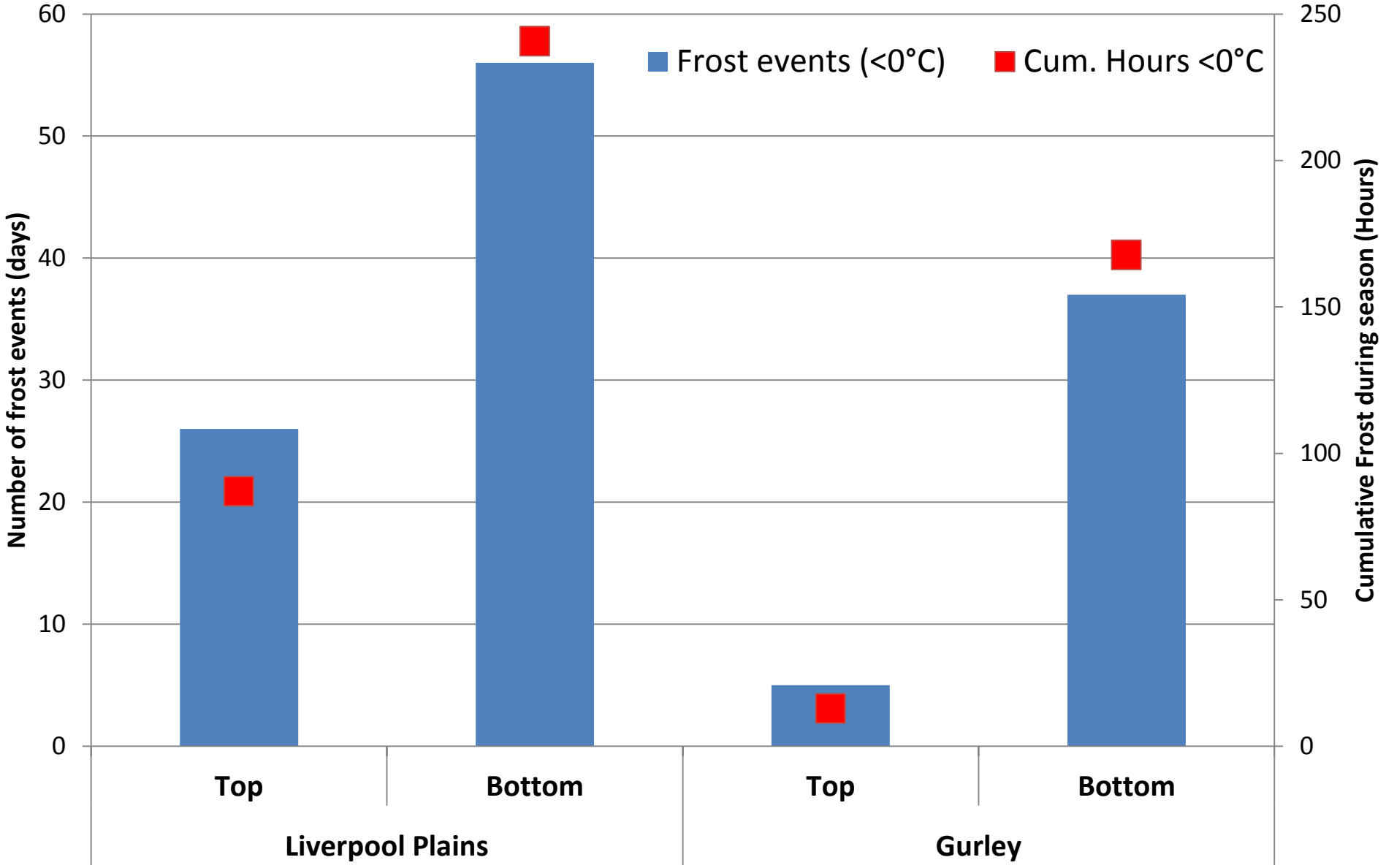
Average Temperatures



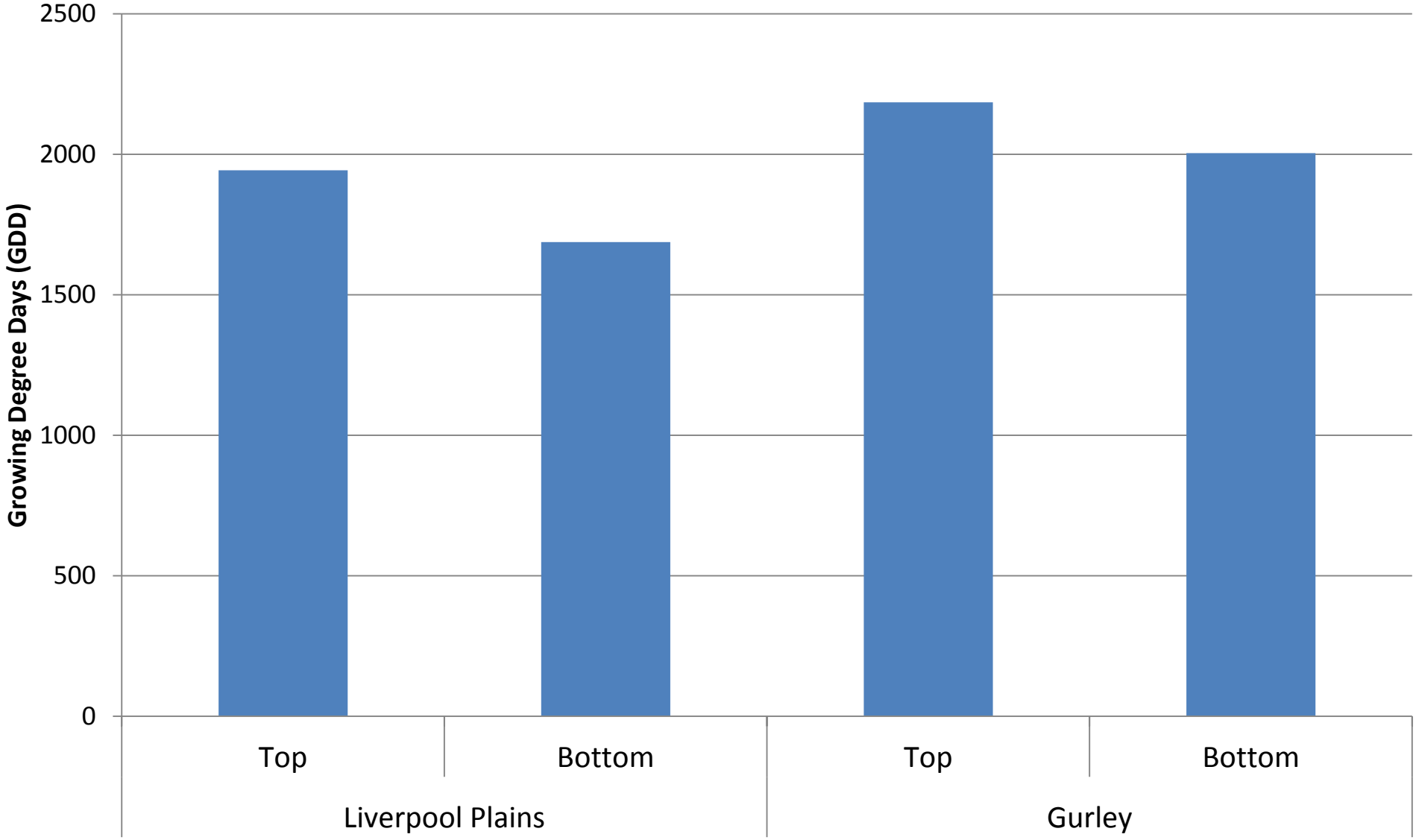
Number of Frost Events <0°C



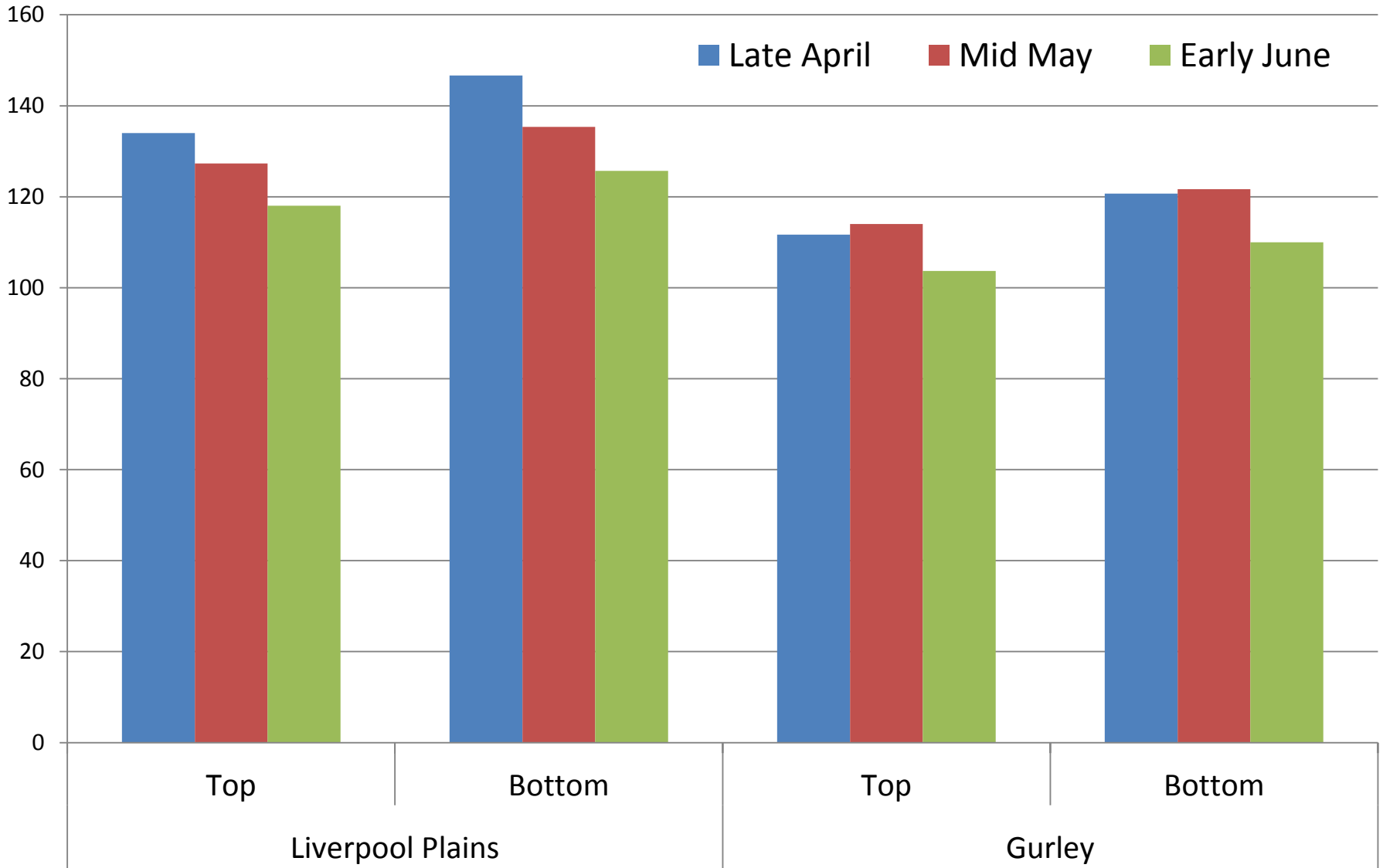
Number of Frost Events <0°C



Growing Degree Days (GDD)



Days to flower and elevation



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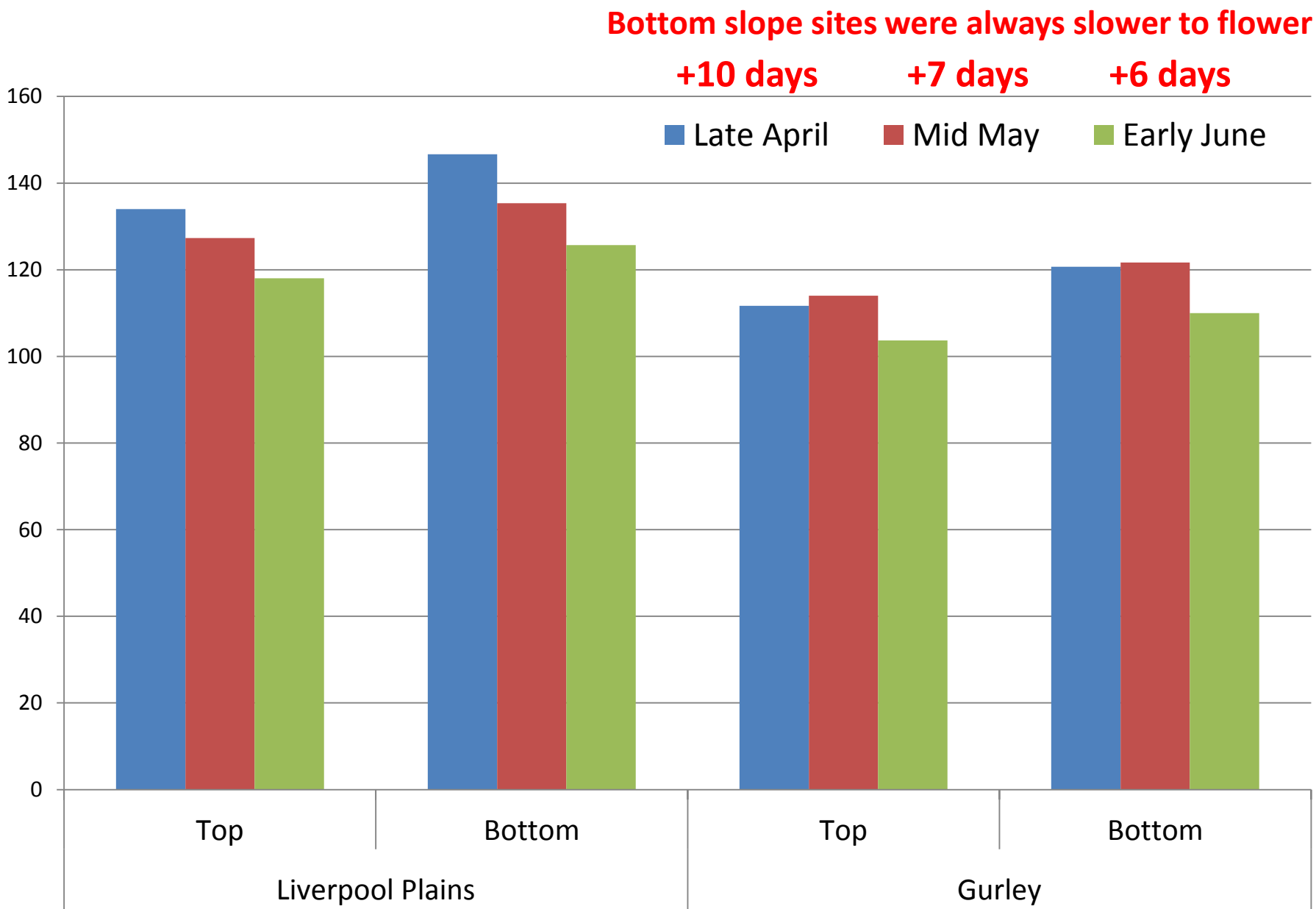
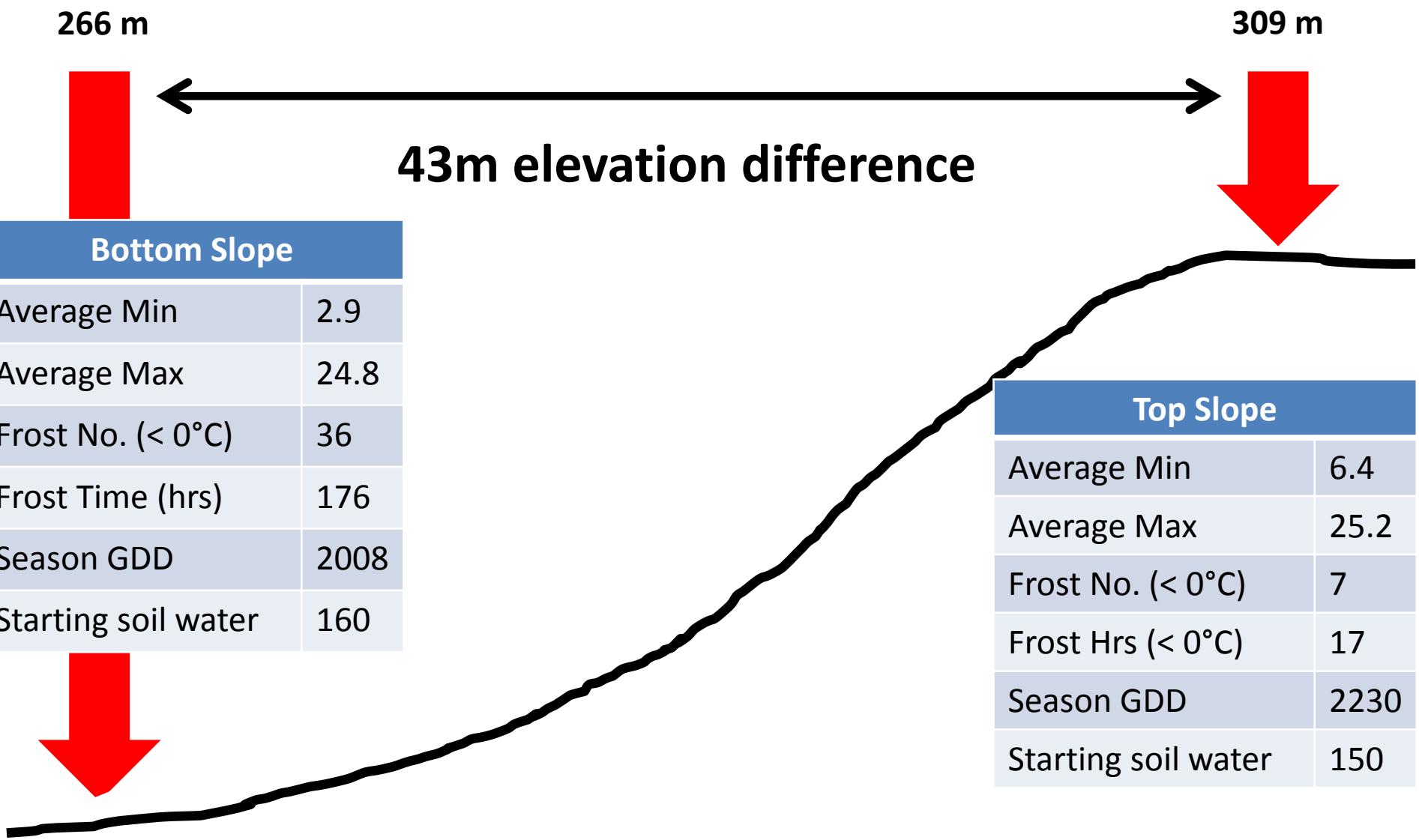


Visual difference in field (9th Sep) 2016 at Gurley

LPB Dart Top Slope

LPB Dart Bottom Slope

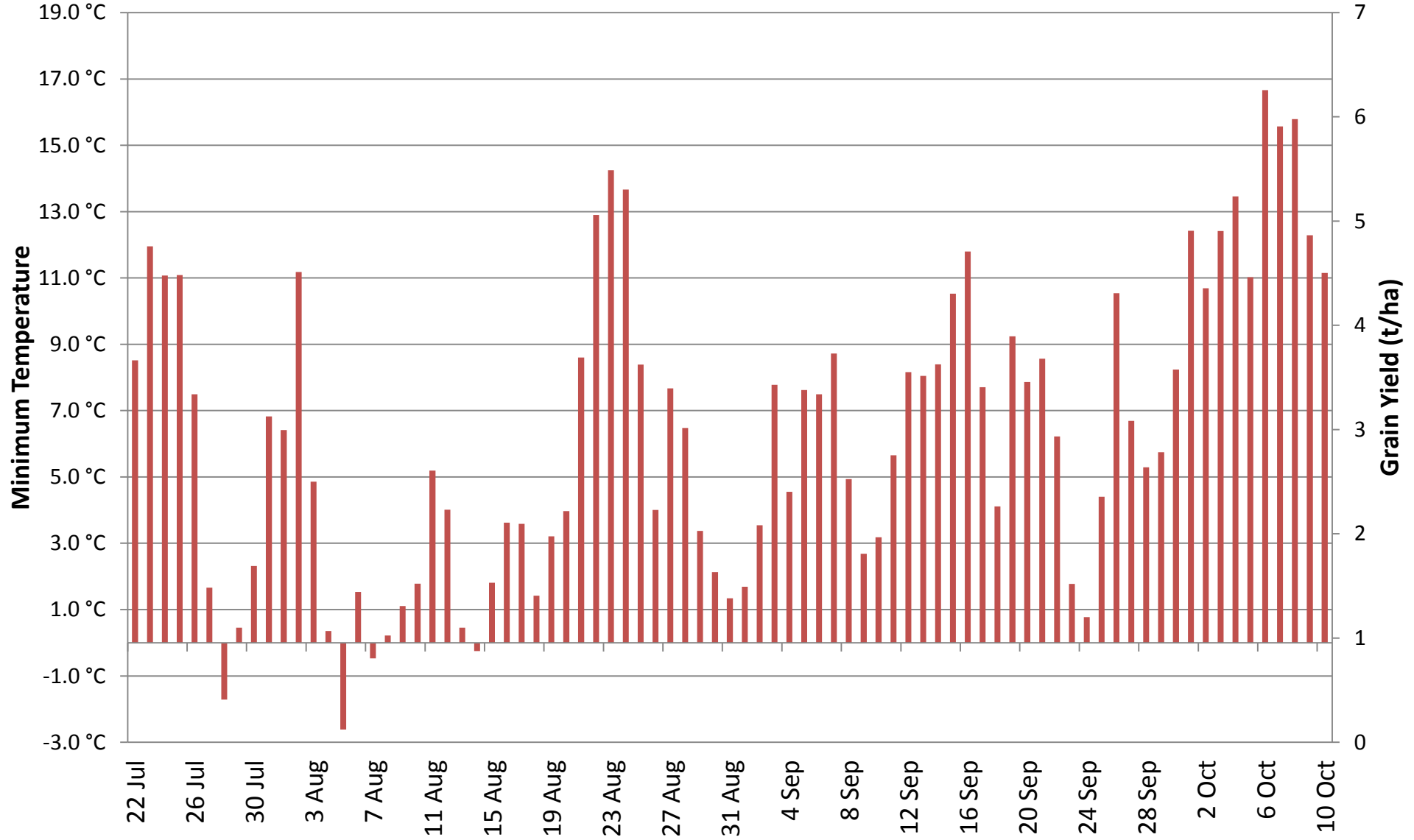
Gurley TOS Site 2015



Bottom Slope	
Average Min	2.9
Average Max	24.8
Frost No. (< 0°C)	36
Frost Time (hrs)	176
Season GDD	2008
Starting soil water	160

Top Slope	
Average Min	6.4
Average Max	25.2
Frost No. (< 0°C)	7
Frost Hrs (< 0°C)	17
Season GDD	2230
Starting soil water	150

Top Slope – Min Temperature, Grain Yield and Anthesis Date



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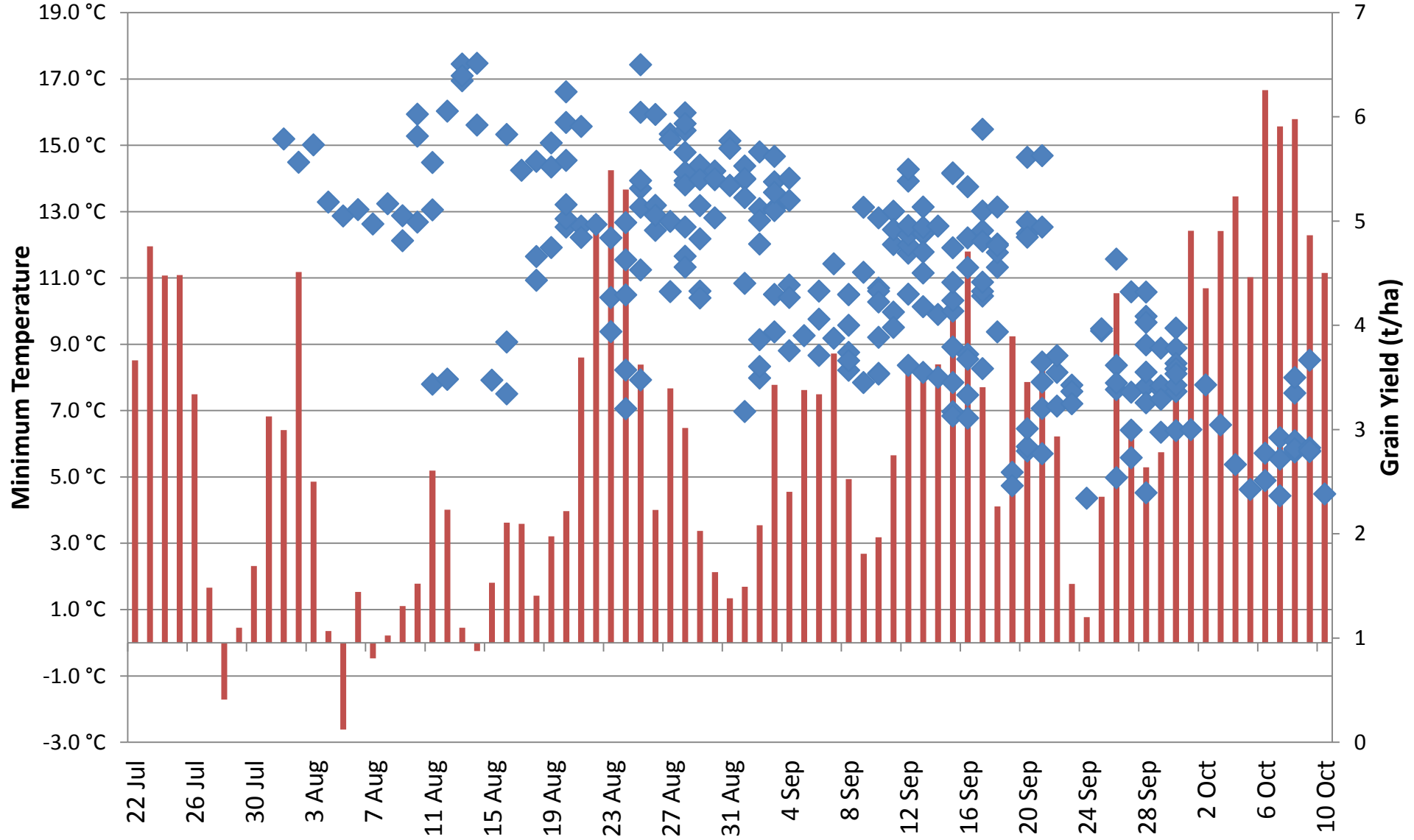

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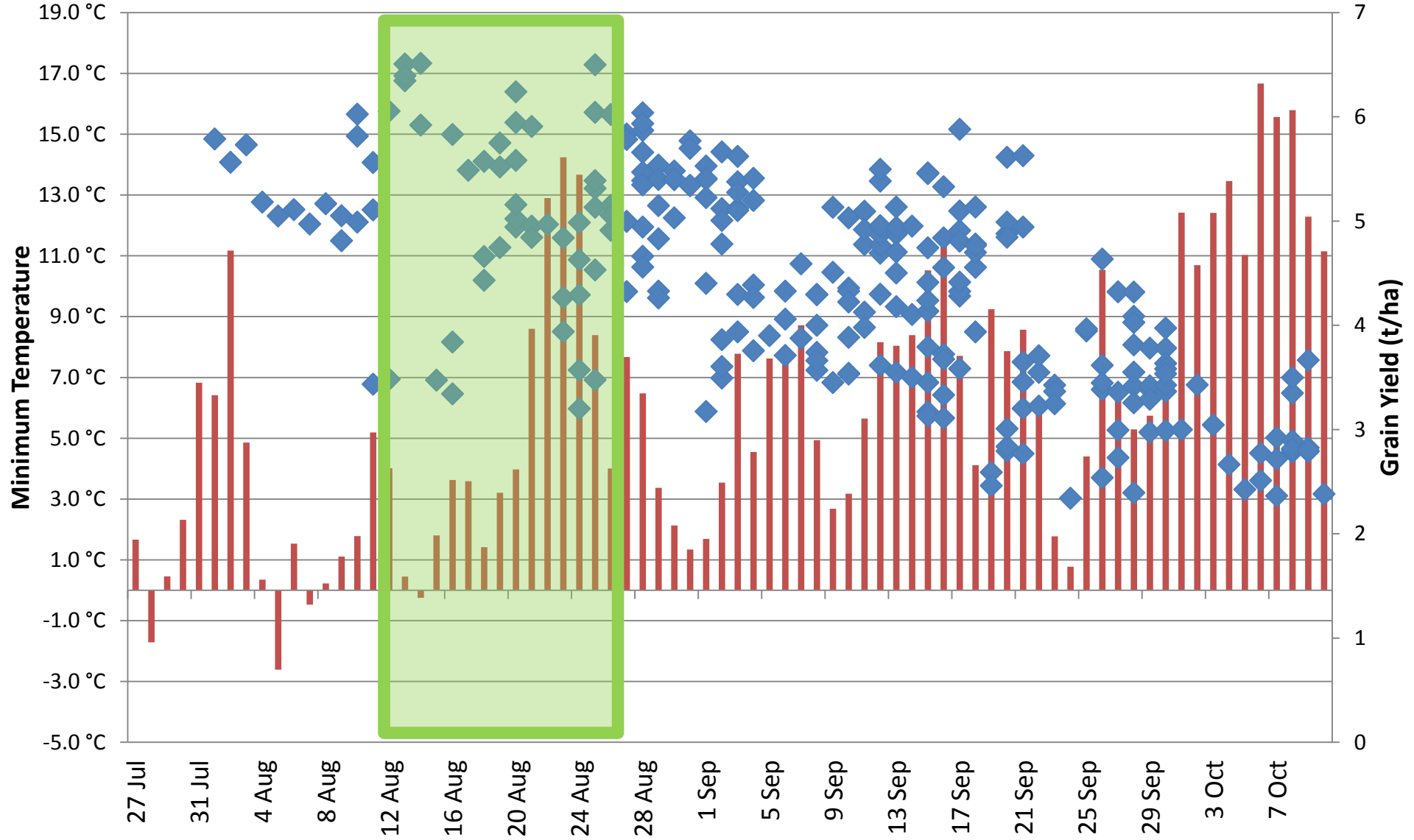
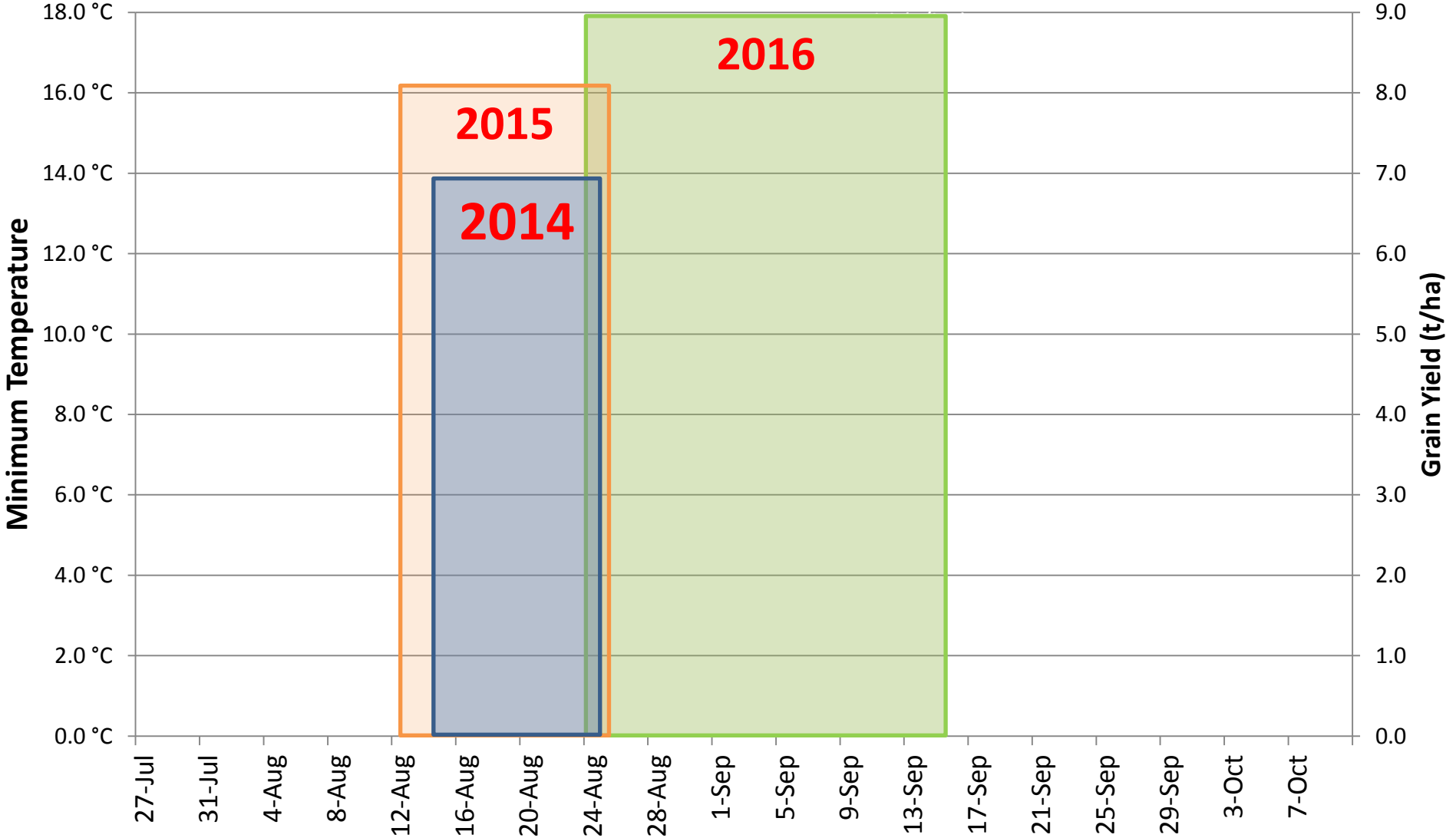
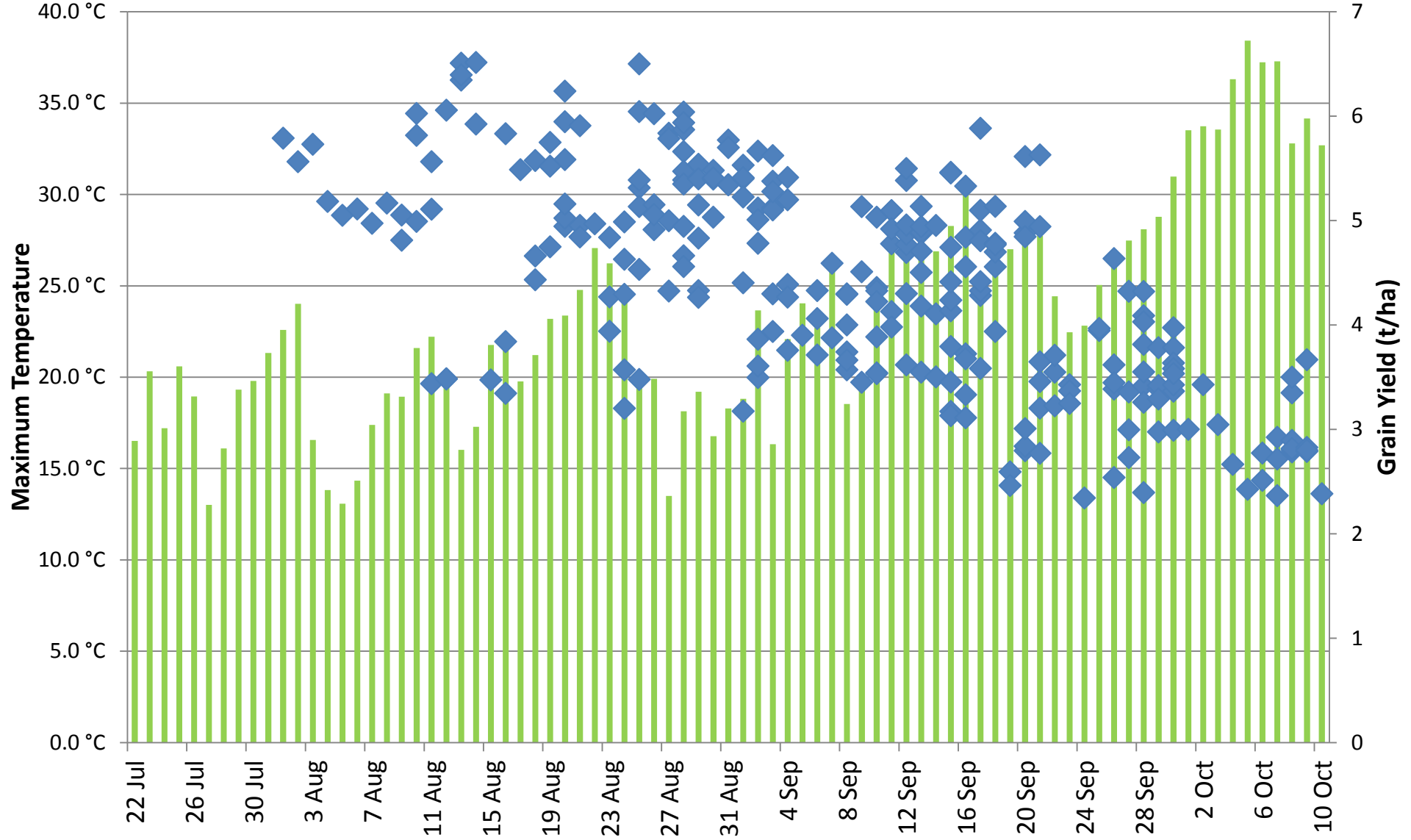


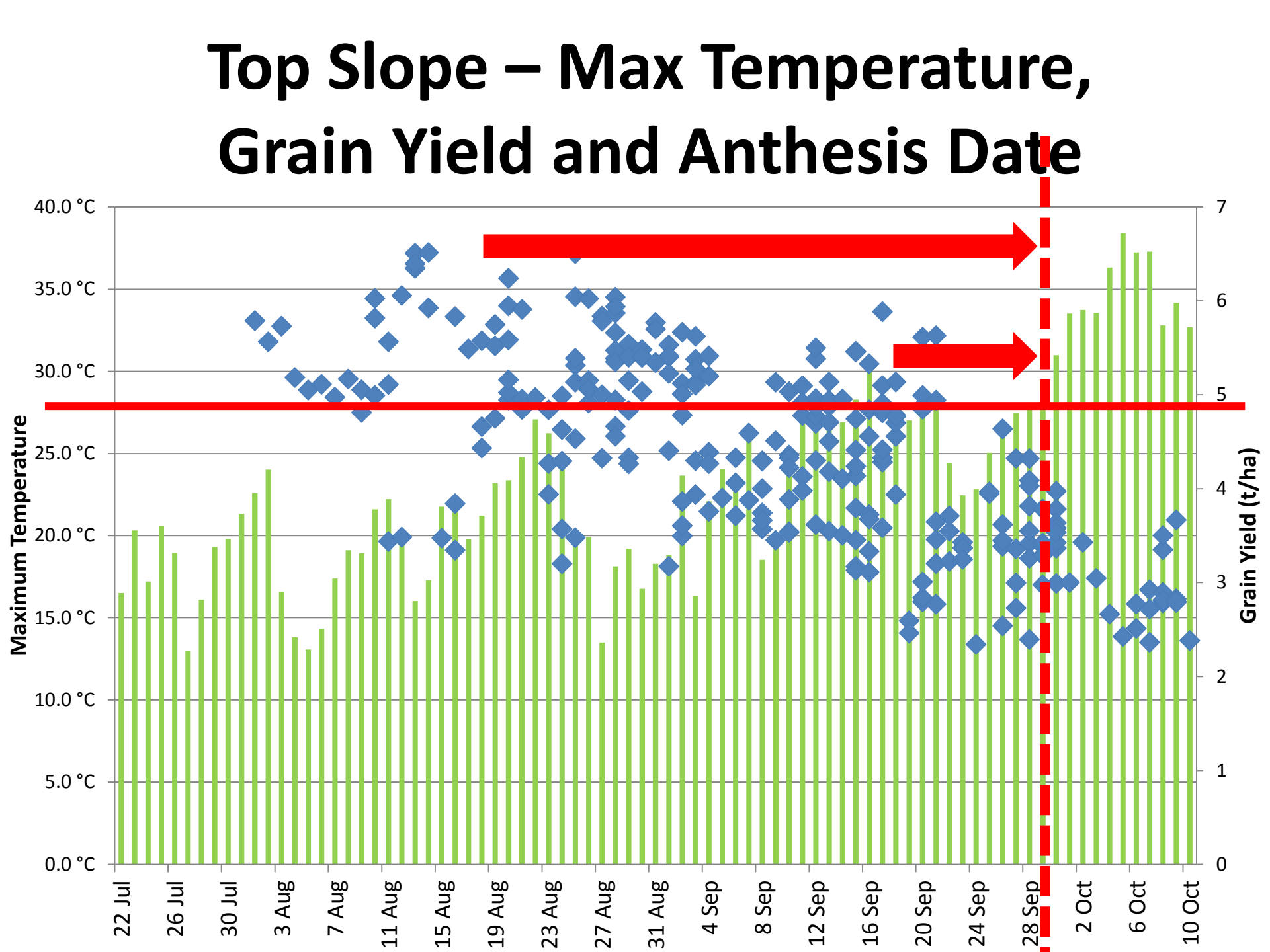
Top Slope – Min Temperature, Grain Yield and Anthesis Date



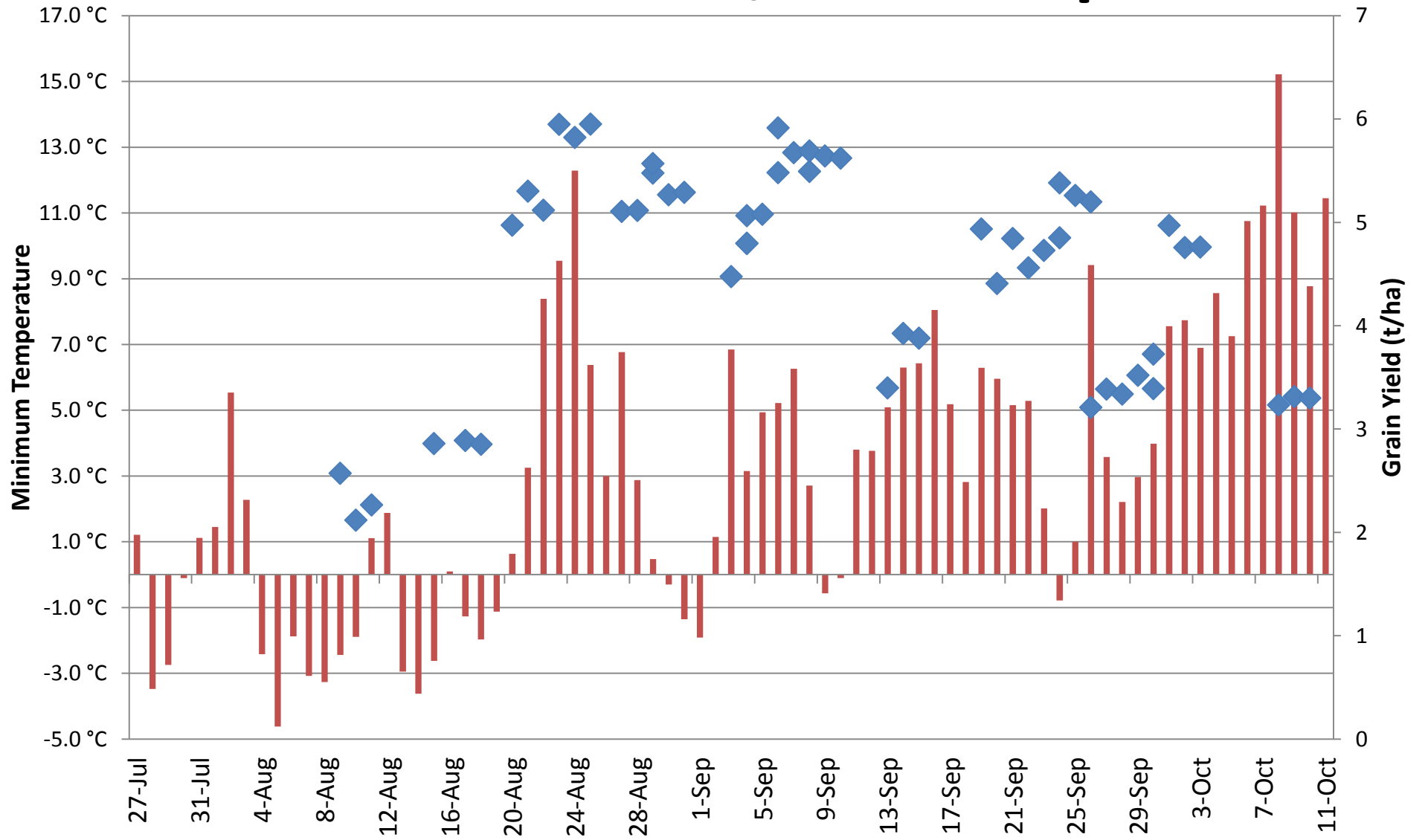
Top Slope – Max Temperature, Grain Yield and Anthesis Date



Top Slope – Max Temperature, Grain Yield and Anthesis Date

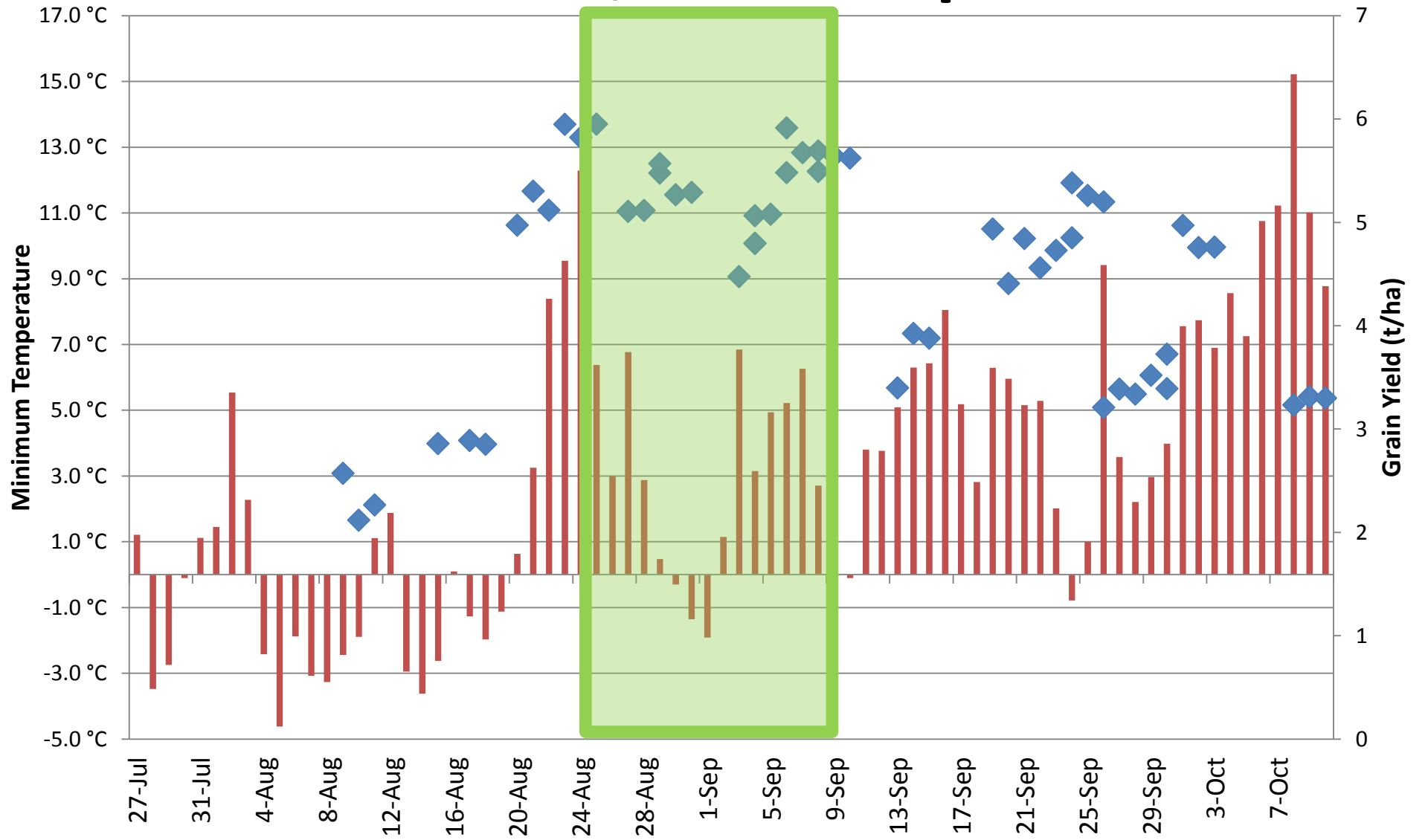


Bottom Slope – Anthesis date, Grain Yield, Min Temp

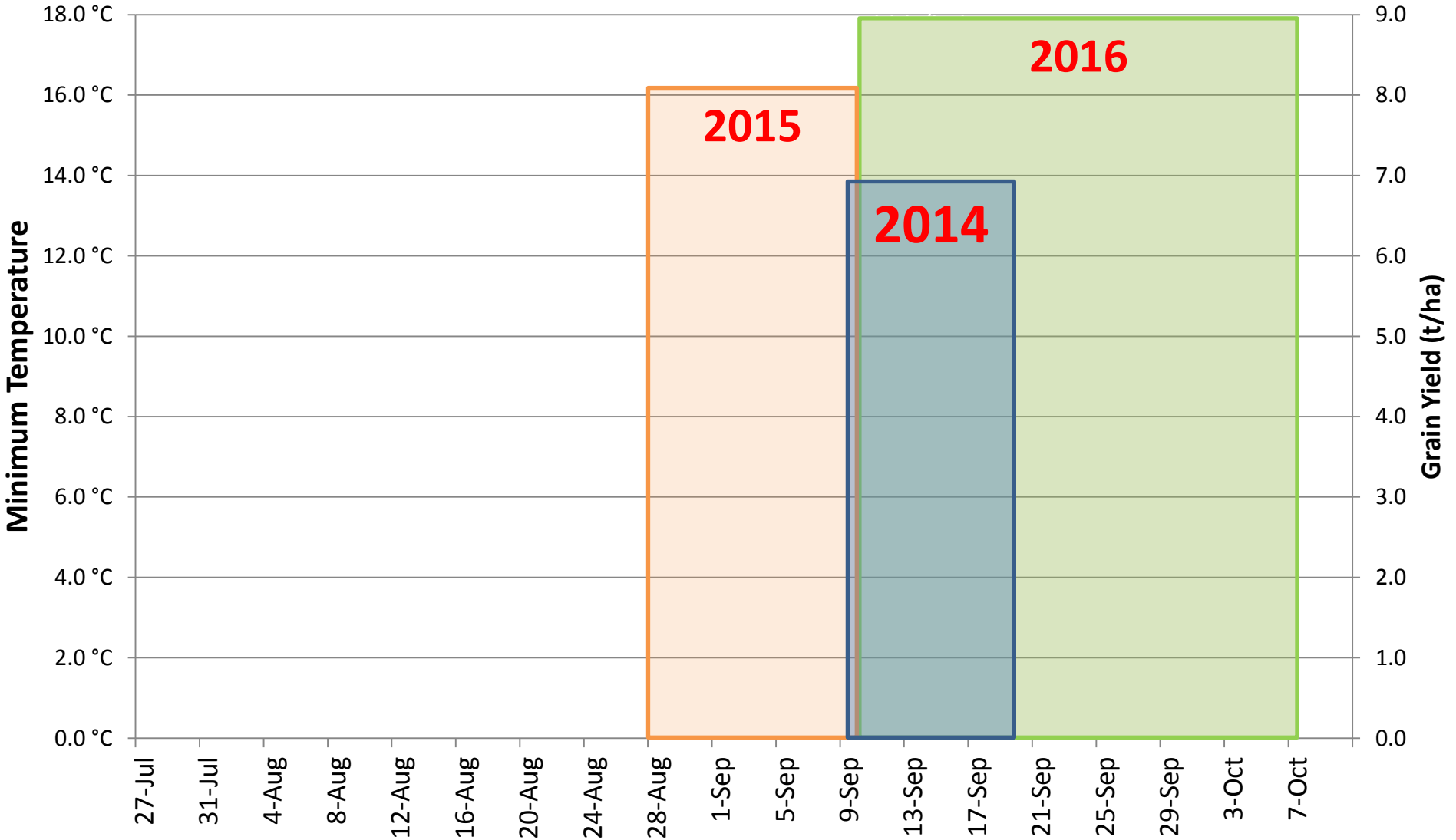


Bottom Slope – Anthesis date, p

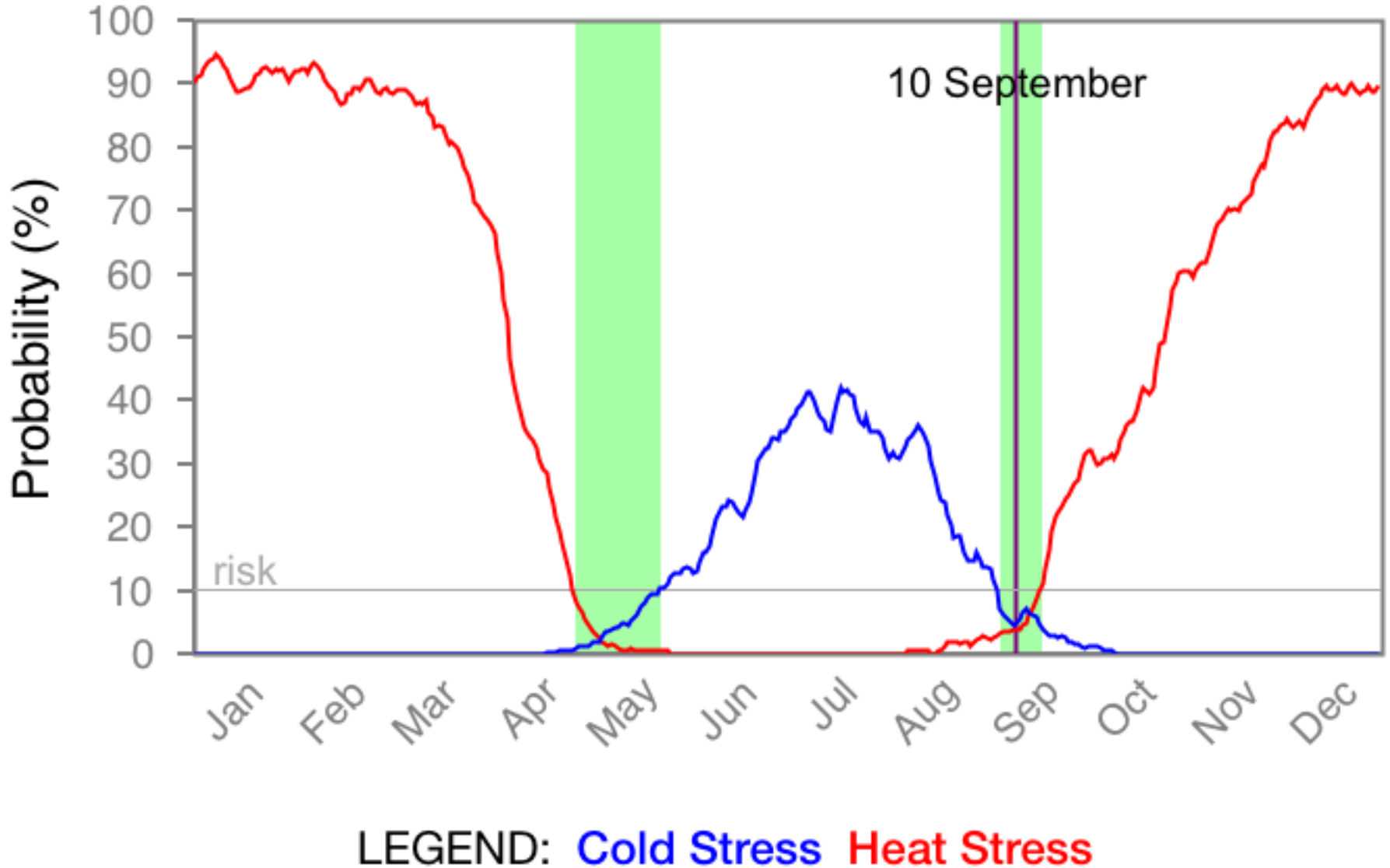
Bottom Slope – Anthesis date, Grain Yield, Min Temp



Bottom Slope – Min Temperature, Grain Yield and Anthesis Date

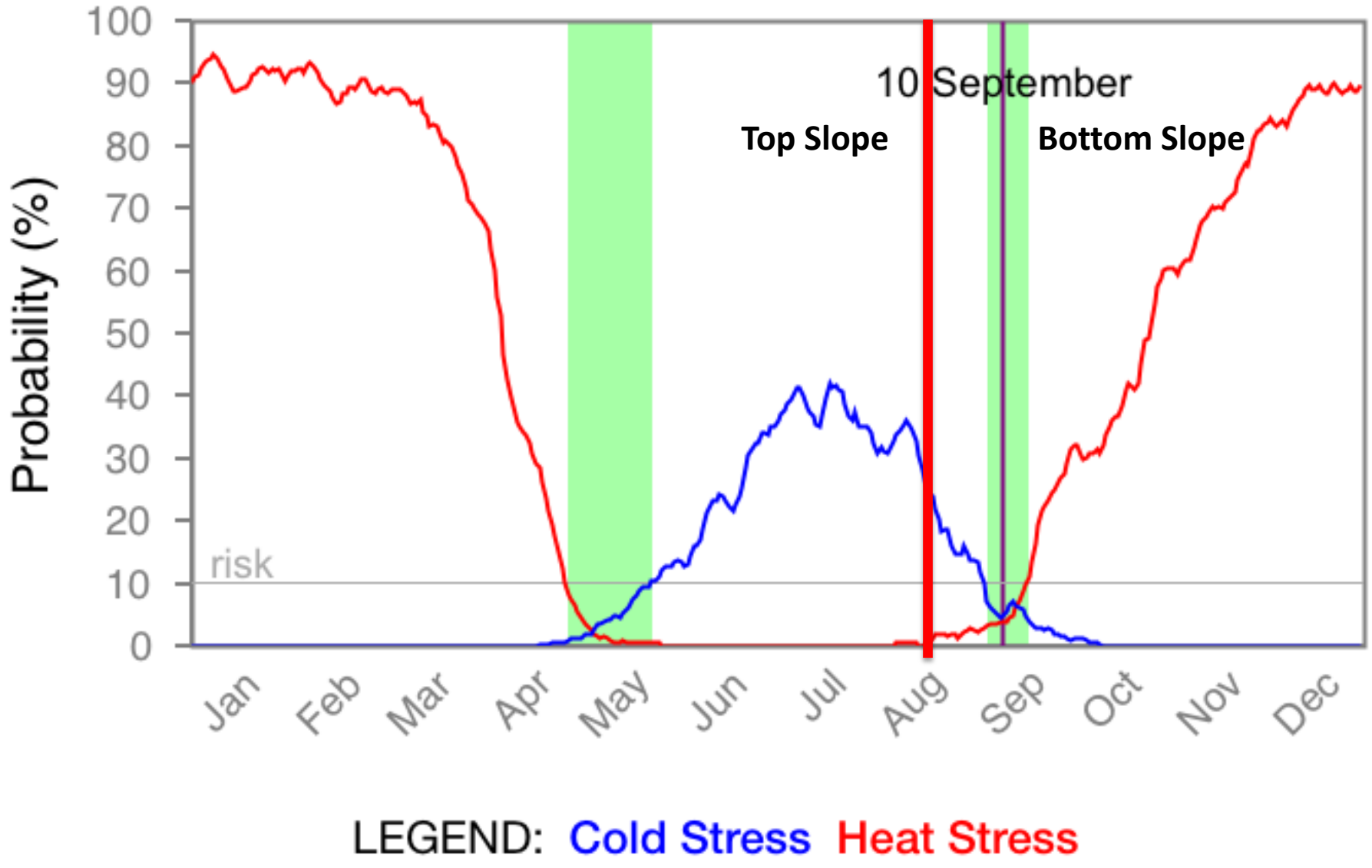


Probability of cold and heat stress for PALLAMALLAWA POST OFFICE



LEGEND: Cold Stress Heat Stress

Probability of cold and heat stress for PALLAMALLAWA POST OFFICE

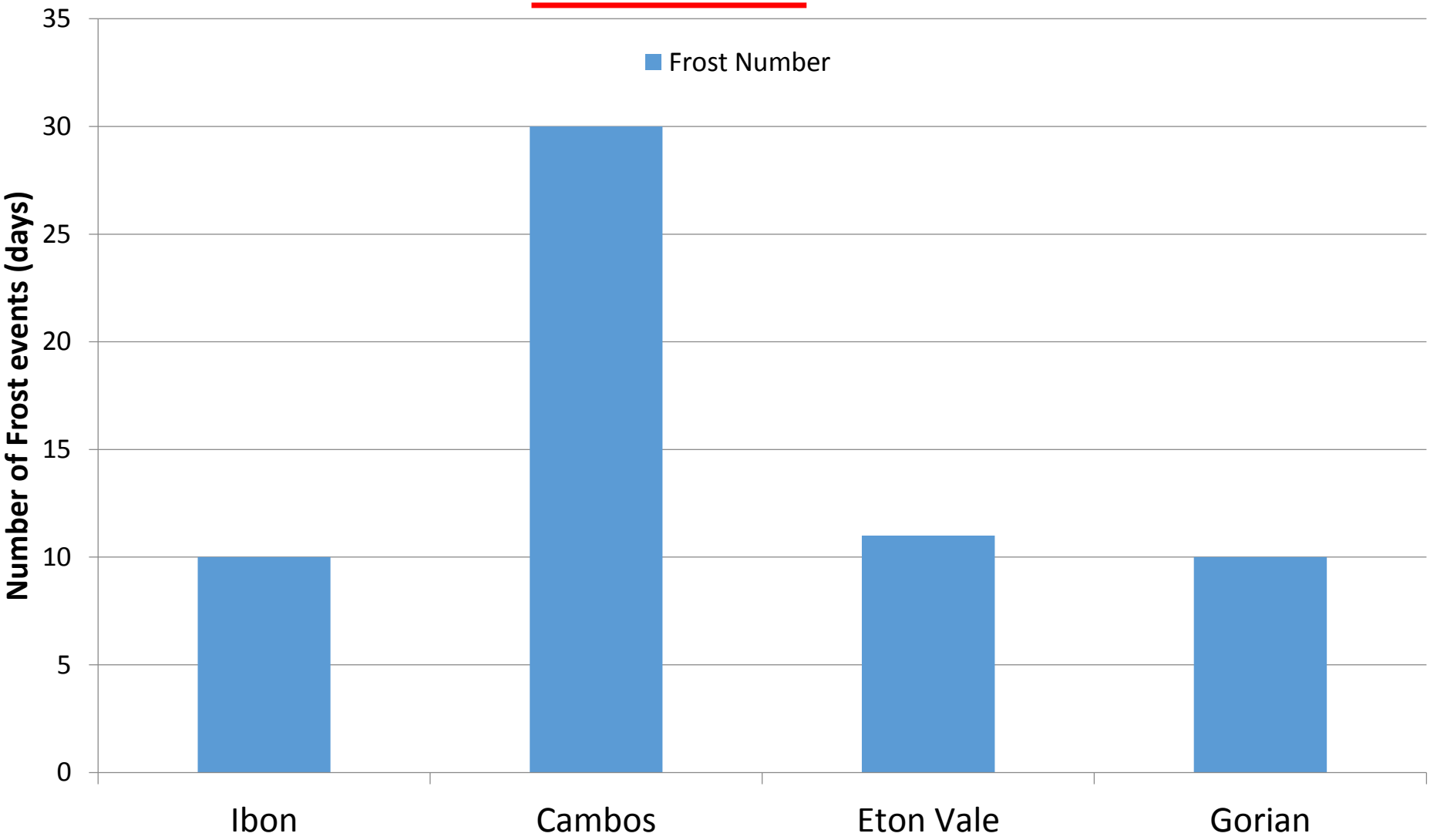


Does frost risk change in the west?

Rowena

Does frost risk change in the west?

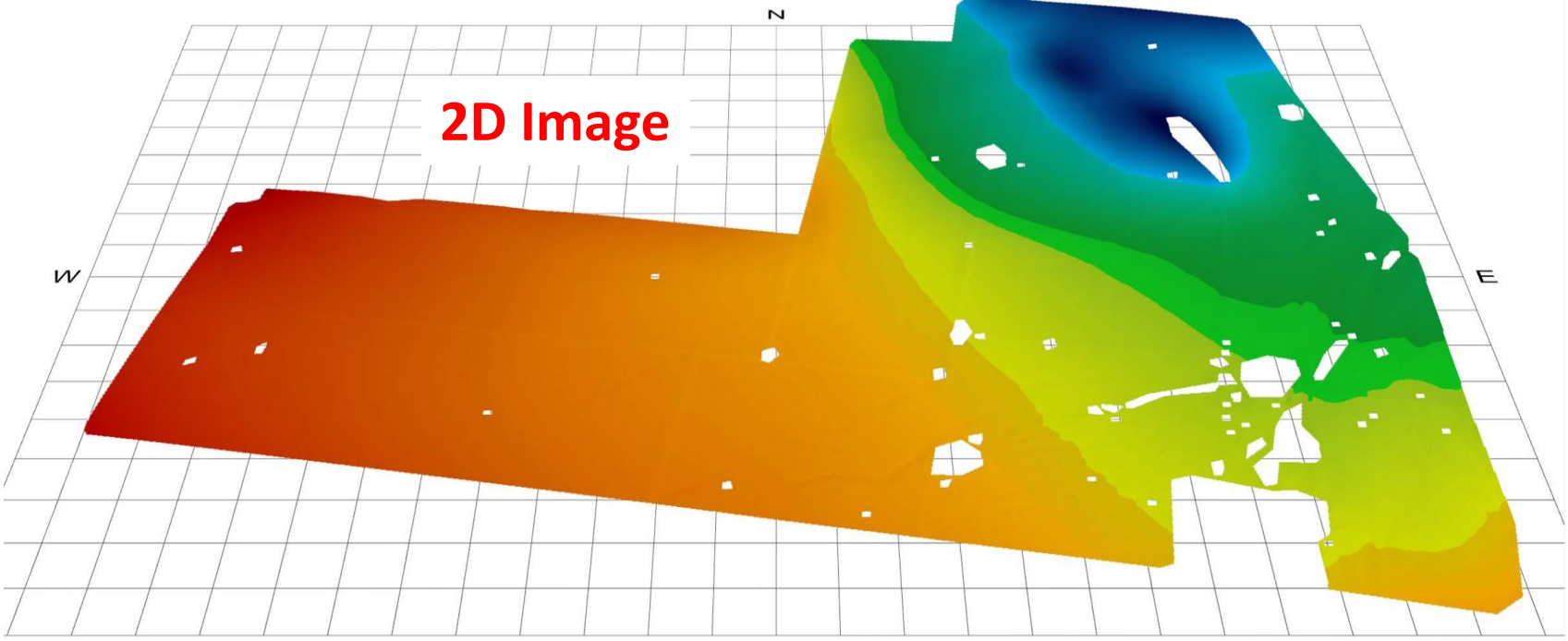
Rowena



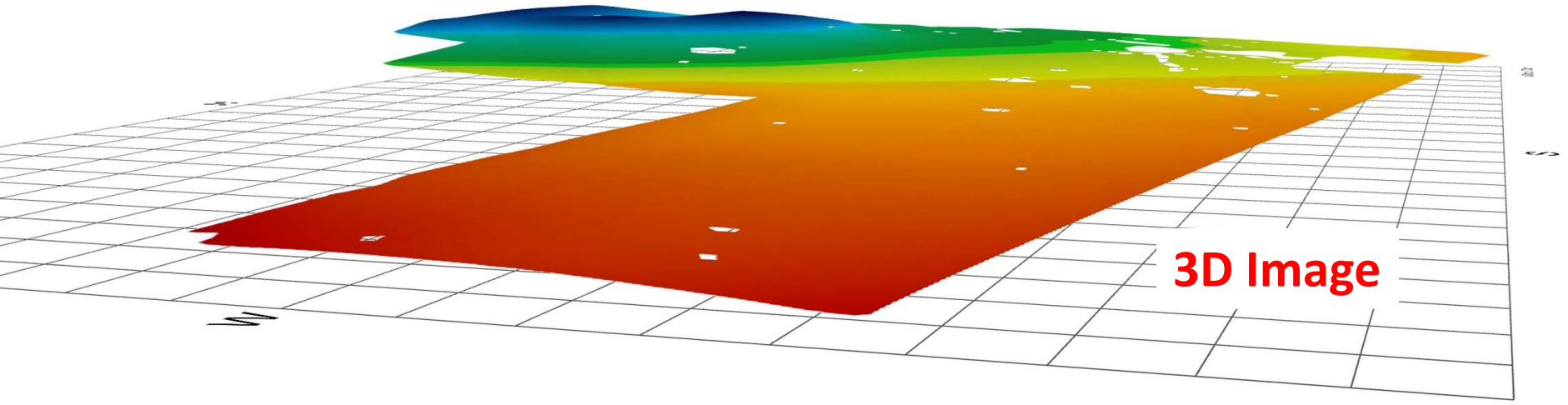
From trials to adoption!

- Plenty of motivation to go earlier
- Huge difference in frost risk with small changes in elevation
  - Needs to be exploited

- Although it should not be used solely elevation can be used as an indicator of frost risk!
  - Anyone with GPS is collecting elevation data



Virtually everyone has elevation maps of their paddocks



From trials to adoption!

- Individual paddocks could be combined very easily for a whole farm elevation map
  - modelling drainage and air-movement

- Developing frost risk zones
  - Some basic data collection (data loggers and elevation data)
  - Very little $ cost
  - What proportion of the paddock is at risk?

- With todays equipment the options are endless
  - use variable rate technology and use a particular elevation change to switch varieties

Take home messages

- Planting date is one of the most significant agronomic levers available
- This data shows that elevation differences offers an opportunity for earlier planting with less frost risk
  - Lower parts of the landscape have a narrower flowering windows
  - There is a maturity adjustment of varieties to their environment, which helps protect against frost
- Elevation in these trials is responsible for variation in temperatures – however on a landscape scale aspect, drainage points, tree lines, etc will all combine to influence frost risk.
- Still building data but it needs to be incorporated in to models to broaden the applicability.

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GRDC UPDATES

Acknowledgements

- *The research undertaken as part of this project (AMPS00010) is made possible by the significant contributions of growers through the support of the GRDC*
- *Trial Cooperators – Hugh Simson "Brothers", Ed Simson "Plantation", Paul Slack "Koreen"*
- *Sophie Clift, Sophie Wilmott, Tony Lockery and Sophie O'Neill for technical assistance*

Thank you

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