Grapevine physiology in controlled environments

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Introduction

- Grape growers believe that heat stress prevents sugar from accumulating in berries
- Slows ripening and potentially loss of crop
- Where does heat impact on the sugar transport pathway?
- Source – phloem vasculature – sink?
- Our research directed at solving this puzzle

Heat stress effects on Semillon berries

Why controlled environments?

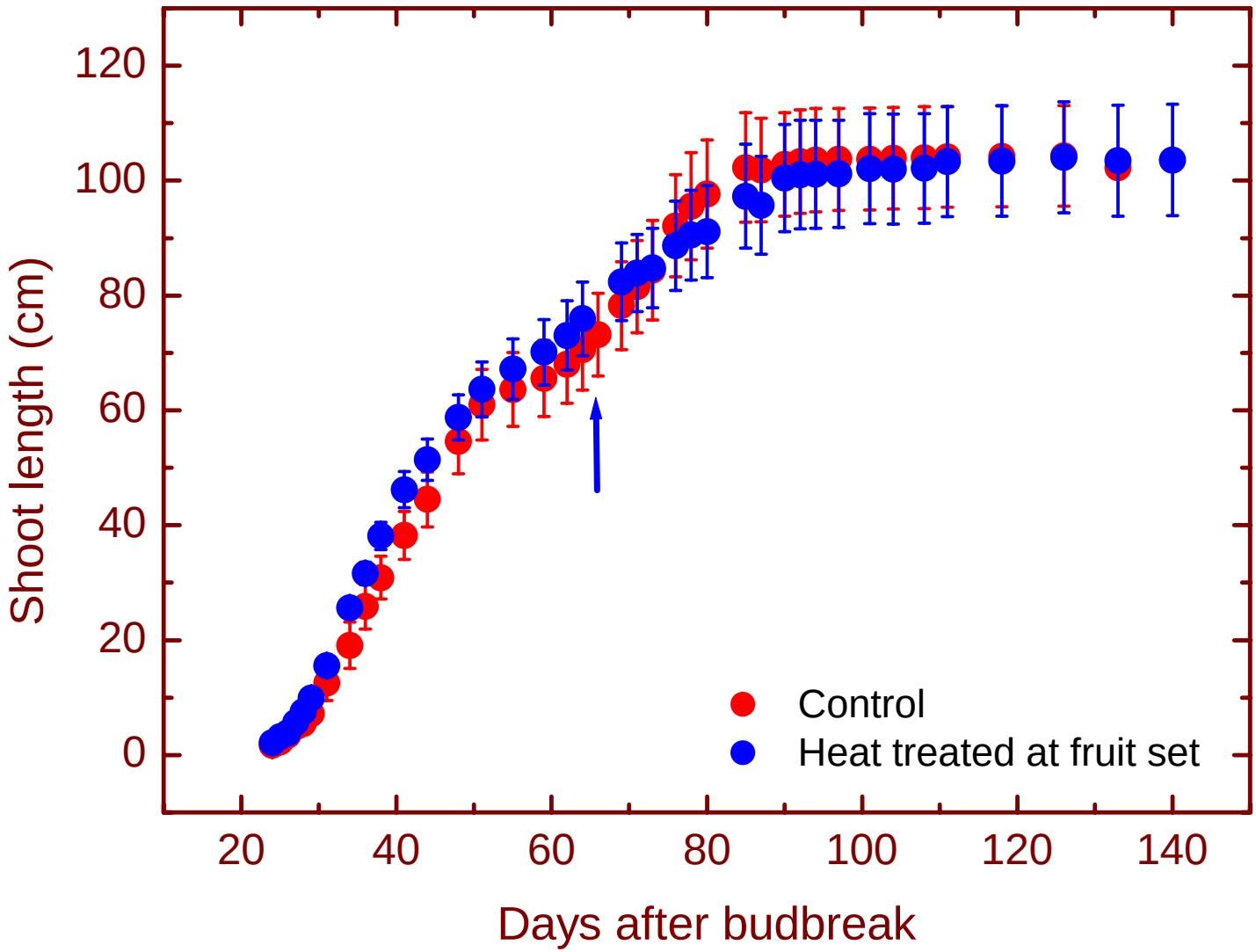
- Over last two growing seasons, low frequency of heat events (Temperature > 40^{o}C)
- Hard to study when nature does not provide

- CEs guarantee conditions for the study

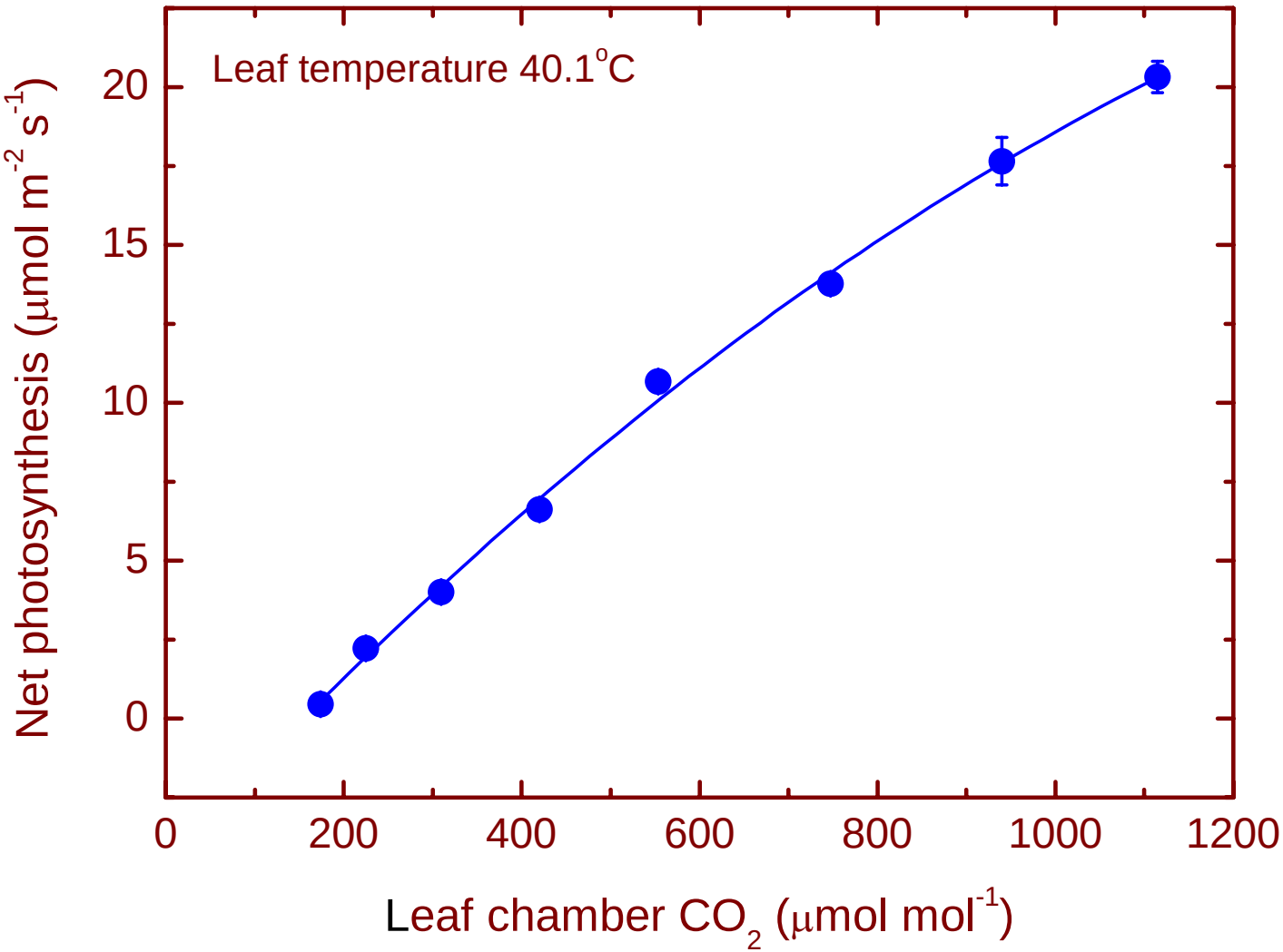
Methods

- Vines grown in CE conditions at 25/15^{o}C and 650 µmol m^{-2} s^{-1} from budbreak
- Exposed to 40/25^{o}C regime at selected developmental stages (flower, set, veraison, mid-ripening, mature)
- Measured shoot and bunch growth, photosynthesis, berry composition and yield

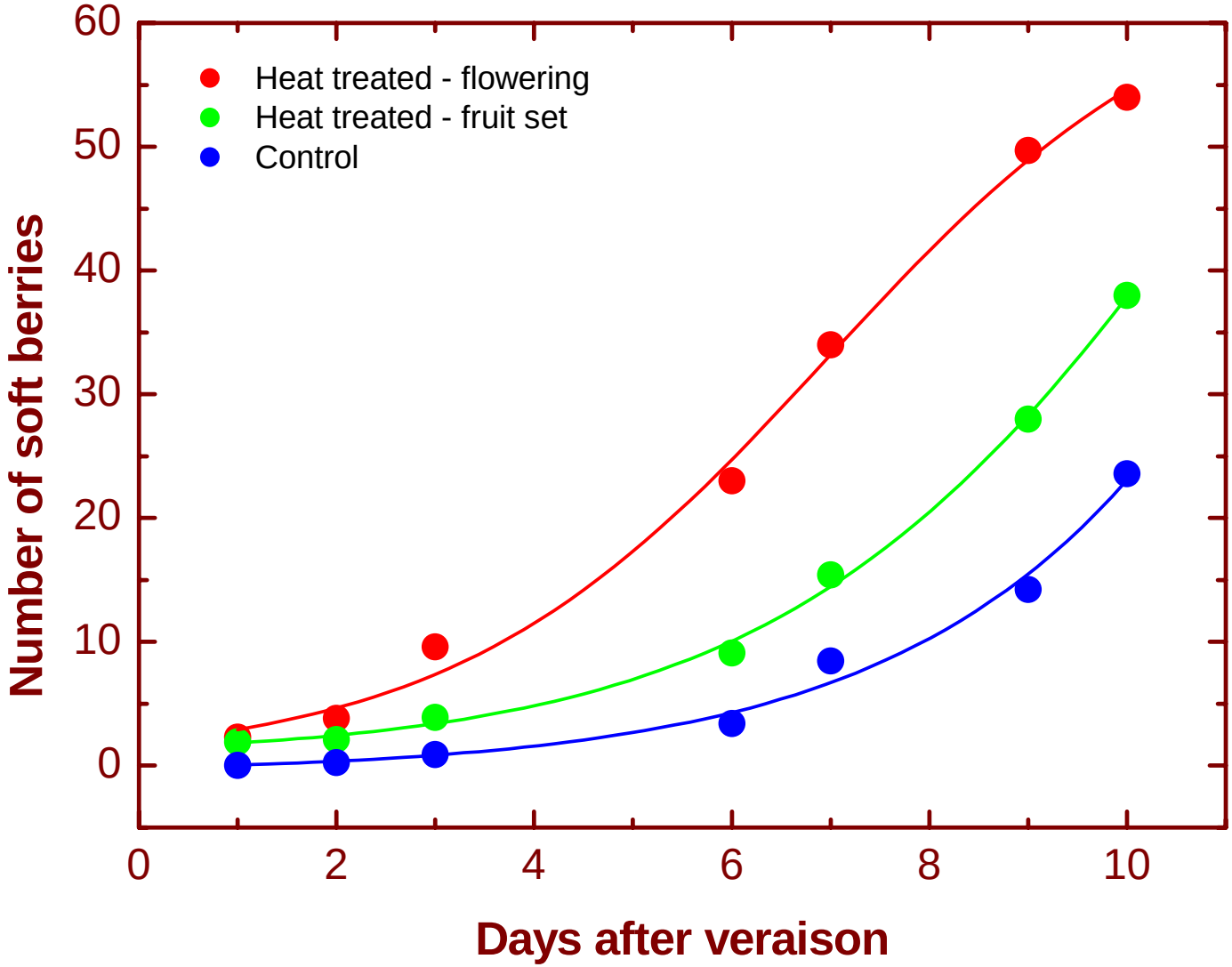
Shoot growth



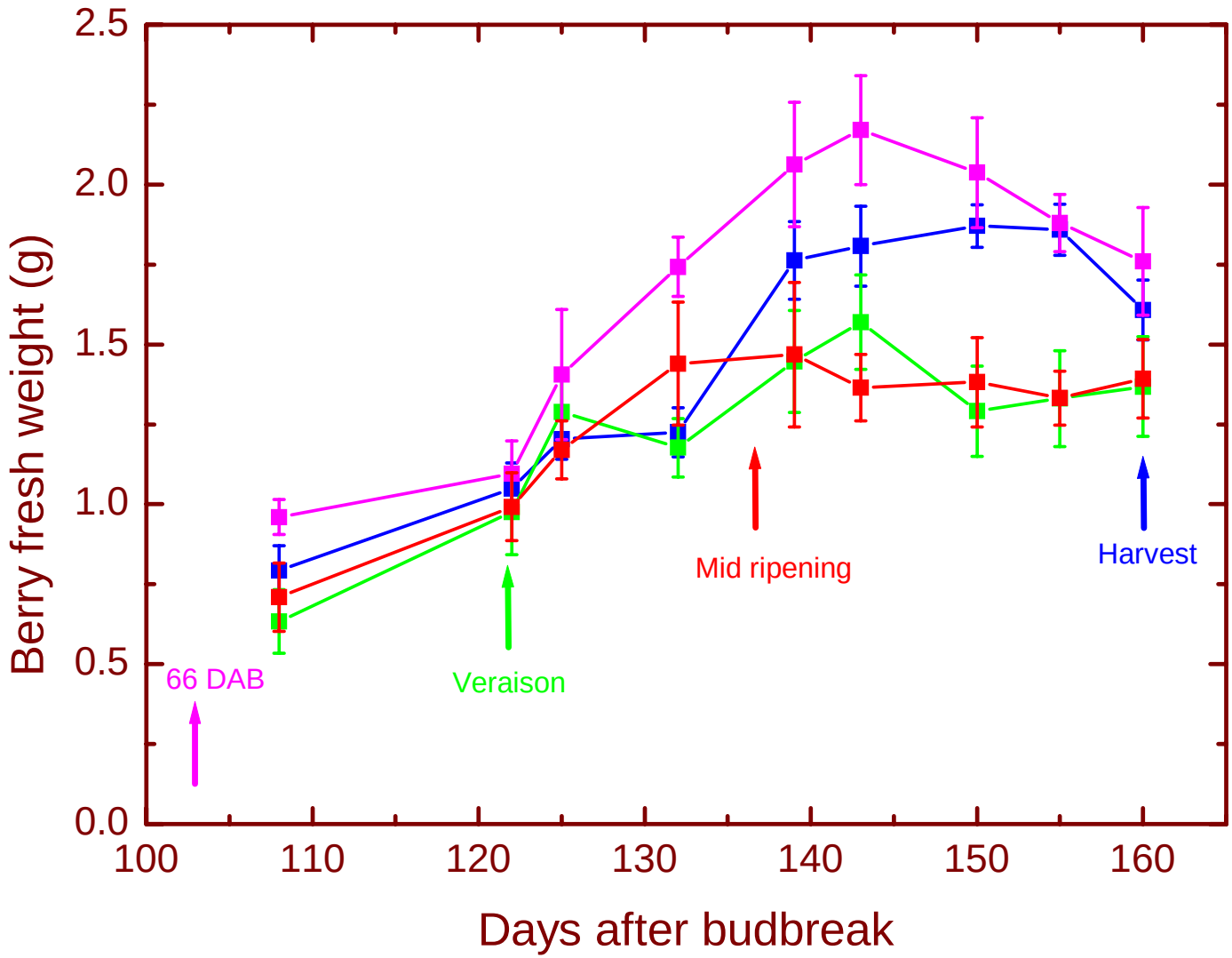
Photosynthesis



Bunch development



Berry weight

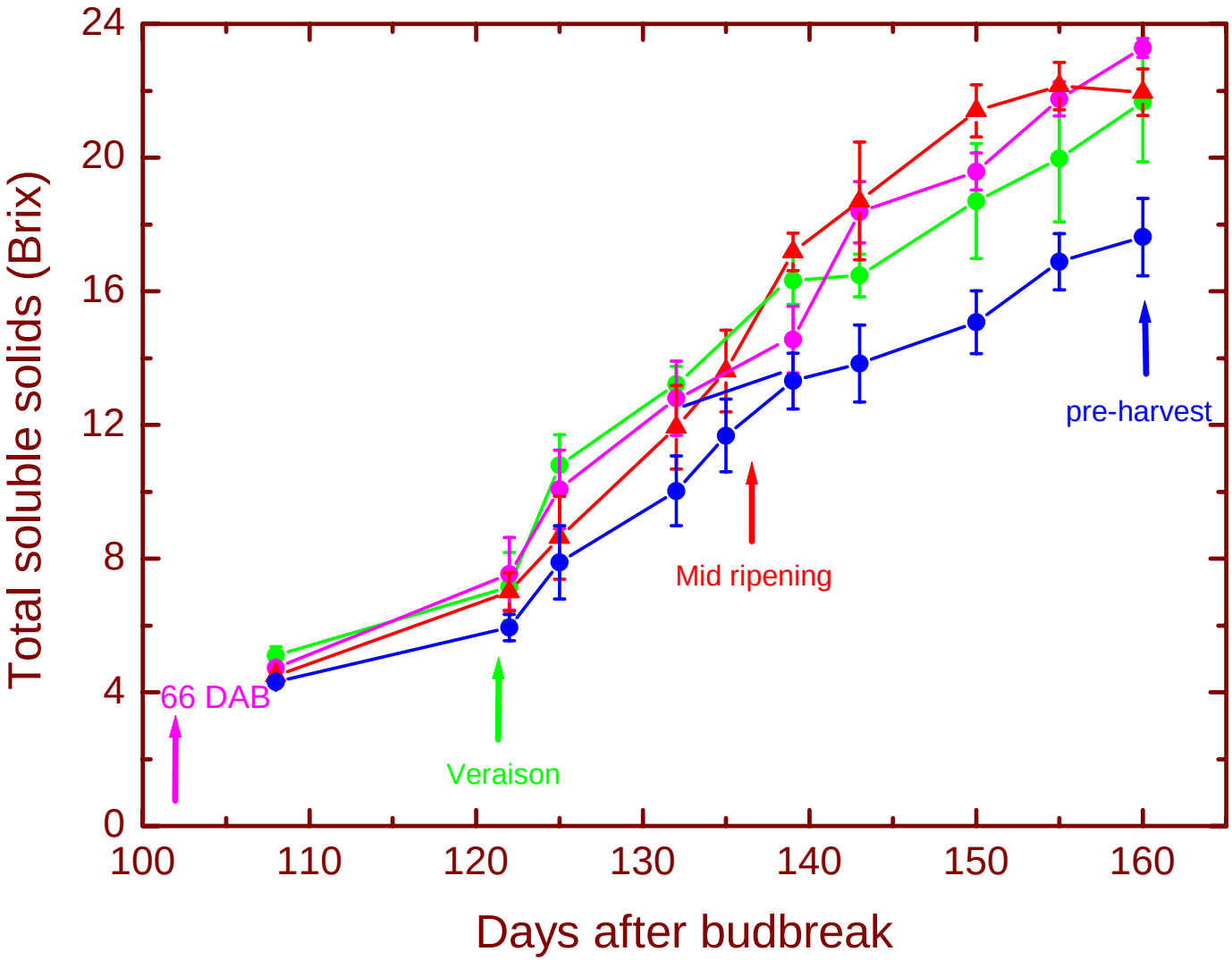


Heat effects at veraison

Heat effects at mid-ripening

Heat effects at maturity

Sugar accumulation



Conclusions

- Vegetative growth not affected by heat stress
- Photosynthesis unaffected
- Early heat events enhanced bunch development
- Late heat events slowed berry growth and increased incidence of damaged berries
- Sugar accumulation not *apparently* affected by heat stress

Acknowledgments

- My thanks to:
- Ms Sylvie Sicard, Technical Officer for the project
- Dr Marc Thomas, Research Associate
- Funding from the Grape and Wine Research and Development Corporation
- NSW Wine Industry Association