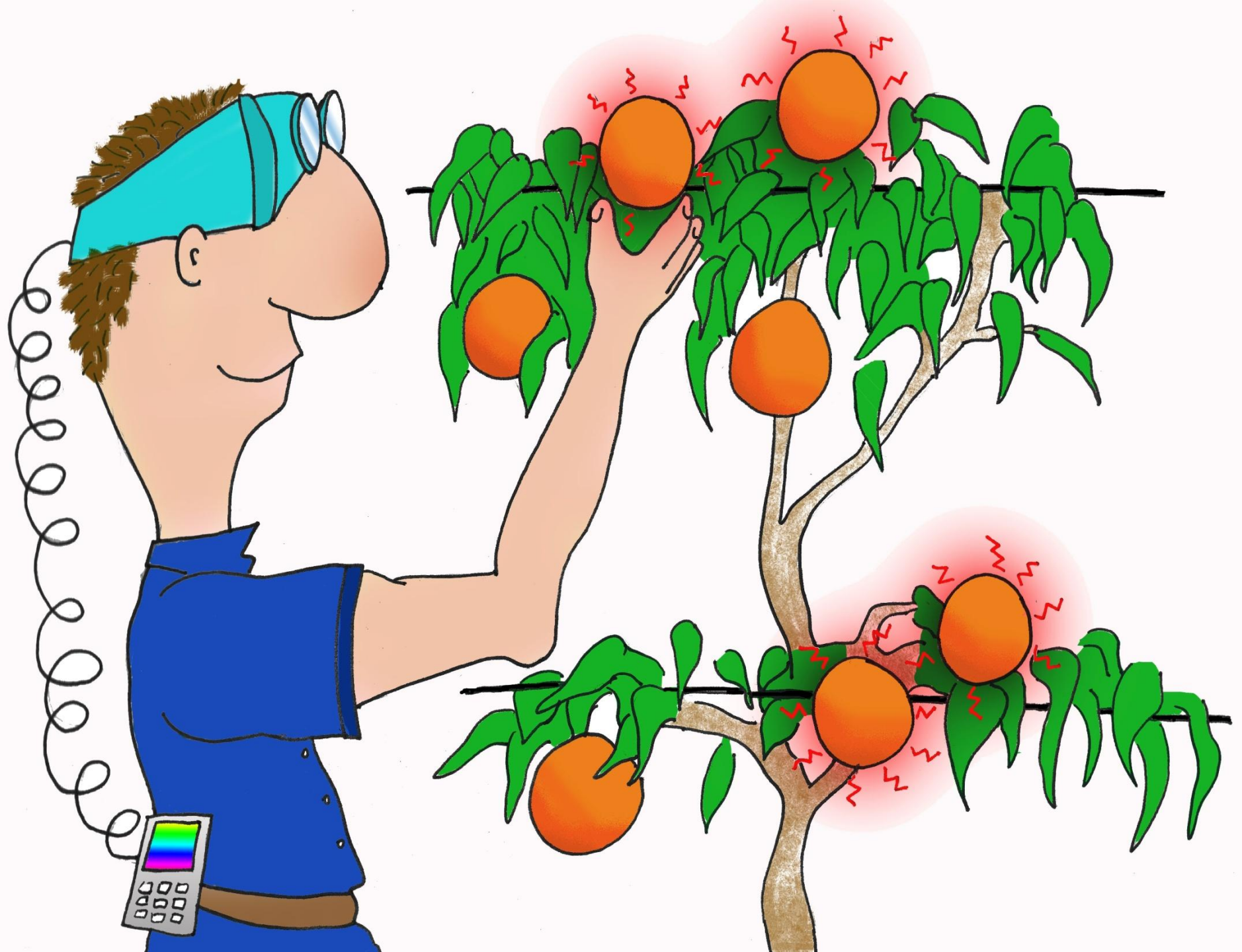


Cold Stored Peaches and Plums Respond differently to 1-Methylcyclopropene(SmartFresh™)

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Holford, Mark Jones, John Golding
and Claudio Bonghi



Symptoms of Low Temperature Breakdown (Chilling Injuries, CI)



University of
Western Sydney

CENTRE FOR PLANTS
AND THE ENVIRONMENT



1-Methylcyclopropene (1-MCP)

- 1-MCP blocks the action of ethylene, the natural fruit ripening hormone
- Treating fruit before cool storage generally makes CI worse in peaches and nectarines but improves storage life of plums

Aims

- Verify the responses of peaches, nectarines and plums to 1-MCP
- Identify differences in gene expression in peaches and plums in response to cold storage and 1-MCP

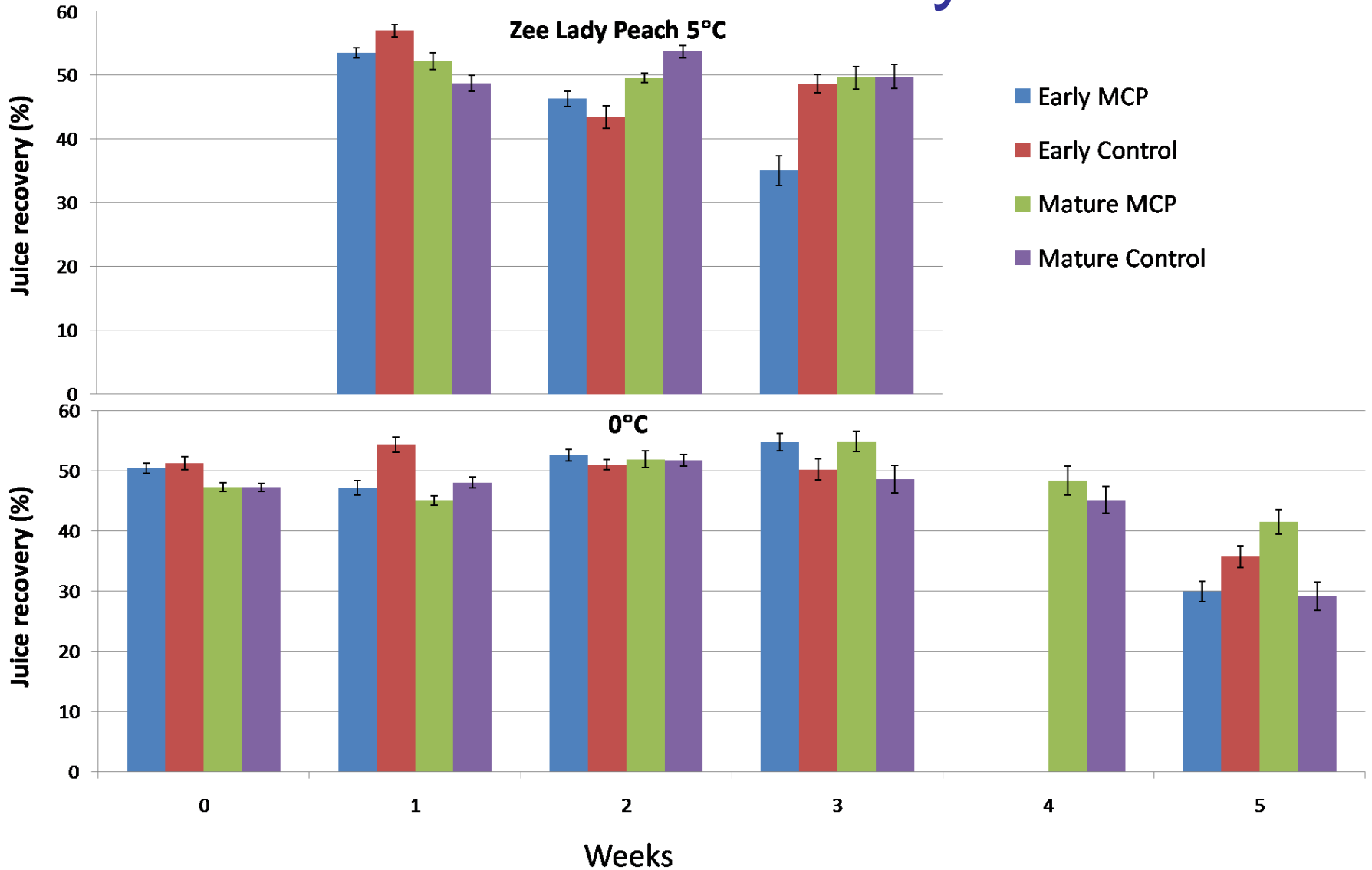
Storage Experiments

- 2008 Zee Lady peach; Ruby Red and October Sun plums at 0 and 5°C
(Importance of maturity highlighted)
- 2009 Zee Lady peach (two maturities); plums Radiant, Ruby Red and October Sun; plumcot Flavor Fall at 0 and 5°C
- 1-MCP applied at 625ppb for 24 h at 20°C
- Samples of fruit transferred periodically to 20°C, assessed after 4-5 days

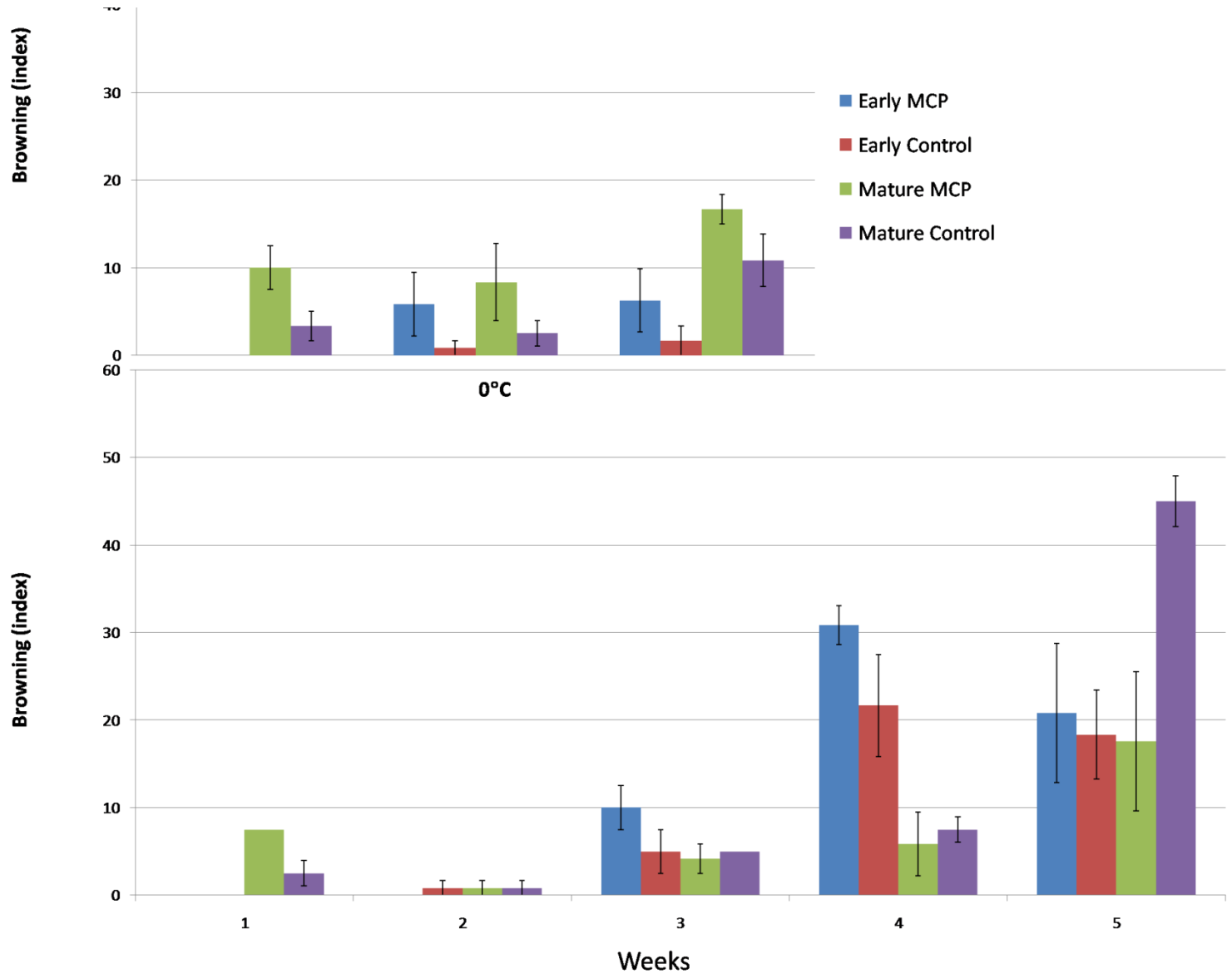
Results 2009

- Zee Lady peach, 1-MCP increased CI in early maturity, less response in mature fruit
- All plums stored better following 1-MCP treatment
- Plumcot stored better following 1-MCP treatment
- Storage life of all cultivars at 5°C half that at 0°C

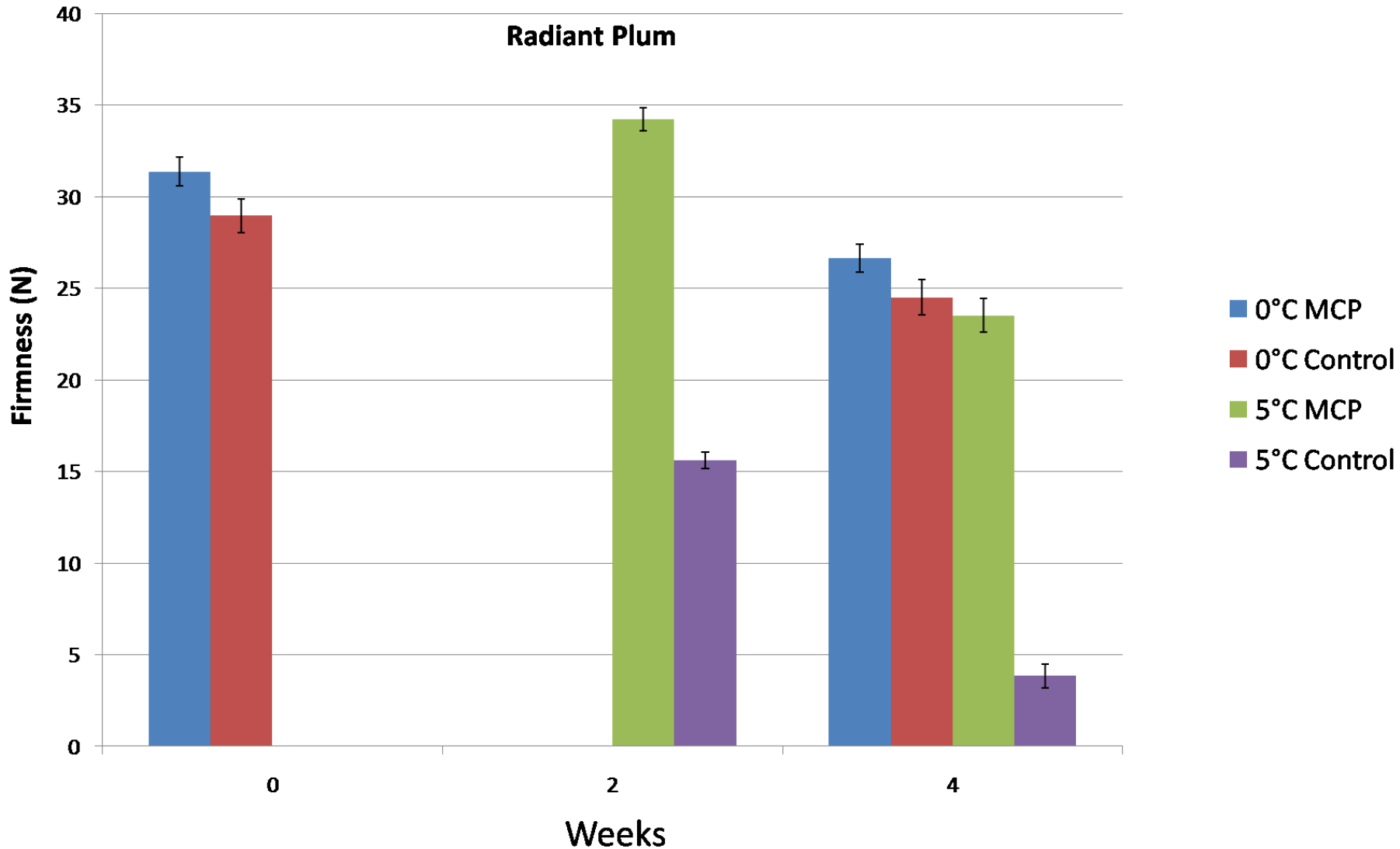
Zee Lady Juice Recovery



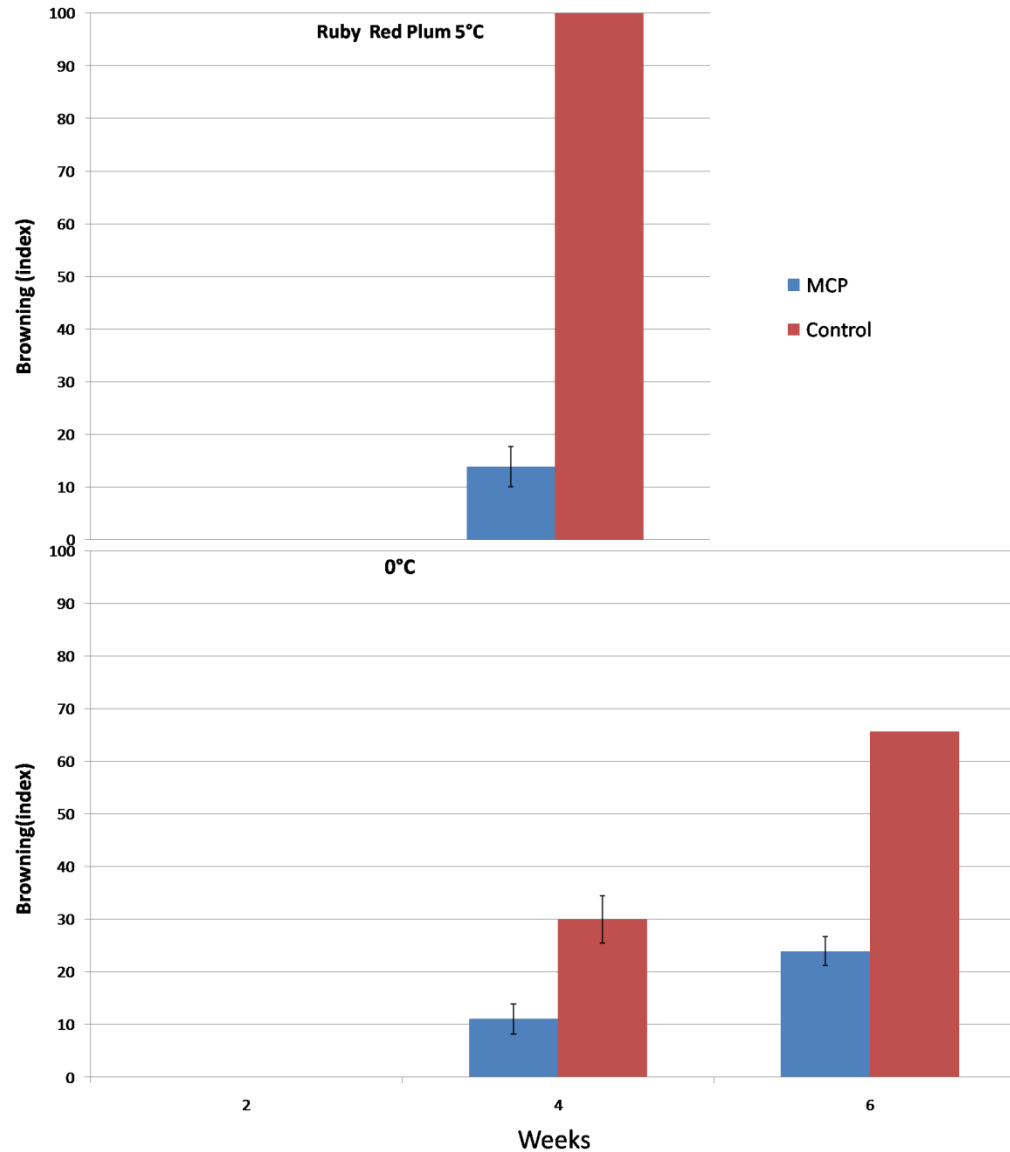
Zee Lady Flesh Browning



Radiant Firmness



Ruby Red, Flesh Browning



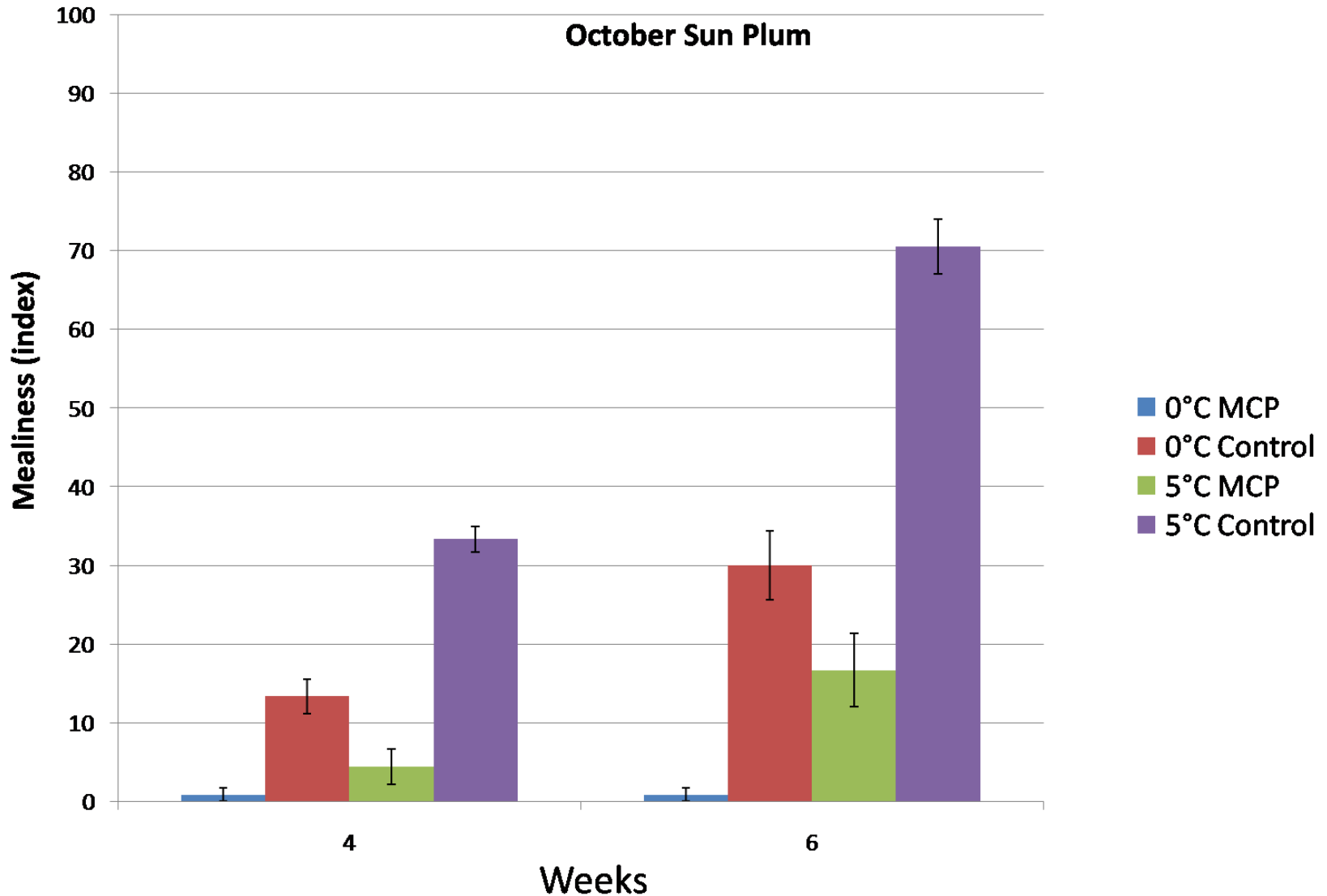
October Sun

Left 5°C

Right 0°C

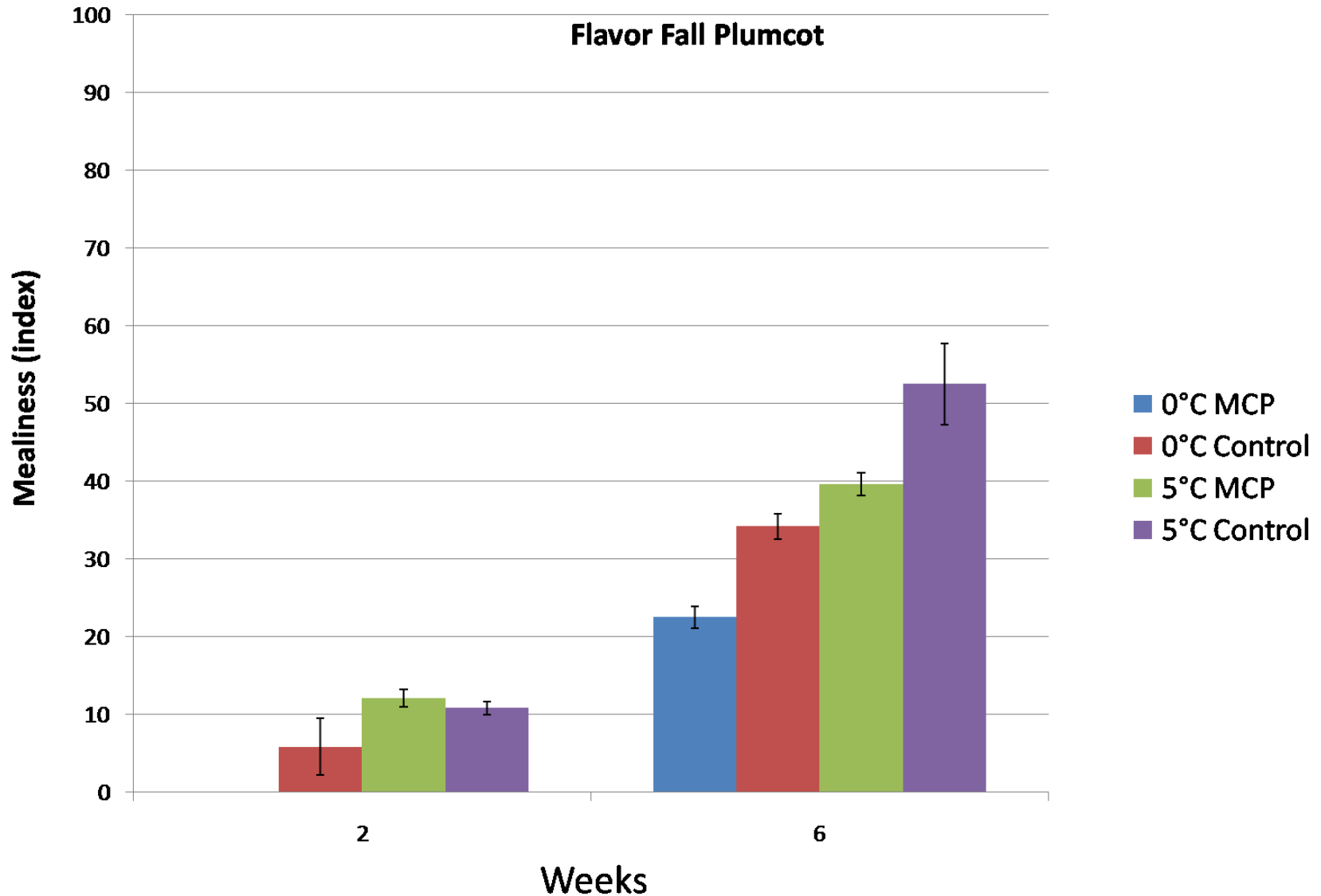


October Sun Mealiness



Flavor Fall Plumcot

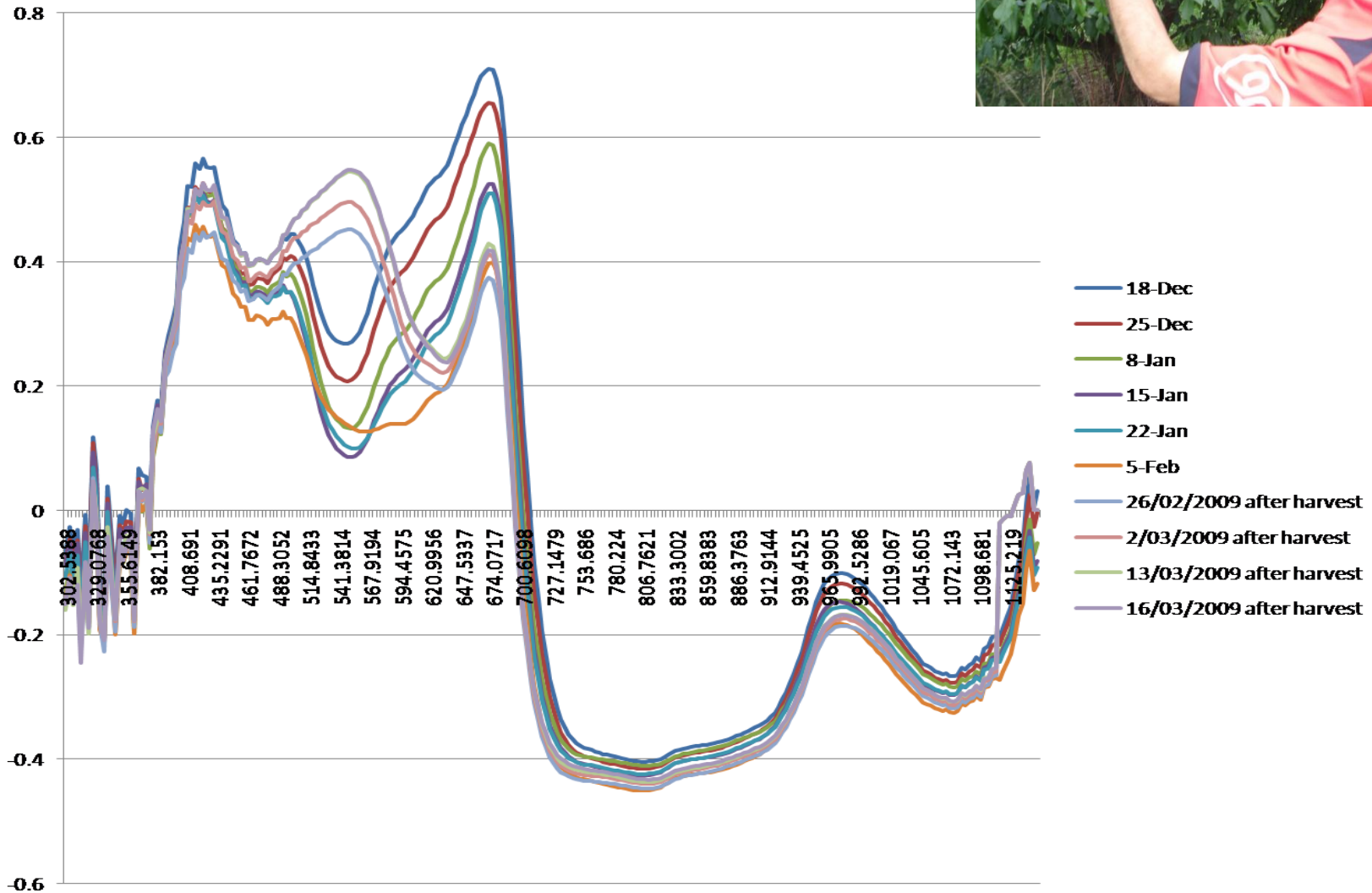
Mealiness



Maturity of Plums Non-destructive Measurement



Ruby Red Blood Plum



Non-destructive Measurement of Maturity of Plums

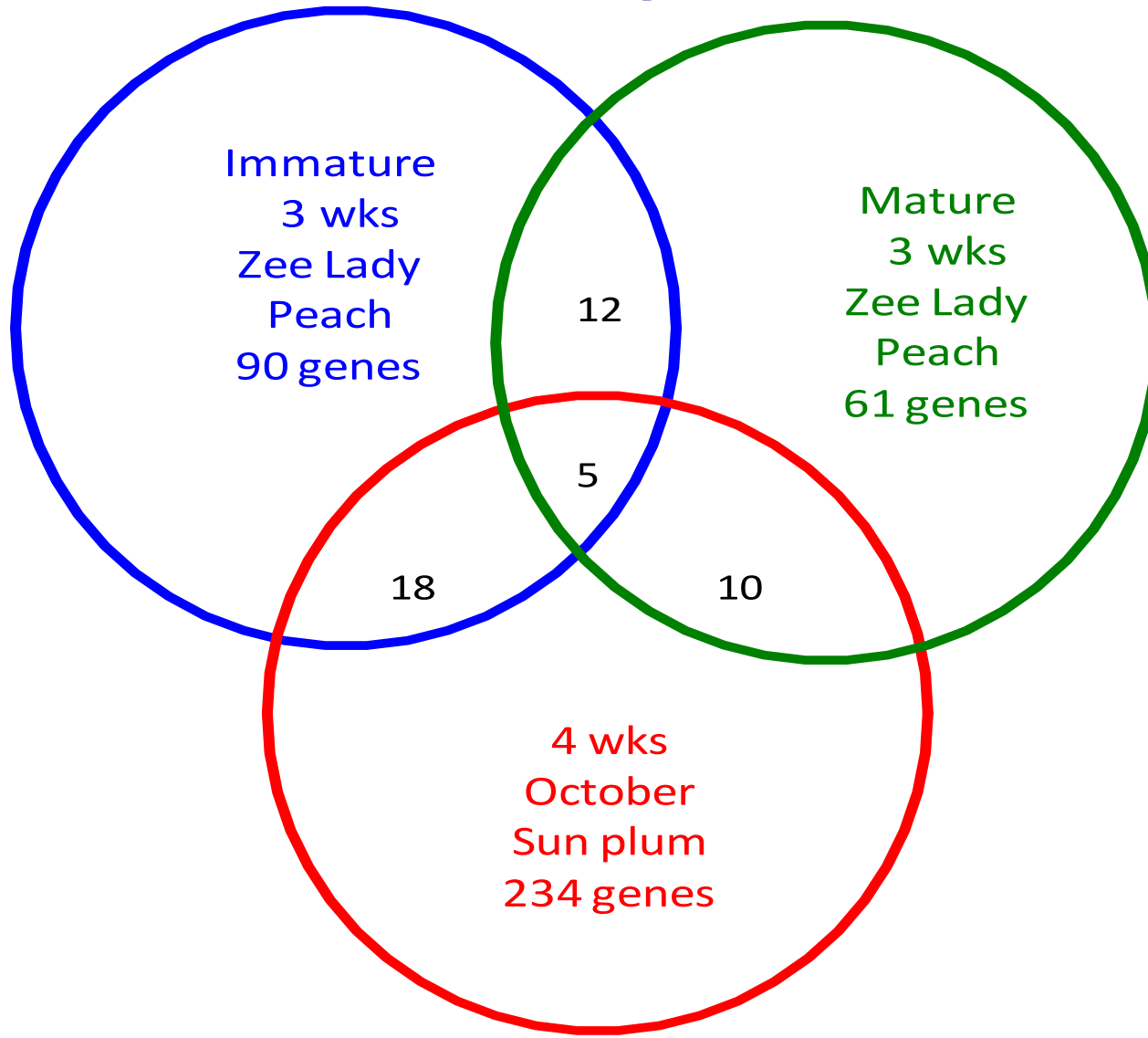
Pilot study showed:

- I_{AD} Index developed by Ziosi et al. for peaches can be applied to plums
- It is not necessary to incorporate changes in anthocyanins in the Index
- Detailed laboratory testing on current commercial cvs is required to relate I_{AD} measurements to changes in firmness and ethylene production

Gene Expression

- Messenger ribonucleic acids (mRNA) were extracted from Zee Lady peaches and October Sun plums before cool storage and after 4 weeks cool storage
- mRNA was taken to U Padova, Italy in 2008 and 2009 where microarray analyses were conducted

Differential Gene Expression



Conclusions

- Application of 1-MCP increases severity of CI in peaches and nectarines but generally extends the storage life of plums
- Application of 1-MCP could allow plums to be harvested at advanced maturity but choosing ideal maturity will be critical
- A hand held spectrometer enables non-destructive measurements of both soluble solids concentrations and changes in chlorophyll index (I_{AD})
- Changes in gene expression have been identified that could explain the differences in responses of peaches and plums to 1-MCP and cool storage
- This information could identify genetic markers that can be used to select cultivars with improved storage life

Acknowledgements

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