



**Plant & Food  
Research**  
Rangahau Ahumāra Kai

# Hops – What is the potential and direction?

**Kerry Templeton**



# Introduction



Hops 101  
Brief NZ History (of hops)  
Potential  
Direction  
Industry links

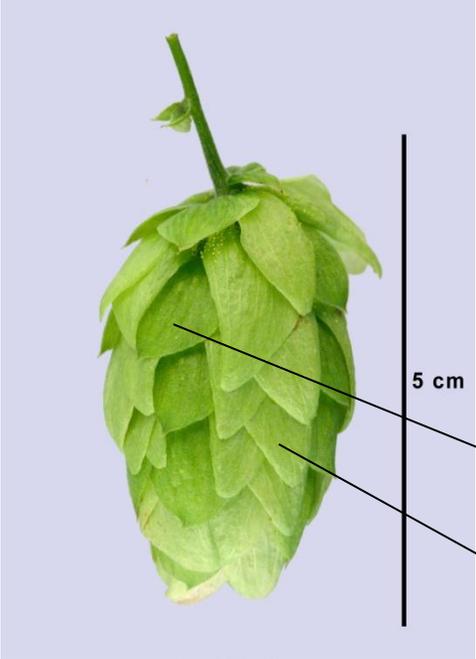


# Hops (*Humulus lupulus*)



- Found in
  - Central Asia
  - Central Europe
  - North America
- » Dioecious
- » Climbing bine
- » Perennial
- » Flowering-
  - day-length sensitive
- » Rich source of secondary metabolites





bract

bracteole

Lupulin gland

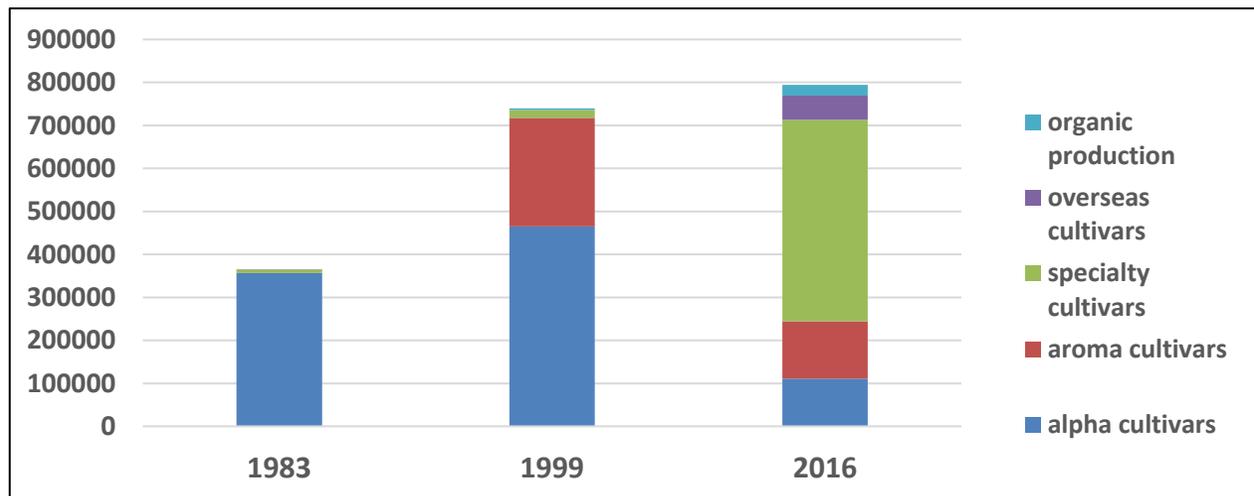




# Hop growing in NZ

- Hops introduced >150 years ago
- NZ breeding commenced 1950s
  - Disease resistance
- Change in 1980s to “aroma” type
- Change again in 2000s as IPA and hop forward beers changed the demand to “flavour” type hops
- Industry expansion (2015 on)

New Zealand hop production changes (kilograms)



Cultivar name	Year released
Green Bullet™	1972
Sticklebract	1972
Dr Rudi	1976
Rakau™	1983
Pacific Gem™	1987
Wakatu™	1988
Pacifica™	1994
NZ Southern Cross™	1994
<b>Motueka™</b>	<b>1997</b>
<b>Riwaka™</b>	<b>1997</b>
<b>Nelson Sauvin™</b>	<b>2000</b>
Pacific Sunrise™	2000
NZ Pacific Jade™	2004
Wai-iti™	2011
Kohatu®	2011
Waimea™	2012
Moutere™	2015
Nectaron®	2020

# The hop garden



- 5 m trellis
- ~3000–3500 plants/ha (cultivar specific)
- Irrigation
- Fertiliser
- Stringing
- Training



# March: Harvest – field operations



# Harvest – picking machine operations



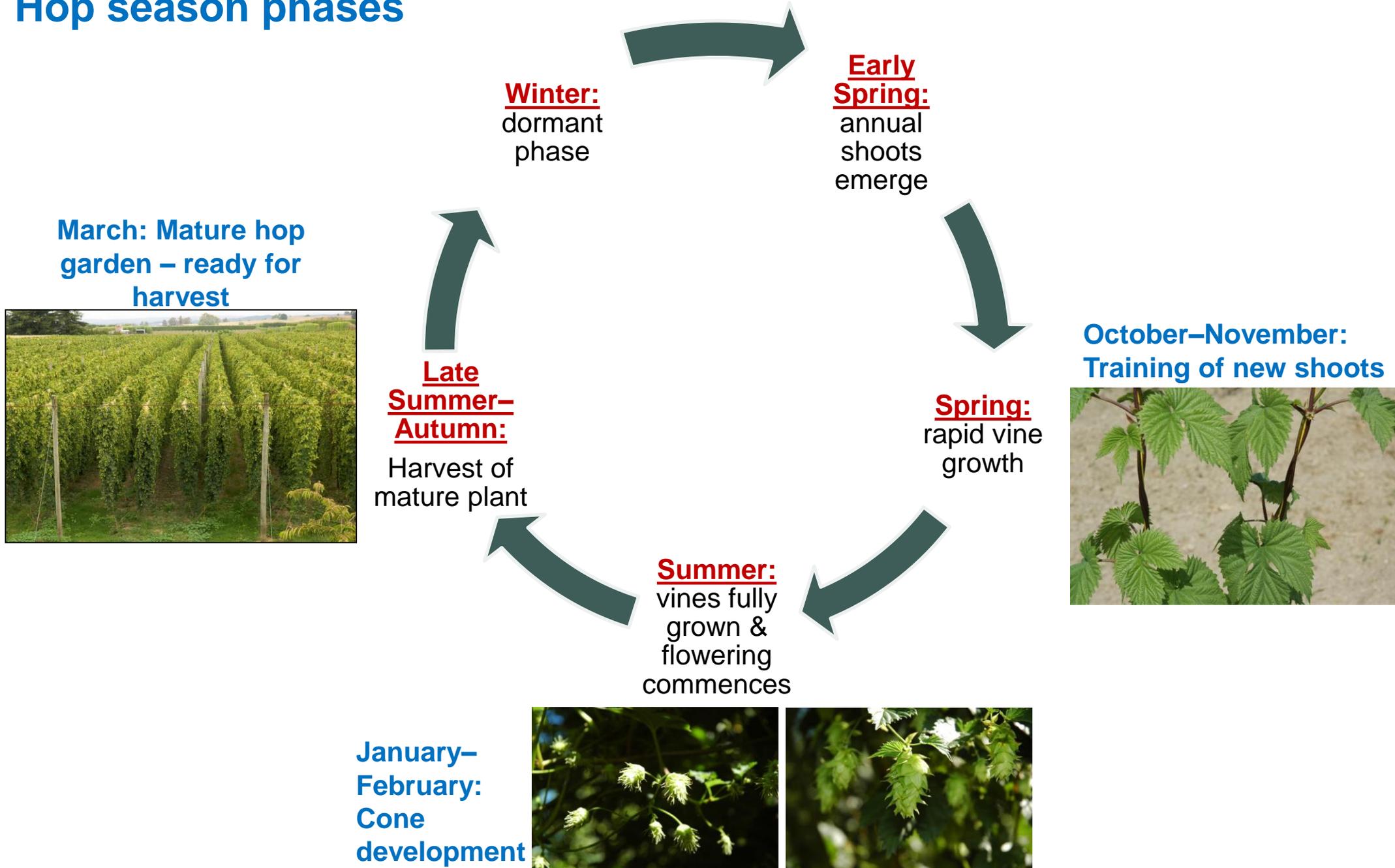
## Kiln drying



## Conditioning floor



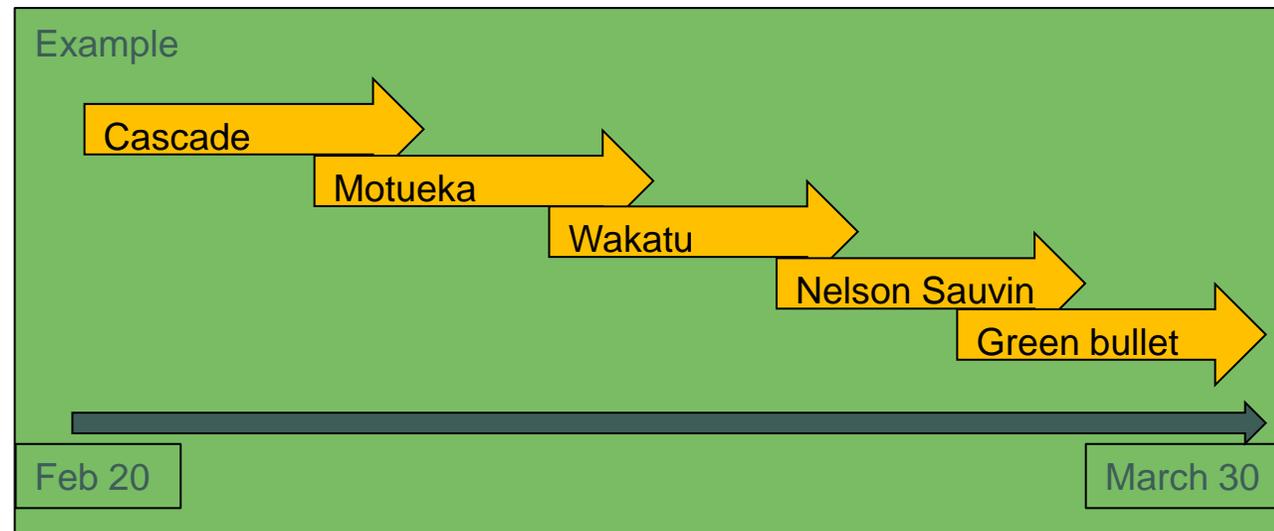
# Hop season phases



# Important criteria



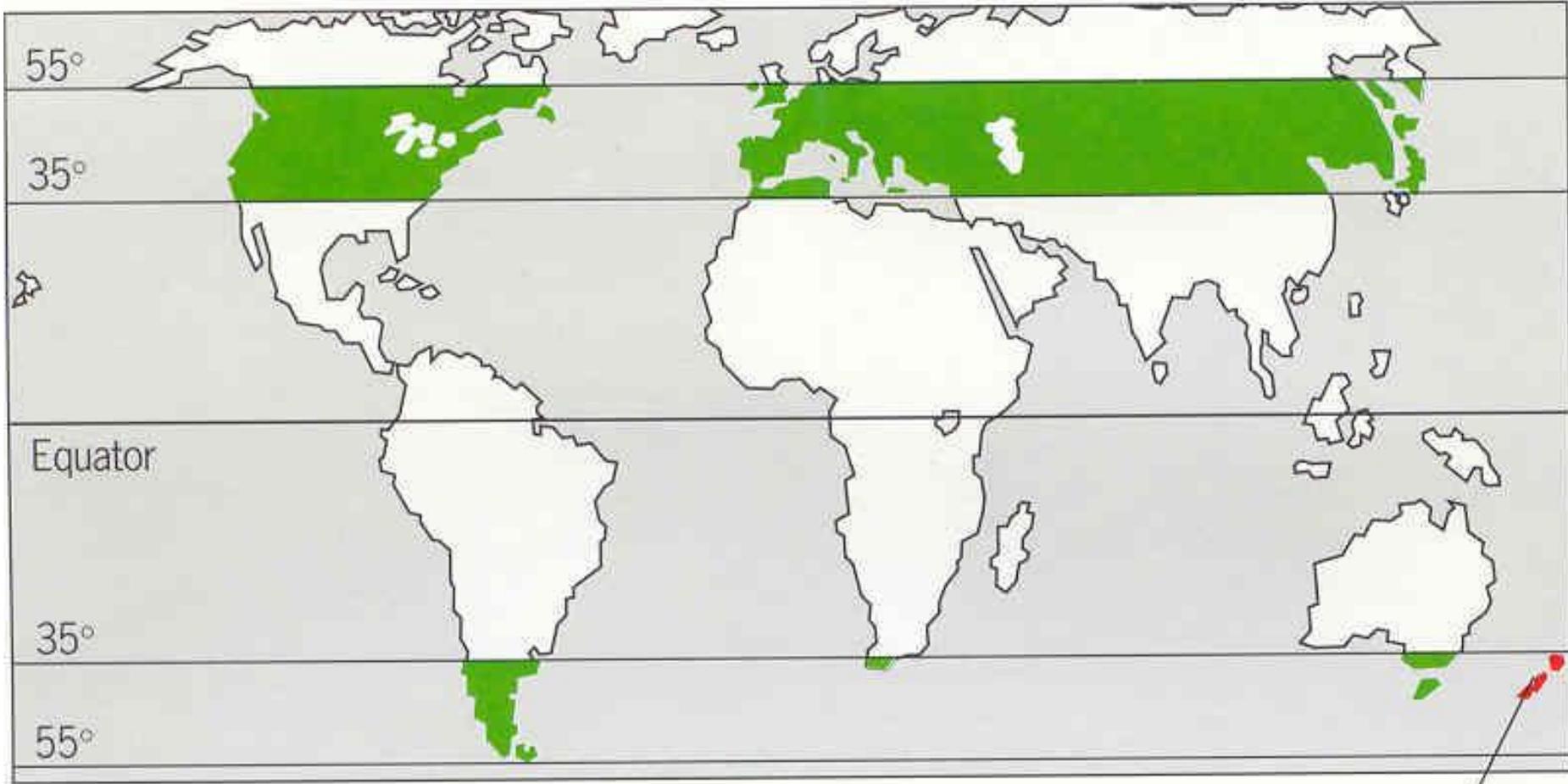
- Yield
  - A number of agronomic factors can affect this
  - Training time and quality of trained material
  - Fertiliser, irrigation and weed control
- Harvest window
  - Each cultivar has 5–7 days to be harvested, varies by location, soil type, etc.
  - Dry matter and chemical profile used to assess harvest ripeness.



# Limits of hop growing areas



Potential growing zone Northern Hemisphere



Potential growing zone Southern Hemisphere

New Zealand

# Hop potential in NZ

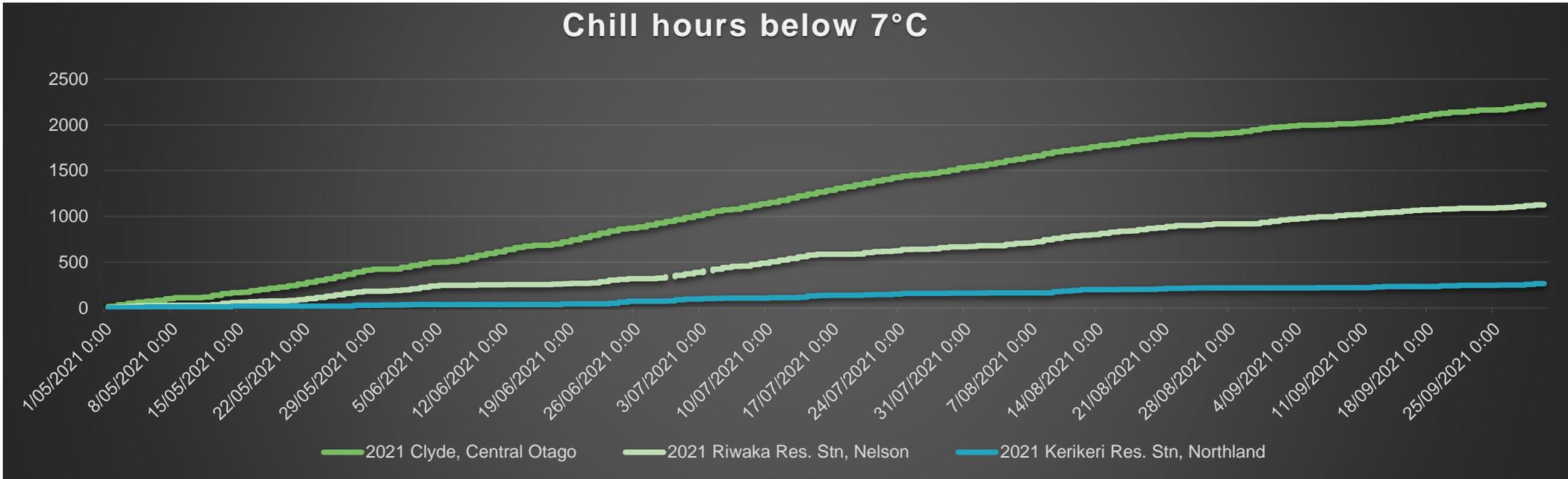


- PFR trial established 2016 to study potential for hop production outside the traditional area at the top of the South Island.
- 3 sites chosen
  - Kerikeri ~35° south
  - Motueka ~41° south
  - Clyde ~45° south
- 10 commercial cultivars chosen covering the range of harvest windows and yields

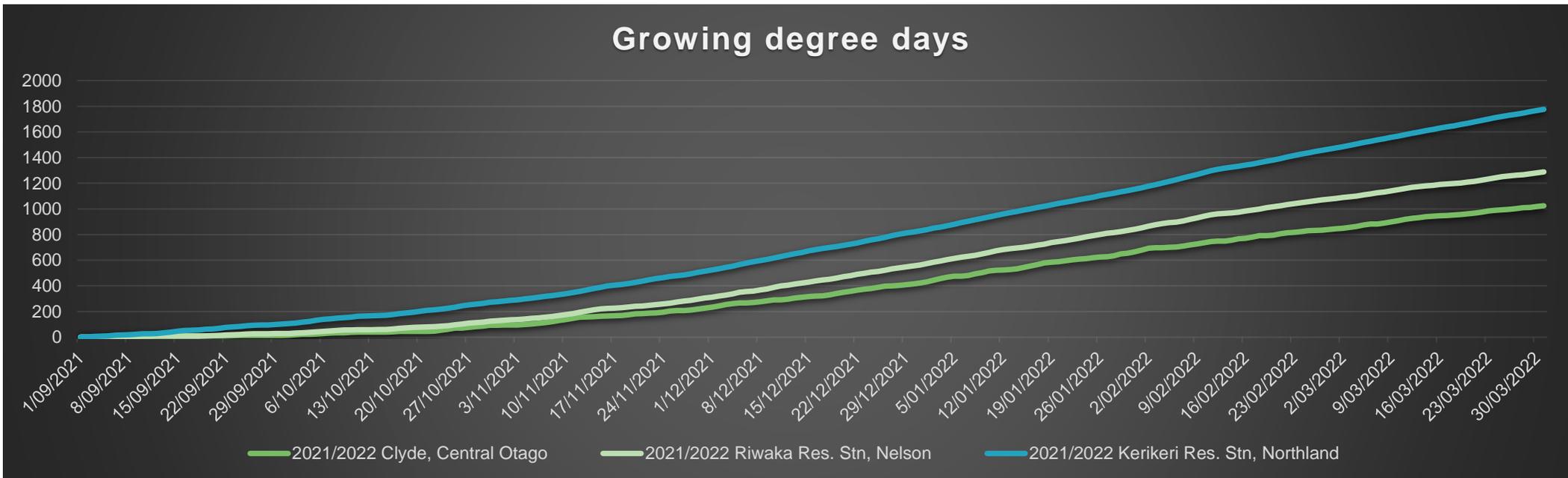




### Chill hours below 7°C



### Growing degree days



# Yield



- Kerikeri had lower yield compared with the other sites
  - Lower winter chilling (no frosts)
- Clyde and Motueka had similar yields

- Challenges
  - Orchard management
  - New to the crop

Clyde Hop garden



Motueka Hop garden



# Harvest windows

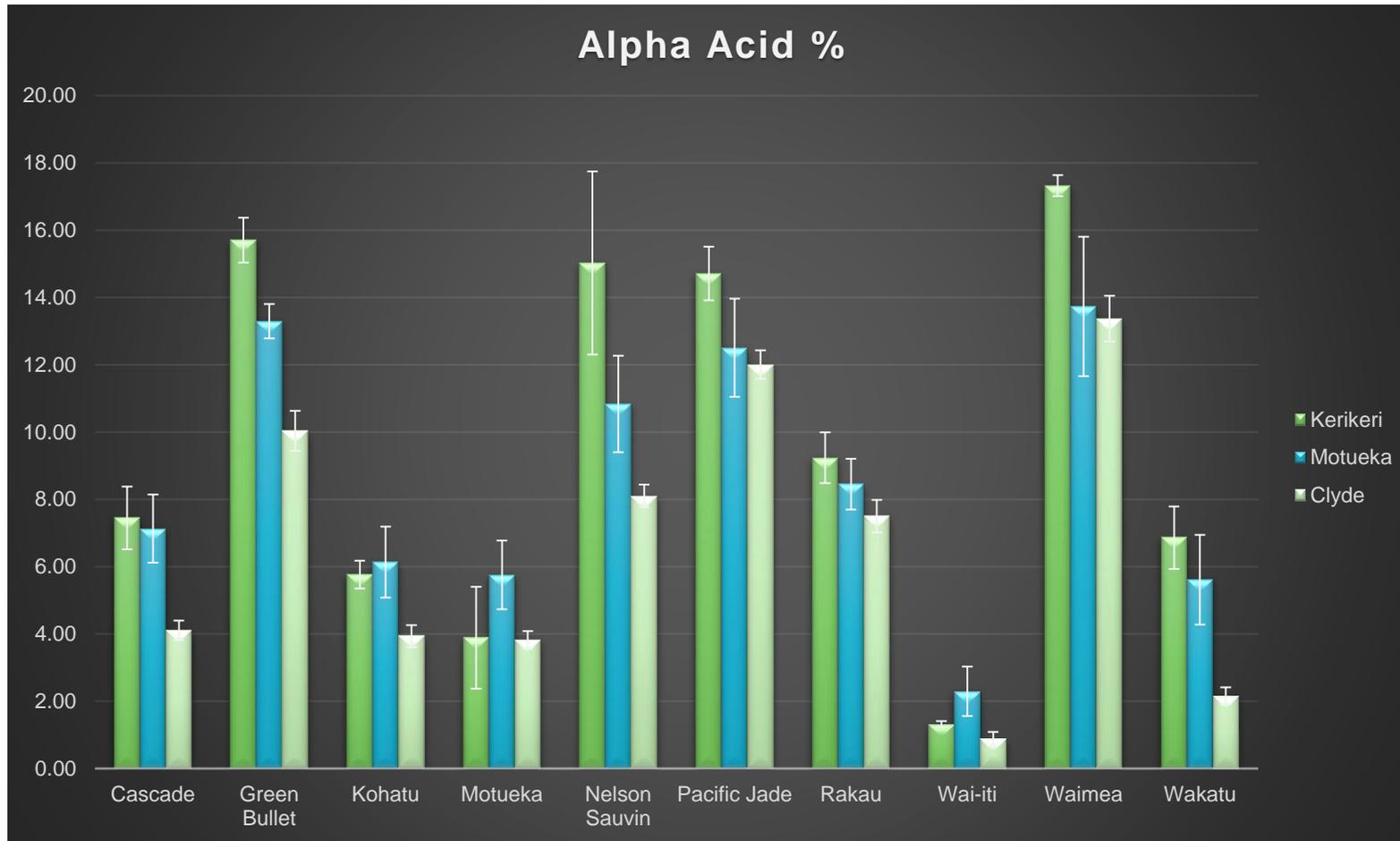


- Motueka and Clyde – Similar harvest dates (other than early cultivars)
- Kerikeri – Harvest dates up to 30 days earlier

	Harvest date Kerikeri*	Harvest date Motueka*	Harvest date Clyde*
Cascade	27-Jan	25-Feb	8-Mar
Motueka™	18-Feb	3-Mar	10-Mar
Wakatu™	12-Feb	5-Mar	11-Mar
Kohatu®	24-Feb	10-Mar	15-Mar
Wai-iti™	3-Mar	14-Mar	18-Mar
Nelson Sauvignon™	17-Feb	20-Mar	17-Mar
Pacific Jade™	4-Feb	20-Mar	23-Mar
Waimea™	12-Feb	22-Mar	24-Mar
Rakau™	26-Feb	24-Mar	30-Mar
Green Bullet™	8-Mar	28-Mar	25-Mar

*\*Dates are indicative only, and vary year to year*

# Chemistry (Alpha Acid)



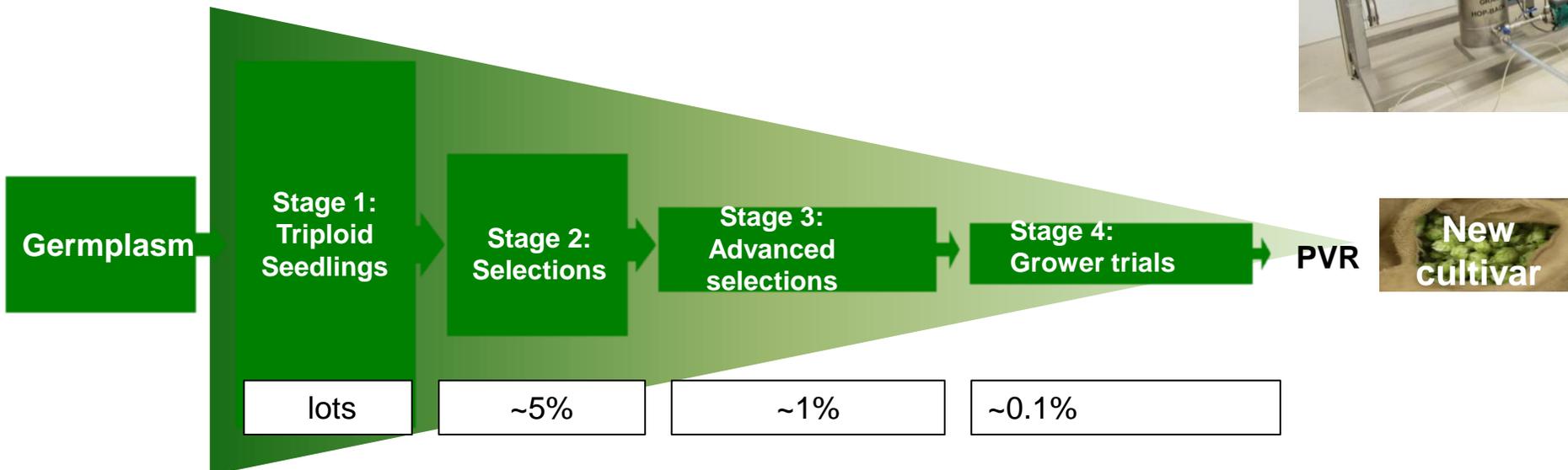
# To grow hops successfully you need.....



- Good winter chill
- High sunlight hours – late spring to autumn
- Access to water for irrigation
- Little wind – late spring to autumn
- Flat land
- **A good understanding of the crop and its requirements**
- **Facilities to handle post-harvest requirements – Cool store**
- Many resources available online or via books
- Roughly anywhere from Taupō south should be able to grow hops

# Breeding

- Hop use in brewing is like the fashion industry
- Constant demand for unique flavours and aromas
- Breeding is the best way to develop and explore new aromas and flavours
- Yield and harvest window important criteria



# Acknowledgements



- PFR Kerikeri
  - Victoria Eyre
  - Daniel Black
- PFR Clyde
  - Kate Colhoun
  - Petra Malkova
- PFR Motueka
  - Ron Beatson
  - Dave Andersen
  - Lawrence Graham
  - Donna Graham
- PFR senior management for providing funding and support for this work



Plant & Food<sup>™</sup>  
Research  
Rangahau Ahumāra Kai

Thank you

[Kerry.Templeton@plantandfood.co.nz](mailto:Kerry.Templeton@plantandfood.co.nz)

A smart  
green  
future.  
Together.

[plantandfood.co.nz](http://plantandfood.co.nz)     

The New Zealand Institute for Plant and Food Research Limited

# Disclaimer



## **Presentation for:**

Agronomy Society – 50th Anniversary Symposium, Lincoln, 31 August – 1 September 2022

## **Publication data:**

Templeton K. August 2022. Hops – What is the potential and direction? A Plant & Food Research PowerPoint presentation. Job Code: P/884000/05, P/810006/01, SPTS No. 22879.

## **Presentation prepared by:**

Kerry Templeton  
Scientist, Metabolite Traits  
August 2022

## **Presentation approved by:**

Ed Morgan  
Science Group Leader, PremCrops&Tech  
August 2022

## **For more information contact:**

Kerry Templeton  
DDI: +64 3 907 3625  
Kerry.Templeton@plantandfood.co.nz

### **DISCLAIMER**

The New Zealand Institute for Plant and Food Research Limited does not give any prediction, warranty or assurance in relation to the accuracy of or fitness for any particular use or application of, any information or scientific or other result contained in this presentation. Neither The New Zealand Institute for Plant and Food Research Limited nor any of its employees, students, contractors, subcontractors or agents shall be liable for any cost (including legal costs), claim, liability, loss, damage, injury or the like, which may be suffered or incurred as a direct or indirect result of the reliance by any person on any information contained in this presentation.