Growing Hops outside of Nelson Tasman

The LU Hop Garden in 2022

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A bit about myself…

- I am a biochemist and molecular geneticist
  - Genome sequencing of all kinds
  - Plant breeding (of most kinds)
  - Currently focused on Apomixis (asexual seed production), New breeding systems for Hops and crop evolution
- I have worked with a wide range of Horticultural crops
  - Floriculture
  - Grapes
  - Hops
- Work has focused on development of new phenotypes such as plant pigmentation, novel flavour and aromas and use of plants as biofactories for plant based metabolites
- I currently have a focus on basic-applied research into one of the key driver of plant evolution – mobile genetic elements otherwise known as Transposons

From this

To this

To this and onwards…..

And as much as possible I escape to do this…..

Hops

- Hops are a vigorous, climbing, herbaceous perennial, trained to grow up strings in a hop garden. Depending on location often the garden height can be as much as 6m

- Each year the plant dies back, leaving a permanent root stock, then grows and flowers again the next year. Expected life span of hops varies, again by location, but can be as much as 20 years

- The female flowers, commonly referred to as cones, contain the alpha acids, beta acids, and essential oils that create aroma and bitterness in beer, and have been used in brewing for over 1000 years.

- Hops are native to the temperate zones of the northern hemisphere, but today are primarily grown between 35° and 55° latitude in both the northern and southern hemispheres.

Hops – where they are grown (latitude and day-length considerations)

- As a plant that has evolved in temperate Northern latitudes, the best locations in NZ should reflect the most similar temperature and day-length profiles

- Nelson/Tasman was selected as the prime growing region for Hops based largely on politics around 1900.
  - However this might be a bit uncharitable. The area has significant areas of low wind run, abundant water and fertile soils. Certainly it has been very successful over the last ~120 years

- We have found wilding hops growing successfully as far South as Timaru and on several locations on the west coast. There are numbers of remnant gardens throughout the South Island and there is currently a successful commercial venture operating in Garston, Southland

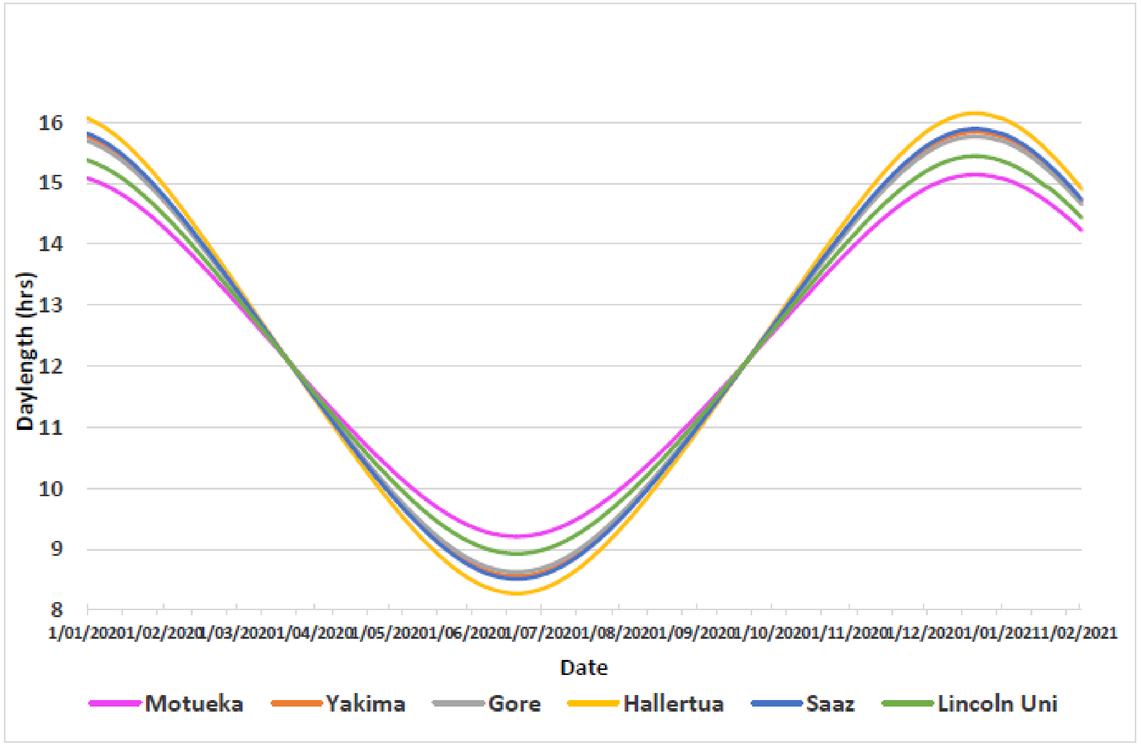

Figure 3: Annual photoperiods of significant and H. lupulus growing regions. Northern hemisphere locations have had their latitudes inverted to southern hemisphere equivalents

Key consideration for Hop production outside of Nelson/Tasman

- Hop breeding programme established by DSIR in 1940's to generate material resistant to black rot
- Subsequent breeding efforts have focused on selections that work best in Nelson and Tasman
  - So most NZ generated germplasm will perform best in Nelson/Tasman
- "Traditional" varieties performance outside Nelson is largely unknown
- There is a need to breed new cultivars to meet the needs of other regions and climate change.
  - New architectures to cope with high wind run – i.e. dwarf varieties
  - Altered cold dormancy requirements
  - Altered flowering time (impacts yield and harvest timings)

So what do Hops need…..

See: https://hapi.co.nz/resources/

- Day-lengths longer than 13hrs in mid-summer
  - Hops are a short day flowering plant, responding to reduction in day length after a minimum number of nodes have formed
  - This means that the flowering trigger is perceived after the longest day and the signal is a reduction in day length, leading to floral development after Christmas
  - This can be modified by temperature however
- There are chilling requirements to ensure the plant enters dormancy and exits dormancy appropriately. There is a day length component to this which we think ensures that re-emergence wont happen until after the shortest day.
  - Minimum chilling appears to be 4 deg C average for 6 weeks
  - Lower chilling leads to erratic and often weak spring growth
- Flat land is more efficient and cheaper to establish
- In general hops prefer rich alluvial soils or deep sandy or gravelly, well drained loam soil.
- Wind and Hail are devastating to Hops so wind protection is essential and hail protection strongly recommended

Hop Garden establishment – my experience

- Prepare the site well. I would strongly recommend deep ripping – up to 2M depending on soil profile
  - Multiple weed treatments will make later management far far easier
- Irrigation is essential – recommend trickle irrigation rather than overhead sprinkler type
  - Trickle irrigation allows for fertigation and thus precise xcontrol over the necessary fertilisation
- Send $$$ on soil testing to gain an understanding of the fertility of the prospective garden and spend $$$ on recommended mitigation
- Seek help from growers and contractors in Nelson for Garden construction. Local contractors have very little experience, lack specific equipment and are very expensive
- Spend $$$ on wind protection and I would recommend a mix of artificial and natural wind breaks and I would recommend hail protection.
- Get help from growers in Nelson – Listen and do largely what they say!

Hop gardens my experience

- Very important to establish harvesting and processing capability early
  - Anyone who says you can hand harvest doesn't know what they are talking about.
- Specialist equipment for working at height is critical.
  - Again talk with growers in Nelson – they have the solutions….and plans for construction of what you need
- Harvester – i.e. cone pickers - these are essential
  - Really only 2 sensible options
  - You will need one to cope with volume – this is a calculation of harvest window and bine throughput
  - As the cones are very perishable you need a reliable option
- Kilns
  - Also essential so that as soon as the cones are harvested they are dried to ~10% moisture as soon as possible.
  - Heating plant for hot air is part of this set up. Diesel and electrical options are available
- Bailing and pelletizing
  - Depending on your intended market these are an essential part of the operation as brewers prefer palletised Hops

Summary

- Can commercial hop production be successful in Canterbury?
  - A categorical yes
  - Need careful site selection
  - Need careful plant selection
  - Probably more expensive to setup due to extra wind and hail protection
- It is an capital intensive operation with much infrastructure lying idle for 80% of the year
- Scale is important for profitability
- Options for cooperatives to share harvest and processing plant