

# What makes British Hops unique?

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24<sup>th</sup> March 2014: IBD Asia Pacific Convention



# Key Components of Uniqueness

- Latitude
- Climate & Soil = “Terroir”
- Irradiation (hours of sunshine)
- Breeding History

And then...

- World Varieties – British Pedigree
- Busting the myths - Seeded Hops
- Aroma Hops

# What do we mean by British?



United Kingdom  
UK  
British  
Great Britain  
England / English



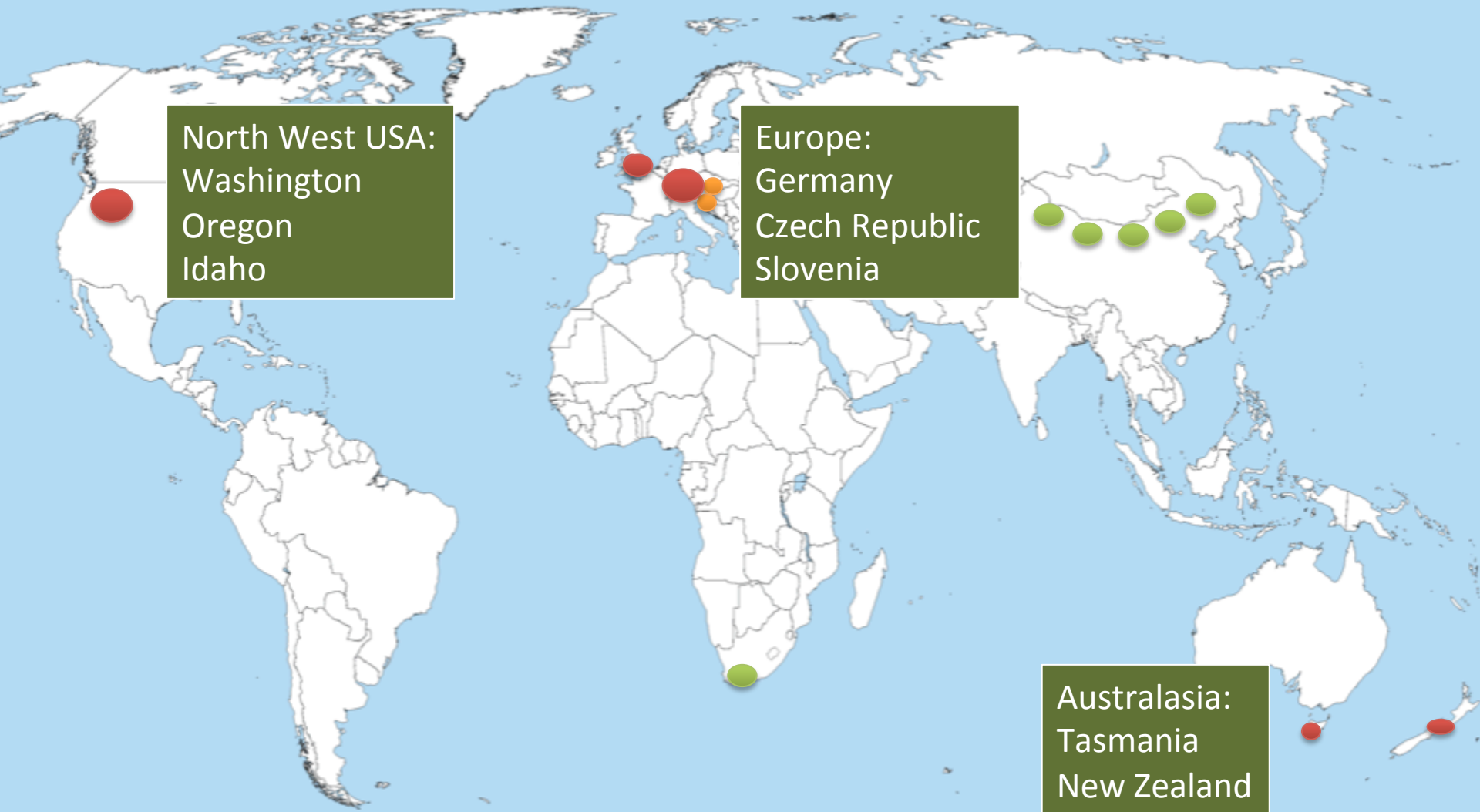
# Where do Hops grow in the UK?



# Where do hops grow in the world & why?

On family farms, big and small, all over the world.

# World Hop Growing



North West USA:  
Washington  
Oregon  
Idaho

Europe:  
Germany  
Czech Republic  
Slovenia

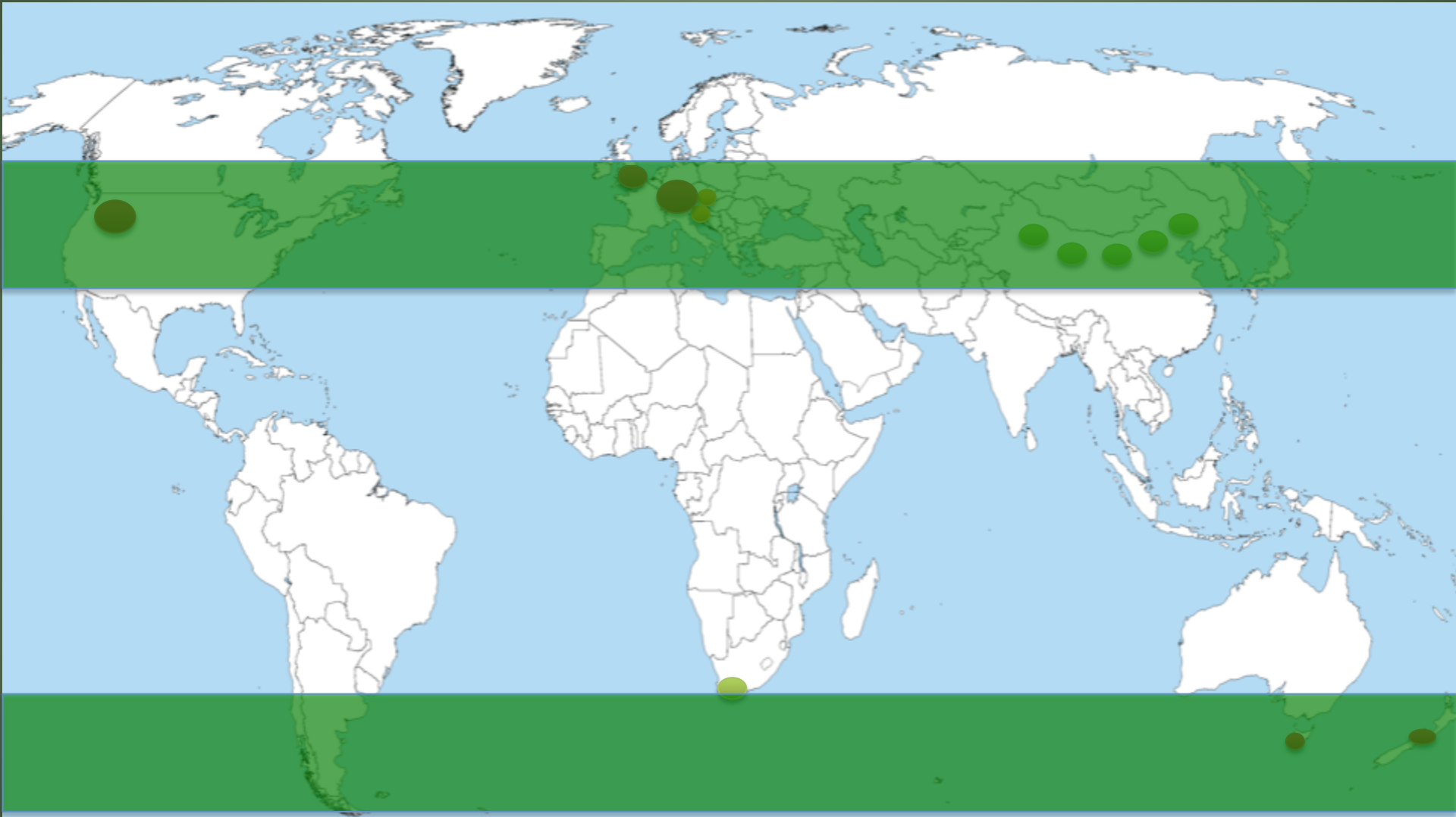
Australasia:  
Tasmania  
New Zealand

● ● For home market & export

● For home market only



# Latitude: 35-55°



Daylight length, temperature, precipitation.

# Climate

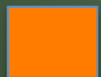
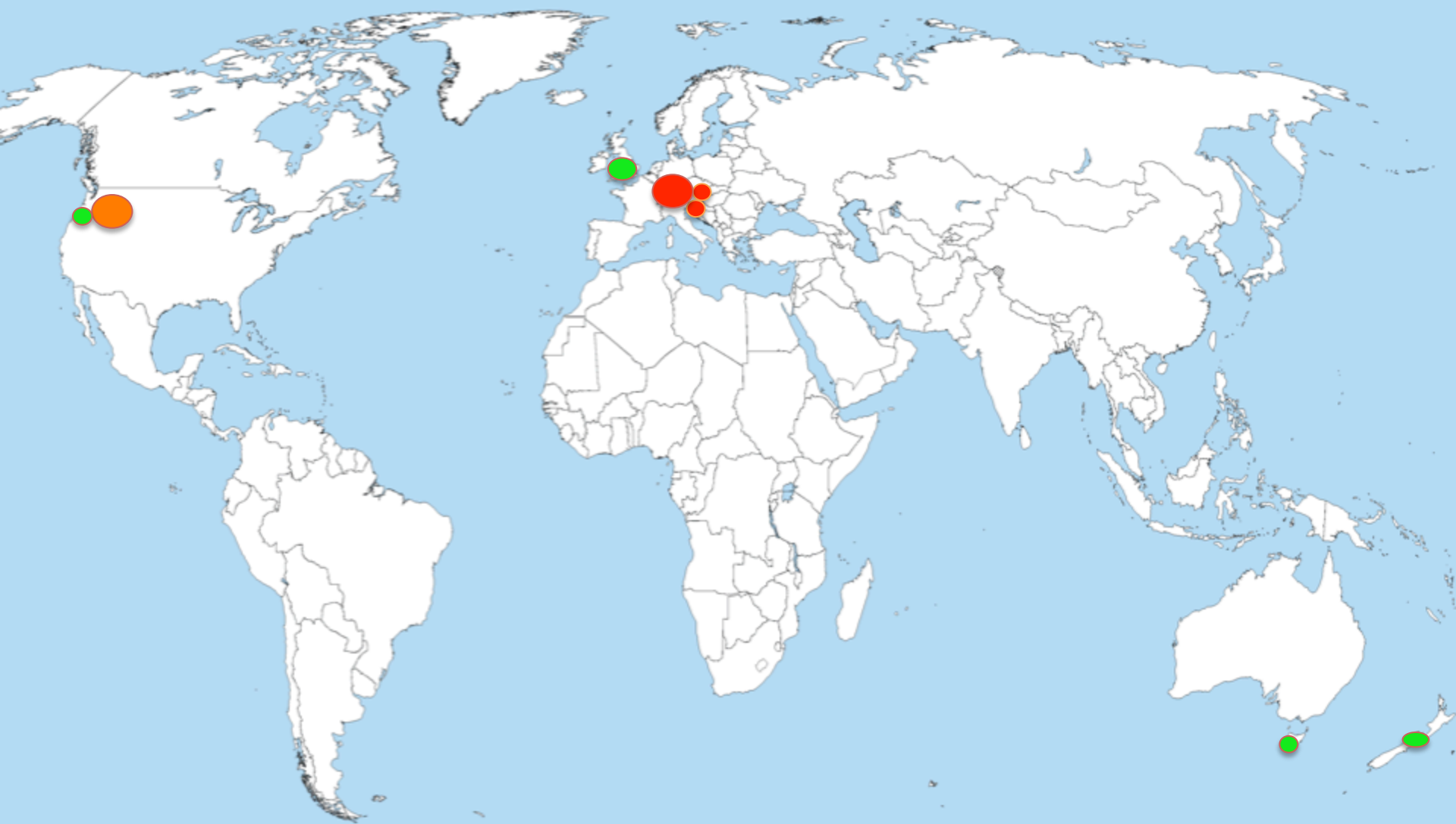
- “Climate is what you expect, weather is what you get”
- Climate measures average patterns of variation (over at least 30 years):
  - Temperature
  - Precipitation
  - Humidity
  - Atmospheric pressure
  - Wind



# What affects Climate?

- Latitude
- Altitude
- Terrain
- Nearby water bodies
- Currents

# Climate



Semi-arid



Continental



Maritime



British Hop  
Association



# Definition: Semi-arid climate (cold)

- Intermediate of desert and humid climates
- Low rainfall
- Dominated by grasses or shrubs
- Features hot, dry summers & cold winters
- Higher elevation, temperature swings

North-West USA: Washington State, Idaho

# Continental climates

- Lacks significant water bodies nearby
- Significant variation in temperature:
  - Cold winters with snow
  - Hot summers, moderate rainfall

Germany, Czech Republic, Slovenia

# Maritime climate

- Warm (not hot) summers
- Cool (not cold) winters
- Annual temperature range smaller than semi-arid and continental climates
- Even annual precipitation (no “dry” season)

United Kingdom, Oregon (USA), New Zealand, Tasmania (Australia)

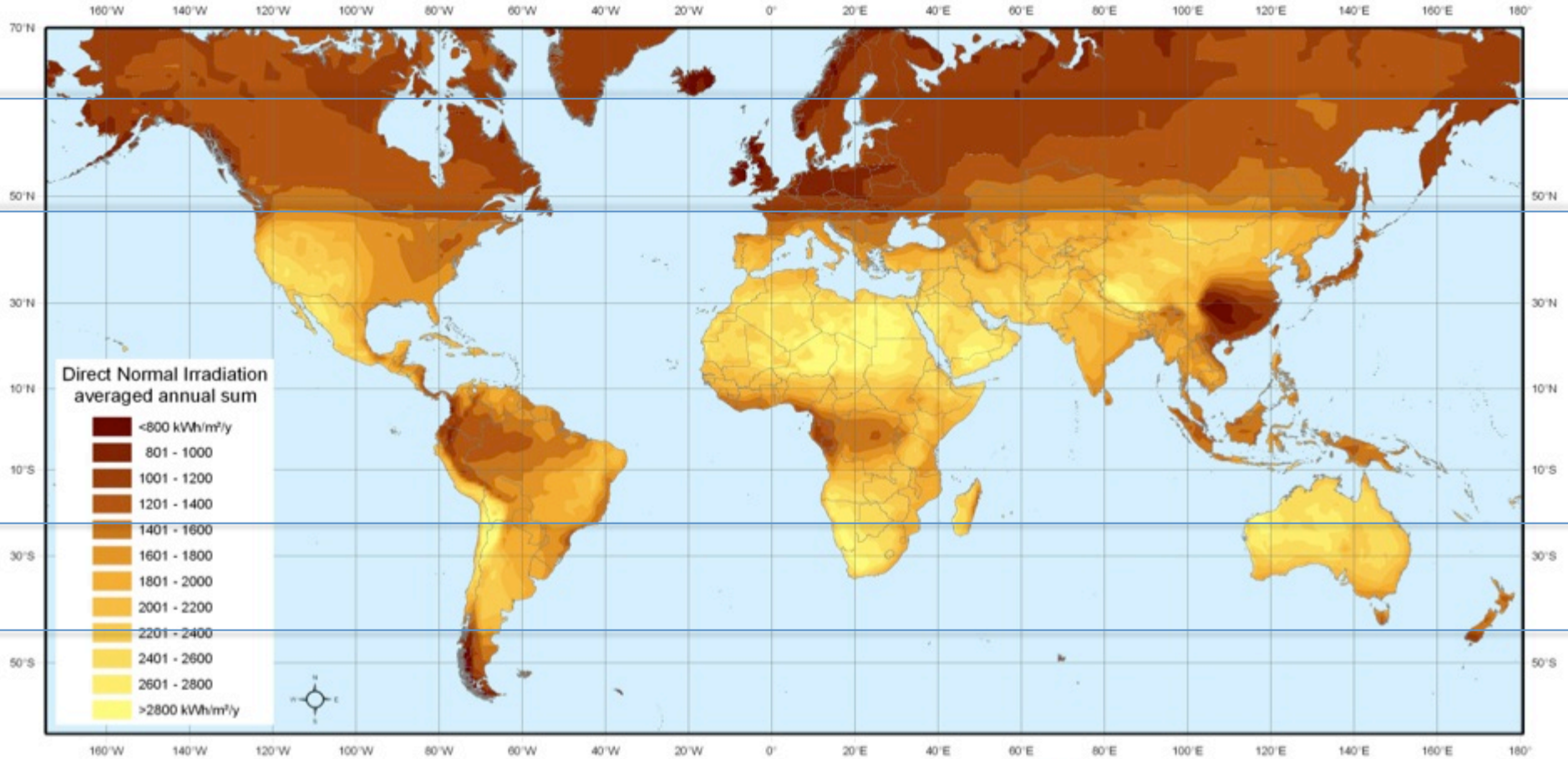
# BUT... British Hops are unique

- The UK, Oregon State (USA), New Zealand and Tasmania, Australia do all have maritime climates
- And all have long daylight length but all except the UK have higher light levels

The UK has a “Dull maritime” climate

# Sunlight levels lower in UK

## Direct Normal Irradiation (DNI)



# “Terroir”

The complete natural environment of a fruit that affects the characteristic taste and flavour, including factors such as:

- soil
- geography
- geology
- topography
- climate



# Ideal Hop Growing Soil Types/Irrigation

- Good quality, deep, well drained loamy or sandy soils
- Sufficient warmth and moisture, otherwise irrigated
- Majority of British Hops are NOT irrigated
- All semi arid and most continental and other maritime hops are irrigated

# What does the unique British terroir deliver to the Brewer?

- Lower myrcene content
- Myrcene indicates monoterpene content
- Monoterpenes = aroma intensity, e.g.
  - Geraniol: rose, geranium, lemon
  - Limonene: orange, lemon, citrus
  - Turpeniol: pine, turpentine, green, woody

# Terroir Analysis

## Myrcene Differentiation

Variety	Analysis	Long-term ave		
		UK	NZ	USA
<b>Fuggle</b>	myrcene	24.5	32.0	
<b>Challenger</b>	myrcene	29.3	43.5	
<b>Target</b>	myrcene	40.9	57.7	
<b>Cascade</b>	myrcene	42.3		58.1

# What does the unique British Hop terroir deliver to the Brewer?

- Delicate, gentle, complex aromas
- Aromas that produce complex, delicate, flavours in the beer
- Drinkable, “session” beers

# Perfect Beer Styles for British Hops

Pale Ale

India Pale Ale

Porters

Stouts

# What else is unique about British Hops?

A World Leading Hop Breeding  
Programme



Professor ES Salmon



Dr RA Neve



Dr WG Keyworth,  
East Malling Research



Dr Peter Darby

# British Hop Breeding History

- 1669: By growers for Yield & Aroma
- 1906: **Prof E S Salmon** at Wye College planted out new hop seedlings to create new Alpha / Bittering varieties that “possess marketable value”
- 1949: **Dr W G Keyworth**, wilt resistance
- 1953: **Dr R A Neve**, disease & wilt resistance



# British Hop Breeding History

- 1981: **Dr Peter Darby**  
Pioneer of “dwarfed” varieties:  
First Gold, Sovereign  
(to reduce production costs and environmental impact)  
  
World’s first aphid-resistant variety:  
“Boadicea”  
  
Aroma breeding

# British Hop Breeding

- Long established...
- Foundation of world hop breeding in 20<sup>th</sup> century
- Source of all the world's bitter hop varieties
- Best in world for scientific innovation
- World leader on hop disease resistance
- Pioneers in environmental sustainability & lowering production costs

# Who bred which Varieties?

## Growers:

1737: Mathon (aka Canterbury Whitebine)

1790: **Old Golding** (from Canterbury Whitebine)

1805: Colegate

1838: East Kent Golding (aka Canterbury Golding)

1865: Bramling

1875: **Fuggle**

1881: Cobbs

1887: Early Bird (Amos)

1889: Eastwell Golding

1932: **WGV** (Whitbread Golding Variety)

# Who bred which Varieties?

**Prof E S Salmon:**

1934: **Brewers Gold**

1938: **Bullion**

1940: Nonsuch

1944: **Northern Brewer**

1946: Pride of Kent

1948: Early Choice

1949: Keyworths Early / Midseason

1951: Bramling Cross

# Who bred which Varieties?

**Dr W G Keyworth:**

1960: Defender

1960: Density

1960: Janus

# Who bred which Varieties?

**Dr R A Neve:**

**1967: Progress**

**1971: Northdown**

**1972: Challenger**

**1972: Target**

**1983: Yeoman**

# Who bred which Varieties?

**Dr Peter Darby:**

1996: **Admiral**

1996: **First Gold**

1996: Phoenix

1996: Pioneer

2001: **Pilgrim**

2001: Pilot

2004: Boadicea

2006: **Sovereign**

tbc: Endeavour

# What is the British Hop Aroma Pedigree?



# Quintessentially British

Golding (1790): Spicy, honey, earthy  **BRITISH**

Fuggle (1875): Minty, Floral, Earthy  **WORLD**

Perfect alone or in combination

# Goldings Modern Family Tree 1919 - 1961

**Bullion**

**Brewers Gold**

**Bramling Golding**

**Pride of Kent**

**Early Choice**

**Nonsuch OB53**

**Keyworths Midseason**

**Bramling Cross**

**1147 / WGV**

**Northern Brewer**

# Goldings Modern Family Tree

## 1961 - 1985

Wye Northdown

Progress

Keyworths Early

Omega

Wye Challenger

Wye Target

Admiral

Yeoman

Phoenix

Pilgrim

First Gold

# Goldings Modern Family Tree 1986 to date

**Herald**

**Pioneer**

**Pilot**

**Boadicea**

**Sovereign**

**Endeavour**

# World Varieties : “The Fuggle Heritage”

# 0 Generation = British Fuggles

Savinski Golding

US Tettnang

Styrian Golding

Early Green

Slovenia

USA

# 1st Generation from British Fuggle

Celeia

Smoothcone

Columbia

Cerera

Willamette

Slovenia

New Zealand

USA

# 2nd Generation from British Fuggles

Buket

Green Bullet

Cascade

Superalpha

Cicero

Pacific Gem

Nugget

Southern Cross

Cekin

Nelson Sauvin

Slovenia

New Zealand

USA



# 3rd Generation from British Fuggie

Citra

Horizon

USA

# 4th Generation from British Fuggie

Centennial

Crystal

Mt Rainier

Sterling

USA

# 5th Generation from British Fuggle

Chelan

Millenium

Newport

Santiam

Glacier

USA

# Why are British Hops Seeded? And is it a problem?

# Seeded Hops

- All hops are seeded if male hops are present
- Male hops are present naturally in the British landscape
- A landscape of historic hedgerows that naturally divide fields
- A landscape that we want to protect

# British Landscape



# Hedgerows up close



# Are seeded hops a problem?

- Untrue that seeded hops affect beer quality
- Trials in Switzerland in 1978 on standard Continental lager disproved this theory

“Hop products from seeded hops had no adverse effect on beer quality and the flavour of all beers was acceptable with no statistical significance for differentiation or preference”



# Do seeded hops “cost” more?

- No, another myth
- The resin in the hop flower remains constant regardless of the presence of seeds
- So when buying alpha acid %, the seeded hop has the same value as the unseeded hop

# Seeded Hop Calculation

Say a cone is 75 parts leaf, 10 parts resin and 1 or 10 parts seed

## Seeded Hop Calculation

$$\text{Seed} = 10 \div 95 \times 100 = 10.5\%$$

$$\text{Resin} = 10 \div 95 \times 100 = 10.5\%$$

## Seedless Hop Calculation

$$\text{Seed} = 1 \div 86 \times 100 = 1.2\%$$

$$\text{Resin} = 10 \div 86 \times 100 = 11.6\%$$

$$\text{Yield} \quad \text{Seeded } 95 \times 10.5\% = 9.98$$

$$\text{Seedless } 86 \times 11.6\% = 9.98$$

$$\text{Yield} \times \text{Resin} = \text{Constant}$$

# British Aroma Hops

# British Aroma Hops

- Complex, mostly delicate with some high notes
- Aroma notes that include:

citrus, orange, mint, pepper,  
blackcurrant, lemon, chocolate,  
sage, pine, apricot, floral, honey

# Today's British Hop Varieties

# British Hop Aroma Varieties

Variety	Alpha Range	Characteristics	Flavour Intensity
Admiral	13 - 16	Resinous, orangey, citrus	9
Cascade (UK)	5 - 9	Lychees, floral, grapefruit	9
Target	8.5 - 13.5	Sage, citrus, spice	9
Bramling Cross	6 - 8	Spicy, blackcurrant, lemon	8
Pioneer	8 - 10.5	Cedar, grapefruit, herbal	8
Challenger	6.5 - 9	Spicy, cedar, green tea	7
Endeavour	8 - 10.5	Blackcurrant, spicy, citrus	7
Northdown	7 - 10	Spicy, floral, pine	7
WGV	5 - 7.5	Spicy, botanical, floral	7
Beata	3 - 6	Honey, apricot, almond	6

# British Hop Aroma Varieties (contd)

Variety	Alpha Range	Characteristics	Flavour Intensity
Boadicea	7 - 10	Spicy, light floral	6
East Kent Goldings	4 - 6	Spicy, honey, thyme	6
First Gold	6.5 - 10	Orange, marmalade, spicy	6
Fuggle	3.5 - 6.5	Minty, floral, earthy	6
Goldings	4 - 9.5	Spicy, honey, earthy	6
Pilgrim	9 - 13	Spicy, citrus, pears	6
Progress	6 - 7.5	Sweet, floral, minty	6
Sovereign	4.5 - 6.5	Herbal, floral, earthy	6
Phoenix	8 -12	Molasses, chocolate, spicy	5
Pilot	8 - 11	Lemon, spicy, marmalade	5

[www.britishhops.org.uk](http://www.britishhops.org.uk)

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