

Current blueberry developments and how they can translate towards a UK cherry model



The James
Hutton
Institute

Susan McCallum & Julie Graham



Background

- UK market value £237 Million
- Market penetration 42%
- Approx. 11 million households bought blueberries
- UK sold 25,641 Tonnes in 2015

Developing a successful Blueberry Industry

- Need knowledge of existing cultivars -crop characteristics and fruit quality and how to grow well across UK
- Consumer requirements fresh and processed met
- Competitive advantage over imported fruit
- Research base including genetics and mapping to sustain and support industry
- Encouragement to invest in a long term crop and overcome future challenges





Current research Aims

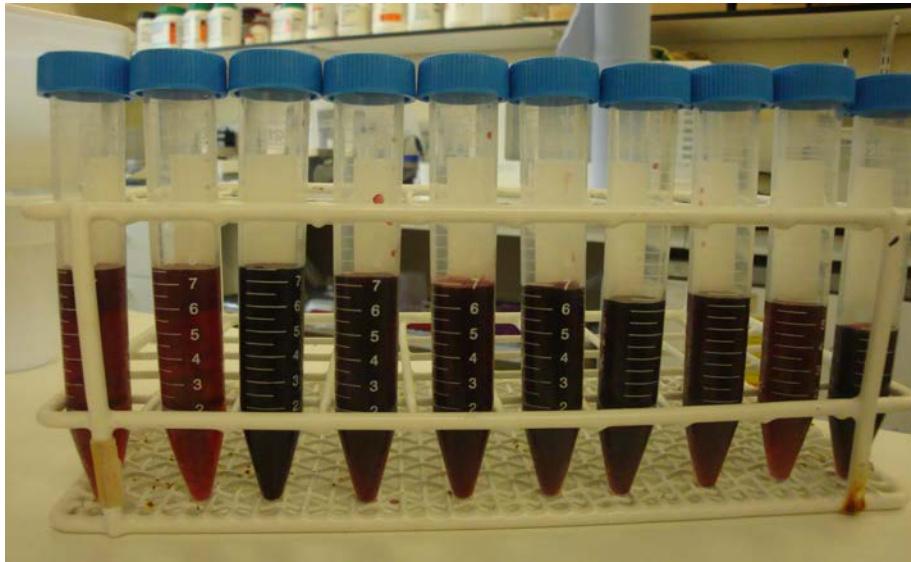
- Identify varieties best adapted to UK climate utilising and where possible extending the fresh market season.
- Identify biotic and abiotic stress responses in plants
- Develop robust marker assisted breeding and selection tools that will enable breeders to accelerate new high quality variety development.

■ ■ Phenotypic Analysis



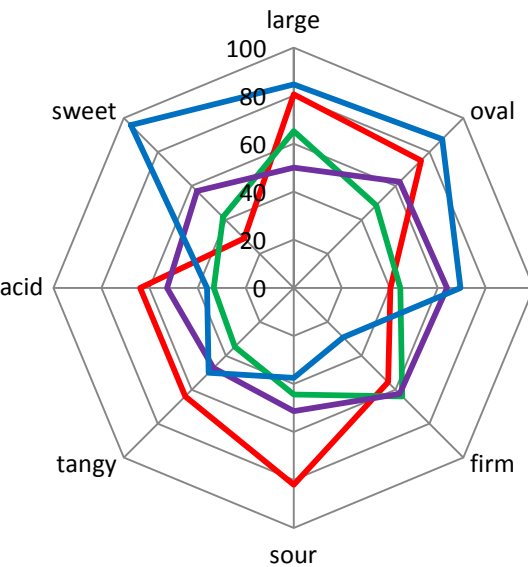
Sensory analysis

- Sensory characters (before and after processing) sweetness, sourness and flavour intensity, texture
- Fruit composition (both fresh and processed) - sugar and organic acids, flavour volatiles, antioxidant capacity, total phenolics, anthocyanins and vitamin C
- Juice yield for processing





Consumer and sensory analysis: what are the expectations from blueberry?



Attribute class	Attribute	Reference standards
Appearance	Size	Photograph
	Round vs oval	Photograph
	Matt vs shiny	Photograph
	Firm	Fresh blueberries
	Blue	Photograph
	Red	Photograph
Aroma	Sweet	Honey solution
	Fruity	Forest fruits
	Acid	Solution of vinegar
	Intensity	blueberry juice
Taste	Sweet	Solution of granulated sugar
	Sour	Solution of forest fruits
	Bitter	Diluted tonic water
	Fruity	Forest fruits
	Acid	Diluted citric acid
	Intensity	blueberry juice

Attributes	No. of Reference standards			
	2	5	7	9
Blue				
Matt vs shiny				
Red				
Round vs oval				
Size				



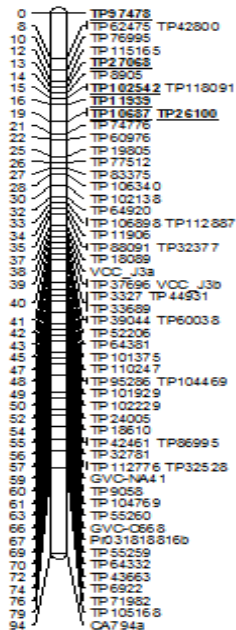
HORTLink Research



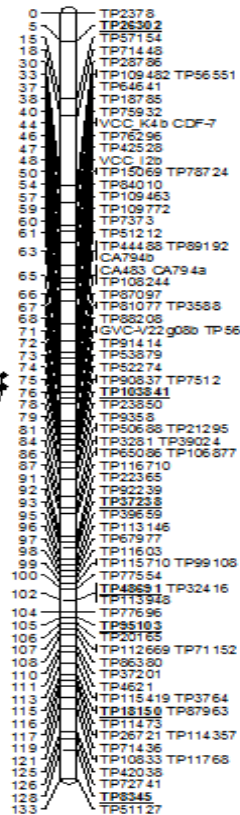
The James
Hutton
Institute

- Developing tools for a sustainable UK blueberry industry
- Constructed first tetraploid linkage map in blueberry

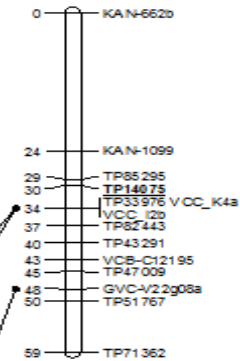
Jewel12a



Draper12



Jewel12b



Draper



105 mapping individuals

Early to mid season
High chilling
Cold hardy
Firm fruit
Sweet taste

Jewel

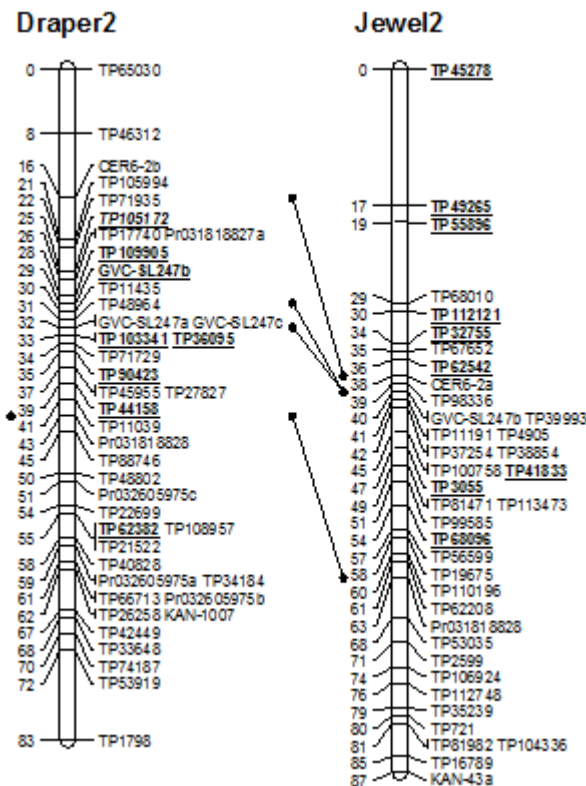


Early to mid season
Low chilling
Cold sensitive
Very large fruit
Slightly tart



Developing genetic resources

- Further develop genetic resources in blueberries using Genotyping by Sequencing to estimate allele dosage





Blueberry Breeding @ James Hutton

- Underpinning research facilitating marker assisted breeding

Quality Traits

Fruit size
Picking scar
Colour
Firmness
Bloom
Phytochemical composition

Agronomic Traits

Yield
Season
Machine Harvest
Winter Hardiness
Pest & Disease resistance
Habit





Breeding priorities

- Underpinning research facilitating marker assisted breeding

Quality Traits

Fruit size

Picking scar

Colour

Firmness

Bloom

Phytochemical composition

Agronomic Traits

Yield

Season

Machine Harvest

Winter Hardiness

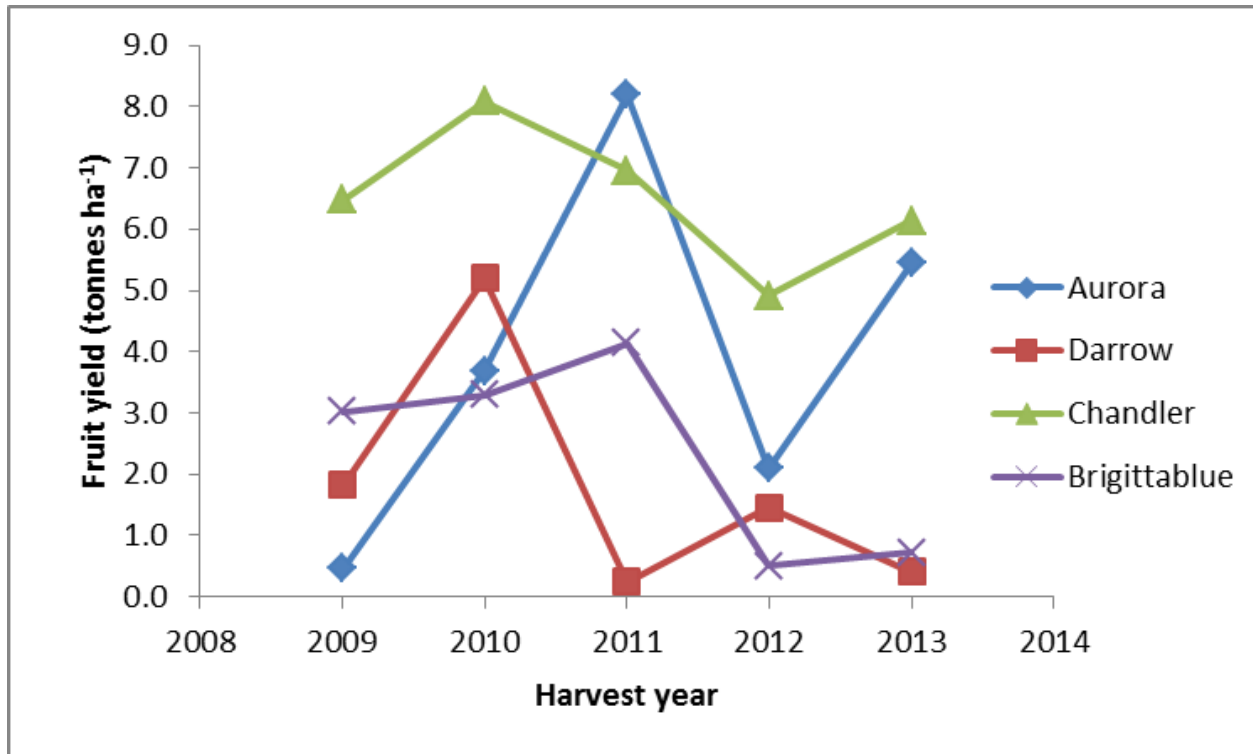
Pest & Disease resistance

Habit

- Interspecific crosses
- Gene Pyramiding for selected traits
- Network analysis – gene expression/metabolomic atlas

Current research- Improving blueberry Yield

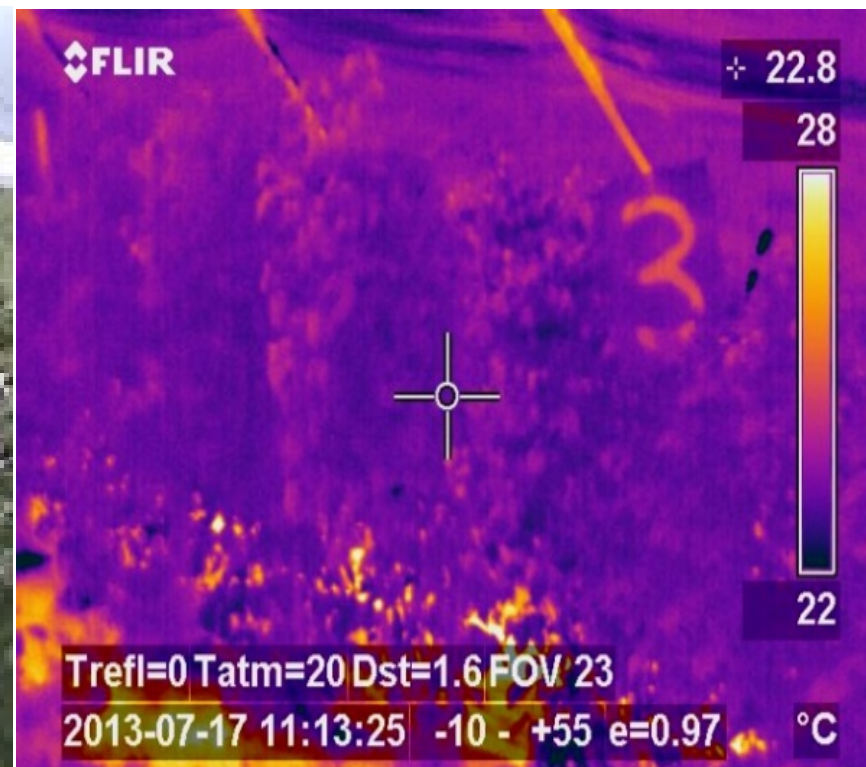
- Understand the mechanisms controlling yield instability



Current research- Imaging sensor solutions

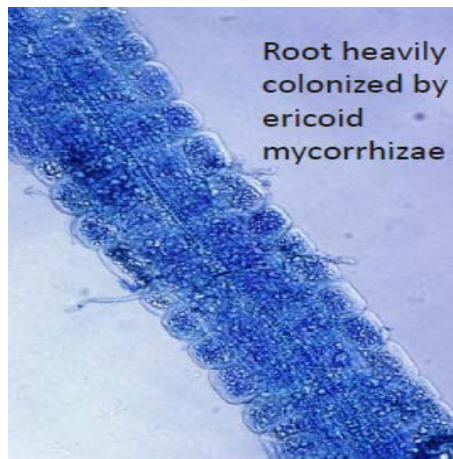
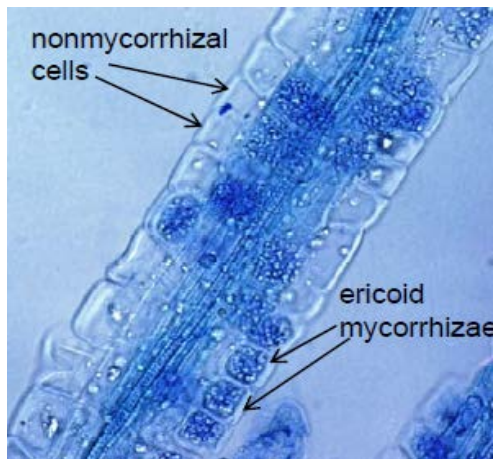
- Utilise imaging technologies to understand plant stresses

Innovate 101819



Developing area – Blueberry mycorrhizae

- Lowbush blueberries depend upon symbiotic fungi for establishment, nutrition and resistance to soil pathogens
- Increase exploitation of soil nutrient sources
- Increase drought resistance
- Currently no known data on mycorrhizae status of commercial blueberries at any stage of production in the UK





How can this translate towards a Cherry model?



The James
Hutton
Institute



How can this translate towards a Cherry model?

- Pressure to diversify from challenges in growing soft fruit crops eg. reduction in actives, resistant high quality varieties, raspberry root rot
- Potential for soft fruit growers to utilise innovation and expertise: state-of-the-art polythene tunnels, irrigation regimes and frost protection regimes
- Develop cherry as a high value crop for the Scottish industry.



Background

- >95% cherries imported mainly Spain, Turkey and US
- 2014 record year for cherry sales
- Range of different UK varieties including: Merchant, Sunburst, Stella, Skeena, Regina, Sweetheart, Penny





Blueberry model: steps for cherry



The James
Hutton
Institute

- Identification cherry germplasm for Scotland.
 - Identify barriers to profitability.
 - Identify technology to overcome barriers
 - Utilize advantages from the Scottish season.
 - Assess potential for a wide production season
 - Financial model
-
- Foundation for the establishment of a viable and sustainable cherry industry, with clear indications of future targets for innovative research and development.



Thank you



The James
Hutton
Institute





The James
Hutton
Institute

Funded by



**The Scottish
Government**

The James Hutton Institute is supported by the Scottish Government's Rural and Environment Science and Analytical Services Division (RESAS)