

Updates from the RBC Raspberry Breeding Programme



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SSCR/Bulrush Soft fruit winter meeting, 18th February 2016





Current breeding objectives



High fruit quality, large size, good shelf-life

- Raspberry Breeding Consortium (RBC) 2014-2019
 - Scottish Government, AHDB, SSCR and industry partners from UK and Europe
- Select high quality floricanes and primocane cultivars suitable for fresh and processing markets
- Create new hybrids with improved P&D resistance, especially to *Phytophthora* root rot
- Deployment of marker assisted selection



Breeding plots in high tunnels at JHI

2015 Season at James Hutton Institute

- Mild and dry winter, cold and dry spring
- Wet and dull July
- First fruit mid July
- Warm from late August into autumn
- Late start to P&D infestations, potato aphid, *Phytophthora*, raspberry beetle, split fruit, less RLBM
- Development issues with commercial cultivars and advanced selections
 - Bud break issues and odd flowering patterns



Fruit for the Future July 2015, 14°C



Glen Dee at JHI (released 2014)

- Identified for trials in 2011 as a late floricane
- Mid-late season, between Glen Ample and Octavia
- Large, pale, conical fruit
- Flavour is sweet with an acid bite, creamy texture
- Superb shelf-life, maintains uniform colour and firmness
- Very vigorous cane with a easy to manage habit
- *Phytophthora* symptoms in field after 4 years
- Raspberry beetle damage



	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix ^o	First pick date
Glen Dee	1690.7	5.4	10.8	27th July
Glen Ample	2301.1	5.4	9.5	20 th July
Tulameen	1278.5	4.8	10.7	23 rd July
Octavia	1911.4	5.6	8.6	29 th July



James
Hutton
Limited

Glen Dee in trials

- Earlier season than expected in on-farm trials in 2014 and 2015
- Good feedback on fruit quality, especially shelf-life, fruit size and productivity
- Retailer feedback positive
- 'Fragile laterals'
- Very early bud break on some canes on 3 sites
 - Included in JHI dormancy assessments
 - Tipping
 - Nutrition
 - Not seen in JHI breeding plots



Maravilla

Glen Dee



Glen Dee in Perthshire, June 2015



James
Hutton
Limited

0485K-1 at JHI

- Early-mid season selection with glossy appearance, popular with visitors
- Best early selection for flavour at FFF 2013-15
- Sweet, sherbet flavour with low acidity
- Data from 7 seasons and 2 sites at JHI
- 2-3 years positive feedback from on-farm trials in UK and Europe
- Poor and patchy bud break in 2015
 - Symptoms look like lack of winter chill
 - Subsequent low yield in 2015
 - Included in dormancy assessments



	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix ^o	First pick date
0485K-1	1441	5.4	10.4	27th July
Glen Ample	2301.1	5.4	9.5	20 th July
Tulameen	1278.5	4.8	10.7	23 rd July
Octavia	1911.4	5.6	8.6	29 th July

Advanced floricanne genotypes



0658E-1

Beautiful appearance and aromatic flavour

- Large and quick to pick
- Fruit in on-farm trials in 2016
 - AHDB trial, Oxford as guard entries
- More information in 2016



0658C5

Large fruit size and productivity

	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix ^o	First pick date
0658C5	3907.5	6.7	9.5	20th July
0658E-1	3164.5	6.7	9.8	20th July
Glen Ample	2301.1	5.4	9.5	20 th July
Tulameen	1278.5	4.8	10.7	23 rd July
Octavia	1911.4	5.6	8.6	29 th July

New early floricane **0925C-2**

- Primocane x floricane hybrid with little autumn crop
- Two seasons in floricane breeding trials
- Early season fruit in 2014 and earliest in 2015
- Productive over a long season
- Maintains a large fruit size, good shelf-life
- Appears to stand up well to *Phytophthora* after flooding
- Propagation for trials initiated in 2016



	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix ^o	First pick date
0925C-2	2762.3	6.1	9.6	13th July
Glen Ample	2301.1	5.4	9.5	20 th July
Tulameen	1278.5	4.8	10.7	23 rd July
Octavia	1911.4	5.6	8.6	29 th July



Breeding for primocane types

- Focus on early autumn season with high fruit quality
- Late start to autumn season in 2015
- 550 seedlings from 2012/13 crosses
 - >120 with Rub118b (*Phytophthora*) marker
- Open-field seedlings flowered before tunnel
- First fruit mid-August, main crop late September
- Controls
 - Autumn Treasure, Erika, Polka, Kweli, Imara, Kwanza



Primocane seedlings in 10L pots at JHI

Primocane selections in trials

- 24 JHI early-stage selections in Norfolk glasshouse trial
- 4 new selections stood out for quality and flavour
- Initiate propagation for on-farm trials in 2016
- Significant improvements in most recent crosses



1132F-12*



1249K-7

*Plants available in 2016

Molecular marker deployment: resistance to *Phytophthora* root rot

- Development of PCR-based markers for *Phytophthora* resistance in 2008
 - SSR marker Rub118b, a 110bp allele from Latham
- Parents with Rub118b used in crossing 2009
- 10 Selections fruiting in 5-plant plots in 2014/15
 - Exceptional root vigour
 - Two selections with good fruit quality and productivity
 - Survived a pot test and field flooding
- A further 30 selections for assessment in 2016



0946/12

(Glen Moy x Latham) x Glen Doll



0957/58

(Glen Moy x Latham) x Glen Fyne



Molecular marker deployment : resistance to *Phytophthora* root rot

Families combining root rot resistance and high fruit quality screened in 2015

- >250 seedlings with marker
- >130 floricanes
 - Long cane to fruit in 2016
- >120 primocanes
 - 10L pots in primocane tunnel
 - Immature crop in autumn 2015



JHI Primocane tunnel, May 2015

Molecular marker deployment: New markers

Post-harvest softening markers to
select for improved shelf-life
(HL0195)

- 2 Softening markers
- >250 seedlings with root rot
marker screened
- Requires phenotype data in 2016
season for validation
 - Firmness and shelf-life scores



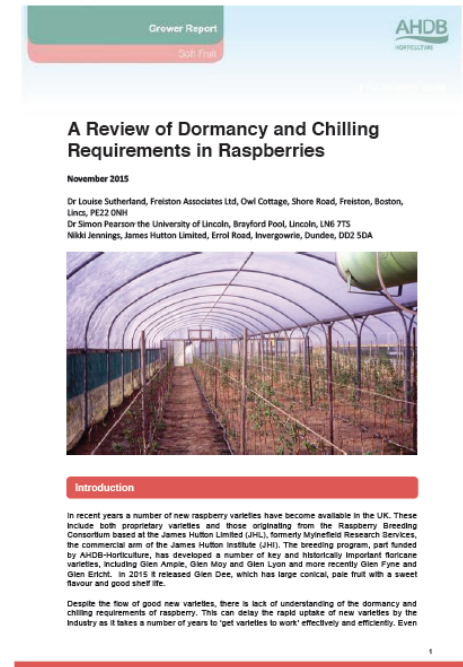
Shelf-life, 11 days storage at 4°C

Fruit size markers to follow (HL0170)

Dormancy investigations

- Review of historical development data and Met Site records at JHI (Louise Sutherland, RBC Chairman)
 - ‘Dormancy and chilling in raspberries’ published by AHDB as a KT Note
- Dormancy experiment initiated to assess and compare chill requirement of advanced selections and cultivars
- Established blackcurrant protocol (Jones *et al*, 2015)
- Genotypes sampled from 2 sites, JHI and Norfolk
 - Glen Dee / Glen Dee (defoliated*)
 - 0485K-1
 - 0435D-3 (very early season)
 - Glen Ample
 - Octavia*
 - 0658C5*

*JHI site only



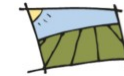
Dormancy experiment

- Canes from established plants harvested fortnightly from October-March
 - 5 reps / genotype
 - Initial assessments of tip fruit and senescence recorded at each harvest
 - Top 25 buds assessed for bud break over 3 weeks
- Data loggers at sampling sites to record hourly temperatures
- Accumulated chill hours calculated
- JHI Met site data will supplement additional information
- Results in late spring 2016





Raspberry Breeding Consortium 2014-2019



GENSON BV Soft Fruit Plants
Sint-Oedenrode - Holland



Kwekerij
deWesterbouwing



Highland
Fruit Stocks

