

Updates from the RBC Raspberry Breeding Programme



SSCR Soft Fruit winter meeting, 16th February 2017



2016 Season at James Hutton Institute

- Mild and wet winter, sustained temperatures $>12^{\circ}\text{C}$ Nov-Jan
- Wettest winter on record (Scotland)
- Repeated flooding in breeding plots
- Chilling units achieved late in winter
- Patchy bud break issues (although less than 2015)
- Cool and dry spring, blizzards in late April
- Condensed flowering period
- First fruit 8th July
- Warm and dry from late summer into October
- *Phytophthora* and raspberry beetle prevalent, short aphid season, split fruit, powdery mildew and wind rub appeared late season



Raspberry beetle damage



Split fruit



Glen Dee at JHI (released 2014)

- Stood out with large fruit in a new young plot
- Large, pale, conical fruit, sweet with an acid bite and creamy texture
- Consistent and superb shelf-life, maintains uniform colour and firmness
- Vigorous cane with a easy to manage habit – good cane for 2017



Castleton Farm, Aberdeenshire, Sept 2016

	Mean yield/ plant (g)	Mean fruit size (g)	Mean Brix ^o	First pick date
Glen Dee	1833	5.5	10.7	15th July
Glen Ample	1704	4.2	7.9	15 th July
Octavia	1241	5.3	8.9	18 th July



Glen Dee in substrate, Kent





Glen Dee in soil production, Scotland 2016



Even bud break, April 2016



Strong lateral extension, July 2016

Glen Dee in soil, Scotland 2016



Perthshire, 28th July 2016

Big fruit



0485K-1 at JHI

- Selected for trials 2010
- Early season selection with glossy appearance, consistently popular with visitors
- Tasting feedback - best selection for flavour at FFF 2012-16
- Sweet, sherbet flavour with low acidity
- Fruit smaller than usual in 2016
- Poor and patchy bud break in 2015/2016
 - Symptoms look like lack of winter chill
 - Subsequent low yield in 2016



	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix°	First pick date
0485K-1	1121	4.4	10.3	11th July
Glen Ample	1704	4.2	7.9	15 th July
Octavia	1241	5.3	8.9	18 th July

0485K-1 on-farm trials

Positive and consistent feedback on flavour and appearance by triallists, retailers and industry members:

- Early – mid selection with glossy appearance
- Aromatic ‘Love hearts’ flavour with low acid
- Poor bud break lead to subsequent low yield in 2016
 - ‘Looks like a lack of winter chill’
 - May be more suited as cold-stored long cane in warmer regions



Photo courtesy of S&A Produce



Patchy bud break, AHDB, Oxford

0658E-1

- Identified for trials in 2014
- Beautiful appearance, flavour was juicy and tart in 2016
- Preferred over 0485K-1 for flavour by Soft Fruit Technical Manager (leading retailer)
- First year on-farm trials:
 - Thin floricanes – not fully established
 - Juicy but tart in 2016
 - Short season
 - Stronger canes for 2017



AHDB trial, Oxford



BGG Clockhouse trial, Kent

	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix°	First pick date
0658E-1	2477	5.2	10.4	15 th July
Glen Ample	2049	4.6	9.5	15 th July
Cascade Delight	1523	5.9	10.9	25 th July



Early floricanne RBC16F6

- Primocane x Floricanne cross showing tip fruit in autumn
- Earliest in breeding plots in 2015 and 2016
- Productive over a long season, highest yield last season
- Maintains fruit size, good shelf-life score
- Has *Rub118b* marker for root rot resistance
- No symptoms of *Phytophthora* despite repeated flooding in a 4-year infested plot
- Plants available for trials in 2017



	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix ^o	First pick date
RBC16F6	2671	5.5	9.9	8th July
Glen Ample	2049	4.6	9.5	15 th July
Cascade Delight	1523	5.9	10.9	25 th July

Events in 2016

Fruit tasting at the following events

- *Royal Highland Show*
- *Fruit for the Future*
- *Fruit Focus*
- *RBC summer meeting*

Visitors were asked to score samples for appearance, texture and flavour



Lesley at Fruit Focus 2016

Fruit events 2016

Consistent results:

- Glen Dee scored best overall
- 0485K-1 scored best for flavour



New floricanes selected in 2016



RBC17F7

- Good field tolerance to *Phytophthora* after 5 yrs

	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix°	First pick date
RBC17F7	3916	5.2	9.1	8th July
Glen Ample	2049	4.6	9.5	15 th July
Cascade Delight	1523	5.9	10.9	25 th July



RBC17F8

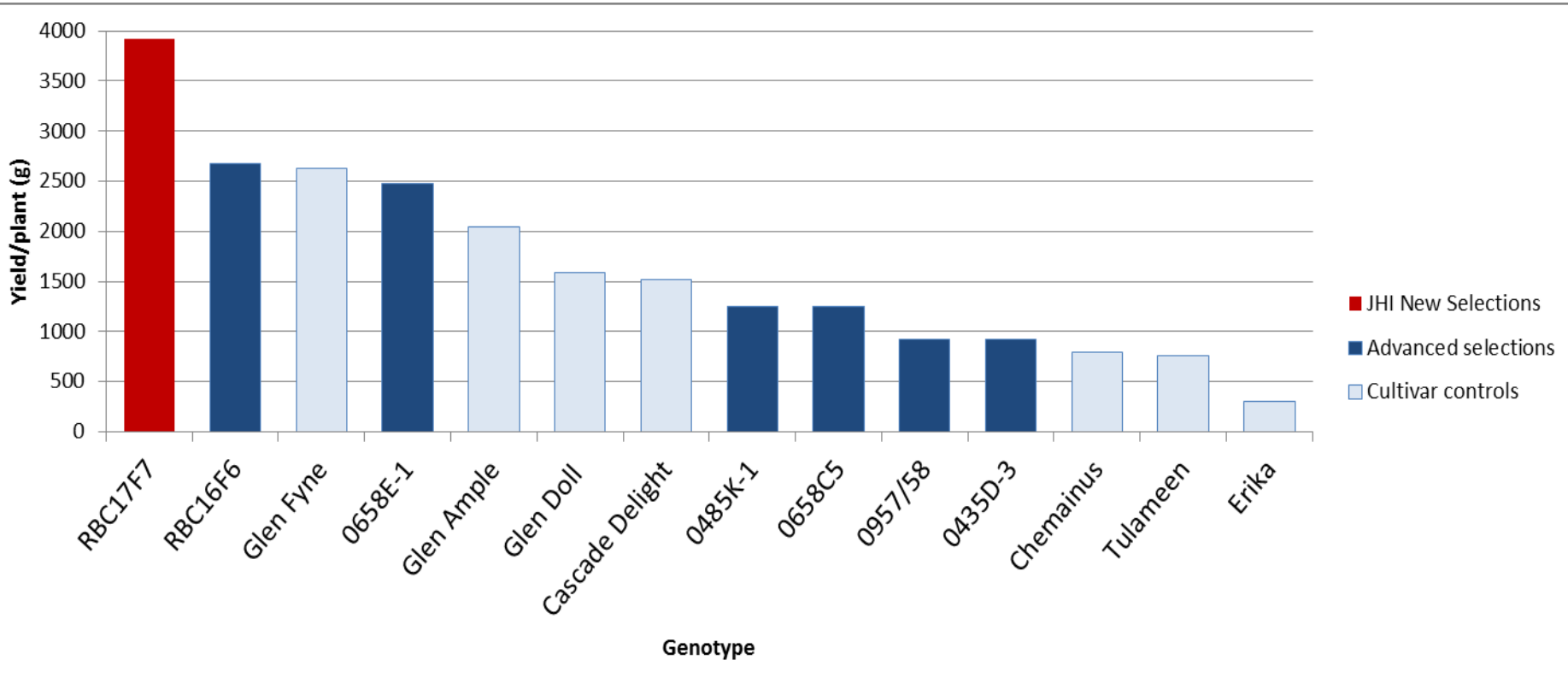
- Sweet, aromatic flavour and good shelf-life

	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix°	First pick date
RBC17F8	2387	5.7	9.1	11th July
Glen Ample	1704	4.2	7.9	15 th July
Octavia	1241	5.3	8.9	18 th July



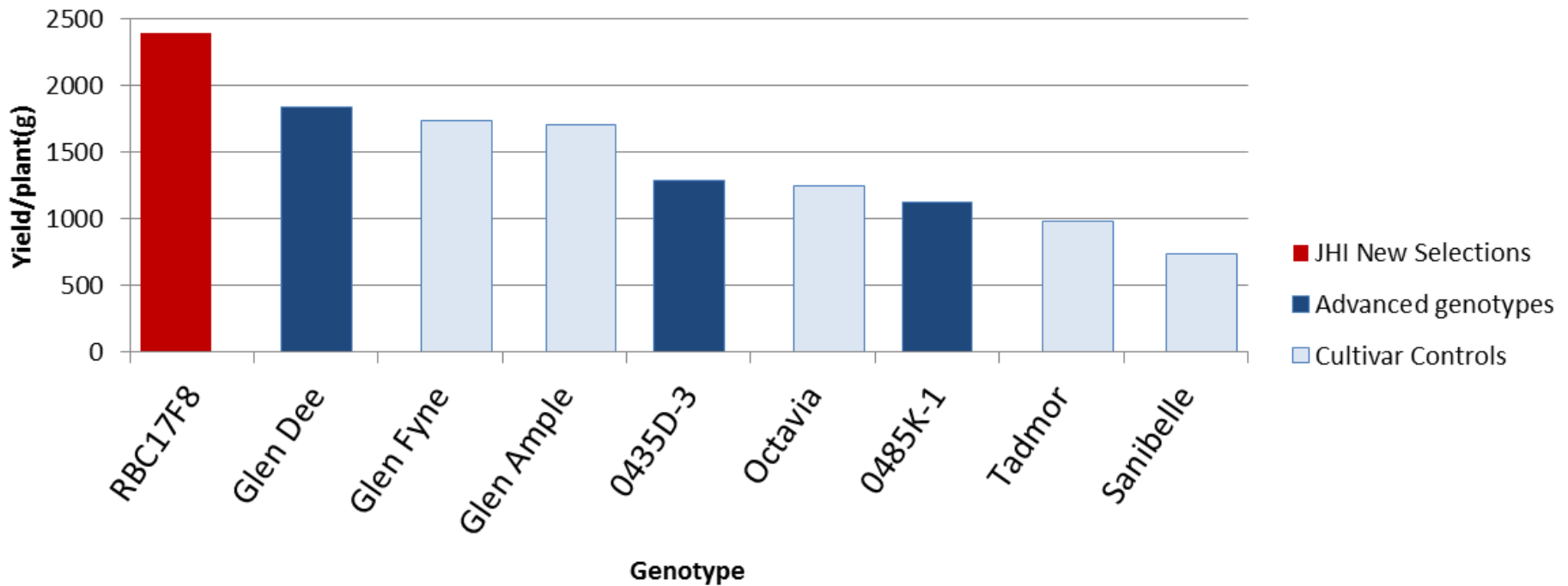
2016 yield at JHI

Plots M17 and M21 (4th season)



2016 yield at JHI

Plot M31 (1st season)



Molecular marker deployment : Selections with *Rub118b* marker

- 39 selections in 4-plant plots assessed for fruit quality
- Glen Ample and Glen Fyne controls showing root rot symptoms
- Many genotypes very productive and had good eating quality
- High root vigour and spawn number
- All had small fruit size
- Good parental material for future crossing



0946/12 high spawn number

Molecular marker deployment: Softening markers

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

- >250 seedlings identified with *Rub118b* marker screened with softening markers
- Fruit assessments completed on long cane in 2016
- Markers will be validated against phenotype data



Shelf-life, 11 days storage at 4°C



Molecular marker deployment : resistance to *Phytophthora* x fruit size

- >900 seedlings in progress of screening
 - New generation of 2015 crosses, with largest-fruited genotypes
 - *Rub118b* (*Phytophthora* resistance)
 - Four markers for fruit size
- Selected genotypes from these new populations will be assessed in a *Phytophthora* pot test to check there is no loss of linkage



JHI Primocane types in 2016

- Warm, bright conditions gave good primocane growth and fruit quality
- Autumn fruit assessed from late July until early November
- 400 seedlings
 - 120 with *Rub118b* marker
- 20 selections
- 15 JHI early-stage selections in Norfolk trials
- Controls
 - Autumn Treasure, Erika, Polka, Kweli, Imara, Kwanza, Versailles



Primocane seedlings in 10L pots at JHI

**Visible step-change in fruit quality
seen in 2015 selections**

New early primocane RBC16P5

- First ripe fruit 28th July, ~3 weeks before Polka
- Large fruit size, easy to plug
- Sweet, low acidity with a 'vanilla' flavour
- Positive feedback from Norfolk trials



Norfolk, August 2016



JHI 1st August 2016

New primocane RBC16P4

- First pick 5th September at JHI
- Large fruit with sweet flavour and low acidity
- Quick and easy to plug
- Performed very well with promising feedback in 2016 in Norfolk trials

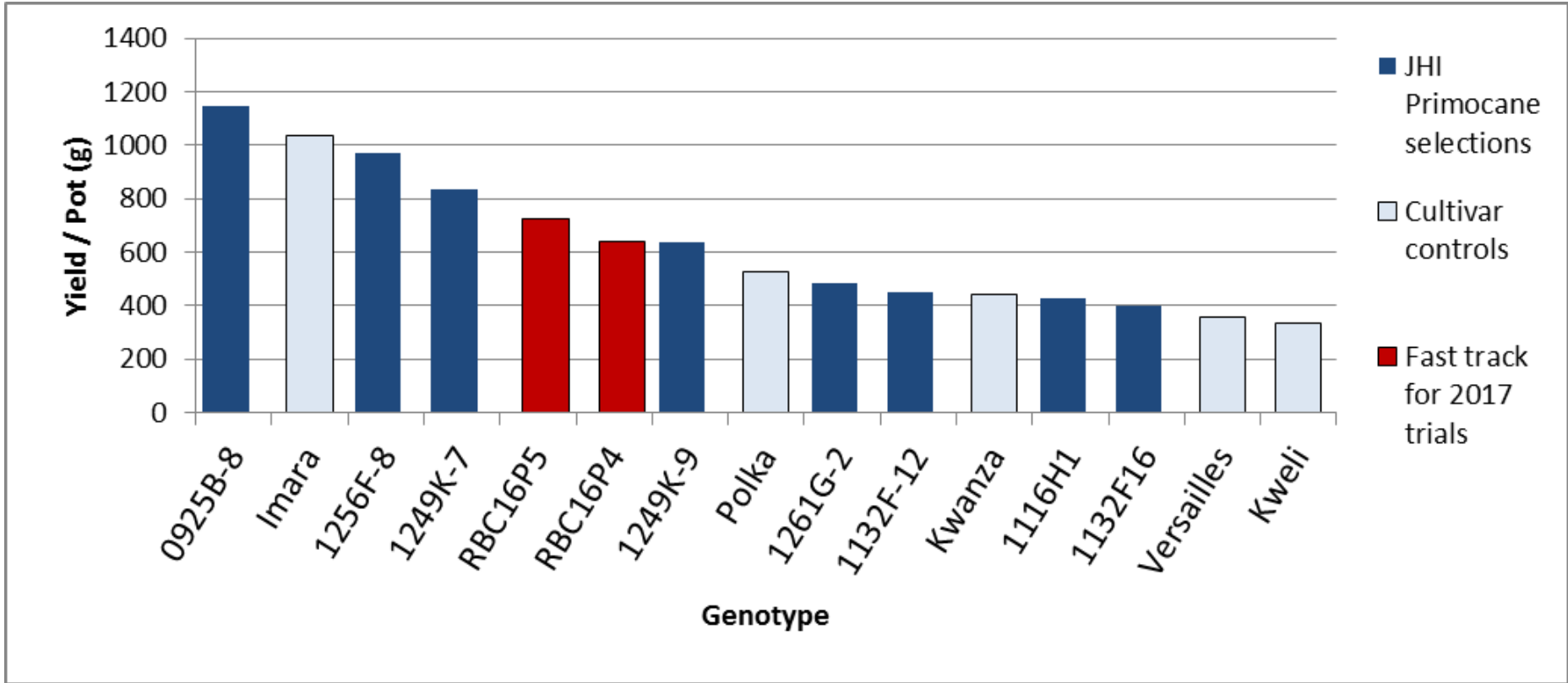
	Mean yield/ plant(g)	Mean fruit size (g)	Mean Brix°	First pick date
RBC16P4	640	6.0	13.7	5 th Sept
RBC16P5	723	7.1	12.9	28 th July
Polka	525	4.6	11.1	18 th Aug



RBC16P4, JHI September 2016



Primocane yield at JHI



Plans to fast track RBC16P4 and RBC16P5 into trials in 2017

Plans for 2017

- Crossing programme 2017
- Dormancy experiment
- Trial visits
- Review of selection methods
 - *Phytophthora* infection and poor establishment of breeding plots in 2016
 - New selection plots will be evaluated in substrate
 - Seedlings and processing types will continue in soil
- Demonstration plot



Glen Rocio in Huelva, Spain
Feb 2017



JHL Demonstration plot

- Dedicated plot to showcase advanced selections
- Distinct from breeding plots at JHI
 - 10L pots in substrate
 - 2 reps, 10 plants/rep
 - 10 x floricanne selections/cvs
 - 10 x primocane selections/cvs
- Elite Tunnels, Enviro range
 - 2 x 50m bays, 8.5m span
- Plants propagated at JHI for spring planting 2017





Raspberry Breeding Consortium 2014-2019

