

**Project Title** The UK Raspberry Breeding Programme

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The results and conclusions in this report are based on a series of experiments conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

**AUTHENTICATION**

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

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## SF 35b The UK Raspberry Breeding Programme

### Grower Summary

#### Headline

- The UK Raspberry Breeding Programme continues to develop new cultivars with potential for adoption by the raspberry industry.

#### Background and expected deliverables

In 2009, the UK raspberry industry formed a consortium to fund the UK Raspberry Breeding Programme for five years. The objective of the programme is to produce improved raspberry cultivars selected for particular markets and cultural practices.

Detailed specifications of the objectives can be found in the revised objectives document. A summary of the expected deliverables from this work include:

- New potential cultivars suitable for both fresh market production (including season extension through protected cropping) and machine harvesting for processing.
- New hybrids with improved pest and disease resistance, especially to *Phytophthora rubi* (root rot).
- Development of new cultivars will be aided by the deployment of marker assisted selection, developed at JHI, substantially reducing the time required to produce a new cultivar.
- Development of new primocane-fruiting cultivars.
- Evaluation of promising selections under commercial conditions in grower trials.

#### Summary of the project and main conclusions

##### *James Hutton Institute Trials in 2012*

In 2012, the following plots were under evaluation at JHI:

- 30 genotypes in a protected site of replicated 5-plant plots (plot J7), in its third and final season.
- 60 genotypes in a protected site of replicated 5-plant plots (plot M27).
- Approximately 4,500 seedlings from the 2008 crossing programme.
- 700 seedlings in pots in a protected site for primocane-fruiting evaluation.
- A summary of the characteristics of key selections, including those already identified for on-farm trials are summarised in Tables 1 and 2. Glen Ample, Tulameen and Octavia are included as controls.

**Table 1. Summary of characteristics of JHI key floricane selections in 2012: Plot J7, third season**

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0485K-1	1371.5	4.9	10.7	23/07/12	Early-mid season. Large, conical and glossy fruit with consistent quality in both JHI sites. Popular with visitors primarily due to its appearance. Easy and quick to pick. <i>Gene H</i>
0019E2	2751	5.7	10.3	26/07/12	Mid-late season. Consistently productive with a large fruit size, great flavour. Performed well on both sites at JHI and on-farm trials
0534RB1	1093	5.4	12.6	26/07/12	Mid-late season. Frost damage caused crumbly fruit at the beginning of picking. Fruit was large and sweet late season.
0435D-3	4798	3.9	10.1	12/07/12	Very early season. Suffered frost damage in 2012 but secondary laterals emerges producing fruit later in season. Large yield is based on a few healthy plants only. Root rot symptoms in 2012
0447C-5	3514	6.2	11.5	06/08/12	Late season. Large, firm fruit, keeps colour well in cold store, good flavour all season, picked for one week longer than Octavia, beetle damage late season
Glen Ample	1494	5.1	9.6	26/07/12	Very late for Ample
Tulameen	625	4.1	12.6	26/07/12	Very late for Tulameen, very sweet, soft and rough, fruit breaks up when picked
Octavia	1593.5	5.6	9.4	06/08/12	Large fruit, quality and flavour better than most years. Beetle damage late in season

**Table 2. Summary of characteristics of JHI key floricane selections in 2012: Plot M26, first season**

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0453C4	2929.5	4.0	9.3	16/07/12	Frost damage but good quality over a long season. Fruit size is a concern
0433F2	2064	3.9	8.4	16/07/12	Great flavour, looks and tastes similar to Tulameen but too soft, poor shelf-life
0460F-5*	1642	4.9	8.8	20/07/12	Neat, conical and very attractive, sweet with little acid. Maybe a little dark
0658E-1*	1976.5	6.1	9.0	23/07/12	Mid-season, best quality and good flavour, produces a good crop of pale firm fruit with a huge fruit size, good shelf-life, healthy plots with long strong laterals
0550E4*	2825	4.8	10.8	16/07/12	Large, firm and attractive, sweet and dry all season, healthy plot, vigorous primocane. Has <i>Gene H</i>
0658C5*	3140.5	6.0	9.0	20/07/12	Large, conical fruit with a pleasant flavour, very productive, vigorous cane with easy managed cane
Glen Ericht	2552.5	4.3	7.3	16/07/12	Early-mid season. Very productive, fruit is displayed well and is quick to pick. Fruit firm and acidic
Glen Doll	1569	4.4	10.5	16/07/12	Typical Doll – yields well with very firm fruit. Excellent shelf-life but flavour dry and not as nice as Fyne
Glen Fyne	3107	4.6	9.5	16/07/12	Flowers suffered frost damage but all plots gave a good crop of bright fruit, sweet and juicy
Glen Ample	1757.8	5.2	9.2	20/07/12	Began picking unusually late in 2012, large size but sharp for Ample

\*New selections proposed for on-farm trials in 2013

### Primocane seedlings

Approximately 700 seedlings were evaluated for primocane-fruiting habit and quality during the 2012 season. These single plant plots are from crosses made in 2009 and 2010 (primocane x floricane)

and were initially screened for absence of spines and aphid resistance prior to moving into a polytunnel in 10 litre pots.

- The earliest selections began fruiting in late August, with the late types still flowering into October.
- Autumn Treasure is the primocane parent of the majority of the 2009 crosses, and the attractive appearance and size of Treasure is seen in many of the progeny.
- Several selections were identified with large fruit, good quality and easily plucked from the receptacle. Yield isn't recorded at this stage. Eight selections were recommended for trials in 2013 (see Table 3 below).

**Table 3. Primocane selections at JHI in 2012**

Selection	Parents			First Pick	Fruit size (g)	Brix %	Notes
0930B-9	Glen Doll	x	Autumn Treasure	27/08/12	5.2	10.2	Very early, sweet, aromatic, easy pick
0925B4	0304F6	x	Autumn Treasure	27/08/12	5.1	8.7	Very early, lots of fruit, very firm, flavour okay
0919D-7	9767RA3	x	Autumn Treasure	04/09/12	4.9	10.3	Nice habit, attractive fruit, pleasant flavour, firm
0974E1	Autumn Treasure	x	Glen Doll	17/09/12	5.7	10.1	Looks productive, firm but juicy, some aroma
1004H-13	Autumn Treasure	x	0668F-3	17/09/12	7.6	10.1	Very large fruit, long conic, later season
1012J-11	0704D5	x	Autumn Treasure	17/09/12	6.9	9.7	Huge fruit, floral and sweet
0925C-9	0304F6	x	Autumn Treasure	21/09/12	7.0	10.3	Large size, very attractive, aromatic, attractive. Keeps a good colour in punnet
0925B8	0304F6	x	Autumn Treasure	01/10/12	6.9	10.1	Late season, huge, meaty fruit, firm and bright, aromatic

#### *Main conclusions*

- Glen Fyne performed exceptionally well in a bad year and was sampled by Tesco and Sainsbury's taste panels. Sainsbury's have shown a keen interest but are yet to put Glen Fyne on their list.
- Marker assisted selection has identified 12 selections with the *Phytophthora* resistance marker. Selections with the marker, identified in 2011, are planted in trials at the institute and on a commercial farm for evaluation in 2013.
- Late selection 0447C-5 performed exceptionally well and samples had favourable feedback from Sainsbury's when compared with Octavia.
- 0019E2 performed well at JHI and in farm trials. Results from trials in Scotland, England and Spain generated good feedback, which included productive plots with large fruit and good flavour. This selection has performed well for two seasons and plants are available for larger trials from RW Walpole in Spring 2013.
- 0485K-1 was identified as a promising cultivar very early in the selection process, with initial on-farm results recording very attractive fruit with a pleasant flavour. Plants are available for larger trials from RW Walpole in Spring 2013.

- Four selections 9350F3, 0453C4, 0304F6 and 0433F2 were planted in trials in spring/summer 2011 and produced a small crop in 2012. From these results and previous results from JHI the following was observed:
  - 0433F2 is soft compared with controls.
  - 0453C4 has a small fruit size compared with controls.
  - 9350F3 and 0304F6 both require further trialling.
- Plants of selections 0485K-1 and 0534RB1, identified for on-farm trials in 2010, were planted in 2012.
- Plants of selections 0435D-3 and 0447C-5, identified for on-farm trials in 2011, will be available for spring planting in 2013.
- Eight primocane selections have been selected and are recommended for trials in England in 2013.

### **Financial benefits**

The release of cultivars with improved fruit quality and yield will result in increased class 1 fruit and increase growers' productivity. New cultivars with pest and disease resistance will lead to a reduction in pesticide applications, the costs associated with these and the financial implications of fruit rejections occurring as a result of pesticide residues. With the possibility of a loss of agrochemicals as a result of EU-led policy changes, it is essential that the industry has access to resistant germplasm into the future.

### **Action points for consortia members**

- Continue to sample Glen Fyne and submit to supermarket taste panels in 2013.
- Trial advanced selections 0447C-5, 0435D-3, 0019E2 and 0485K-1.
- Propagate new selection 0658C5 for on-farm trials.