

Project Title	Raspberry (<i>Rubus idaeus</i>) breeding consortium for the UK
Project number:	SF 35b
Project leader:	Nikki Jennings, Mylnefield Research Services Ltd, Scottish Crop Research Institute, Invergowrie, DD2 5DA Rex Brennan, Scottish Crop Research Institute, Invergowrie, DD2 5DA
Report:	Annual report, November 2009
Previous report	
Key staff:	Nikki Jennings Lynne Ferguson Rex Brennan
Location of project:	Scottish Crop Research Institute, Errol Road, Invergowrie, DD2 5DA
Project coordinator:	Peter Thomson
Date project commenced:	1 st April 2009
Date completion due:	31 st March 2014
Key words:	Breeding, raspberry, cultivar, trials, selections, crossing, <i>Phytophthora</i>

Whilst reports issued under the auspices of the HDC are prepared from the best available information, neither the authors nor the HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure discussed.

The contents of this publication are strictly private to HDC members. No part of this publication may be copied or reproduced in any form or by any means without prior written permission of the Horticultural Development Council.

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.

[Name]
[Position]
[Organisation]

Signature Date

[Name]
[Position]
[Organisation]

Signature Date

Report authorised by:

[Name]
[Position]
[Organisation]

Signature Date

[Name]
[Position]
[Organisation]

Signature Date

CONTENTS

	Page
Grower Summary	4
Headline	4
Background and expected deliverables	4
Summary of the project and main conclusions	4
Financial benefits	5
Action points for consortia	5
Science section	6
Introduction	6
Materials and Methods	6
Results and Discussion	11
Conclusions	17
Technology transfer	17
[Glossary]	19
References	19
Appendix: 1 – Trials Data and On Farm Trials	20
Appendix: 2 – Photographs	41

SF 35b Raspberry (*Rubus idaeus*) breeding consortium for the UK

Grower Summary

Headline

- New selections 0433F2, 0403F6 and 0453C4 performed exceptionally well in SCRI trials and will be trialled on commercial sites in 2010.

Background and expected deliverables

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

The expected deliverables from this work will include:

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

Summary of the project and main conclusions

This year the following plots were evaluated at SCRI:

- 20 genotypes in a protected site of replicated 5-plant plots (plot J24), in its third and final season.
- 20 genotypes in a protected site of replicated 5-plant plots (plot J25), in its second season.
- 30 genotypes in a protected site of replicated 5-plant plots (plot J26), in its first season.
- 18 genotypes in a machine-harvest site of 20-plant plots in its second season.
- Approximately 4000 seedlings from the 2006 crossing programme.
- Approximately 4000 seedlings from the 2007 crossing programme.

A summary of the characteristics of key selections, including those already identified for on-farm trials are summarised in Tables 1, 2 and 3.

Table 1 Summary of characteristics of key selections at SCRI - Plot J24 (third season)

Genotype	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
9764F-3*	3686.5	5.9	8.6	09/07/09	Mid season. Consistently large fruit, attractive in a punnet, floral and sweet, but little juice.
97134B1*	2601.5	4.7	9.1	09/07/09	Large conical yellow raspberry of good quality, with a sweet raspberry flavour early in season, but deteriorated later in season.
9767RA3	3453.5	5.4	9.0	06/07/09	Early season. Bright and attractive in a punnet, good shelf life, pleasant flavour.
9628E-3*	4836	5.9	10.6	17/07/09	Mid-late season. Large meaty fruit with prominent drupes, consistent size and flavour in 2009.
Glen Ample	4963	5.7	8.8	09/07/09	Very productive with large fruit. Flavour was sharp – considered poor for Ample.

*Selections currently in on-farm trials

Table 2 Summary of characteristics of key selections at SCRI - Plot J25 (second season)

Genotype	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
9350F3	3776.5	4.7	9.1	09/07/09	Mid-late season. Attractive, large conical fruit, excellent display, flavour sweet and mild in 2009.
0304F6	3835	5.4	9.7	09/07/09	Mid-late season. Large pale meaty fruit, strong sweet flavour with an acid edge, great display on long, strong laterals.
99111B2*	2767.5	5.3	9.2	02/07/09	Early-mid season, dark fruit, slightly soft at end of season, very upright primocane, continues to display strong tolerance to Phytophthora.
Glen Fyne	3932	4.9	10.6	06/07/09	Mid season. Fruit is firm with good cohesion and has a sweet and aromatic flavour. Canes produce a high yield of good quality fruit.
Tulameen	1709	5.0	12.6	06/07/09	Sweet, strong flavour but fruit was rough, lumpy and soft all season.
Octavia	1942.5	5.8	9.3	17/07/09	Very late, enormous fruit size, pale colour, good aroma but sharp flavour. Tendency to tear around lip of fruit.

*Selections currently in on-farm trials

Table 3 Summary of characteristics of key selections at SCRI - Plot J26 (first season)

Genotype	Mean yield/ stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0453C4	3434	4.4	10.6	29/06/09	Very early. Glossy, firm, good shelf-life, great sweet and floral flavour all season, good habit and display, small size at end of season.
0453C5	3502	4.3	9.6	02/07/09	Early. Very attractive in a punnet, good flavour all season, very firm, great display.

Genotype	Mean yield/stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0433F2	1932.5	5.0	10.3	06/07/09	Glossy conical fruit – resembles Tulameen, sweet and aromatic.
0433H-3	3901	4.7	8.8	02/07/09	Early season. Sweet and floral flavour, consistent through the season, firm, slightly dull in colour, smaller size at end of season.
9911C-1	5333	5.3	10.0	02/07/09	Early season. Large fruit with prominent drupes, sweet and floral all season, solar damage occurred early in 2009 season.
Glen Ample	2934	5.5	8.5	06/07/09	Very poor example of Ample. Short laterals and petioles, very difficult to pick, flavour more acidic than usual for Ample.
Glen Fyne	5539	5.4	11.3	06/07/09	Mid season, large fruit, sweet and juicy, good yield but exhibited root rot symptoms in plot.
Octavia	2673.5	5.4	9.8	13/07/09	Late season. Fruit clustered on very short petioles, sharp flavour but pleasant aroma, some mildew appeared on primocanes.
Tulameen	2893	4.8	11.5	06/07/09	Variable establishment, 4/5 plants with very poor quality – rough and crumbly, some bleeding in punnet, superb flavour.

***Selections currently in on-farm trials**

The yield from SCRI of the on-farm selections are compared with Glen Ample in Figures 1, 2 and 3.

Figure 1 Mean yield of selections in SCRI plot J24

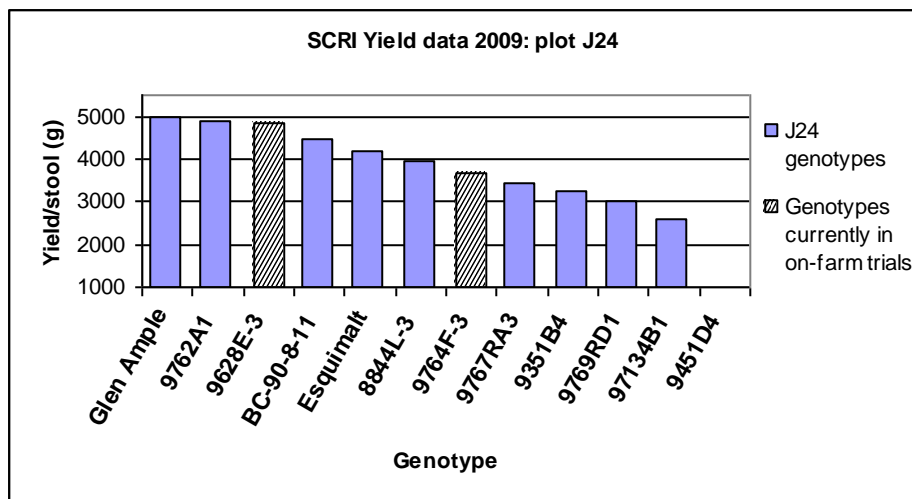


Figure 2 Mean yield of selections in SCRI plot J25

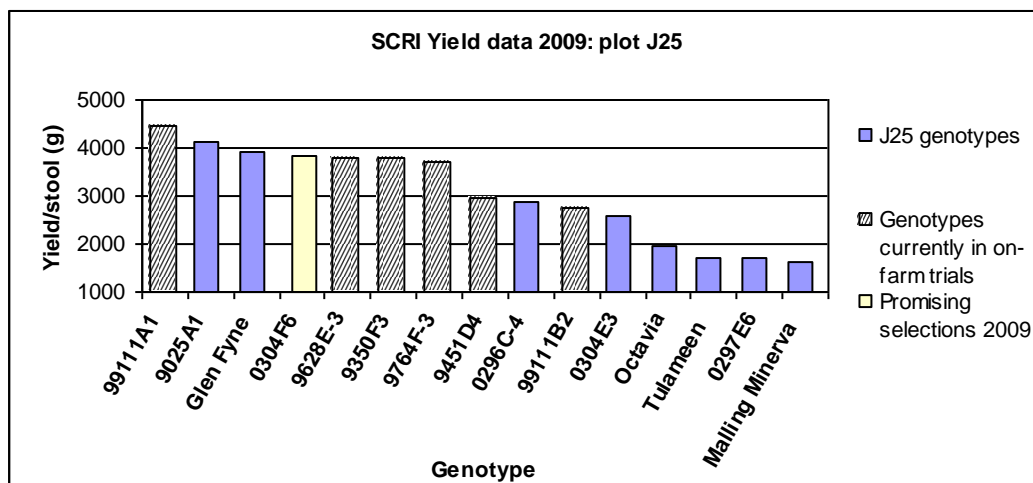
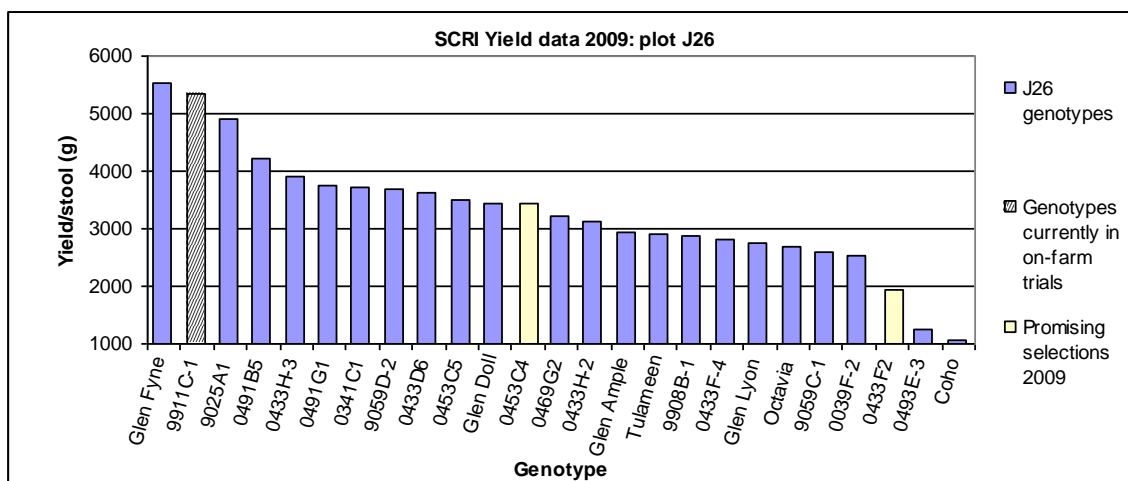


Figure 3 Mean yield of selections in SCRI plot J26



Machine harvested plot

A plot for machine harvesting, consisting of eighteen 20m rows, was planted in spring 2006 at SCRI. This plot is now badly infested with Phytophthora root rot. A summary of the most promising selections is shown in Table 4.

Table 4 SCRI Machine harvest plot - summary of key selections

Selection	Yield/m (g)	Fruit size (g)	Brix %	First pick date	Characteristics of machine pick
9911B2*	323.5	3.2	9.2	28/07/09	Good machine pick, little green or stalk but poor yield in 2009 and very acidic in flavour. Good primocane growth.
9911A1*	1153.8	3.2	9.7	21/07/09	Good machine pick, high IQF%*, dry, clean, uniform, long season, high yield, strong primocane growth.
9673E4	512.4	2.4	11.2	21/07/09	Very high proportion of IQF % in pick, low green content, fruit is dry and uniform in the tray.
9451D4*	855.5	2.5	10.4	21/07/09	Dark fruit, firm, uniform, resembling Glen Doll. High proportion of IQF% but obvious green and stalk. Sweet flavour later in season.
9025A1	1250.3	2.6	9.6	17/07/09	Dark, good quality but wind and beetle damage on

					fruit. Some tolerance to Phytophthora.
Glen Ample	483.0	2.1	9.2	21/07/09	V. mouldy in second half of season, soft and bleeding throughout season, crumbly fruit, good flavour.

*Individual Quick Frozen: high quality fruit suitable for freezing

Main Conclusions

- Glen Fyne performed very well in SCRI trials producing a high yield of fruit with exceptional flavour. This has been consistent for the last two seasons. First plants became available from propagators in spring 2008.
- Phytophthora-tolerant selections 99111A1 and 99111B2 are continuing to perform well in protected and open-field machine-harvested plots. Both are productive with good fruit quality suitable for processing. Selection 99111A1 appears to be acutely susceptible to RBDV at SCRI, whilst 99111B2 remains RBDV-free. Propagation licences for 99111A1 and 99111B2 have been issued to Trade Solutions. **RW Walpole has requested a licence for 99111B2.**
- Selection 00123A7 was planted in on-farm trials in six UK sites and produced a small crop in 2009. Plots are still to establish but early results are encouraging.
- Selections 0019E2 and 9911C-1 were planted in farm trials in 2008 and early trial data from one site was very promising.
- One new selection 9350F3 performed well in SCRI trials in 2008 and 2009 and is recommended for on-farm trials in 2010.
- Three new selections 0453C4, 0304F6 and 0433F2 stood out in SCRI plots with good eating quality and generated lots of interest from various visitors to SCRI during the fruit season. These are recommended for on-farm trials in 2010.

Financial benefits

The release of varieties with improved fruit quality and yield will result in increased class 1 percentage, thus increasing growers' productivity. New varieties with pest and disease resistance will lead to a reduction in pesticide applications, reducing production costs. It will also lead to reduction in fruit rejections occurring as a result of pesticide residues. With the possibility of further losses of agrochemicals as a result of EU-led policy changes, it is essential that the industry has access to resistant germplasm in the future.

Action points for consortia members

- Continue commercial propagation of Glen Fyne.
- Propagate new selections 9350F3, 0453C4 and 0433F2 for on-farm trials.

Science Section

INTRODUCTION

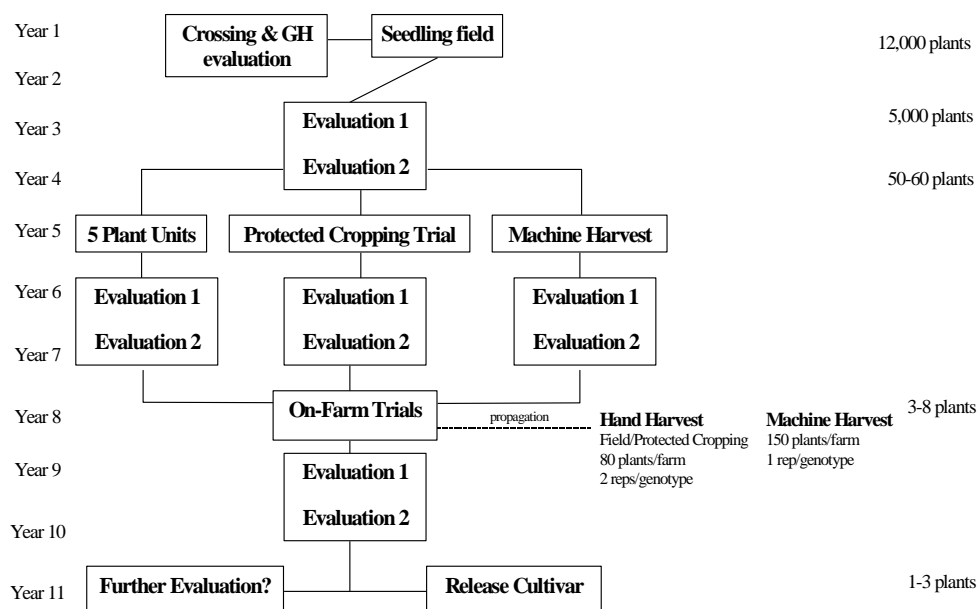
Raspberries have been bred at Mylnefield, Dundee, Scotland since the 1950's and the development of cultivars crucial to the industry's prosperity has continued at SCRI to the present time. The raspberry breeding programme at SCRI has been phenomenally successful and is perhaps best known for the 'Glen' series of cultivars which are grown throughout the world (Jennings and Brennan 2002).

Commercial funding between 1993 and 2000 saw the breeding programme focus upon the development of machine harvestable cultivars for processing. However, it is the fresh market sector that now represents the main area for potential growth in both field and season extension contexts. Although machine harvestable types are still under development, the primary focus is on the fresh market, selecting and developing cultivars suitable for production under a protected cropping system. This will help in identification of adapted germplasm early in the selection process, prior to commercial trialling.

MATERIALS AND METHODS

The programme is based on recurrent selection. Each year selections are made which form the basis of the next generation of crossing. As new variability for particular traits is needed, elite cultivars and selections from outside the programme are included as parents. Each year, approximately 100 crosses are made, producing 100-200 seedlings per family. With variation in germination rates, the programme begins with ~12,000 seedlings. Based on their pedigree, families will be segregating for different characteristics.

Figure 4 Breeding Schedule



Crossing

All hybridizations in the programme are made out of season in an insect-proof glasshouse. Parents for hybridisation are identified and lifted in late autumn and given a chilling period of 7 weeks at 2°C in a vernalisation room, after potting on into 15 litre pots with a peat-based compost mix. The plants are then moved into an insect-proof glasshouse where the

temperature is raised gradually from 10°C to 20°C over a three week period. Daylength is set at 16 hours. Plants break bud, produce laterals and begin to flower approximately four weeks later. Irrigation and fertigation are automated through a DI16 Dosatron.

Open flowers are collected into a Petri-dish for use as a pollen source, dried at room temperature and stored with a desiccant at 4°C. Closed flower buds are emasculated with a scalpel and are ready to pollinate once the stigma have become receptive (approx. 48 hours after emasculation). The pistil is pollinated with an artist's paint brush (Sable, size 5). All tools and hands are sterilized with absolute alcohol between crosses and all excess flower buds are removed to minimize pollen transfer in the glasshouse environment, therefore pollen bags are not required. Parent plants are sprayed for pests and diseases as appropriate for the duration of crossing.

Seed extraction

Fruit from each family is collected when ripe and left in a Pectinase solution overnight at room temperature. The pulp is separated from the seed by blending the mixture for 10 seconds in a domestic blender. The mixture is left to settle for one minute; viable seed will sink to the bottom and pulp and non-viable seed will float to the top. The pulp is decanted from the viable seed. The seed is rinsed by filling the jug with tap water, leaving to settle and decanted. The rinse cycle is repeated three times, until the tap water is clear. The seed which is clean and free of any pulp, is left to dry overnight on filter paper. Dry seeds are stored in glassine bags (100 x 70mm) with a dessicant at 4°C.

Seed scarification

Up to 1000 seeds/family are scarified in acid, assuming 15-20% germination. Remaining seed is stored in case of poor germination. Seed must be clean and dry before scarification in acid. Seed is transferred to a boiling tube (~500 seeds/tube) with concentrated sulphuric acid for exactly 20 minutes. Seed is rinsed by pouring the seed and acid through a metal sieve, secured by a retort stand, and rinsing with tap water for 10 minutes. Seed is submerged under the water during this period. Seed is then submerged in calcium hypochlorite solution for 6-10 days. The seed is stirred every day and the solution is changed once during this period. Once the seed coat has been scarified with acid, it is important that the seed is not left to dry out.

Stratification and germination

Seed is rinsed under tap water for 10 minutes and mixed with damp vermiculite. The mixture is stored in a sealable bag at 4°C for six weeks. After this period, the seed and vermiculite is treated with GA₃ (3ppm) and left at room temperature overnight.

The seed and vermiculite is sown onto Bulrush Brown/Black peat in a seed tray and covered with a fine layer of dry vermiculite. The trays are incubated at 20°C in corex incubators, specially constructed at SCRI, to maintain heat and humidity. Seeds begin to germinate within 7 days.

Spines

Spined genotypes are eliminated early at the germination stage of the seedlings. The spine glands can be seen around the leaflets at the cotyledon stage. These are removed from families which are segregating for spines, leaving only the spine-free plants for further evaluation. All progeny are kept from crosses where plants are expected to be all spiny due to the parents used.

Aphid resistance

Seedlings in the breeding programme are screened for the gene *A₁₀*, conferring resistance to four biotypes of the large raspberry aphid (*Amphorophora idaei*). After the segregating families are screened for spinelessness, the remaining seedlings are pricked out and potted-on into FP9 pots with compost mix containing slow release fertilizer. These are reared in a glasshouse with a 16 hour day length at 20°C. Once plants have produced 3-4 true leaves, they are ready to be inoculated with biotype two of *A. idaei*. Two apterous *Amorphora idaei*

aphids are placed on each test plant alongside controls Malling Jewel (susceptible) and Autumn Bliss (resistant). The plants are scored after 10-14 days; susceptible plants will have a feeding colony versus resistant plants which will have no reproducing population. Susceptible progeny in segregating families are discarded. Aphids are cultured and supplied by entomologists on-site at SCRI.

Field planting

After spiny and aphid-susceptible genotypes are eliminated, the remaining seedlings (~5000 individuals) are hardened-off for field planting. If the ground conditions are appropriate the seedlings are planted in late autumn, otherwise they are held in a Tygan structure until the following spring. This is a 9m, semi-permanent single-span tunnel, covered with an insect-proof mesh, instead of polythene.

All outdoor raspberry breeding plantations at SCRI are prepared and managed with the same practice. Raised beds are formed, 2.5m apart, with a potato bed-maker. Seedlings are planted 0.8m apart, with a 0.8m gap between families. Grass seed is sown in the alleyways. Plants are supported with a traditional post and wire system and old floricanes are cut out and new primocanes are laced-in in the traditional manner. Overhead irrigation is supplied as needed. A minimal spray programme is applied as follows in order to select for resistance/susceptibility to pathogens.

Pest/Pathogen	Pesticide active	Rate/ha	Application
Weed control	Dichlobenil	5L	February
Root rot	Fluazinam	1.5L	Spring and autumn
Cane midge	Chlorpyrifos	1L	Monitored
Raspberry beetle	Chlorpyrifos	1L	Monitored

Breeding and selection for tolerance to raspberry root rot

An important objective of the breeding programme is the development of cultivars with tolerance to raspberry root rot, caused by the fungus *Phytophthora fragariae* var. *rubi*. Currently 20% of the crossing programme is dedicated to breeding for tolerance to the disease, where one parent with known resistance or tolerance is crossed with genotypes with good agronomic characteristics. Progeny are planted alongside susceptible controls in an infected plot at SCRI. Seedlings are evaluated once these controls show symptoms of root rot, usually around 3-5 years after planting. Tolerant selections require further evaluation for fruit quality and yield before a cultivar can be released.

First stage selection

These plants are evaluated for two fruiting years for basic fruiting characteristics (size, shape, flavour, colour, firmness, shelf life). Around 1% of the seedlings (30-50 individuals) are selected for small replicated trials of protected hand harvest plots and, where appropriate, machine harvest plots at SCRI. Once selected, root from these genotypes are lifted from the plot and given a six week vernalisation period at 4°C. Root from each selection is then sown into a shallow tray on top of Bulrush compost and germinated with bottom heat in a glasshouse set at 20°C, 16 hours day length. These are evaluated for a further three fruiting years, alongside commercial cultivars, where more detailed assessments are made on fruit quality, yield, plant habit and tolerance to pest and disease.

SCRI polytunnel

One hectare of Haygrove polytunnels were constructed at SCRI in 2004 to evaluate germplasm under a protected cropping system with the objective of identifying suitable cultivars early in the selection process. The 100m x 100m structure is a Spanish-style Haygrove SMART series multi-bay tunnel with thirteen bays, each spanning 7.8m, built on 2m legs. Tunnels are covered with standard 150mu Visqueen polythene. Raspberry tunnels have three rows per bay, 2.5m between rows with a 2.8m leg row. Alleyways are grassed and leg rows covered with UV-stable fabric mulch (Phormasol) to control weeds. Raised

beds are formed before planting. Irrigation and fertigation is controlled by a D8 Dosatron and is fed through Ram Light tape under the bedding polythene. A commercial fertigation programme, standard for established plots of 'Glen Ample' and 'Tulameen', is used:

	Rate (L/ha/week)	Start date	Duration
N-P-K 3-2-9	80	May	16 weeks
Potassium sulphate	125	June	8 weeks

A 4m high Paraweb windbreak is erected on the west side of the tunnels to protect the structure from wind damage.

Plant material

Selections from the breeding programme are planted in replicated five-plant plots. Plants are placed at 0.8m spacing with a 0.8m gap between each genotype, giving two genotypes between each post. A continuous row of 'Glen Ample' was planted in the westernmost row of the raspberry plot as a guard.

Plants are supported with a post and wire system. A double post system is erected at row ends and mid-row to give extra support. Wire support is put in at three heights since there is large diversity between genotypes of establishment and vigour.

Chemical application

Generally, breeding plots at SCRI are kept free of chemical application to assess resistance/susceptibility of pest and disease. However, after discussions in 2004, it was felt that the protected plots of raspberries should be kept free of any pathogens in order to observe optimum fruit quality and yield. The basic spraying programme is below. Additional applications will be based on observations and presented in the Results section.

Pest/Pathogen	Control method (active)	Rate/ha	Application	
Root rot	Fluazinam	1.5L	Spring and autumn	Standard
Raspberry beetle	Chlorpyrifos	1L	First open flowers	Monitored
Two spotted spider mite	Spidex (<i>Phytoseiulus persimilis</i>)		Fruit season	Monitored

Assessments

Several physical fruit quality characteristics are assessed on an arbitrary score of one to nine, where one equals poor or low intensity and nine equals excellent or high intensity, as follows:

Characteristic

Flavour	1 = bad/off flavour	9 = fruity + aromatic with a balance of sweet/acid
Shape	1 = globular	9 = long conic
Colour	1 = v. pale	9 = v. dark/purple
Firmness	1 = v. soft	9 = v. firm
Collar	1 = v. uneven	9 = v. even with good cohesion
Pick	1 = v. difficult to plug	9 = falls off when touched
Vigour	1 = low vigour <1m	9 = v. vigorous >3m
Plant habit	1 = collapsed cane	9 = v. upright cane
Cane diseases	1 = no symptoms	9 = severe symptoms
Overall score	1 = completely inadequate	9 = perfect agronomical traits

- Total yield for each five-plant plot is picked and calculated as yield per stool.

- Fruit size is measured in grams by taking the average weight of ten fruit.
- Season is assessed by recording dates of first flower, first fruit, first pick, 50% pick and final pick.
- Number of fruit per lateral is counted on laterals from the top, middle and bottom of the plot.
- Brix is measured with a Palette 100 PR-100 digital refractometer.
- Additional notes are recorded on flavour description, uniformity, display, comparison with control varieties, disease infection and other identifying features.

Advanced Selections

All the fruit data is collated and promising selections (usually one or two genotypes) with consistent desirable characteristics are identified as potential new cultivars, and are thus candidates for on-farm trials. Once permission has been given by the programme management group (PMG), vegetative buds are micropropagated to provide root rot-free plants to growers. This is initiated by growing primocane from root harvested in late autumn from the SCRI field trial, vernalised and propagated as the root from the 'First stage selection'. Vegetative buds are initiated into micropropagation in the following spring to produce modules for field planting 12 months thereafter.

Pathogen-testing is initiated at this time to produce indexed mother stock in anticipation of commercialisation. This requires a minimum of one year, providing the plant material is at an appropriate growth stage. The mother plants must be free of all pathogens listed in the declaration, under E.P.P.O guidelines, to enter to certification scheme. Fully-tested mother plants are held until a decision is made to release or discard these advanced selections.

The plants are distributed to growers within the Consortium and are trialled on diverse geographical sites and cultivation methods next to commercial cultivars for comparison. These trials are evaluated for at least two fruiting years. Growers are requested to fill out a single page 'Raspberry Trial Results Form', detailing plant establishment, cultivation and comparing the advanced selection with a control cultivar for various characteristics. The growers provide valuable feedback on how the selection performs on a commercial trial. If these advanced selections are superior to existing commercial cultivars, they will undergo commercialisation.

RESULTS AND DISCUSSION

2009 Crossing programme

This year 88 crosses were made at SCRI, targeting mainly resistance to *Phytophthora* root rot and improvement of primocane-fruiting types. Parent plants were identified as containing the resistance marker developed at SCRI as part of the Hortlink 0169 and RERAD Workpackage 1.3. Progeny from these crosses will be subsequently screened with this marker to identify seedlings with resistance to root rot with the intention of planting these populations in an infestation plot in 2010.

Breeding trials at SCRI

This year the following plots were under evaluation:

- 20 genotypes in a protected site of replicated 5-plant plots (plot J24), in its third and final season.
- 20 genotypes in a protected site of replicated 5-plant plots (plot J25), in its second season.
- 30 genotypes in a protected site of replicated 5-plant plots (plot J26), in its first season.
- 18 genotypes in a machine-harvest site of 20-plant plots in its second season.
- Approximately 4000 seedlings from the 2006 crossing programme.
- Approximately 4000 seedlings from the 2007 crossing programme.

This season, three protected five-plant plots were evaluated under protected cropping. This year was the third and final season for the established plot J24, the second season of J25 and the first season for J26, planted in 2007/08.

- Cool spring temperatures led to late flowering and the fruiting plots were covered on schedule in mid-June. Higher temperatures late June and early July brought on development and fruit from the early selections ripened particularly early and picking started on 29th of June.
- Irrigation consultants, Agri-Tech, were used during the growing season to optimise irrigation applied in the tunnels.
- Yield, fruit size and firmness were average but flavour and brix levels were exceptionally good for most of the season.
- In the open field plot, all aspects of fruit quality, including flavour, Brix levels, fruit size were much poorer than in the protected plots.
- Efforts were made to cultivate the germplasm as close to a commercial system as possible. This proved a challenge as such diversity in a small area made uniformity of spraying and feeding more difficult to achieve. The spraying programme is detailed in Table 5.

Table 5 SCRI protected cropping trials J24, J25 and J26 - spray programme 2009

Date	Trade Name	Active	Application Rate	Control
17/03/09	Osorno	Dichlobenil		Weeds
10/04/09	Shirlan	Fluazinam	1.5L/Ha	Root rot
21/05/09	Cyren	Chlorpyrifos	1L/Ha	Vine weevil
25/05/09	Shark	Carfentrazone-ethyl	1.25L/Ha	Primocane
02/07/09	Aphox	Pirimicarb	0.28kg.Ha	Aphids (<i>Myzus persicae</i>)
07/10/09	Shirlan	Fluazinam	1.5L/Ha	Root rot

The trial was hand-picked for yield and basic fruit quality characteristics were evaluated; size, shape, colour, firmness flavour and Brix were assessed once per week. In Appendix 1, yield and season data for each plot can be found in Tables 11, 12 and 13, selections are ranked in order of yield (highest to lowest) in Tables 14, 15 and 16. All arbitrary scores on fruit quality and plant habit are summarized alongside fruit size and Brix levels in Tables 17, 18 and 19.

Key selections from the plots, including selections currently in on-farm trials are summarized in Table 6, 7 and 8. Mean yield of the selections fruiting in the plots are shown in a bar graphs in Figures 5, 6 and 7.

Table 6 Plot J24 (third season): Summary of characteristics of key selections at SCRI

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
9764F-3*	3686.5	5.9	8.6	09/07/09	Mid season. Consistent large fruit, attractive in a punnet, floral + sweet but little juice
97134B1*	2601.5	4.7	9.1	09/07/09	Large conical yellow raspberry good quality with a sweet raspberry flavour early season, both deteriorated late season
9767RA3	3453.5	5.4	9.0	06/07/09	Early season. Bright + attractive in a punnet, good shelf life, pleasant flavour
9628E-3*	4836	5.9	10.6	17/07/09	Mid-late season. Large meaty fruit with prominent drupes, consistent size + flavour this season
Glen Ample	4963	5.7	8.8	09/07/09	Very productive with large fruit, flavour sharp – poor for Ample

*Selections currently in on-farm trials

Table 7 Plot J25 (second season): Summary of characteristics of key selections at SCRI

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
9350F3	3776.5	4.7	9.1	09/07/09	Mid-late season. Attractive, large conical fruit, excellent display, flavour sweet + mild this season
0304F6	3835	5.4	9.7	09/07/09	Mid-late season. Large pale meaty fruit, strong sweet flavour with an acid edge, great display on long, strong laterals
99111B2*	2767.5	5.3	9.2	02/07/09	Early-mid season, dark fruit, slightly soft at end of season, very upright primocane, continues to display strong tolerance to <i>Phytophthora</i> ,
Glen Fyne	3932	4.9	10.6	06/07/09	Mid season. Fruit is firm with good cohesion and has a sweet and aromatic flavour. Canes produce a high yield of good quality fruit
Tulameen	1709	5.0	12.6	06/07/09	Sweet, strong flavour but rough, lumpy and soft all season
Octavia	1942.5	5.8	9.3	17/07/09	Very late, Enormous fruit, pale, tearing collar, good aroma but sharp

*Selections currently in on-farm trials

Table 8 Plot J26 (first season): Summary of characteristics of key selections at SCRI

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0453C4	3434	4.4	10.6	29/06/09	Very early. Glossy, firm, good shelf-life, great sweet + floral flavour all season, good habit + display, small at end of season
0453C5	3502	4.3	9.6	02/07/09	Early. Very attractive in a punnet, good flavour all season, very firm, great display.
0433F2	1932.5	5.0	10.3	06/07/09	Glossy conical fruit – looks like Tulameen, sweet + aromatic.

Genotype	Mean yield / stool (g)	Mean fruit size (g)	Mean Brix %	First pick date	Characteristics
0433H-3	3901	4.7	8.8	02/07/09	Early season. Sweet + floral flavour, consistent through the season, firm, slightly dull, smaller at end of season
9911C-1	5333	5.3	10.0	02/07/09	Early season. Large fruit with prominent drupes, sweet + floral all season, solar damage early season
Glen Ample	2934	5.5	8.5	06/07/09	Very poor example of Ample. Short laterals and petioles, very difficult to pick, flavour acid for Ample
Glen Fyne	5539	5.4	11.3	06/07/09	Mid season, large fruit, sweet + juicy, good yield but root rot symptoms in plot
Octavia	2673.5	5.4	9.8	13/07/09	Late season. Fruit clustered on very short petioles, sharp but nice aroma, some mildew on primocane
Tulameen	2893	4.8	11.5	06/07/09	Variable establishment, 4/5 plants with very poor quality – rough + crumbly, bleeding in punnet, superb flavour

*Selections currently in on-farm trials

Figure 5 Mean yield of selections in SCRI plot J24

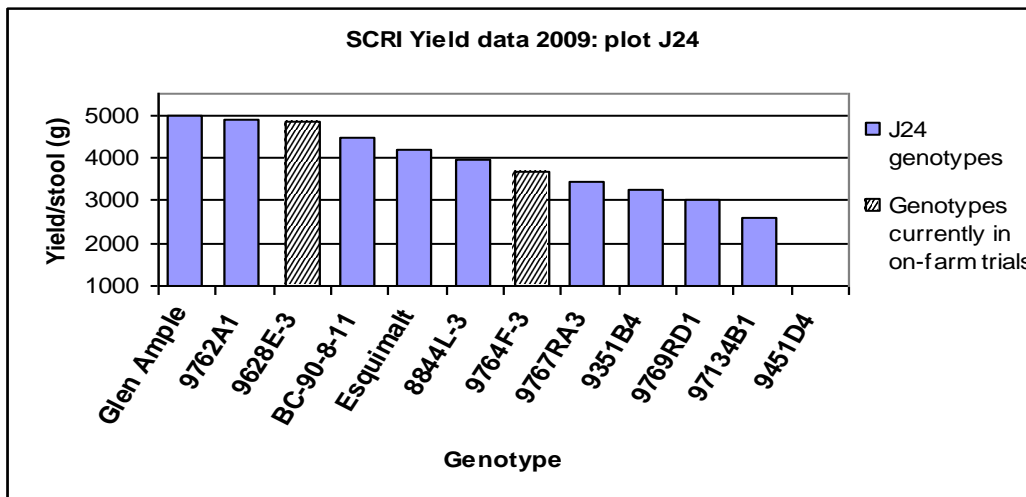


Figure 6 Mean yield of selections in SCRI plot J25

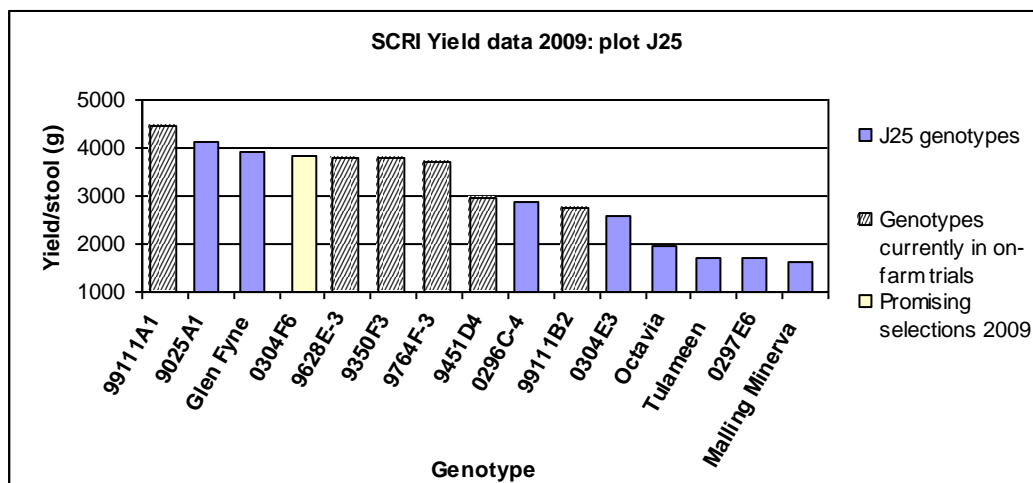
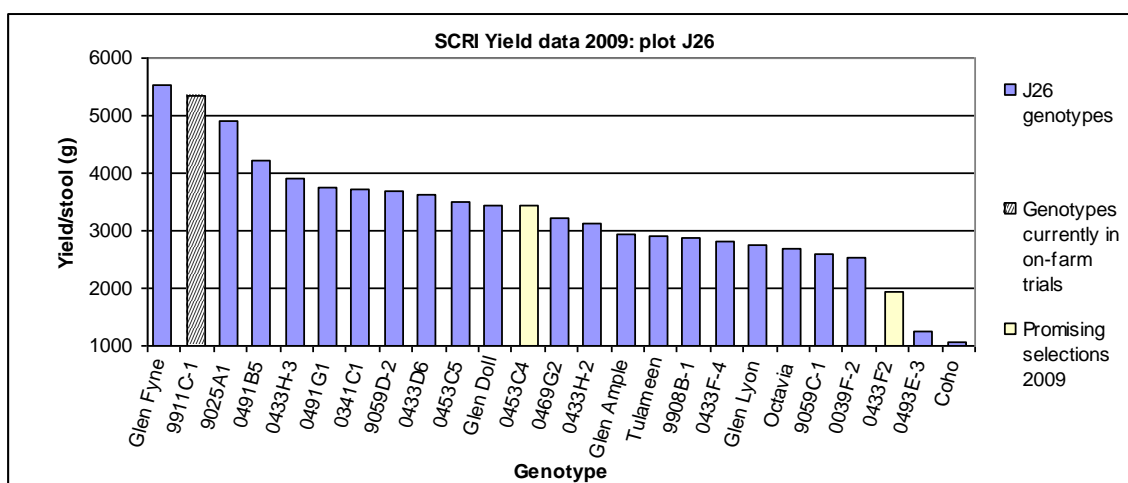


Figure 7 Mean yield of selections in SCRI plot J26



Proposed new elite selections

- **9350F3 (EM5961/1 x 26C1)**. This productive mid-late season selection performed well in SCRI plots in 2008, producing large fruit with a pleasant sweet flavour all season. Results from this season can be found in Table 7, Figure 6 and Appendix 1, Tables 12 and 18.
- **0453C4 (0015D3 x 9059C-1)**. This very early season selection started picking 5 days before Glen Lyon and performed well in SCRI plots in 2009, producing firm fruit with a good shelf-life and a sweet and floral flavour all season. Results from this season can be found in Table 8, Figure 7 and Appendix 1, Tables 13 and 19.
- **0304F6 (9455F-2 x 9050RD3)**. This mid season selection has performed well in SCRI trials in 2008 and 2009. It has large bright pale fruit presented well on long but strong laterals. Results from this season can be found in Table 7, Figure 6 and Appendix 1, Tables 12 and 18.
- **0433F2 (003RB1 x 0015D3)**. This mid-season selection strongly resembles Tulameen in appearance, with large conical glossy fruit and sweet aromatic flavour. Results from this season can be found in Table 8, Figure 7 and Appendix 1, Tables 13 and 19.

Machine harvest plot

A plot of eighteen 20m rows for machine harvesting was planted in spring 2006 at SCRI . This season, its second fruiting year, the plot was harvested twice per week with a tractor-

pulled Korvan harvester at SCRI. Yield, fruit quality and proportions of IQF ('Individual Quick Frozen': high quality fruit suitable for freezing), under-ripe, ripe with stalk and mouldy fruit were measured. This trial received chemical control for *Phytophthora* root rot only as the disease was found to be prevalent in the plot in 2008, spreading rapidly and resulting in many dead plants in some genotypes in 2009. Results can be found in Appendix 1, Tables 20 and 21. A summary of the most promising selections can be found in Table 9.

Table 9 SCRI Machine harvest plot, summary of key selections

Selection	Yield / m (g)	Fruit size (g)	Brix %	First pick date	Characteristics of machine pick
99111B2*	323.5	3.2	9.2	28/07/09	Good machine pick, little green or stalk but poor yield this year, very acid. Good primocane growth
99111A1*	1153.8	3.2	9.7	21/07/09	Good machine pick, high IQF%*, dry, clean, uniform, long season, high yield, strong primocane growth
9673E4	512.4	2.4	11.2	21/07/09	Very high proportion of IQF % in pick, low green content, fruit is dry + uniform in the tray
9451D4*	855.5	2.5	10.4	21/07/09	Dark fruit, firm, uniform, looks like Glen Doll, high proportion of IQF% but obvious green + stalk, sweet flavour later in season
9025A1	1250.3	2.6	9.6	17/07/09	Dark, good quality but wind and beetle damage on fruit, some tolerance to <i>Phytophthora</i>
Glen Ample	483.0	2.1	9.2	21/07/09	v. mouldy second half of season, soft + bleeding throughout season, many crumbly, good flavour

*Individual Quick Frozen: high quality fruit suitable for freezing

Primocane selections

This season, primocane-fruited types were selected from seedling fields from crosses made in 2006 and 2007. These selections, fruited in open field plots, were identified with an early season large fruit, easy pick and good fruit quality and will be fruited in protected five-plant plots next year.

On-farm selections

Since 2002, several selections have been identified for on-farm trials. Location and distribution of these selections are shown in Appendix 1, Tables 22 and 23. Feedback forms were sent to triallists to assess yield and fruit quality relative to control varieties. The returned forms are summarized in Appendix 1, Table 24 and some of the selections are described below. The progress of disease-testing of each selection is indicated in Table 10.

Selections identified in 2002/03

Seven selections were planted out on-farm trials in 2005 (see Appendix 1, Table 15) including two selections with good tolerance to root rot, 99111A1 and 99111B2, which are discussed below. The remaining selections, selected from outside plots at SCRI between 2002 and 2003. Early feedback from these trials suggests that selection 9455F-2 is the most promising from this group in terms of fruit quality, flavour and yield.

Phytophthora tolerant selections 99111A1 and 99111B2

In 2006, plants were sent out to growers for on-farm trialling. One triallist, Pete Marshall, planted the selections, alongside Glen Moy control plants, into ground that was severely infested with *Phytophthora*, where a seven year old plot of Glen Ample had been seriously infected and grubbed out in 2003. This year, 99111B2 showed symptoms of root rot for the first time only after the root system was disturbed.

Established plots of both selections were fruited at SCRI in protected and open field plots this season. Both are well suited to machine-harvesting and although yield and fruit quality are impressive, flavour remains to be poor relative to Glen Ample and Tulameen, and are therefore recommended for the processing market.

Selections identified in 2004 and 2005

Two selections 9764F-3 and 9628E-3, selected in 2004 were sent for micropropagation in 2005. Plants of 9764F-3 were sent to triallists in spring 2007. Plants of 9628E-3 were planted late 2008 and spring 2009.

Both 9764F-3 and 9628E-3 have been fruiting in replicated protected plots for several years at SCRI and the data has shown a good consistent performance in terms of yield, fruit size and quality. For the second consecutive season, 9628E-3 produced the higher yield, larger mean fruit size and slightly higher mean Brix but had variable flavour throughout the season. Selection 9764F-3 had better eating quality and a more consistent flavour.

Selection 00123A7 was selected for trials in 2005, after one season of evaluation at SCRI, and fast-tracked through micropropagation and planted into on-farm trials in 2007 and 2008. Feedback from trials was mixed with a small fruit size as the main concern. This selection will be fruiting on more trial sites in 2010, including a new plot at SCRI.

Yellow selection 97135B1

Feedback from trials in Aberdeenshire has been very positive for this genotype with particular regards to yield and flavour and its potential as a niche variety. Feedback from trials at Hargreaves report good yields but mention small fruit size as a concern. At SCRI fruit quality and flavour are particularly good early in the season but both deteriorated mid to late season. It also shows very good tolerance to root rot in the SCRI infestation plot.

Selections identified in 2006

In 2006, two new selections 9911C-1 and 0019E2 were selected for on-farm trials. 9911C-1 is an early season selection. 0019E2 is a mid to late season selection with large, firm conical fruit. Micropropagated plants were planted out on six trial sites in autumn 2008. Feedback indicates that the plants have established well, and early fruit results from 0019E2 are very promising. At SCRI 9911C-1 performed well during the last two seasons. 0019E2 will fruit in a new SCRI plot in 2010.

Table 10 Selections undergoing disease testing at SCRI

Selection	Progress of pathogen testing	Indexed root available
Glen Doll	Fully tested. Material in high health house	2008 (6 mothers)
Glen Fyne	Fully tested. Material in high health house	2008 (6 mothers)
99111A1	Fully tested. Material in high health house	2008 (6 mothers)
99111B2	Fully tested. Material in high health house	2008 (6 mothers)
9628E-3	Fully tested. Material in high health house	2008 (6 mothers)
9764F-3	Fully tested. Material in high health house	2008 (6 mothers)
00123A7	Fully tested. Material in high health house	2008 (6 mothers)
9911C-1	Fully tested. Material in high health house	2009 (4 mothers)
0019E2	Fully tested. Material in high health house	2009 (4 mothers)
9350F3	Testing initiated 2009	Expected 2010/11
0453C4	Testing initiated 2009	Expected 2010/11
0433F2	Testing initiated 2009	Expected 2010/11
9025A1	Awaiting results	Expected 2010
9046RA2	Material from John Hamilton, positive for virus	Expected 2010
97134B1	Positive for RLMV, retesting initiated 2009	Expected 2011

2010 Fruit season

The following SCRI plots will be fruiting and evaluated in 2010:

- Protected plot of 20 SCRI selections identified in 2005.
- Protected plot of 30 SCRI selections identified in 2006.
- Protected plot of 20 SCRI selections identified in 2007.
- Machine-harvest plot of 18 genotypes in 20m rows.
- Demonstration plot of SCRI *Rubus* cultivars.
- 4000 seedlings from crosses made in 2007.

Molecular markers for root rot

Breeding for resistance to *Phytophthora* root rot is a major objective of the breeding programme. The traditional method of selection involves screening progeny in an infestation plot at SCRI, which is time-consuming and costly in terms of field resources.

The Hortlink project, HL0169, headed by Julie Graham at SCRI, has made it possible to shorten this process through the use of genetic markers linked to root rot resistance. This project has identified germplasm with resistance to root rot, developed molecular markers for screening promising selections for resistance to root rot and through RERAD workpackage 1.3 produced an enhanced map of potential gene sequences for raspberry breeding. These markers are now available to the breeding programme.

In 2009 crosses were made using parents that contain the resistant markers, and subsequent screening of the progeny will be carried out early in 2010 using the markers to identify resistant seedlings early in the selection process.

Marker assisted selection has become recently available to identify other important traits early in the selection process, namely fruit quality characteristics (Hortlink HL0170, RERAD Workpackage 1.3). These will be easily integrated with the markers for root rot resistance and seedlings will be screened routinely using these techniques.

Use of the markers in the germplasm makes this an exciting time for raspberry breeding and puts the programme at the forefront of molecular breeding in perennial crops.

Aphid screening populations with the RB strain of aphid

In 2008, crosses were made with parental material containing a novel source of aphid resistance, identified at SCRI through work funded by RERAD (Workpackage 1.3), with the intention of combining this gene with the existing *A₁₀* gene to produce more robust resistance to aphids than single gene resistance. These progeny were screened with the resistance-breaking biotype of the large raspberry aphid (*Amphorophora idaei*) in summer 2009, identifying resistant genotypes that will be screened for agronomic traits in a field plot.

CONCLUSIONS

- Glen Fyne performed very well in SCRI trials producing a high yield of fruit with exceptional flavour. This has been consistent for the last two seasons. First plants became available from propagators in spring 2008.
- *Phytophthora* tolerant selections 99111A1 and 99111B2 are continuing to perform well in protected and open-field machine-harvested plots, both are productive with good fruit quality suitable for processing. Selection 99111A1 appears to be acutely susceptible to RBDV at SCRI, whilst 99111B2 remains RBDV-free. Propagation licences for 99111A1 and 99111B2 have been issued to Trade Solutions. RW Walpole has requested a licence for 99111B2.
- Selection 00123A7 was planted on on-farm trials in six UK sites and produced a small crop in 2009. Plots are still to establish but early results are encouraging.
- Selections 0019E2 and 99111C-1 were planted on farm trials in 2008 and early trial data from one site was very promising.

- One new selection 9350F3 performed well in SCRI trials in 2008 and 2009 and is recommended for on-farm trials in 2010.
- Three new selections 0453C4, 0304F6 and 0433F2 stood out in SCRI plots with good eating quality and generated lots of interest from various visitors to SCRI during the fruit season and are recommended for on-farm trials in 2010.

TECHNOLOGY TRANSFER

- A presentation of the project was given at the following events:
 - Soft Fruit Growers Conference, Hook, Sweden, 2-3rd December 2008.
 - Aberdeen Plant breeding and biotechnology students, SCRI, 9th December 2008.
 - SSCR Soft Fruit Committee, SCRI, 25th February 2009.
 - GSK Raspberry Development meeting, 2nd April 2009.
 - COST 863, Summer Berry School, Ancona, Italy, 25-27 May 2009.
 - Fruit for the Future, SCRI, 18th July 2009.

Publications

- Graham, J. and Jennings, N. 2009. Raspberry breeding. pp. 233-248. In: S.M. Jain and P.M. Priyadarshan (eds.), Breeding plantation tree crops: Temperate species. Springer, New York.
- Hall, H.K., Hummer, K.E., Jamieson, A.R., Jennings, S.N. and Weber, C.A. 2009. Raspberry breeding and genetics. Plant Breeding Reviews 32:39-382
- 'Raspberry variety trials at SCRI in 2008' Horticultural Development Company Factsheet 22/08, Project SF35a
- Brennan, R and Jennings, N. 2009. Soft Fruit for the Future. Journal of the Royal Caledonian Horticultural Society 71-75.

Other Knowledge Transfer

- Out of Doors programme, BBC Radio Scotland, broadcast 1st August 2009.
- The Food Programme, BBC Radio 4, broadcast mid August 2009.

GLOSSARY

Cotyledon	The embryonic leaf of a seed.
Crossing	The mating of individuals of different genotypes of the same species in order to promote genetic recombination.
Emasculation	The removal of male reproductive organs.
Genotype	An individual with a unique genetic constitution.
Pistil	The female reproductive structure of a flower, consisting of ovary, style and stigma.
Progeny	The resulting offspring of a cross.
Seed scarification	The physical disruption of the seed epidermis.
Seed stratification	The exposure of seeds to extended cold periods prior to germination at warm temperatures.
Stigma	The surface of a pistil upon which the pollen grains germinate.
Vernalisation	A process of thermal induction in plants, in which growth and flowering are promoted by exposure to low temperatures.

REFERENCES

- Graham, J., Smith, K., Tierney, I., MacKenzie, K., Hackett, C.A. 2006. Mapping gene *H* controlling cane pubescence in raspberry and its association with resistance to cane botrytis and spur blight, rust and cane spot. *Theo. Appl. Gen.* 112: 818-831.
- Jennings, S.N., Brennan, R. 2002. Improvement of raspberry cultivars in Scotland. *Acta Horticulturae* 585: 179-183.
- Lincoln, R.J., Boxshall, G.A., Clark, P.F. 1982. A dictionary of ecology, evolution and systematics. Cambridge University Press.

Appendix 1

Table 11 SCRI Polytunnel site J24 – Yield and season data in 2009 (third fruiting year)

Selection	Field Expt	Rep	First Flower	First Fruit	Last Pick	Yield/Stool (g)	Mean Fruit / lateral
9628E-3	J24	1	28/05/09	17/07/09	13/08/09	4836.0	20.5
8844L-3	J24	1	25/05/09	09/07/09	03/08/09	3951.0	13.5
9351B4	J24	1	01/06/09	09/07/09	03/08/09	3508.0	13.0
9451D4	J24	1	05/06/09	27/07/09	13/08/09	2240.0	16.0
97134B1	J24	1	28/05/09	13/07/09	10/08/09	2963.0	12.0
9762A1	J24	1	25/05/09	06/07/09	06/08/09	4878.0	19.5
9764F-3	J24	1	01/06/09	27/07/09	06/08/09	3440.0	24.0
9767RA3	J24	1	28/05/09	06/07/09	10/08/09	3154.0	13.5
9769RD1	J24	1	28/05/09	09/07/09	10/08/09	3009.0	15.0
Esquimalt	J24	1	01/06/09	27/07/09	06/08/09	3456.0	29.0
Glen Ample	J24	1	25/05/09	09/07/09	10/08/09	5048.0	32.0
8844L-3	J24	2	25/05/09	06/07/09	06/08/09	3688.0	14.5
9351B4	J24	2	01/06/09	09/07/09	03/08/09	3042.0	16.5
97134B1	J24	2	28/05/09	09/07/09	10/08/09	2547.0	11.0
9764F-3	J24	2	28/05/09	09/07/09	13/08/09	3974.0	10.0
9767RA3	J24	2	01/06/09	09/07/09	10/08/09	3399.0	13.5
BC-90-8-11	J24	2	01/06/09	23/07/09	10/08/09	4457.0	9.5
Esquimalt	J24	2	01/06/09	13/07/09	10/08/09	4455.0	41.0
Glen Ample	J24	2	28/05/09	09/07/09	13/08/09	4967.0	16.5

Table 12 SCRI Polytunnel site J25 – Yield and season data in 2009 (Second fruiting year)

Selection	Field Expt	Rep	First Flower	First Fruit	Last Pick	Yield/Stool (g)	Mean Fruit / lateral
9628E-3	J25	1	28/05/09	09/07/09	10/08/09	3339.0	22.0
Glen Fyne	J25	1	25/05/09	06/07/09	13/08/09	4482.0	19.5
Glen Fyne	J25	1	25/05/09	06/07/09	13/08/09	3983.0	22.0
0304E3	J25	1	05/06/09	09/07/09	10/08/09	2592.0	17.0
0297E6	J25	1	25/05/09	06/07/09	06/08/09	1706.0	13.0
0296C-4	J25	1	25/05/09	06/07/09	06/08/09	2643.0	17.0
0304F6	J25	1	05/06/09	09/07/09	13/08/09	3815.0	11.0
9025A1	J25	1	05/06/09	13/07/09	10/08/09	3274.0	28.5
9350F3	J25	1	28/05/09	09/07/09	10/08/09	3760.0	15.0
9764F-3	J25	1	25/05/09	13/07/09	10/08/09	2128.0	10.0
99111B2	J25	1	25/05/09	06/07/09	30/07/09	1777.0	10.0
Malling Minerva	J25	1	25/05/09	06/07/09	30/07/09	1631.0	28.0

Selection	Field Expt	Rep	First Flower	First Fruit	Last Pick	Yield/Stool (g)	Mean Fruit / lateral
Octavia	J25	1	05/06/09	27/07/09	13/08/09	2179.0	29.0
Tulameen	J25	1	28/05/09	09/07/09	10/08/09	1787.0	14.5
9628E-3	J25	2	28/05/09	06/07/09	13/08/09	3524.0	24.0
Glen Fyne	J25	2	25/05/09	09/07/09	13/08/09	3331.0	18.0
0296C-4	J25	2	28/05/09	09/07/09	10/08/09	3187.0	20.0
0304F6	J25	2	05/06/09	13/07/09	13/08/09	4331.0	24.0
9025A1	J25	2	05/06/09	13/07/09	10/08/09	3793.0	18.0
9350F3	J25	2	28/05/09	09/07/09	10/08/09	3327.0	32.5
9451D4	J25	2	05/06/09	20/07/09	13/08/09	2968.0	23.0
9764F-3	J25	2	28/05/09	09/07/09	13/08/09	4481.0	19.5
99111A1	J25	2	25/05/09	06/07/09	03/08/09	4447.0	13.5
99111B2	J25	2	25/05/09	02/07/09	06/08/09	3356.0	14.5
Octavia	J25	2	05/06/09	20/07/09	13/08/09	2076.0	33.0
Tulameen	J25	2	25/05/09	06/07/09	03/08/09	1566.0	8.0

Table 13 SCRI Polytunnel site J26 – Yield and season data in 2009 (first fruiting year)

Selection	Field Expt	Rep	First Flower	First Fruit	Last Pick	Yield/Stool (g)	Mean Fruit / lateral
Glen Fyne	J26	1	25/05/09	06/07/09	10/08/09	5539.0	20.5
0039F-2	J26	1	25/05/09	02/07/09	06/08/09	2431	8.5
0341C1	J26	1	25/05/09	06/07/09	30/07/09	3603	15.0
0433D6	J26	1	25/05/09	02/07/09	27/07/09	3059	8.5
0433F2	J26	1	28/05/09	13/07/09	13/08/09	2619	15.0
0433F-4	J26	1	28/05/09	06/07/09	30/07/09	2865	8.5
0433H-2	J26	1	25/05/09	02/07/09	06/08/09	3360.0	8.5
0433H-3	J26	1	25/05/09	02/07/09	30/07/09	3728	11.5
0453C4	J26	1	25/05/09	29/06/09	27/07/09	3508.0	11.0
0453C5	J26	1	25/05/09	02/06/09	30/07/09	3496	10.5
0469G2	J26	1	25/05/09	02/07/09	03/08/09	3385.0	10.0
0491B5	J26	1	28/05/09	13/07/09	10/08/09	4661	9.5
0491G1	J26	1	01/06/09	13/07/09	13/08/09	3084	17.0
9025A1	J26	1	05/06/09	17/07/09	10/08/09	5134	17.0
Glen Doll	J26	1	08/06/09	17/07/09	10/08/09	970.0	16.5
9059C-1	J26	1	28/05/09	06/07/09	03/08/09	1554	8.5
9908B-1	J26	1	28/05/09	06/07/09	03/08/09	2622	10.0
9911C-1	J26	1	25/05/09	06/07/09	10/08/09	5532	20.5
Coho	J26	1	25/05/09	06/07/09	03/08/09	1068.0	7.5
Glen Lyon	J26	1	25/05/09	06/07/09	30/07/09	2755.0	8.0
Glen Ample	J26	1	28/05/09	06/07/09	10/08/09	3140	8.5
Octavia	J26	1	01/06/09	20/07/09	13/08/09	2121	18.5
Tulameen	J26	1	25/05/09	09/07/09	10/08/09	3061	10.5
0039F-2	J26	2	25/05/09	02/07/09	30/07/09	1711.0	7.5

Selection	Field Expt	Rep	First Flower	First Fruit	Last Pick	Yield/Stool (g)	Mean Fruit / lateral
0341C1	J26	2	19/05/09	02/07/09	03/08/09	3760	15.0
0433D6	J26	2	28/05/09	02/07/09	10/08/09	3739	8.5
0433F2	J26	2	28/05/09	06/07/09	30/07/09	1208.0	8.5
0433F-4	J26	2	25/05/09	06/07/09	10/08/09	2734.0	10.5
0433H-2	J26	2	25/05/09	02/07/09	03/08/09	2617.0	12.0
0433H-3	J26	2	25/05/09	02/07/09	06/08/09	3528.0	10.5
0453C4	J26	2	25/05/09	02/07/09	27/07/09	2800.0	12.0
0453C5	J26	2	25/05/09	02/07/09	03/08/09	2893.0	9.0
0469G2	J26	2	19/05/09	02/07/09	13/07/09	1952.0	17.0
0491B5	J26	2	01/06/09	13/07/09	10/08/09	3978	11.0
0491G1	J26	2	01/06/09	06/07/09	13/08/09	4074.0	14.0
9025A1	J26	2	01/06/09	06/07/09	10/08/09	5080.0	22.5
Glen Doll	J26	2	01/06/09	13/07/09	10/08/09	3441.0	36.5
9059C-1	J26	2	25/05/09	02/07/09	03/08/09	2728.0	8.5
9059D-2	J26	2	25/05/09	06/07/09	10/08/09	3676	9.5
9908B-1	J26	2	25/05/09	02/07/09	13/07/09	2002.0	18.0
9911C-1	J26	2	25/05/09	06/07/09	10/08/09	5319	21.0
Glen Ample	J26	2	28/05/09	06/07/09	10/08/09	1399	17.5
Octavia	J26	2	01/06/09	13/07/09	13/08/09	2725.0	13.0
Tulameen	J26	2	25/05/09	06/07/09	06/08/09	1989	14.5
0493E-3	J26	4	28/05/09	06/07/09	03/08/09	1246.0	7.0

Table 14 SCRI plot J24: Mean yield 2009

Selection	Field Expt	Mean yield/stool (g)
Glen Ample	J24	4963
9762A1	J24	4878
9628E-3	J24	4836
BC-90-8-11	J24	4457
Esquimalt	J24	4203
8844L-3	J24	3962.5
9764F-3	J24	3686.5
9767RA3	J24	3453.5
9351B4	J24	3258.5
9769RD1	J24	3009
97134B1	J24	2601.5
9451D4	J24	2240

Table 15 SCRI plot J25: Mean yield 2009

Selection	Field Expt	Mean yield/stool (g)
99111A1	J25	4447
9025A1	J25	4137
Glen Fyne	J25	3932
0304F6	J25	3835
9628E-3	J25	3784
9350F3	J25	3776.5
9764F-3	J25	3724.5
9451D4	J25	2968
0296C-4	J25	2889.5
99111B2	J25	2767.5
0304E3	J25	2592
Octavia	J25	1942.5
Tulameen	J25	1709
0297E6	J25	1706
Malling Minerva	J25	1631

Table 16 SCRI plot J26: Mean yield 2009

Selection	Field Expt	Mean yield/stool (g)
Glen Fyne	J26	5539
9911C-1	J26	5333
9025A1	J26	4897.5
0491B5	J26	4210.5
0433H-3	J26	3901
0491G1	J26	3757.5
0341C1	J26	3718
9059D-2	J26	3676
0433D6	J26	3617.5
0453C5	J26	3502
Glen Doll	J26	3441
0453C4	J26	3434
0469G2	J26	3223
0433H-2	J26	3112.5
Glen Ample	J26	2934
Tulameen	J26	2893
9908B-1	J26	2881
0433F-4	J26	2810
Glen Lyon	J26	2755
Octavia	J26	2673.5
9059C-1	J26	2579.5
0039F-2	J26	2525
0433F2	J26	1932.5
0493E-3	J26	1246
Coho	J26	1068

Table 17 SCRI Polytunnel site J24. Summary of arbitrary scores and comments (ranked highest to lowest)

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
9764F-3	2	8.2	5.9	8.3	6	6.6	5	6	8	6.6	4.3	5.3	large + attractive in a punnet, floral + sweet but little juice
9628E-3	1	10.6	5.9	8.5	6.5	5.5	4	6.5	6	6	5	5	big prominent drupes, pleasant flavour, consistent size + flavour
9351B4	2	9.4	4.6	9	6.5	5	4.5	5.7	8	7	4.5	5	floral + sweet but dry in the mouth, attractive in a punnet,
9767RA3	1	8.1	5.2	9	6.2	5.5	5	5.3	8	6.2	4.7	4.7	variable size + shape, firm + meaty, flavour improved mid-pick, bright + attractive in punnet
9351B4	1	9.8	4.1	9	6	5.5	5	6	8.5	6	4.5	4.5	variable flavour, small + blotchy
Glen Ample	1	9.3	5.8	8.5	6	5	5	6	4.5	5	6	4.5	big drupes, torn collars, meaty, sweet + good flavour
BC-90-8-11	2	9.7	5.8	9	3.5	6.5	4	5.7	8.5	6	4.5	4.5	enormous fruit, looks great in punnet, acid early season, improving mid-pick, some mildew on fruit
9769RD1	1	9.7	4.8	8.6	5.6	4.6	5	5.5	8	6.6	3.6	4.3	attractive but dark, slightly blotchy, bland
Glen Ample	2	8.8	5.7	8.3	5.3	6	5	6	6	5.6	4.3	4.3	large + meaty but slightly rough, poor flavour for ample - sharp
9767RA3	2	9.8	5.6	9	6	5.3	5.6	6	8	6.6	4.6	4.3	attractive, prominent drupes with a slight crease, ~large 9451D4
97101D4	1		0.0	6	4	5	5	4.7	6	5	6	4	slightly rough, good flavour, juicy
8844L-3	1	9.7	5.2	9	6	6.5	6.5	5.5	8	5	5	4	bleeding in punnet, high drupe number, flavour ~sweet rhubarb,
9764F-3	1	9.1	5.9	8	7	6	5	6.5	7	5	6	4	large firm + meaty, drupes have a crease

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
9451D4	1	7.7	4.5	9	4.5	4.5	6	6	8	7	3.5	4	like dark Doll, small but meaty, little juice, bland
9717RB1	2	10.0	6.9	8	7	5	5	5	7	7	5	4	rough and shiney, very firm, meaty, pleasant flavour
8844L-3	2	10.0	5.4	8.3	6	6.3	6	5	7.6	6.6	4	4	attractive + glossy but too dark, v sweet but little aroma + no acidity
Esquimalt	2	9.2	5.8	7.3	5.3	5.6	4.6	5.5	6.3	5.6	5	3.6	uneven drupes, like a rough ample, aromatic + sweet early season
97134B1	1	10.0	4.5	7.6	5.3	6.6	Y	5	6	4	4.3	3.3	yellow selection, good flavour + quality early season, but deteriorated mid-late season becoming blotchy, unattractive + acidic
9763F-1	1		5.6	6	3	4	5	5.7	7	6	5	3	rough, dull, ugly, many aphid casts, dry, sweet, poor quality
Esquimalt	1	8.7	4.3	7	6	6	5	6	7	5	4	3	like Ample, blotchy
97134B1	2	8.1	4.9	7.6	4.6	7	Y	5.7	6	4.3	3.6	3	yellow selection, good flavour early season but lumpy, blotchy + acid mid-late season
9762A1	1	10.0	4.1	9	4	4	5	5.7	8.5	4	3.5	2.5	dull bloom ~Prosen, square collar, sharp

Table 18 SCRI Poly tunnel site J25. Summary of arbitrary scores and comments (ranked highest to lowest)

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0304F6	2	9.4	5.6	9	5.6	5.6	3.4	7	7.6	5.6	6.6	6.6	large pale meaty bright fruit, strong sweet flavour with an acid edge, long but strong laterals, great display,
Glen Fyne	1	9.9	5.2	8.8	6.2	6	5	7	7	5.8	6.4	6.4	large and meaty, very sweet raspberry flavour, primocane in way of picking at end
Glen Fyne	1	11.2	5.0	8.5	6.3	5.6	5	6.5	7.6	6	6	6	large fruit all season, v sweet + aromatic, juicy, bright, long season
0304E3	1	10.2	6.6	8.8	6.4	6.4	3	6.5	7.6	6	5.8	6	large meaty fruit, bright, pale and sweet, good raspberry flavour with acid edge
Glen Fyne	1	10.5	5.1	8.8	6.3	5.8	5	6.5	7.1	5.3	6.1	5.8	large shiny fruit, great flavour, prominent drupes
9350F3	2	9.2	4.6	9	6.2	7	4	5.5	8	6.4	5	5.8	sweet + floral flavour - very pleasant, attractive, conical fruit, excellent display, shorter neat laterals,
Glen Fyne	1	10.4	4.7	8.3	6.1	5.6	5	6.5	7	5.6	6	5.6	early fruit slightly rough, good flavour all season
9350F3	1	9.1	4.9	8.6	6.2	7.2	4.8	5.5	7.2	6.4	5.4	5.6	sweet but mild flavour, attractive conical fruit, great display, smaller fruit at end of season
0304F6	1	10.1	5.3	8.6	5.4	5	3.4	6	7.8	7	6	5.6	large, meaty, pale, attractive, sweet flavour with a sharpness, juicy
9628E-3	2	9.7	5.3	8.8	6.6	6	4	6	8.3	6.6	4.6	5.3	good strong raspberry flavour + sweet later in season, very bright, attractive, meaty,
9764F-3	2	10.0	6.1	9	7	6.6	5.2	6	7.6	7	4.6	5.2	large fruit all season, conical, sweet but little juice, slightly blotchy
9764F-3	1	8.5	4.8	8	6.2	6	5	6	7.8	6.6	4.2	5	meaty, large, conical, attractive, not much juice, good habit
9628E-3	1	10.7	5.2	8.7	7	5.2	5	6	6.7	6.5	4.5	5	prominent drupes - with dimple, hairy, generally nice flavour, good habit + display

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0296C-4	1	10.6	4.7	8.6	5.6	6.8	4.4	6.5	7.8	5.8	4.8	4.8	early fruit poor quality and flavour but both improved quickly to good flavour and attractive fruit with neat drupes, looks good in a punnet, good display for picking
0296C-4	2	11.8	4.5	8.8	5.4	6.2	4.2	6	7.2	5.6	5.2	4.8	hairy, conical + pretty ~ Malling Minerva, good flavour - slightly rhubarb, attractive in punnet, root rot in plant 5?
Glen Fyne	2	11.0	4.6	8.6	5.8	6	5.2	6.5	7.4	6	5.8	4.6	juicy + sweet, rough fruit on plant 5, root rot in plot
Octavia	1	9.7	6.0	7.6	5.3	5	4.6	5	5	5.6	4.3	4.3	v large fruit, early fruit acid but improved mid-pick, big fruit until september
Octavia	2	8.9	5.7	7.6	4	5.6	4.3	6	6	6	4.6	4.3	first fruit crumbly, large, meaty, nice flavour later in season
9451D4	2	11.6	5.0	9	4.5	4.7	6	6	8.5	8	4	4.2	small but meaty, round + attractive, firm, dark, chewy, sweet but mild, very pubescent canes
9025A1	1	9.7	4.3	8.8	6.8	5	6.2	7	6.8	6.4	2.6	4	excellent habit and display, neat, attractive fruit, green pea flavour - no fruit flavour! Dark, uneven ripening at end
99111A1	2	8.1	4.3	8.8	3.6	5.4	4.6	5.5	8	5.8	3.8	3.8	small, dull, hairy, acid but some aroma, ripening problem on collar at end of season, this selection performs better in an outside plot
Tulameen	2	11.9	5.2	7.6	6.4	6.4	5.2	5	6.8	4.2	5.8	3.8	very lumpy fruit, very poor quality for most of season, soft, bleeding, lovely sweet strong flavour but odd aftertaste
99111B2	1	9.4	5.1	8.8	5	5.8	5.6	7	7.2	5.8	3.4	3.6	dark prominent drupes, acid but raspberry flavour, slightly soft mid-season, less productive than last year

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
99111B2	2	9.0	5.6	8.3	4.1	6.5	5.5	7	6.8	6	2.6	3.6	dark + dull, prominent drupes, very acid all season, torn collar
9025A1	2	8.3	4.2	8.8	7.4	4.6	5.8	7	8	6.2	2.6	3.6	awful green flavour - like garden peas! very firm, uneven ripening at end of season, superb display + habit
Tulameen	1	13.4	4.8	5.8	7	6.4	5.2	5.5	5.4	4.8	6.4	3.5	poor quality - rough fruit all season, very sweet and strong flavour, soft
Malling Minerva	1	9.9	4.0	8.6	3.8	7.4	6	7	8.4	6	3.6	3.4	dull, dark, dry, hairy fruit, attractive conical shape, slight bloom, odd flavour, root rot in plot
0297E6	1	8.5	5.1	7.2	6.2	5.2	4.7	5.5	5.5	6.2	3.5	2.5	slightly rough all season, variable flavour, blotchy, cut down next year

Table 19 SCRI Polytunnel site J26. Summary of arbitrary scores and comments (ranked highest to lowest)

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0453C4	1	11.1	4.5	9	6.8	5.6	4.6	6	8.4	6.4	5.8	6.4	very early, glossy, firm, great sweet flavour all season, good habit, upright primocane, slightly small
Glen Doll	2	10.7	4.4	9	5.6	5.3	5	6.5	8.6	6.6	6	6.3	fruit size okay for Glen Doll, great fruit quality + flavour, very attractive in a punnet
Glen Fyne	2	11.3	5.4	8.2	6.2	5.8	5	7	7.4	5.4	7	6	slight crumble, lovely sweet juicy raspberry flavour, large fruit, root rot symptoms in plot
Glen Doll	1	11.8	3.7	9	5.5	5.5	5	6	8.5	7	6	5.5	sweet + aromatic, neat + attractive, firm, short laterals
9911C-1	1	10.0	5.4	8.3	6.1	6.3	5	5.5	7.3	6.3	5.6	5.4	early, long season, solar damage on early fruit, long laterals, very sweet all season, slightly rough
0453C4	2	10.2	4.3	8.8	6.2	5.6	4.6	7	8	6.2	5.4	5.4	great flavour - floral + sweet, great display, very attractive in punnet, small at end of season
0453C5	2	10.8	4.6	8.8	6.4	5.4	5	6	7.6	5.6	6.2	5.4	very early, great display of fruit for picking, bright + attractive in a punnet, floral + sweet flavour all season
0433H-3	2	8.3	4.5	8.3	5	5.6	4.6	6	7.5	6.8	5.5	5.3	early season, firm, sweet + floral - consistent flavour, slightly dull, smaller size at end of season
0433F2	1	9.4	5.4	8.5	6.2	7	4.7	6	6.5	4.5	5.7	5.2	looks a lot like Tulameen, conical + glossy, very sweet + aromatic, juicy but slightly soft
0491G1	2	9.4	5.7	8.4	6.8	5.8	4	4	7.4	5.4	4.8	5.2	stunning large pale fruit, meaty, juicy pleasant flavour - sometimes sharp, short, weak petioles make it difficult to pick

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0433H-2	2	10.1	4.6	9	4	5.8	4.8	6	7.6	6.8	5.2	5.2	early, attractive but slightly dull, sweet but mild flavour, variable size
0453C5	1	8.5	4.1	9	6.3	5.1	5	6.5	8.1	6	4.1	4.8	glossy + attractive but small, very firm, nice flavour - not as nice as C4, great display
0433H-3	1	9.3	4.9	8.8	5	6	5	6.5	8.1	7	4.6	4.8	early, sweet, floral + fruity all season, slightly dull but nice in the punnet, slight roughness due to low drupe number, pubescent canes
0433H-2	1	8.6	4.2	8.8	4.1	5.6	4.3	5.5	7.8	6.5	4.8	4.6	variable flavour, juicy, slightly ginger, slightly dull, long strong laterals
0433F-4	1	9.1	4.1	9	5.2	6.2	3.8	6.5	8.2	5.8	5.2	4.6	sweet, floral and juicy, conical, bright + attractive but powdery mildew infection at end, weak petioles
0491G1	1	8.8	5.1	8.2	6.6	6.2	4.2	4	6.6	5.4	4.8	4.6	yellowing florican leaves before fruiting, clustered fruit due to short petioles, large, bright, variable flavour but generally sweet, looks great in a punnet - great colour
9059D-2	2	9.5	5.8	7.5	5.8	5.6	3.6	6.5	6.6	6.5	5.5	4.6	2/5 plants all crumbly, whole fruit bright, firm + pale, great flavour - sweet + fruity, too unstable, parent only
9911C-1	2	10.0	5.2	8.5	6.6	5.8	5	5.5	7.1	6.6	5	4.6	early, large fruit with prominent drupes, slightly rough at beginning of season, floral and sweet flavour all season
9025A1	2	10.1	4.7	9	7.2	5	5.8	7	8	6.8	3.6	4.6	superb plant habit, huge yield, easy to pick, awful grassy flavour, uneven ripening near end of season - processing only
0039F-2	1	8.7	4.7	8.8	7.1	6.5	2	6.5	8.6	5	4	4.5	very bright 'orange' coloured fruit, eye-catching, floral flavour with some sharpness, variable firmness, very poor trailing primocane, parent

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
													only
Octavia	1	10.6	5.1	8.3	4.6	5.3	4.3	5	6.6	6.3	4.6	4.3	fruit clustered on very short petioles, sharp but nice aroma, large fruit, some mildew on primocane
0491B5	1	8.4	4.2	8.8	6.6	5.4	5.2	6	7.2	6.6	3.6	4	good lateral display but fruit clustered, good quality but flavour nothing special
0433F2	2	11.2	4.6	7.7	6	5.7	4.7	6	6	4	4.8	4	Stunning bright conical fruit – like Tulameen with a lovely flavour, slightly soft
Tulameen	1	11.1	4.9	6.2	7	7	5.2	6	5.4	5	6.4	4	variable establishment, 4 out of 5 plants with very poor quality - rough + crumbly, bleeding in punnet, superb flavour
0341C1	2	9.0	3.4	9	5.1	4.1	5.1	6.5	8.8	5.5	4.3	4	early season, superb flavour - like Tulameen, but flavour drops in second half of season, looks beautiful in a punnet but fruit too small
0433F-4	2	10.0	3.9	8.5	5.1	6	4	4.5	7.8	5.5	5.3	4	attractive fruit - looks like Tulameen, sweet floral flavour - v aromatic, great display, variable firmness - may be too soft
Octavia	2	9.1	5.8	8.3	5	5.3	4	6	6.6	4.6	4	4	slightly soft this season, variable flavour - rhubarb, but juicy
0039F-2	2	8.9	4.8	9	7.2	6.6	2	6	8.2	4.6	3.6	4	very bright, pale orange colour, very eye-catching, juicy but odd flavour, v poor plant habit - parent only
EM6396/46	2	11.9	4.9	8.5	5.5	5.5	4.5	6	8.5	6.5	4	4	badly infested with potato aphids - many casts on fruit and plant, v firm but no juice
Nootka	1	14.9	2.9	5	4	4	7	4	6	3	8	4	v sweet, fruity and aromatic flavour - best of the season, many crumbly, colour dark + purple

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0433D6	1	9.9	4.8	8.6	4.3	6.5	4.8	6.5	7.6	6.8	4.6	3.8	very early, good flavour mid-late season but little juice, conical fruit attractive in punnet, slightly dull + blotchy
9059C-1	2	9.2	5.3	8.8	5.4	5.2	4.6	6	7.8	5.4	3.8	3.8	early, good flavour but sharp, looks good in a punnet but blotchy at end of season
0341C1	1	8.4	3.4	9	5.4	4.4	4.6	7	8.8	5.8	4	3.7	good display, fruit very pretty ~ 96734 but far too small, bland, discard in 2010
0433D6	2	10.3	4.4	8.7	4	6	4.5	5.5	7.5	6.5	4.5	3.7	very early, looks like small Tulameen, slightly dull, sweet but mild, good display, mildew at end of season
Coho	1	12.1	5.0	8.2	5	6.2	5.5	6	6.5	6	6.2	3.7	superb flavour, v aromatic = sweet, murly rough fruit, dark, unattractive
9025A1	1	8.8	4.3	8.6	7.3	5.3	5.6	8	7.6	6	3	3.6	great fruit quality but too small + flavour too poor for fresh, grassy flavour, chewy
9059C-1	1	10.4	5.3	8.4	4.6	5	4.2	6.5	6.8	5.8	3.8	3.6	juicy but tart, pale + dull ~Moy, performs better outside
Glen Ample	2	9.1	6.1	7.8	6	5	5	4	5.3	6	3.8	3.6	very poor example of Ample, sparse plants, short laterals, short petioles, small leaves, v difficult pick - drupes stuck to plug, acid
Tulameen	2	11.9	4.8	7.4	7	6.4	5.2	5.5	6	4.4	5.8	3.6	rough and bleeding in punnet, most fruit rough, v sweet + aromatic but odd aftertaste, plant 3 not bad quality
Glen Lyon	1	9.3	4.7	8.6	5.2	5	4.8	6	7.8	5.8	3.6	3.6	early, great display, nice quality for Lyon but acidic, variable firmness late season
0491B5	2	8.9	4.8	8	6.5	5.5	5.5	5	6.7	5.7	3.5	3.5	late season, great display but uneven ripening at beginning of pick, slightly rough, mishappen collar, blotchy, seedy, peardrop flavour

Selection	Rep	Mean Brix (%)	Mean Fruit size (g)	Fruit set	Brightness	Fruit shape	Fruit colour	Pick	Collar	Firm	Flavour	Overall score	Notes
0469G2	1	8.4	4.3	8	5.3	6	3.3	6.5	7.5	6.5	3.3	3.1	early, very eye-catching colour, early fruit acid - improving mid-late season
Glen Ample	1	7.9	5.0	7.1	5.8	5.1	5	5	5.6	5.6	3.8	3.1	poor plants - very short laterals, rough + lumpy fruit, poor flavour for ample
0493E-3	1	9.2	4.2	8.6	3.4	4.2	4.4	5.5	7.8	6	3.8	3	looks ~Prosen, white collar, dull, acid, no juice, small, unattractive, very short laterals
9908B-1	1	8.8	4.8	9	5	5.4	5.6	5.5	6.4	7	3.4	2.8	dark, dull, poor flavour, mildew on florican leaves early on and on fruit later in season, discard for 2010
0337B2	1	9.6	6.2	6.3	4.3	4.3	5.3	5	6	5.6	3.6	2.6	all fruit very rough, tearing collar, some aroma but acid, blotchy, discard 2010
9908B-1	2	8.9	0.0	8.7	4.5	5	5.5	6	6.2	6.5	3.5	2.5	mildew on fruit early in season, dark, rough, blotchy, sweetness but no flavour, discard
0493E-3	2	8.7	5.4	8	3.3	5	3.6	7	8	7	3	2.3	small, dull, white bloom around collar ~Prosen, hairy, acid, good display
0469G2	2	7.6	4.0	9	5.3	7	2.6	6	7.3	7.3	2.3	2.2	pale orange-colour, dull, blotchy - unattractive, long laterals drooping, yellowing florican leaves - root rot?
0337B2	2	10.5	6.1	7	4	5	4.6	5	6.3	7.3	2.6	2	rough, dull, blotchy fruit all season, stopped picking, discard 2010
9059D-2	1		0.0		4						7	1	all plants crumbly, great flavour, very long laterals

Table 20 SCRI Machine harvest plot, machine pick evaluation data 2009

Selection	Row	First pick	Brix %	Firm	Bright	Red/Purple	Flavour	Overall Score	Notes
9701A1	3	21/07/09	10.1	5	4	3	6	5	good flavour, very pale
9703RH-3	4	28/07/09	9.9	5	6	6	5	5	good quality fruit but low yield,very slight bleeding, nice flavour
9451D4	5	21/07/09	10.4	6	3	6	4	6	very good clean dry pick, meaty, many IQF*
9050RD3	6	21/07/09	10.8	3.5	6	5.5	5.5	3.5	soft + bleeding in tray, poor quality, variable size + shape, lovely sweet flavour
99111A1	7	17/07/09	9.7	4	4	4	4	6	slight beetle damage, but clean and dry, uniform pick, slightly watery flavour, best MH 2009
99105B7	8	17/07/09	10.3	4.5	3.5	5.5	5.5	5	dark, dry, dull, prominent drupes, uniform, aromatic and sweet, some beetle damage
9673E4	9	21/07/09	11.2	5.5	6	4	4	6	clean and dry, bright, attractive, nice pick, flavour only improved later in season
9025A1	10	21/07/09	9.6	3.5	5	6.5	3.5	3	good quality at beginning of season, becoming soft + bleeding in tray with variable size, some beetle damage,
99111B2	12	28/07/09	9.2	4	4	6	4	4	prominent drupes, slight windrub, large fruit
Glen Ample	15	21/07/09	9.8	4	4	5	4	3	rough, crumbly, bleeding, poor quality, blotchy, floral but generally poor flavour
9612F2	17	21/07/09	11.1	5	5	5	5	4	some crumble and windrub, meaty, pleasant flavour, some beetle damage
NZ9131RJA7	18	21/07/09	11.4	5	3	6.5	5.5	2	dark, sweet and floral, many mummified later in season, very dull bloom/mildew

*Individual Quick Frozen: high quality fruit suitable for freezing

Table 21 SCRI machine harvest plot L26: machine pick data

Selection	Row	Row length (m)	Primo height (m)	Yield (g)	Yield/m (g)	Mean fruit size (g)	IQF*	Pulp	Under Ripe	Stalk + Ripe	Diseased
9701A1	3	13.9	1.4	7320	526.6	2.9	3.1%	88.7%	2.1%	1.8%	4.3%
9703RH-3	4	10.2	1.8	2998	293.9	2.4	3.6%	92.2%	0.6%	0.9%	2.7%
9451D4	5	17.4	1	14886	855.5	2.5	6.2%	80.2%	4.8%	6.1%	2.7%
9050RD3	6	17.7	1.3	7518	424.7	3.0	3.7%	79.6%	3.9%	9.6%	3.2%
99111A1	7	19.2	1.3	22152	1153.8	3.2	10.4%	83.7%	0.8%	2.7%	2.4%
99105B7	8	18.7	0.9	14396	769.8	2.3	2.9%	92.2%	0.8%	2.8%	1.3%
9673E4	9	18.7	1.1	9582	512.4	2.4	14.1%	79.9%	1.8%	2.1%	2.1%
9025A1	10	17.8	1.1	22256	1250.3	2.6	1.6%	93.7%	0.0%	1.9%	2.8%
99111B2	12	18.1	1.4	5856	323.5	3.2	8.8%	84.6%	1.6%	3.4%	1.6%
Glen Ample	15	18.8	0.9	9080	483.0	2.1	0.9%	91.5%	2.9%	1.5%	3.2%
9612F2	17	12.3	1.3	8284	673.5	3.9	3.4%	88.7%	1.0%	3.9%	3.0%
NZ9131RJA7	18	18.5	0.9	10152	548.8	2.4	1.0%	92.2%	2.1%	1.4%	3.3%

Individual Quick Frozen: high quality fruit suitable for freezing

Table 22 Distribution of on-farm trial plants 2005/06

Customer	Triallist	Trialling & Testing	9612F2	99111B2	9455F-2	9451D4	9751E-2	99111A1	00123A7	Delivery
Hargreaves	Jane Fairlie, Hargreaves Plants Ltd, Cowpers Gate, Long Sutton, PE12 9BS	243.05	25	25	25					June 2005
		250			12	50	50	50		Autumn 2005
KG	Peter Bevan, KG Fruits Ltd, Tatlingbury Oast, Five Oak Green, Tonbridge, Kent, TN12 6RG	244.05	15	15	15					June 2005
		251				50	50	50		Autumn 2005
Berryworld	Paul Harold, Sunclose Farm, Butt Lane, Milton, Cambridge, CB4 6DQ	245.05	20	20	20					June 2005
	Peter Vinson, E Vinson Ltd, Ewell Farm, Graveney Road, Faversham, Kent, ME13 8UP	246.05	20	20	20					June 2005
		255				20	20			Autumn 2005
	Harry Hall, Hall Hunter Partnership, Heathlands Farm, Honey Hill, Wokingham, Berks	252				30	30			Autumn 2005
Trade Solutions	Peter Marshall, Peter Marshall & Co, Muirton of Alyth, Alyth, PH11 8JF	247.05	12	110	25					June 2005
	Michael Thomson, East Gormack, Blairgowrie, PH12 8UL	253		150		50	50	150		Autumn 2005
Summerfruit Company	Charles Atkins, Amery Court Farm, Chapel Lane, Blean, Canterbury,	249			38	50	50			Autumn 2005
ASF	Lochy Porter, Angus Soft Fruit Ltd, East Seaton, Arbroath, DD11 5SD	254			38	50	50	50		Autumn 2005
		278.06							38	May 2006

*dropped from on-farm trials November 2005

Table 23 Distribution of on-farm trial plants 2007

Customer	Triallist	00123A7	9764F-3	0019E2	9911C-1	9628E-3	97134B1	0485K-1	Delivery
Hargreaves	Jane Fairlie, Hargreaves Plants Ltd, Cowpers Gate, Long Sutton, PE12 9BS	150	50						Spring 2007
				100	65	100			Autumn 2008
KG	Jon Regan, Hugh Lowe Farms Ltd, Europa Nurseries, Ashes Lane, Hadlow, Kent TN11 9QU	150	50						Spring 2007
BerryWorld	Peter Vinson, E Vinson Ltd, Ewell Farm, Graveney Road, Faversham, Kent, ME13 8UP		10	20		20			Spring 2007
	Harry Hall, Hall Hunter Partnership, Heathlands Farm, Honey Hill, Wokingham, Berks					50			Autumn 2008
	Paul Harold, Sunclose Farm, Butt Lane, Milton, Cambs CB24 6DQ			80	80				
Trade Solutions	Michael Thomson, East Gormack, Blairgowrie, PH12 8UL	175	50						Spring 2007
				100	100	100			Autumn 2008
Summerfruit Company	Tim Morton, Gaskains Ltd, Norham Farm, Selling, Faversham, ME139RL		50	100	100				Autumn 2007
		100				100	10	10	Autumn 2008
ASF	Lochy Porter, Angus Soft Fruit Ltd, East Seaton, Arbroath, DD11 5SD	62	50						Spring 2007
		70		100	65	100			Autumn 2008

Table 24 Summary of triallist results

Triallist*	Selection	Control Variety	Yield			Fruit size			Appearance			Flavour			Firmness			Fruit rot			Root rot			Cane disease			Compare with control			Plant more?	Comments				
			Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse						
A	0019E-2	Ample																																	
B	0019E-2	Ample /Tula.	x			x			x			x			x			x			x			x					yes		High yield, good flavour and cohesion, nice size fruits, good colour				
A	9628E-3	Ample	x			x			x			x			x			x			x			x											
B	9628E-3	Ample /Tula.	x				x			x			x			x			x					x			no		Fruit size - too small. Yield - 2.5kg less in plot than control. Flavour - quite acidic - no balance or sweetness						
A	9751E2	Ample	x			x			x			x			x			x			x			x											
A	00123A7	Ample	x			x			x			x			x			x			x			x											
B	00123A7	Ample /Tula.	x				x			x			x			x			x				x												Undecided - smaller fruits than controls
D	00123A7	Glen Doll	x			x				x			x			x			x				x				maybe		Glen Doll in surrounding field not growing well, so picking of whole field stopped early						
A	9455F-2	Ample	x			x			x			x			x			x			x			x											
E	9455F-2	Octavia	x			x			x			x			x			x			x			x			yes		Meaty, large fruit with good shelf life and flavour. Observation since then supports this. Also have Glen Doll beside it. This variety is much better.						
E	9612F2	Octavia	x			x			x			x			x			x			x			x			no		We did measure yields in 2004. Quality and yield are good. Flavour not as good as 9455F-2. This year's return based on general observation.						

Triallist*	Selection	Control Variety	Yield			Fruit size			Appearance			Flavour			Firmness			Fruit rot			Root rot			Cane disease			Compare with control			Plant more?	Comments
			Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse	Better	Similar	Worse		
B	97134B1	none/ yellow	X			X	X		X	X		X	X	X	X		X				none								no	potential yield very high, but berry size very small. No other yellow florican type in trial at this time so no comparison	
A	9764F-3	Ample	X			X	X		X	X		X	X	X	X		X				X	X								Please note that Glen Doll control is not what would be expected. Canes very stunted, low yield and low vigour. Fruit shape - conical. Flavour score 2.6 out of 5. Appearance of fruit 3 out of 5. Fruit colour - dark red	
F	9764F-3	Glen Doll	X			X			X			X										X						no			
C	9764F-3	Ample	X			X	X		X	X		X	X	X	X		X					X						no			
A	99111A1	Ample	X			X	X		X	X		X	X	X	X		X				X	X									
E	99111B2	Octavia	X			X			X	X		X	X	X	X		X				X	X						no	No yield measurements were made. Yield and size adequate. Flavour is very sharp and not suitable for general variety		
A	9911C-1	Ample	X			X	X		X	X		X	X	X	X		X				X	X									

***Key to Triallists**

Triallist

- A Angus Soft Fruits
- B Hargreaves Plants Ltd
- C Edward Vinson Ltd, Berryworld Plus
- D Peter Thomson, KG Growers
- E Paul Harrold, Berryworld
- F Summerfruit Company

APPENDIX: 2

Photographs



Plate 1 SCRI Selection 0433F2



Plate 2 SCRI Selection 0453C4



Plate 3 SCRI cv. Glen Fyne



Plate 4 SCRI selection 9350F3



Plate 5 SCRI selection 9911C-1



Plate 6 SCRI selection 0019E2

