

Pear Evaluation Program Stage 2

Garry Langford
Apple & Pear Australia Limited (APAL)

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Author: Susanna Turpin¹, Ross Wall²,
Garry Langford³

¹TDI Select Fruits

²Fruit Scope

³Apple and Pear Australia Ltd

Research Provider: Apple and Pear Australia Limited

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**Horticulture Australia Project AP11031
Pear Breeding Program Stage 2**

Susanna Turpin
TDI Select Fruits
47 Kerferd Street
Tatura Victoria 3616
Tel: 0429 674 606
Fax: (03) 5824 1303
Email: tdiselect@bigpond.com

The National Pear Breeding Program commenced in 1993 and ceased in 2010. The program continued on solely as a Pear Evaluation Program from January 2011 to June 2013 and the results are reported herein.

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MEDIA SUMMARY

The commercial development of new pear varieties is one of the key strategies of Apple and Pear Australia Limited (APAL) to revitalise the Australian Pear Industry. This involved completion of productivity and quality evaluations of the first-generation selections from the National Pear Breeding Program (NPBP) and to identify those suitable for commercial evaluation.

The project also aimed to identify new selections from the 6,000 second generation seedlings and establish them onto rootstocks. These new pear selections will highlight the potential benefits of continuation of pear breeding and may help entice new investors into funding pear breeding with early and exclusive access to this material potentially included.

The program has a large range of red blushed pears with exceptional eating quality that are to follow the first two cultivar releases of ANP-0181 and ANP-0131. The intellectual property, distribution and marketing of both these cultivars are managed by Coregeo Australia. These pears offer the opportunity for Australian growers to produce a range of high quality red blushed pear varieties that can have a clearly defined marketing advantage internationally. These pear varieties have the potential to re-invigorate consumer interest in eating pears, attract new pear consumers and increase per capita consumption.

The new cultivar ANP-0131 trademarked “Deliza” is well suited to wide spread release to the Apple and Pear Industry due to its long term storage. It stores for up to 4 months cool store and 10 months under controlled atmosphere when picked at a flesh pressure of around 6kg. A recent consumer preference evaluation between ANP-0131 and Packham’s Triumph confirmed consumers’ willingness to pay a premium for ANP0131 and for most to purchase it in addition to other pear and apple cultivars.

The early selection ANP-0118 will take more skill by the grower to achieve a suitable product for market in terms of sufficient red blush coverage, and suitable tree ripened eating quality. This cultivar is ideally marketed immediately as a crisp, tree ripened pear due to its early ripening period prior to Williams Bon Chrétien (WBC) in early-mid January.

Management trials are now underway by the Victorian Department of Environment and Primary Industries (DEPI) to determine the combination of rootstocks, training systems and irrigation techniques that will maximise the precocity, yield and quality attributes of these new blushed cultivars. Grower trials have also been established overseas in Europe and the USA.

The Dr Jules Guyot x Corella selection ANP-0534 is the most recent pear to be recommended for commercial evaluation. It has shown consistent high quality and productivity attributes over the last three years. It has strong, bright red blush and when it ripens its skin shows a distinct background colour change from green to yellow taking the difficulty out of determining when a pear is properly softened to eat.

Another promising selection is the light green pear ANP-0506 which has an extremely long harvest range from mid Feb to early May. It is tree-ripened as a crisp pear or can be softened to a fine buttery texture with good aromatics when harvested and stored for the correct chilling time. It has potential as a “fresh-cut” product due to its negligible browning of the flesh.

Second generation crosses, many utilising ANP-0118 as a main parent, have been evaluated over the last three years and 41 new selections made. These selections include an apple-shaped selection ANP-1218 with bright red blush. The tree is extremely productive and sizes large fruit. The flesh texture is fine, melting with pleasant European pear aromatics. This selection has potential as a niche product to attract new pear consumers.

TECHNICAL SUMMARY

New varieties are needed to re-invigorate consumer interest in eating pears and attract new pear consumers by presenting a product that is visually attractive, tastes good and has a desirable texture. They are expected to attract a price premium based on previous uptake of the Corella pear cultivar. Higher returns will encourage growers to adopt these new varieties and increase investment in more intensive pear production systems to increase market share both domestically and overseas.

A major aim of the Pear Evaluation Project was to finalise productivity and quality evaluations of the first-generation selections from the NPBP, including determination of the harvest period that optimised eating quality and storage potential of each selection. Consumer dissatisfaction with the consistency of fruit quality, particularly the ripeness of pears has limited pear consumption compared to other fruits. The fruit pressure in association with the starch rating appeared to provide the most reliable indication of optimum harvest period for each selection.

Two pear selections are currently managed by Coregeo Australia. ANP-0118 will be principally marketed as a crisp, tree-ripened pear. It is ideally harvested from 4.5 to 6.5 kg, and if stored long term requires 8 to 10 weeks conditioning at low temperature to induce correct melting of the flesh, similar to Corella and Packham, otherwise it will not melt correctly and develop off flavours. Soluble solids can range from 11 to 16°brix. ANP-0131 can be stored under controlled atmosphere (CA) conditions for up to 10 months similar to Packham's Triumph. It is ideally harvested at 5 to 6.5 kg with a soluble solid range from 13 to 16°brix dependent upon the season. The starch index for both should be around 3 based on a scale of 1 (100% starch) to 6 (no starch). Both cultivars have typical blush coverage from 20 to 40% and up to 70% skin coverage dependent upon sun exposure.

ANP-0534 was recommended for commercial evaluation in 2011. It appears to have medium-term storage of several months and can be ripened within a month of storage either as a crisp eating pear or softened to a fine, melting texture. Under short storage it retains its green/red skin colour and upon softening shows a distinct change in skin color from green to yellow. Another promising selection is the light green pear ANP-0506 which has an extremely long harvest range from mid Feb to early May. It is tree-ripened as a crisp pear or can be softened to a fine buttery texture with good aromatics when harvested and stored for the correct chilling time. It has potential as a "fresh-cut" product due to its negligible browning of the flesh.

Most of the 95 selections from the Dr Jules Guyot x Rogue Red (and reciprocal) cross only have 1 to 2 months storage under air at 0°C but at least 10% of them have slightly longer storage. Around a quarter of the progeny have moderate resistance to pear scab. They also have exceptional aromatics and eating quality with fine, melting flesh and an attractive appearance that will appeal to consumers. There were two outstanding selections identified over the last three years for potential commercial evaluation. ANP-0632 is slightly resistant to both fruit and leaf scab, has a cold storage potential of 2 to 4 months, and consistently good appearance and eating quality. Productivity data is still limited but it appears to have a good sizing potential. The other selection ANP0911 was slightly resistant to both leaf and fruit scab in 2012 and 2013.

Forty one progeny were selected from the second generation seedling population over the past five years. A greater selection pressure was applied to the second generation seedlings such that a similar selection rate was achieved between the first and second generation seedlings populations of 0.6 and 0.7% respectively. Two crosses, ANP-0305 (Comice x BPM) x ANP-0420 (Guyot x Corella) and ANP-0131 (Corella x Comice) x ANP-0118 (BPM x Corella) had a selection rate greater than 5%.

INTRODUCTION

The development of new pear varieties is one of the key strategies of Apple and Pear Australia Limited (APAL) to revitalise the Australian Pear Industry. The National Pear Breeding Program has bred and assessed new pear varieties since 1993, and produced up to 60,000 seedling trees from over 200 different pear crosses. The program identified 358 elite pear selections from which two selections have progressed to commercial trials in Australia and overseas in 2009. The intellectual property, distribution and marketing of both these cultivars were assigned to Coregeo Australia in 2009. Coregeo Australia, a division of APAL, was formed in 2008 and currently manages Pink Lady® apple. In 2006 the program ceased crossing to concentrate resources on the evaluation of selections. There were 191 elite selections remaining in replicated trials in 2010 when DEPI, Victoria exited the program and APAL established a three year Pear Evaluation Project to firstly finalise recommendations from the 54,000 first generation seedling and secondly make new selections from the 6,000 second generation seedling population.

The program has a large range of red blushed pears with exceptional eating quality. Some have a soft melting flesh and others a more crisp texture. These new pears principally come from crosses between Dr Jules Guyot x Rogue Red (and reciprocal cross), and Dr Jules Guyot x Corella. The Dr Jules Guyot x Rogue Red (and reciprocal) crosses have soft melting flesh and strong aromatic flavours typical of traditional European pears, whilst the Dr Jules Guyot x Corella crosses can be eaten either crisp or softened. These two crosses have a proportion of seedlings with moderate pear scab resistance.

MATERIALS AND METHODS

Evaluation of seedlings and selections

A three step strategy developed in 2003/04 is used to identify desirable hybrids in seedling families that have begun to set fruit. The strategy includes visual selection in the orchard, followed by cold storage and then quality assessment after the fruit has fully ripened. This process is described in detail in Liu et al (2005).

Bud wood of selected trees is collected in late winter (August) and then grafted onto rootstock D6. Rootstocks are supplied by AusBuds Pty Ltd and are certified virus free. To propagate the trees, bench grafting using the whip-tongue technique is conducted in early spring (September). Trees are immediately planted in the tree nursery after grafting. The nursery is regularly watered and kept weed free by hand weeding and/or application of selective herbicides. The originally selected seedling trees are also maintained in the breeding orchard for at least two more seasons until the selections commence fruiting in replicated trials.

A minimum of four trees per selection are planted at the DEPI Tatura site in replicated trials. Propagated trees are grown for one year in a nursery and then transplanted into double staggered rows on an open Tatura trellis in early spring with a row x tree spacing of 3.5 m x 1.5 m. The trials are a randomised factorial design with selection and tree position (east or west) as treatment factors.

The firmness, sugar, seed colour and starch levels of selections are checked on 2 fruit prior to commencing fruit harvests. A polystyrene box (47 x 33cm x 18cm depth) of fruit is picked and fruit counted and weighed to determine average fruit weight of selections in each replicate. Selections are harvested on two to three picks dates based on the harvest maturity of both parents. Fruit quality and productivity is then assessed to determine the optimum harvest period. Due to low fruit sets in 2009-10 fruit was bulked between replicates for some selections and only one harvest date was possible. Harvest indices of fruit weight(g), height(mm), width(mm), firmness (kg), sugar (°brix), seed colour and starch level are initially measured on 1 to 5 fruit prior to 4-5 weeks cool storage at 0 to -1°C. The fruit from seedling trees and selections are evaluated on the same 1-7 likeness scales. Scores are given for fruit shape, colour and overall appearance, and fruit texture, flavour and overall eating experience. In 2008-09 and 2009-10 all selections were assessed but the later selections had to be sourced from the original seedling trees as they had not yet set fruit in replicated trials. Storage attributes: neck shrivel, scald, limb rub, internal browning and mealiness were rated on a 1-5 scale. Parent cultivars are assessed along with selections to act as controls.

Pear selection demonstration trial

A 0.75ha block of elite selections was established on BP1 rootstock in August 2009. There are from 33 to 165 trees each of individual selections at 1.5m x 3.5m tree spacing planted in 1 to 5 row blocks. Some of these selections were established on APFIP sites in 2010. This trial site can be used as a source of bud wood and more selections included or removed dependent upon their performance.

RESULTS









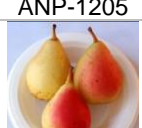

Identification of new selections

Forty one progeny were selected from the second generation seedling population over the past five years. A greater selection pressure was applied to the second generation seedlings such that a similar selection rate was achieved between the first and second generation seedlings populations of 0.6 and 0.7% respectively.

The top ten crosses with the highest percentage of current selections or potential selections are listed in table 1. Two crosses, ANP-0305 (Comice x BPM) x ANP-0420 (Guyot x Corella) and ANP-0131 (Corella x Comice) x ANP-0118 (BPM x Corella) have a selection rate greater than 5% based on current selections. In comparison, only the Guyot x Rogue Red (including its reciprocal cross) and the BPM x Corella cross had a selection rate greater than 4% in the first generation seedlings.

The majority of selections from the second generation seedling population were established on D6 rootstock in summer 2013 and will be planted into a replicated trial in winter 2013.

Table 1: Top 10 crosses in the second generation seedling population based on selection rate.

Cross	Harvest range	Number selections per cross	% select	Total number seedlings	Example of a selection
ANP-0305 (Comice x BPM) x ANP-0420 (Guyot x Corella)	16 Jan – 22 Feb	6	7.8	77	 ANP-1208
ANP-0131 (Corella x Comice) x ANP-0118 (BPM x Corella)	2 Jan – 3 Feb	3	5.2	58	 ANP-1211
Rogue Red x ANP-0420 (Guyot x Corella)	25 Jan – 11 Feb	4	4.5	89	 ANP-1118
Corella x ANP-0411 (Comice x BPM)	Mid Jan	1	3.2	31	 ANP-1201
Precoce di Fiorano x ANP-0118 (BPM x Corella)	25 – 31 Dec	3	2.3	128	 ANP-1001
ANP-0118 (BPM x Corella) x ANP-0112 (Corella x Packham)	28 Jan – 22 Feb	7	2.2	316	 ANP-1213
Precoce di Fiorano X ANP-0309 (BPM x Corella)	Late Dec – early Jan	1	1.4	70	 ANP-1301
Corella x ANP-0423 (US 56112-146 x Packham)	Late Jan – mid Feb	3	1.0	304	 ANP-1205
Howell X ANP-0422 (Guyot x Hood)	Late Dec – late Feb	1	0.3	300	 ANP-1217
Comice x ANP-0422 (Guyot x Hood)	Early Jan – mid Feb	1	0.3	318	 ANP-1108
Total Population (45 crosses)		41	0.7	6,111	

Evaluation of current selections

Scab resistance

Scab levels were initially low in spring in the assessment blocks and increased as the season progressed in 2012. The selections were evaluated for field infection of pear scab in the fruit and leaves at harvest and late March respectively based on a 1 to 9 scale where resistant selections were rated from 1 to 4 and susceptible selections were rated from 5 to 9. Only 22% of the Guyot x Rogue Red (and reciprocal cross) selections had resistance to both leaf and fruit scab which are listed in Table 2 (Full list in Appendix 6). As selections were evaluated by natural infection in the field these ratings are expected to be a minimum and some may fall into the susceptible category when exposed to greater scab infection pressure. For example ANP-0632 had a leaf infection rating of 4 in 2012 but its leaf scab infection has previously been reported as 5 in 2006. In general there was a higher level of infection in the leaves than in the fruit.

Table 2: List of Dr Jules Guyot x Rogue Red (and reciprocal cross) selections that had slight resistance to both leaf and fruit scab in season Mar 2012 and Nov 2013.

Selection	Location	Female	Male	Leaf Scab ^a	Fruit Scab ^a	Leaf Scab ^a	Fruit Scab ^a
				2012		2013	
ANP-1006	I-01-65	Dr Jules Guyot	Rogue Red	4		2	3
ANP-0624	I-08-69	Dr Jules Guyot	Rogue Red	3	4	2	3
ANP-1011	I-09-82	Dr Jules Guyot	Rogue Red	3		2	5
ANP-0715	I-10-13	Dr Jules Guyot	Rogue Red	3	3	3	3
ANP-0716	I-10-28	Dr Jules Guyot	Rogue Red	3	2	3	3
ANP-0911	I-14-22	Dr Jules Guyot	Rogue Red	4	4	3	3
ANP-0629	I-15-02	Dr Jules Guyot	Rogue Red	3?	3		
ANP-0632	I-16-58	Dr Jules Guyot	Rogue Red	4	3	3	3
ANP-0543	I-18-12	Dr Jules Guyot	Rogue Red		2	2	5
ANP-0934	I-49-52	Rogue Red	Dr Jules Guyot	4		2	1
ANP-0721	K-19-21	Rogue Red	Dr Jules Guyot	3?	2	2	4
ANP-0643	K-19-46	Rogue Red	Dr Jules Guyot	2?	3	2	2
ANP-0644	K-19-77	Dr Jules Guyot	Rogue Red	4?	3	2	3
ANP-0940	K-20-91	Rogue Red	Dr Jules Guyot	2?	3	2	1
ANP-0646	K-21-19	Dr Jules Guyot	Rogue Red	4	3	2	6
ANP-0963	K-21-22	Dr Jules Guyot	Rogue Red	2?	3	2	6
ANP-0647	K-21-70	Dr Jules Guyot	Rogue Red	4	3	3	3
ANP-0724	K-22-31	Dr Jules Guyot	Rogue Red	4	4	2	7
ANP-1034	K-22-63	Dr Jules Guyot	Rogue Red	4	3	3	6
ANP-0650	K-23-05	Dr Jules Guyot	Rogue Red		4		4
ANP-0651	K-23-20	Dr Jules Guyot	Rogue Red	4	3	3	5

1 = highly resistant (no visible symptoms); 2 = resistant (few small scab spots detectable on close scrutiny); 3 and 4 = slightly resistant (scab infection immediately apparent); 5 and 6 = slightly susceptible (infection widespread over tree); 7 and 8 = susceptible (multiple lesions per leaf/fruit or large surface covered by scab on most leaves/fruit); and 9 = highly susceptible (nearly all leaves/fruit black with scab, leaves eventually fall off).

A major aim of the storage and scab trials are to identify the superior selections amongst the Guyot x Rogue Red (and reciprocal cross) selections and the Guyot x Corella selections which have 95 and 27 progeny respectively currently under evaluation. All these selections have appearance and eating quality attributes suitable

for commercial release. When storage potential and scab resistance of the Guyot x Rogue Red (and reciprocal cross) selections are taken into account with the limited productivity data available there are two outstanding selections. ANP-0632 is slightly resistant to both fruit and leaf scab, has a cold storage potential of 2 to 4 months, and consistently good appearance and eating quality (Photo 1). Productivity data is still limited but it appears to have a good sizing potential with an average fruit weight range from 132 to 170g in its second year of cropping in replicated trials in 2012. The other selection is ANP-0911 which was slightly resistant to both leaf and fruit scab in 2012 and 2013 (Photo 2).



Photo 1: ANP-0632
(Dr Jules Guyot x Rogue Red)



Photo 2: ANP-0911
(Dr Jules Guyot x Rogue Red)

Quality and productivity

Postharvest indices of fruit firmness (kg), sugar ($^{\circ}$ brix), seed colour and starch level have been measured over the last four seasons and compared to appearance and eating quality traits of each of the progeny to develop harvest criteria (Table 3, Appendix 3). Note seed colour was not evaluated in 2012 because of its lower contribution to the determination of harvest period.

The flower and fruit density were also monitored and average fruit weight of harvested fruit measured to determine the most productive selections relative to the control cultivars Packham, Williams and Corella (Table 4, Appendix 4). The quality and productivity ratings and consistency scores are dependent upon the amount of data available for their calculation. Where selections are yet to fruit on replicated trials data is taken from the original seedling tree. The second-generation selections (i.e. selections in years 2011 [ANP-11--] or 2012 [ANP-12--]) have limited data collected at this stage, so although the quality and productivity ratings are consistent their reliability will increase as more data is collected in forthcoming seasons

Strong, consistent blush and uniform shape, with the absence of russet are likely to attract market premiums. There is sufficient genetic diversity for blush in the current selections (Table 5, Appendix 5). The consistency, strength and coverage of blush is another trait to distinguish superior progeny from the Guyot x Rogue Red (and reciprocal cross) selections and the Guyot x Corella selections. Those with consistent strong, bright blush and a slight resistance to both leaf and fruit scab in the Guyot x Rogue Red (and reciprocal cross) selections are: ANP-0632, ANP-0634, ANP-0715,

ANP-0716, ANP-0960 and ANP-1034; in the Guyot x Corella selections: ANP-0941, ANP-0948 and ANP-1005.

Table 3: Harvest indices of the Coregeo cultivars (ANP-01118, ANP-0131 and ANP-0534), promising Dr Jules Guyot x Rogue Red selections with pear scab resistance (ANP-0911, and ANP-0632), promising second generation pear selections (ANP-1104, ANP-1118, ANP-1201, ANP-1211, ANP-1212, ANP-1218, ANP-1207 and ANP-1217), selection for fresh-cuts (ANP-0506), and industry standard cultivars (Corella, Packham and WBC) respectively, based on averaged data from season 2009 through to 2012.

Selection	Location	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0118	C-31-42	BPM	Corella	6 - 15 Jan	5.0	12.7		5.0	yes
ANP-0131	F-11-82	Corella	Comice	11 Feb - 1 Mar	6.3	13.7	3.5	2.4	
ANP-0534	G-28-19	Dr Jules Guyot	Corella	4 - 11 Feb	7.2	15.1	3.0	3.5	yes
ANP-0911	I-14-22	Dr Jules Guyot	Rogue Red	27 Jan - 9 Feb	6.1	15.1	2.5	2.9	yes
ANP-0632	I-16-58	Dr Jules Guyot	Rogue Red	25 Jan - 9 Feb	7.3	15.8	3.5	3.4	yes
ANP-1104	BB-33-108	Comice	C-31-42 (BPM x Corella)	3 - 11 Feb	5.9	18.3		3.4	yes
ANP-1118	BB-14-47	Rogue Red	F-49-86 (Guyot x Corella R)	25 Jan - 22 Feb	7.3	15.9		4.0	
ANP-1201	BB-03-03	Corella	F-02-85 (Comice x BPM R)	17 Jan	5.5				
ANP-1211	BB-36-98	F-11-82 (Corella x Comice)	C-31-42 (BPM x Corella)	3 Feb	5.7				
ANP-1212	BB-43-65	C-31-42 (BPM x Corella)	C-01-49 (Corella x Packham)	28 Jan	6.7				
ANP-1218	BB-14-26	Rogue Red	F-49-86 (Guyot x Corella R)	23 Feb	5.6				
ANP-1207	BB-23-12	B-19-10 (Comice x BPM R)	F-49-86 (Guyot x Corella R)	27 Jan	5.5				
ANP-1217	CC-47-46	Howell	F-55-78 (Guyot x Hood)	22 Feb	5.3				
ANP-0506	F-06-16	Comice	Howell	4 - 9 Feb	5.4	12.9	2.6	4.1	yes
Corella		Forelle?	op	18 Feb - 20 Mar	6.6	14.0	4.0	2.5	
Packham		Uvedale St. Germain	WBC ?	4 Feb - 19 Mar	8.7	13.9	2.0	3.0	
WBC		Unknown		23 Jan - 4 Feb	9.4	11.8	2.3	3.3	

a Seed colour: 1 = white, 2 = cream, 3 = light tan, 4 = tan, 5 = brown, 6 = black

b Starch scale: 1 = whole surface black-blue, 2 = some or most of the core clear, 3 = clear just past core, 4 = most of cortex clear (50%), 5 = 90% of the cortex clear (black under the skin) and 6 = all clear of starch.

Table 4: Productivity, appearance and eating quality ratings and consistency scores of the Coregeo cultivars (ANP-01118, ANP-0131 and ANP-0534), promising Dr Jules Guyot x Rogue Red selections with pear scab resistance (ANP-0911, and ANP-0632), promising second generation pear selections (ANP-1104, ANP-1118, ANP-1201, ANP-1211, ANP-1212, ANP-1218, ANP-1207 and ANP-1217), selection for fresh-cuts (ANP-0506), and industry standard cultivars (Corella, Packham and WBC) respectively, based on averaged data from season 2009 through to 2012.

Selection	Location	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-0118	C-31-42	2.6	3.7	111	4	3	3	3
ANP-0131	F-11-82	3.1	4.0	177	3	4	4	4
ANP-0534	G-28-19	3.2	3.5	166	3	4	5	4
ANP-0911	I-14-22	2.1	2.2	249	4	4	2	4
ANP-0632	I-16-58	1.8	2.3	154	3	4	5	3
ANP-1104	BB-33-108	2.0	3.0	90	3	4	5	4
ANP-1118	BB-14-47	2.2	3.0	152	3	4	5	5
ANP-1201	BB-03-03	2.0	2.0	110	3	5	4	5
ANP-1211	BB-36-98	2.3	4.0	57	5	5	2	5
ANP-1212	BB-43-65	1.7	2.0	105	4	5	4	5
ANP-1218	BB-14-26	2.7	4.0	195	2	5	2	5
ANP-1207	BB-23-12	2.0	3.0	95	4	5	3	5
ANP-1217	CC-47-46	2.7	3.9	133	3	5	4	5
ANP-0506	F-06-16	3.2	3.5	234	2	4	4	3
Corella		2.4	3.0	158	3	4	4	3
Packham		3.8	5.6	191	1	5	3	3
WBC		2.5	3.0	192	2	4	2	4

a Productivity rating: Average of flower density, fruit weight and tree yield ratings; Fruit weight rating 1 < 100g, 2 = 100-199g, 3 = 200-299g, 4 = 300-400 and 5 = >400; Tree yield rating 1 <5kg, 2 = 5 - 9.9, 3 = 10-14.9, 4 = 15 - 20 and 5 >20kg/tree.

b Flower density rating: 1 <20, 2 <40, 3 < 60, 4 <80, 5 <100, 6 <120 and 7 >120 flower clusters (For trees on stock ratings increase by an increment of 30 flower clusters).

c Appearance rating: Based on 1 to 7 likeness scale for shape, colour, overall where 1 = dislike very much to 7 = like very much on data from 2008 to 2011. 1 = rating < 5,5,5; 2 = rating 5,5,5; 3 = rating 6 for at least one attribute; 4 = rating 6,6,6 and 5 = rating 7 for at least one attribute.

d Appearance consistency rating: Based on consistency of appearance rating on data from 2008 to 2011 where 1 = low, 2 = low - medium, 3 = medium, 4 = medium to high and 5 = high.

e Eating quality rating: Based on 1 to 7 likeness scale for texture, taste, overall where 1 = dislike very much to 7 = like very much on data from 2008 to 2011. 1 = rating < 5,5,5; 2 = rating 5,5,5; 3 = rating 6 for at least one attribute; 4 = rating 6,6,6 and 5 = rating 7 for at least one attribute

f Eating quality consistency: Based on consistency of eating quality rating on data from 2009 to 2011 where 1 = low, 2 = low - medium, 3 = medium, 4 = medium to high and 5 = high.

Post-harvest storage

Selections were evaluated after 1, 2 and 3 months of air storage at 0°C based on their optimum fruit firmness as measured over the last 3 seasons and reported in the previous HAL final report AP10029. Dr Jules Guyot x Rogue Red selections and Coregeo managed cultivar releases from the program ANP-0118 and ANP-0131 were placed under controlled atmosphere (CA) storage till July for evaluation of their storage potential. Results from CA storage were inconclusive in the 2012 season, so storage potentials were re-examined in 2013 based on at least three different harvest pressures within their optimum range of firmness for harvest to determine trends in storage length. Results of these trials will be reported separate to this report. There are at least 12 selections in the Dr Jules Guyot x Rogue Red cross that have storage potential of 2 months or more, but only two of them also show resistance to pear scab.

In 2012 some selections were put under CA for at least 5 months where sufficient fruit was available. The Coregeo selections ANP-0131 and ANP-0534 were both CA stored for 6 months. ANP-0131 did not show any storage disorders (Photo 3a) and ripened to a good eating quality. Whilst ANP-0534 appeared to be good externally (Photo 3b), there was a small amount of internal browning around the core in most fruit. Further work is required to determine the optimum storage conditions for CA storage of both ANP-0534 and ANP-0131.

Samples of the Guyot x Rogue Red selections with longer storage potential, ANP-0632, ANP-0909 and ANP-0927, were not available for testing CA storage. Other Guyot x Rogue Red (and reciprocal cross) selections tested did not store for 5 months under CA and were prone to scald and internal browning. The other main selections that stored well under CA were from the Packham x Comice cross: ANP-0612, ANP-0613 and ANP-0639. These selections are distinguished by their exceptionally good flavour derived from Comice but their appearance is not good enough to be commercially viable compared to the other selections. However, they are likely to be good parents for eating quality and storage traits. There are an additional 4 selections within the Packham x Comice in the pear germplasm that were not tested under CA storage but have stored well under air storage at 0°C for 2 and 3 months. Another cross with good CA storage was Butirra Precoce Morettini x YaLi which includes the selections ANP-0518 and ANP-1002. They are tree ripened in late February/early March and have shown good productivity similar to Packham with an average fruit size of 310g for ANP-0518 and 241g for ANP-1002.



Photo 3a, b: ANP-0131 and ANP-0534 removed from CA store after 6 months.

Table 5: Blush and russet attributes of the Coregeo cultivars (ANP-01118, ANP-0131 and ANP-0534), promising Dr Jules Guyot x Rogue Red selections with pear scab resistance (ANP-0911, and ANP-0632), promising second generation pear selections (ANP-1104, ANP-1118, ANP-1201, ANP-1211, ANP-1212, ANP-1218, ANP-1207 and ANP-1217), selection for fresh-cuts (ANP-0506), and industry standard cultivars (Corella, Packham and WBC) respectively, based on data from season 2011 through to 2012. Average full bloom based on data from 2009 to 2013.

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-0118	25-Sep	7	L	M	L-H	100	10-50	2	4
ANP-0131	23-Sep	10		L-M	L-H	90	20-70	3	4
ANP-0534	25-Sep	8	L	M	L-H	100	40-80	4.5	3
ANP-0911	29-Sep	5		L	L-H	100	30-80	4	3
ANP-0632	07-Oct	3		H	H	100	50-90	7	3
ANP-1104	20-Sep	6		M	L-M	80	30-50	2	5
ANP-1118	29-Sep	3	L	M	M-H	100	60	4	3
ANP-1201	23-Sep	6	L	M-H	H	100	40-90	6	4
ANP-1211	22-Sep	6		H	H	100	30-50	6	4
ANP-1212	22-Sep	5		M-H	M	100	50-90	4	3
ANP-1218	06-Oct	3		H	H	100	40-50	6	1
ANP-1207	23-Sep	2		M-H	M-H	90	20-50	4	2
ANP-1217	22-Sep	6		L-M	L	30	30-40	1	3
ANP-0506	03-Oct	6							2
Corella	19-Sep	11		M	L-H	95	20-70	3	3
Packham	29-Sep	7	L				0		4
WBC	08-Oct	8	L	M	L	15	10-20	1	4
ANP-0118	25-Sep	7	L	M	L-H	100	10-50	2	4
ANP-0131	23-Sep	10		L-M	L-H	90	20-70	3	4
ANP-0534	25-Sep	8	L	M	L-H	100	40-80	4.5	3

a Russet rating: L=neck and/or calyx russet or low lenticel and/or general russet, M=medium lenticel and/or general russet, H=high lenticel and/or general russet.

b Blush rating: Based on strength/brightness and consistency where L, M, and H = low, medium and high blush and % coverage on 2011 data; 1 = L 10-90%, 2 = L-M, M (M,L consistency) 10-90%, 3 = L-M & L-H (H consistency), 10-90%, 4 = M (H consistency), M-H (M consistency), 10-90%, 5 = H (M consistency) <50%, 6 = H (H consistency) <50% and 7 = H (H consistency) >50%.

c Shape rating: 1 = round to flat round, 2 = rounded oblong or obovate pyriform, 3 = globular-acute pyriform or triangular, 4 = oblong-ovate pyriform or turbinate and 5 = oblong to elongated oblong pyriform.

Selections within the Dr Jules Guyot x Rogue Red (and reciprocal) crosses are prone to scald in storage. However a preliminary evaluation indicated that at least one third did not develop scald when picked at the correct harvest period, stored for one month, ripened for 7 days and then left at room temperature for a further 7 days (Table 6). When the Dr Jules Guyot x Rogue Red (and reciprocal) selections were cool stored for a minimum of 4 months, approximately one fifth of them did not develop scald. Only 4 selections, ANP-1011, ANP-0915, ANP-0632 and ANP0923 did not develop scald under both of these trial conditions. These results indicate that there is some variability within these crosses to select for reduced susceptibility to scald under longer storage.

Table 6: Levels of scald after 7 days at room temperature post ripening and following 4 months cool storage at 0°C on Dr Jules Guyot x Rogue Red (and reciprocal) selections. Only those that rated no scald on either trial are shown.

Selection	Post ripen scald^a	Cool store scald^b
ANP-1011	5	5
ANP-0915	5	5
ANP-0632	5	5
ANP-0923	5	5
ANP-1020	5	4
ANP-0714	5	3
ANP-1010	5	3
ANP-0627	5	3
ANP-0917	5	3
ANP-0922	5	3
ANP-0925	5	3
ANP-0927	5	3
ANP-1007	5	2
ANP-1008	5	2
ANP-1009	5	2
ANP-0916	5	2
ANP-0933	5	2
ANP-0650	5	2
ANP-0622	5	1
ANP-0624	5	1
ANP-0914	5	1
ANP-0938	5	1
ANP-0645	5	1
ANP-0909	4	5
ANP-0911	4	5
ANP-0921	4	5
ANP-0719	4	5
ANP-0720	4	5
ANP-0652	4	5
ANP-0717	3	5
ANP-0930	3	5
ANP-0960		5
ANP-0721		5
ANP-0940		5
% no. scald^c	32%	21%
<p>a Post ripen scald: Based on assessment of fruit ripened for 7 days at room temperature and left for a further 7 days in season 2011 where 1 = extreme, 2 = heavy, 3 = medium, 4 = slight and 5 = no scald.</p> <p>b Cool store scald: Based on assessment of fruit cool stored for a minimum of 4 months at 0°C in season 2011 where 1 = extreme, 2 = heavy, 3 = medium, 4 = slight and 5 = no scald.</p> <p>c 72 Dr Jules Guyot x Rogue Red selections evaluated.</p>		

APFIP trial selections

There are several distinct types of selections that have been identified for potential regional testing on APFIP sites at completion of AP11031 - Pear Evaluation Program (Elite selections photos 5 to 18 in Appendix 1).

2011 Elite Pear selections

The cultivar ANP-0534 in photo 5 has already progressed to testing on three APFIP sites and two grower orchards. Photo 9 shows one of the ANP-0118 second generation crosses, ANP-1001 selected in 2010, which tree ripens in late Dec/early Jan. Its fruit has an attractive appearance similar to Corella but with a superior sweet, aromatic flavour. However ANP-1001 appears to have limited storage and is more suited to immediate marketing as a tree ripened crisp pear similar to ANP-0118.

2012 Elite Pear selections

A further five promising selections from the second generation crosses are ANP-1104 (Photo 11), ANP- 1118 (Photo 12), ANP- 1201 (Photo 13), ANP- 1212 (Photo 14) and ANP-1211 (Photos 15a,b).

ANP-1104 (Photo 11) cropped well on the seedling tree for the last two years. It is a cross between Doyenné du Comice and the early blushed selection ANP-0118 currently under evaluation by Coregeo. The cross was undertaken to improve the pear aromatics of ANP-0118 whilst maintaining its fine crisp texture off the tree and after storage. This selection exemplifies the improvement in eating quality however it is harvested about a month later than ANP-0118 in early February. It has only produced small fruit on the seedling tree with an average of 104g but its sizing potential cannot be fully evaluated until it fruits on a rootstock. It has an early bloom similar to ANP-0118 between Corella and Packham. Almost all the fruit have a medium strength blush with coverage up to 50%, or more if the fruit are left on the tree for longer. It has a more elongated pyriform shape than both its parents. The fruit can be stored for 2 months at 0°C in air before they start to develop symptoms of external scald and internal browning at 3 months storage.

ANP-1118 (Photo 12) displayed consistent good appearance with exceptional eating over a wide range of harvest dates from 25 Jan to 12 Feb in 2012. Fruit storage at 0°C in air was 2 months at the latter pick date compared to one month at the earlier date. It has produced an average fruit size of 128g on the seedling tree over the last two years. The fruit are strongly blushed with 30 to 60% blush coverage on every fruit. The leaves and fruit were slightly resistant to pear scab in 2012.

ANP-1201 (Photo 13) fruited for the first time in 2012 and is a cross between Corella and the first generation selection F-02-85. F-02-85 has exceptional eating quality but is prone to russet which detracts from its appearance. It can store for at least 5 months under CA and has an average fruit size close to 300g with an overall productivity rating of 3.1 out of 5 (Appendix 4). If it could be grown either russet free which occurred in the earlier years during the drought when the conditions were dry or could produce full russet under a wetter climate then it may have potential as a variety in its own right. It was crossed with Corella to improve the appearance. The resultant progeny ANP-1201 still displays slight russet around the neck but has an attractive pyriform shape with strong red blush on all fruit with 40 to 90% coverage. It is

harvested earlier than its parents on 12 Jan in 2012 and stored for 2 months under air at 0°C.

Both ANP-1211 (Photo 15a,b) and ANP-1212 (Photo14) are from ANP-0118 crosses. The ANP-1212 selection was a cross between ANP-0118 and the 2001 selection ANP-0112 to improve the storage of ANP-0118. ANP1212 ripens late January and has a flowering period similar to ANP-0118 reaching full bloom between Corella and Packham. It has good appearance and eating quality with all fruit covered with at least 50% blush. The ANP-0111 selection was a cross between both Coregeo selections ANP-0131 and ANP-0118. It was harvested in 2012 on the 15 Jan (Photo 9a) and on the 3 February (Photo 9b) around a firmness of 5.6kg on both occasions. After two months at air storage at 0°C the fruit ripened to a good eating quality at the latter harvest date but a quarter of the fruit suffered severe internal browning. At the earlier harvest date all fruit were prone to internal browning. The ripening behaviour of this selection requires further investigation to determine its optimum harvest period. However, like ANP-0118 it has a very attractive appearance, including strong, bright red blush on all fruit and appears fruitful.

2013 Elite Pear selections

The cultivar ANP-1207 has distinct red lenticels and a medium thick stem (Photo 16). It is from a cross between ANP-0305 (Comice x BPM) and ANP-0420 (Guyot x Corella) that had pear scab resistance when tested at the seedling stage. There are also several other selections made from this particular cross due to its attractive fruit appearance. The fruit ripen from late January to late February. The cultivar ANP-1217 ripens to a suitable eating quality over a wide harvest range of 2 months from early January to the end of February (Photo 17). It is from a cross between Howell and ANP-0422 (Guyot x Hood) which has a lot of early ripening progeny in early January. The cultivar has an attractive pink blush on consistently shaped shiny, smooth fruit with indistinct lenticels. The apple shaped selection ANP-1218 is very distinctive with bright red blush and a large round-oblate shape (Photo 18a,b). The tree is extremely productive and sizes large fruit. The flesh texture is fine, melting with pleasant European pear aromatics.

The light green pear ANP-0506 has an extremely long harvest range (Photo 19a,b) and appears to be a very productive tree. It can be harvested between mid Feb and early May as a crisp eating pear straight off the tree. It can remain crisp for extended periods of time and does not brown when cut. It can also soften to a fine buttery texture with good aromatics when harvested and stored for the correct chilling time. It has undergone preliminary testing by SPC-Ardmona for development as a “fresh-cut” product. Further testing for “fresh-cuts” at several maturity times will be undertaken next season. The established pear cultivars Packham and WBC are not well suited to minimal processed products such as “fresh-cuts” due to rapid softening and browning of the flesh.

DISCUSSION

The ripening behaviour of each of the pear selections can vary and needs to be determined separately. Ripening is dependent upon their harvest maturity, pre-harvest temperature, length and condition of post-harvest storage and ripening temperature (Villalobos-Acuña and Mitcham, 2008). It is extremely important to initially establish their harvest maturity based on harvest indices such as fruit pressure, starch and soluble sugar level in order to harvest them at their optimum eating quality and storage potential. For example, Packham's Triumph harvested 160-170 days from full bloom and at firmness 6.3 to 8.3kg, requires cold storage for 60-70 days to ripen properly (Richardson and Gerasopoulos, 1994). According to research by Tindale in the 1960's the ideal harvest maturity for Packham pears for optimum storage and fruit quality is mid-March (Fig. 1). Consumer dissatisfaction can occur with consistency of fruit quality, particularly pears which are more difficult to assess for their maturity date and post-harvest storage requirements for ripening than other fruits.

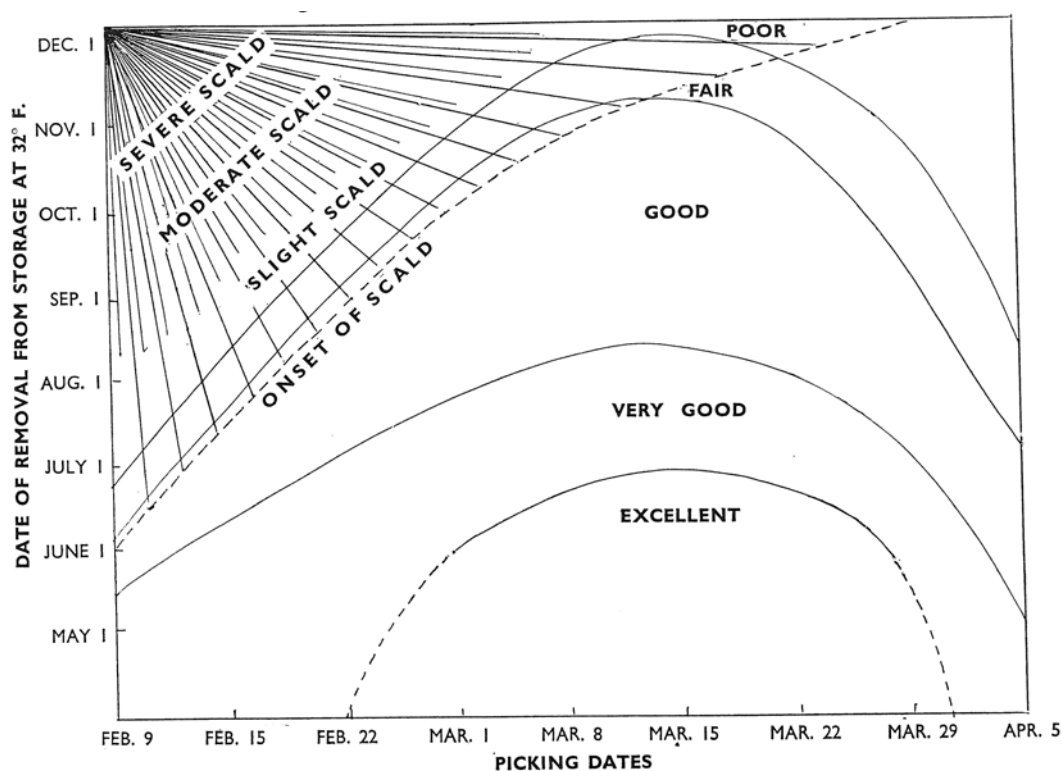


Fig.1. Storage behaviour of Packham pears taken from Tindale (1966). Graph shows the relationship between picking maturity and (a) decline in quality, (b) onset of disorders during storage. Storage period covers time in cool storage at 0°C., plus a further five to seven days at 18°C for ripening.

The new cultivar ANP-0131 trademarked “Deliza” is well suited to wide spread release to the Apple and Pear Industry due to its long term storage. It stores for up to four months cool store and 10 months under controlled atmosphere when picked at a flesh pressure of around 6kg. The early selection ANP-0118 however will take more skill by the grower to achieve a suitable product for market in terms of sufficient red blush

coverage, and suitable tree ripened eating quality. This cultivar is ideally marketed immediately. If it is stored it requires at least two months conditioning at low temperature to induce correct melting of the flesh, similar to Corella and Packham, otherwise it will not melt correctly and develop off flavours. The third recommendation from the evaluation program is ANP-0534 which is a cross between Corella and Dr Jules Guyot. It has slight susceptibility to pear scab (Liu et al, 2008) and develops a distinct musk flavour when ripened. Storage testing is still limited on this cultivar but it appears to have medium-term storage of several months and can be ripened within a month of storage either as a crisp eating pear or softened to a fine, melting texture. Under short storage it retains its green/red skin colour and upon softening shows a distinct change in skin color from green to yellow (Photo 4a,b). It has consistently set a well sized load of fruit over the last three years of evaluation. It ripens in the first 3 weeks of February and flowers at a similar time to Packham.

The 95 selections from the Dr Jules Guyot x Rogue Red (and reciprocal cross) cross only have one to two months storage under air at 0°C but at least 10% of the selections have slightly longer storage. Results from CA tests in 2013 will be available in a separate report. This cross has around a quarter of its progeny with moderate resistance to pear scab. It also has exceptional eating quality with fine, melting flesh and an attractive appearance that will appeal to consumers. The majority of the Dr Jules Guyot x Rogue Red selections ripen from late Jan to mid Feb. Fruit of similar eating quality and appearance has been derived from a cross between Josephine and Rogue Red which has slightly better storage. However there are only a limited number of selections under evaluation and they lack the scab resistance seen in the Dr Jules Guyot x Rogue red crosses that is derived from Guyot.

Consumer evaluation surveys are important in determining the commercial potential of new pear cultivars generated from breeding programs (New Zealand: Gamble et al, 2006; South Africa: Steyn et al, 2011). Consumer evaluation surveys were undertaken on ANP-0131 and ANP-0118 in early 2013 to determine their market acceptance compared against current cultivars. Most notable in the preference evaluation between ANP-0131 and Packham's Triumph, were consumers' willingness to pay a premium for ANP0131 and for most to purchase it in addition to other pear and apple cultivars due to its enhanced appearance and eating quality. Similarly the appearance of ANP-0118 was rated more highly than that of its comparator Williams Bon Chrétien, and its crisp texture was desirable, however it lacked the strong pear aromatics and flavours that appeal to consumers. Sensory and instrumental profiling has been undertaken in apple cultivars to investigate the relationship between volatile compounds and desirable aromatic and flavour attributes (Aprea et al, 2012, Lopez et al, 2006). Similar research is recommended in pear, particularly to identify the volatile compounds in the Dr Jules Guyot x Rogue Red pear selections that contribute to their exceptional eating quality.

An issue with ANP-0118 in season 2012-13 was an increase in astringency at harvest which adversely affected its consumer acceptance. Astringency causes a dry or rough mouth feel due to the effects of soluble tannins on the saliva. Tannins are a polyphenol. The polyphenol content of fruits is primarily influenced by genetics, but also by the degree of ripeness and growing conditions pre-harvest and the storage conditions post-harvest (Hughes, 2010). Fruit tend to lose their astringency as they ripen. In early harvested 'Concorde' pears astringency was found to develop in fruit stored for four

months (Mielke et al, 2005). Growing conditions that can affect fruit astringency pre-harvest include temperature, rainfall and irrigation regime (Kubota et al, 2000). In fruits such as persimmons astringency can be removed in some varieties by treatment with carbon dioxide gas or ethanol vapour (Yamada et al, 2002). It is recommended that for successful commercial release of ANP-0118 that further investigation of its harvest maturity and ripening is required to determine the pre- and post-harvest requirements for consistent, high eating quality. ANP-0118 will be principally marketed as a crisp, tree-ripened pear, however if stored, it appears to require 8 to 10 weeks conditioning at low temperature to induce correct melting of the flesh, similar to Corella and Packham, otherwise it will not melt correctly and develop off flavours.

TECHNOLOGY TRANSFER

One-on-one meetings were organised with local and overseas nurseries and fruit grower through the fruit season to view and taste elite pear selections. Fruit of the two Coregeo cultivars ANP-0118 and ANP-0131 were made available for tasting during grower visits and at selected field days via arrangement with Michael Crisera at Fruit Growers Victoria.

With the removal of trees of William pears due to downsizing of fruit processing by SPC-Ardmona in early 2013, there has been considerable interest in planting the new pear cultivars.

RECOMMENDATIONS

The Dr Jules Guyot x Corella selection ANP-0534 has shown consistent high quality and productivity attributes over the last three years and is the first selection to be recommended for large scale commercial evaluation from the AP-11031 Pear Evaluation Program (Photo 4a). It has strong, bright red blush and when it ripens its skin shows a distinct background colour change from green to yellow taking the difficulty out, for consumers, of determining when a pear is properly softened to eat (Photo 4b). It ripens in the first 3 weeks of February and flowers at a similar time to Packham.



Photo 4a: ANP-0534 (Dr Jules Guyot x Corella). **Photo 4b:** ANP-0534 ripened.

Further recommendations will be included in a separate report which will outline performance of selections under controlled atmosphere storage in 2013.

Selections that have shown elite quality and/or productivity attributes in each year of the evaluation project are highlighted in photos 5 to 19 (Appendix 1). The majority of these elite selections have been fast-tracked to the APFIP sites for regional evaluation.

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LIST OF APPENDICES

Appendix 1: Elite Pear selection photos for 2011, 2012 and 2013.

Appendix 2: Selections from the second generation seedling population by year.

Appendix 3: Harvest indices of pear selections, based on averaged data from season 2009 through to 2012.

Appendix 4: Productivity, appearance and eating quality ratings and consistency scores of pear selections, based on averaged data from season 2009 through to 2012.

Appendix 5: Blush and russet attributes of pear selections, based on averaged data from season 2009 through to 2012 and bloom data from 2009 to 2013.

Appendix 6: Levels of leaf scab on pear selections in late March 2012 and Nov 2013 and on fruit at harvest in 2012 and 2013.

Appendix 1: Elite Pear selections

2011 Elite Pear selection photos



Photo 5: ANP-0534 (Dr Jules Guyot x Corella).

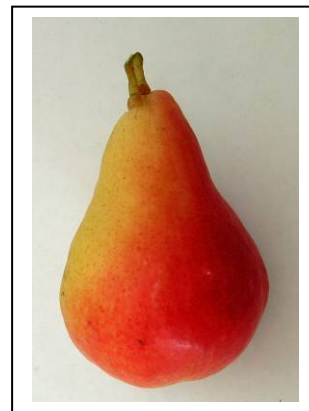


Photo 6: ANP-0711 (Dr Jules Guyot x Corella).



Photo 7: ANP-0644 (Dr Jules Guyot x Rogue Red).



Photo 8: ANP-0648 (Dr Jules Guyot x Rogue Red).



Photo 9: ANP-1001 (Precoce di Fiorano x ANP-0118).

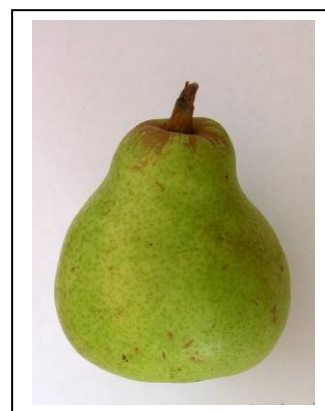


Photo 10: ANP-0514 (Josephine x Doyenné du Comice).

2012 Elite Pear Selection photos



Photo 11: ANP-1104 (Comice x ANP-0118 [BPM x Corella]).



Photo 12: ANP-1118 (Rogue Red x ANP-0420 [Dr Jules Guyot x Corella]).



Photo 13: ANP-1201 (Corella x ANP-0411 [Comice x BPM]).



Photo 14: ANP-1212 (ANP-0118 [BPM x Corella] x ANP-0112 [Corella x Packham]).



Photo 15a: ANP-1211 (ANP-0131 [Corella x Comice] x ANP-0118 [BPM x Corella]) after 2 months cool air storage at 0°C.



Photo 15b: ANP-1211 (ANP-0131 [Corella x Comice] x ANP-0118 [BPM x Corella]) on 15th January 2012 three weeks before harvest.

2013 Elite Pear Selection photos



Photo 16: ANP-1207 (ANP-0305 [Comice x BPM]) x ANP-0420 [Guyot x Corella]).



Photo 17: ANP-1217 (Howell x ANP-0422 [Guyot x Hood]).



Photo 18a: ANP-1218 (Rogue Red x ANP-0420 [Dr Jules Guyot x Corella]) 25 Jan 2012.



Photo 18b: ANP-1218 (Rogue Red x ANP-0420 [Dr Jules Guyot x Corella]).



Photo 19a: ANP-0506 (Comice x Howell)) 22 March 2013.



Photo 19b: ANP-0506 (Comice x Howell)).

Appendix 2: Summary of second generation pear selections in 2011, 2012 and 2013.

2011 Selections	Harvest	Female	Male
ANP-1101	31-Dec	Precoce di Fiorano	ANP-0118 (BPM x Corella)
ANP-1102	20-Jan	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)
ANP-1103	11 Feb - 5 Mar	Comice	ANP-0118 (BPM x Corella)
ANP-1104	11-Feb	Comice	ANP-0118 (BPM x Corella)
ANP-1105	11-Feb	ANP-0305 (Comice x BPM)	ANP-0429 (WBC x BPM)
ANP-1106	01-Feb	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)
ANP-1107	14-Feb	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)
ANP-1108	11-Feb	Comice	ANP-0422 (Guyot x Hood)
ANP-1109	01-Feb	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1110	14 - 22 Feb	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1111	22-Feb	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1112	14-Feb	Comice	ANP-0131 (Corella x Comice)
ANP-1113	08-Feb	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)
ANP-1114	14-Feb	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1115	14-Feb	Rogue Red	ANP-0311 (HW606 x Packham)
ANP-1116	11- 22 Feb	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1117	22-Feb	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1118	11-Feb	Rogue Red	ANP-0420 (Guyot x Corella)

BPM = Butirra Precoce Morettini; Comice = Doyenné du Comice; Guyot = Dr Jules Guyot; Packham = Packham's Triumph

2012 Selections	Harvest	Female	Male
ANP-1201	17-Jan	Corella	ANP-0411 (Comice x BPM)
ANP-1202	25-Jan	Rogue Red	ANP-0420 (Guyot x Corella)
ANP-1203	25-Jan	Rogue Red	ANP-0420 (Guyot x Corella)
ANP-1204	25-Jan	Rogue Red	ANP-0420 (Guyot x Corella)
ANP-1205	26-Jan	Corella	ANP-0423 (US 56112-146)
ANP-1206	27-Jan	Corella	ANP-0423 (US 56112-146)
ANP-1207	27-Jan	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1208	25-Feb	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1209	16-Jan	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1210	27-Jan	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1211	03-Feb	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)
ANP-1212	28-Jan	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1213	28-Jan	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1214	22-Feb	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)
ANP-1215	22-Feb	Rogue Red	ANP-0311 (HW606 x Packham)
ANP-1216	22-Feb	Corella	ANP-0518 (BPM x Yali)
ANP-1217	22-Feb	Howell	ANP-0422 (Guyot x Hood)

2013 Selections	Harvest	Female	Male
ANP-1301	10-Jan	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)
ANP-1302	18-Feb	Corella	ANP-0423 (US 56112-146 x Packham)

Appendix 3: Harvest indices of pear selections, based on averaged data from season 2009 through to 2012.

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0101	BPM	Corella	13 Feb - 1 Mar	6.3	15.7	4.5	3.4	yes
ANP-0114	BPM	Corella	4 - 16 Feb	4.8	14.0		4.1	yes
ANP-0118	BPM	Corella	6 - 15 Jan	5.0	12.7		5.0	yes
ANP-0120	Comice	Yali	30 Jan - 24 Feb					yes
ANP-0121	HW606	Packham	9 - 24 Feb	5.9	13.0	4.5	4.5	
ANP-0131	Corella	Comice	11 Feb - 1 Mar	6.3	13.7	3.5	2.4	
ANP-0132	Dr Jules Guyot	Comice	4 - 18 Feb	6.7	13.0	2.5	3.5	yes
ANP-0302	Dr Jules Guyot	Comice	1 - 2 Feb	7.5	14.6	2.0	2.8	
ANP-0304	WBC	Howell	15 - 30 Jan	6.0	14.4	1.7	4.0	yes
ANP-0308	BPM	Corella	11 - 25 Feb	6.3	14.2	4.5	3.6	yes
ANP-0310	BPM	Corella	23 - 31 Jan	5.5	14.0	3.6	2.5	yes
ANP-0311			25 - 31 Jan	8.3	12.8		3.5	
ANP-0312	Harrow Delight	Packham	23 Jan - 16 Feb	6.1	14.6	2.5	3.4	yes
ANP-0316	WBC	BPM	25 Jan - 4 Feb	7.7	12.8		3.4	
ANP-0320	WBC	Howell	1 Mar	7.7	13.0	4.0	4.2	yes
ANP-0323	WBC	Howell	4 - 6 Feb	8.4	12.6	2.0	3.6	
ANP-0325	BPM	Comice	15 Jan - 4 Feb	5.6	14.5	2.6	3.3	yes
ANP-0333	Dr Jules Guyot	Corella	6 - 18 Feb	6.5	15.3	3.6	3.5	yes
ANP-0341	WBC	Howell	18 Feb - 24 Mar	6.8	11.8	5.0	3.5	yes
ANP-0345	BPM	Corella	11 Feb - 1 Mar	5.7	13.5	3.6	2.7	yes
ANP-0406	BPM	Comice	15 Jan - 4 Feb	6.2	12.9	3.2	4.3	yes
ANP-0409	Comice	BPM	20 Jan - 4 Feb	5.7	14.4	2.0	4.3	yes
ANP-0410	Comice	BPM	15 Jan - 10 Feb	4.9	13.1	2.8	4.6	yes
ANP-0411	Comice	BPM	11 Feb - 1 Mar	5.6	15.6	4.5	3.5	yes
ANP-0421	Dr Jules Guyot	Corella	25 Jan - 1 Feb	6.9	13.0	2.9	2.0	yes
ANP-0423	US 56112-146	Packham	2 - 16 Feb	5.4	12.0	3.0	3.5	yes
ANP-0425	WBC	BPM	20 Jan - 4 Feb	7.1	15.1		3.9	yes
ANP-0427	WBC	BPM	20 - 31 Jan	8.9	13.3	3.0	3.1	
ANP-0428	WBC	BPM	20 Jan - 4 Feb	7.8	14.0		3.8	yes
ANP-0429	WBC	BPM	28 Jan - 2 Feb	7.4	13.0	2.0	3.1	yes
ANP-0432	Dr Jules Guyot	Corella	4 - 20 Feb	6.5	14.9	4.1	1.8	
ANP-0506	Comice	Howell	4 - 9 Feb	5.4	12.9	2.6	4.1	yes
ANP-0514	Josephine	Comice	18 Feb - 4 Apr	3.2	14.8	5.0	2.8	yes
ANP-0518	BPM	YaLi	18 Feb - 24 Mar	4.7	14.7		2.4	
ANP-0520	I11-13B-83	Packham	4 Feb	5.9	10.8	2.5	3.9	yes

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0521	I11-13B-83	Packham	11 Feb - 1 Mar	6.0	12.7	4.0	4.1	
ANP-0528	Dr Jules Guyot	Corella	15 Jan - 11 Feb	8.4	10.7		1.6	
ANP-0532			18 Feb	6.3	15.1		3.0	
ANP-0534	Dr Jules Guyot	Corella	4 - 11 Feb	7.2	15.1	3.0	3.5	yes
ANP-0535	Packham	Comice	11 Feb - 10 Mar	5.8	13.2	6.0	3.9	yes
ANP-0543	Dr Jules Guyot	Rogue Red	21 Jan - 2 Mar	5.3	14.9	3.2	3.4	yes
ANP-0549	Dr Jules Guyot	Rogue Red	24 Jan - 4 Feb	8.1	15.2	2.0	2.7	
ANP-0608	Dr Jules Guyot	Comice	4 - 9 Feb	6.4	11.4		3.2	yes
ANP-0612	Packham	Comice	11 Feb - 6 Mar	4.8	12.8	5.0	4.1	yes
ANP-0613	Packham	Comice	11 Feb - 24 Mar	5.1	15.3		3.5	yes
ANP-0615	Packham	Comice	28 Jan - 2 Mar	4.9	14.6	5.0	3.8	
ANP-0616	Packham	Comice	11 Feb - 2 Mar	5.1	15.2		3.5	yes
ANP-0620	Rogue Red	Eldorado	13 - 18 Feb	6.7	11.3		2.5	
ANP-0621	Dr Jules Guyot	Rogue Red	21 Jan - 8 Feb	7.1	17.0	2.5	2.0	yes
ANP-0622	Dr Jules Guyot	Rogue Red	25 Jan - 5 Feb	5.3	15.2	2.2	4.5	yes
ANP-0624	Dr Jules Guyot	Rogue Red	4 - 9 Feb	6.4	15.6	3.0	3.8	yes
ANP-0625	Dr Jules Guyot	Rogue Red	4 - 9 Feb	6.1	14.8	2.5	3.4	
ANP-0626	Dr Jules Guyot	Rogue Red	21 Jan - 8 Feb	6.4	14.3	3.0	3.3	yes
ANP-0627	Dr Jules Guyot	Rogue Red	4 - 9 Feb	6.9	16.4	2.5	3.6	yes
ANP-0628	Dr Jules Guyot	Rogue Red	4 - 14 Feb	7.1	15.6	2.5	2.4	
ANP-0629	Dr Jules Guyot	Rogue Red	4 - 14 Feb	7.1	14.2	2.6	2.6	
ANP-0630	Dr Jules Guyot	Rogue Red	4 - 8 Feb	7.6	17.0	2.7	3.9	yes
ANP-0632	Dr Jules Guyot	Rogue Red	25 Jan - 9 Feb	7.3	15.8	3.5	3.4	yes
ANP-0634	Dr Jules Guyot	Rogue Red	21 Jan - 10 Feb	5.8	14.5	1.4	4.3	yes
ANP-0638	Rogue Red	Josephine	11 Feb - 1 Mar	5.7	16.9	4.1	2.5	yes
ANP-0639	Packham	Comice	11 Feb - 2 Mar	5.3	15.3	5.0	3.6	yes
ANP-0642	Eldorado	Rogue Red	1 - 4 Mar	6.2	14.5	5.0	3.0	
ANP-0643	Rogue Red	Dr Jules Guyot	27 - 31 Jan	6.2	16.8	2.0	4.1	
ANP-0644	Dr Jules Guyot	Rogue Red	21 Jan - 19 Feb	6.2	15.0	3.1	3.6	
ANP-0645	Dr Jules Guyot	Rogue Red	21 Jan - 6 Feb	6.0	14.5	3.0	3.5	yes
ANP-0646	Dr Jules Guyot	Rogue Red	4 - 8 Feb	5.9	16.0	3.3	4.4	yes
ANP-0647	Dr Jules Guyot	Rogue Red	4 - 14 Feb	4.4	16.2	4.9	4.2	yes
ANP-0648	Dr Jules Guyot	Rogue Red	21 - 31 Jan	7.6	15.1	2.0	4.1	yes
ANP-0650	Dr Jules Guyot	Rogue Red	25 - 28 Jan	5.9	13.8	2.4	3.9	yes
ANP-0651	Dr Jules Guyot	Rogue Red	25 - 30 Jan	6.9	14.9	2.4	3.7	yes
ANP-0652	Dr Jules Guyot	Rogue Red	4 - 20 Feb	6.8	13.3	4.0	3.9	yes
ANP-0701	Comice	Josephine	14 Mar					
ANP-0703	Packham	Comice	18 Feb - 2 Mar	5.3	16.3		2.2	yes
ANP-0705	Dr Jules Guyot	Corella	9 - 19 Feb	5.9	14.2	4.8	2.0	yes

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0708	Dr Jules Guyot	Corella	5 - 11 Feb	6.6	16.4	3.5	2.9	yes
ANP-0710	Dr Jules Guyot	Corella	5 Feb					
ANP-0711	Dr Jules Guyot	Corella	24 Feb	7.2	14.1	4.0	3.4	
ANP-0712	Corella	Dawn	10 Feb	5.7	17.4		4.0	yes
ANP-0713	Dr Jules Guyot	Corella	19 - 24 Feb	6.5	15.5		3.0	
ANP-0714	Dr Jules Guyot	Rogue Red	4 - 5 Feb	7.7	15.3		2.4	
ANP-0715	Dr Jules Guyot	Rogue Red	4 - 5 Feb	7.9	15.4		1.8	
ANP-0716	Dr Jules Guyot	Rogue Red	31 Jan - 8 Feb	8.5	15.8	2.5	2.7	
ANP-0717	Dr Jules Guyot	Rogue Red	30 Jan - 8 Feb	7.3	14.3	2.3	2.6	
ANP-0719	Rogue Red	Dr Jules Guyot	4 - 14 Feb	6.3	14.9	2.5	2.4	
ANP-0720	Rogue Red	Dr Jules Guyot	27 Jan - 4 Feb	8.6	14.9	2.3	3.9	
ANP-0721	Rogue Red	Dr Jules Guyot	27 Jan - 18 Feb	9.3	13.7	3.9	3.3	
ANP-0722	Dr Jules Guyot	Rogue Red	8 Feb	6.1	14.9		3.9	
ANP-0724	Dr Jules Guyot	Rogue Red	9 - 14 Feb	6.1	15.8	2.9	4.0	yes
ANP-0725	Dr Jules Guyot	Rogue Red	21 Jan - 9 Feb	7.3	17.0	3.0	3.8	
ANP-0726	Concord	BPM	25 Feb	4.0	15.1		4.2	yes
ANP-0727	Clapps ?	20th Century ?	24 Feb	5.9	14.4		3.4	
ANP-0801	Comice	Howell	11 Feb - 1 Mar	7.0	12.6	3.3	2.7	
ANP-0901	Comice	ANP-0118	2 - 11 Jan	2.7	15.7	6.0	6.0	yes
ANP-0902	Precoce di Fiorano	ANP-0118	23 Dec - 2 Jan	6.8	16.0	2.0	3.0	yes
ANP-0903	BPM	Forelle	20 - 21 Jan	7.4	22.6		5.0	
ANP-0904	BPM	Forelle	15 - 20 Jan	7.0	17.5		1.0	
ANP-0905	BPM	Forelle	20 - 21 Jan	6.6	14.8		2.5	yes
ANP-0906	BPM	Forelle	20 - 25 Jan	8.0	15.9	2.0	1.0	yes
ANP-0907	Josephine	Rogue Red	20 - 27 Jan	6.6	19.6	3.0	4.0	yes
ANP-0908	Dr Jules Guyot	Rogue Red	28 Jan - 22 Feb	5.1	15.7	5.0	4.0	yes
ANP-0909	Dr Jules Guyot	Rogue Red	21 Jan - 1 Feb	6.8	16.3	2.0	3.3	yes
ANP-0910	Dr Jules Guyot	Rogue Red	21 - 31 Jan	5.4	16.4	2.3	3.4	yes
ANP-0911	Dr Jules Guyot	Rogue Red	27 Jan - 9 Feb	6.1	15.1	2.5	2.9	yes
ANP-0912	Dr Jules Guyot	Rogue Red	21 Jan - 8 Feb	6.5	16.2	2.0	2.7	yes
ANP-0913	Dr Jules Guyot	Rogue Red	21 Jan - 31 Feb	5.3	16.9	5.4	4.3	yes
ANP-0914	Dr Jules Guyot	Rogue Red	15 - 27 Jan	7.0	15.4	2.7	3.5	yes
ANP-0915	Dr Jules Guyot	Rogue Red	21 Jan - 8 Feb	5.6	16.0	3.1	3.5	yes
ANP-0916	Dr Jules Guyot	Rogue Red	25 - 27 Jan	6.8	12.0	3.0	4.7	
ANP-0917	Dr Jules Guyot	Rogue Red	25 Jan - 8 Feb	5.8	14.1	3.0	3.4	yes
ANP-0918	Dr Jules Guyot	Rogue Red	27 Jan - 1 Feb	6.1	15.5	3.4	3.7	yes
ANP-0919	Dr Jules Guyot	Rogue Red	27 Jan - 1 Feb	8.0	14.0		4.0	
ANP-0920	Dr Jules Guyot	Rogue Red	21 Jan - 4 Feb	7.5	16.2	2.5	3.2	

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0921	Dr Jules Guyot	Rogue Red	15 Jan - 4 Feb	6.6	15.3	2.5	3.7	
ANP-0922	Dr Jules Guyot	Rogue Red	21 Jan - 1 Feb	7.2	15.2	1.8	3.9	yes
ANP-0923	Dr Jules Guyot	Rogue Red	25 - 27 Jan	8.3	15.2	1.7	3.9	yes
ANP-0924	Dr Jules Guyot	Rogue Red	27 - 31 Jan	4.4	14.7	4.2	4.1	
ANP-0925	Dr Jules Guyot	Rogue Red	21 - 27 Jan	5.6	15.5	2.8	3.7	
ANP-0926	Dr Jules Guyot	Rogue Red	27 Jan - 9 Feb	8.3	15.1	3.0	4.2	
ANP-0927	Dr Jules Guyot	Rogue Red	27 Jan - 9 Feb	7.3	15.8	4.0	3.2	
ANP-0928	Dr Jules Guyot	Rogue Red	4 - 19 Feb	6.6	16.7	2.8	2.6	
ANP-0929	Dr Jules Guyot	Rogue Red	27 Jan - 1 Feb	6.8	15.1	4.0	3.5	
ANP-0930	Dr Jules Guyot	Rogue Red	21 Jan - 1 Feb	7.2	15.0	3.2	4.2	
ANP-0931	Rogue Red	Dr Jules Guyot	27 - 31 Jan	6.1	14.1	3.0	3.7	yes
ANP-0932	Rogue Red	Dr Jules Guyot	27 Jan - 1 Feb	6.4	19.7		3.0	
ANP-0933	Rogue Red	Dr Jules Guyot	25 - 27 Jan	5.6	15.2	2.8	3.4	yes
ANP-0934	Rogue Red	Dr Jules Guyot	27 Jan - 4 Feb	6.1	15.8	3.0	2.1	yes
ANP-0935	Rogue Red	Dr Jules Guyot	27 Jan - 8 Feb	5.9	16.9	2.5	3.1	yes
ANP-0936	Rogue Red	Dr Jules Guyot	27 - 31 Jan	6.7	13.7	8.8	4.2	
ANP-0937	Rogue Red	Dr Jules Guyot	27 Jan - 1 Feb	6.8	14.7	2.2	3.3	
ANP-0938	Rogue Red	Dr Jules Guyot	25 - 28 Jan	7.1	18.2	3.0	4.8	yes
ANP-0939	Rogue Red	Dr Jules Guyot	21 - 31 Jan	6.5	15.3	2.0	2.8	
ANP-0940	Rogue Red	Dr Jules Guyot	21 - 31 Jan	7.8	13.5	2.5	2.5	
ANP-0941	Dr Jules Guyot	Corella	25 Jan - 4 Feb	7.6	15.4	2.5	2.3	
ANP-0942	Dr Jules Guyot	Corella	29 Jan					
ANP-0943	Dr Jules Guyot	Corella	29 Jan - 9 Feb	6.6	13.6	3.8	3.2	
ANP-0944	Dr Jules Guyot	Corella	29 Jan - 31 Feb	6.0	15.2	2.8	3.1	
ANP-0945	Dr Jules Guyot	Corella	21 - 31 Jan	7.2	15.7		1.9	yes
ANP-0946	Dr Jules Guyot	Corella	29 Jan					
ANP-0947	Dr Jules Guyot	Corella	21 Jan - 4 Feb	6.4	15.6	3.0	3.1	yes
ANP-0948	Dr Jules Guyot	Corella	29 Jan - 4 Feb	5.8	15.0	4.0	3.2	yes
ANP-0949	Dr Jules Guyot	Corella	29 Jan - 4 Feb	6.5	15.2	4.0	3.2	yes
ANP-0950	Dr Jules Guyot	Corella	3 Feb					
ANP-0951	Dr Jules Guyot	Corella	3 Feb					
ANP-0952	Corella	Dawn	24 Feb					
ANP-0953	Rogue Red	WBC	3 Feb					yes
ANP-0954	Rogue Red	WBC	3 - 8 Feb	9.8	16.8		2.7	
ANP-0955	Josephine	Rogue Red	24 Feb					
ANP-0956	Josephine	Rogue Red	4 - 10 Feb	6.6	14.0	3.0	2.7	
ANP-0957	Eldorado	Rogue Red	10 Feb					
ANP-0958	Eldorado	Rogue Red	2 Mar					

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-0959	Rogue Red	Josephine	11 Feb - 2 Mar	7.1	16.0		3.5	
ANP-0960	Dr Jules Guyot	Rogue Red	21 Jan - 17 Feb	6.8	13.1	2.0	5.0	yes
ANP-0961	Dr Jules Guyot	Rogue Red	4 - 17 Feb	7.2	15.6	3.0	4.1	
ANP-0962	Dr Jules Guyot	Rogue Red	4 - 24 Feb	7.7	14.8	4.2	2.4	
ANP-0963	Dr Jules Guyot	Rogue Red	4 - 24 Feb	5.3	16.6	4.0	2.8	yes
ANP-0964	Josephine	Rogue Red	24 Feb - 3 Mar	6.3	15.1		2.0	
ANP-0965	Josephine	Rogue Red	11 Feb - 6 Mar	6.5	15.7	5.3	4.0	
ANP-1001	Precoce di Fiorano	ANP-0118	25 Dec - 4 Jan	3.8	17.7	3.0	3.8	yes
ANP-1002	BPM	YaLi	18 Feb - 24 Mar	3.4	11.1	5.6	5.0	yes
ANP-1003	Unknown		7 - 14 Apr	5.4	11.2	5.5	5.0	yes
ANP-1004	Dr Jules Guyot	Corella	4 - 5 Feb	8.4	16.9		2.4	
ANP-1005	Dr Jules Guyot	Corella	4 - 15 Feb	7.5	14.7	4.8	2.2	
ANP-1006	Dr Jules Guyot	Rogue Red	25 Jan - 5 Feb	6.9	13.4	2.4	5.0	yes
ANP-1007	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	6.4	14.9	2.8	3.1	yes
ANP-1008	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	5.8	14.6	1.2	3.4	yes
ANP-1009	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	7.6	15.2	1.7	4.0	yes
ANP-1010	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	6.7	15.4	2.6	3.2	yes
ANP-1011	Dr Jules Guyot	Rogue Red	4 - 5 Feb	7.6	15.4	2.0	3.9	yes
ANP-1012	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	7.3	16.6	3.5	4.6	
ANP-1013	Dr Jules Guyot	Rogue Red	5 - 14 Feb	7.1	16.5	2.8	3.1	
ANP-1014	Dr Jules Guyot	Rogue Red	21 - 31 Jan	4.5	13.9	5.0	3.1	yes
ANP-1015	Dr Jules Guyot	Rogue Red	21 Jan - 9 Feb	6.9	14.7	3.4	4.7	yes
ANP-1016	Dr Jules Guyot	Rogue Red	4 - 5 Feb	5.2	15.8	3.1	4.4	yes
ANP-1017	Dr Jules Guyot	Rogue Red	4 - 5 Feb	5.4	15.4	3.0	4.0	yes
ANP-1018	Dr Jules Guyot	Rogue Red	4 - 5 Feb	6.8	17.3	3.2	3.2	yes
ANP-1019	Dr Jules Guyot	Rogue Red	4 - 5 Feb	6.4	15.5	3.0	3.2	
ANP-1020	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	7.5	15.6	3.0	3.5	
ANP-1021	Rogue Red	Yali	20 - 25 Mar	4.7	14.5	5.4	5.0	yes
ANP-1022	Rogue Red	Yali	25 Feb - 20 Mar	3.9	14.9	5.0	5.5	yes
ANP-1023	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	5.5	15.9	4.0	3.7	yes
ANP-1024	Dr Jules Guyot	Rogue Red	21 Jan - 5 Feb	5.9	13.5	2.2	2.9	yes
ANP-1025	Rogue Red	Dr Jules Guyot	31 Jan - 11 Feb	6.3	15.2	2.4	2.8	yes
ANP-1026	Rogue Red	Dr Jules Guyot	28 Jan - 9 Feb	8.1	14.8	2.4	3.8	yes
ANP-1027	Rogue Red	Dr Jules Guyot	5 Feb	5.3	14.1		4.4	
ANP-1028	Eldorado	ANP-0118 (BPM x Corella)	15 Feb					
ANP-1029	Rogue Red	Yali	24 Mar					
ANP-1030	Vicar of Winkfield	Eldorado	21 Jan - 2 Feb	4.3	17.4	3.0	4.2	yes
ANP-1031	Josephine	Rogue Red	11 Feb - 1 Mar	5.7	14.3	4.5	2.0	

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-1032	Rogue Red	Dr Jules Guyot	21 Jan - 9 Feb	8.0	17.2	2.8	4.0	yes
ANP-1033	Rogue Red	Dr Jules Guyot	25 Jan - 31 Feb	7.1	14.8	2.0	3.9	
ANP-1034	Dr Jules Guyot	Rogue Red	21 - 31 Jan	7.6	14.8	3.0	4.9	
ANP-1035	Concord	BPM	21 Jan					
ANP-1036	Concord	BPM	2 Feb	10.7	19.1	2.0	3.0	
ANP-1101	Precoce di Fiorano	ANP-0118 (BPM x Corella)	31 Dec	3.6	14.4		5.0	
ANP-1102	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)	20 Jan					
ANP-1103	Comice	ANP-0118 (BPM x Corella)	11 Feb	3.9				
ANP-1104	Comice	ANP-0118 (BPM x Corella)	3 - 11 Feb	5.9	18.3		3.4	yes
ANP-1105	ANP-0305 (Comice x BPM)	ANP-0429 (WBC x BPM)	3 - 11 Feb	5.6				yes
ANP-1106	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	28 Jan - 1 Feb	5.1				
ANP-1107	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	14 Feb	4.6				
ANP-1108	Comice	ANP-0422 (Guyot x Hood)	3 - 11 Feb	3.6	16.4		4.2	yes
ANP-1109	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	1 Feb	4.1				
ANP-1110	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	28 Jan - 14 Feb	5.1				
ANP-1111	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	22 Feb					
ANP-1112	Comice	ANP-0131 (Corella x Comice)	14 - 22 Feb	4.7	18.9		2.0	
ANP-1113	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	15 Jan - 8 Feb	7.6				
ANP-1114	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	28 Jan - 14 Feb	5.7				
ANP-1115	Rogue Red	ANP-0311 (HW606 x Packham)	14 - 22 Feb	6.2	14.6		2.2	yes
ANP-1116	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	11 Feb	5.6				
ANP-1117	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	3 - 22 Feb	6.0				
ANP-1118	Rogue Red	ANP-0420 (Guyot x Corella)	25 Jan - 22 Feb	7.3	15.9		4.0	
ANP-1201	Corella	ANP-0411 (Comice x BPM)	17 Jan	5.5				
ANP-1202	Rogue Red	ANP-0420 (Guyot x Corella)	25 Jan	5.0				
ANP-1203	Rogue Red	ANP-0420 (Guyot x Corella)	25 Jan	6.4				
ANP-1204	Rogue Red	ANP-0420 (Guyot x Corella)	25 Jan	4.5				
ANP-1205	Corella	ANP-0423 (US 56112-146)	26 Jan	6.0				
ANP-1206	Corella	ANP-0423 (US 56112-146)	27 Jan	6.0				

Selection	Female	Male	Start of Harvest	Firm (kg)	Sugar °Brix	Seed colour ^a	Starch scale ^b	Tree ripen
ANP-1207	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	27 Jan	5.5				
ANP-1208	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	25 Feb	6.3				
ANP-1209	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	16 Jan	6.4				
ANP-1210	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	27 Jan	6.5				
ANP-1211	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)	3 Feb	5.7				
ANP-1212	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	28 Jan	6.7				
ANP-1213	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	28 Jan	5.5				
ANP-1214	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	22 Feb					
ANP-1215	Rogue Red	ANP-0311 (HW606 x Packham)	22 Feb	8.0				
ANP-1216	Corella	ANP-0518 (BPM x Yali)	22 Feb	5.7				
ANP-1217	Howell	ANP-0422 (Guyot x Hood)	22 Feb	5.3				
ANP-1218	Rogue Red	ANP-0420 (Guyot x Corella)	23 Feb	5.6				
Corella	Forelle?	op	18 Feb - 20 Mar	6.6	14.0	4.0	2.5	
Packham	Uvedale St. Germain	WBC ?	4 Feb - 19 Mar	8.7	13.9	2.0	3.0	
WBC	Unknown		23 Jan - 4 Feb	9.4	11.8	2.3	3.3	

a Seed colour: 1 = white, 2 = cream, 3 = light tan, 4 = tan, 5 = brown, 6 = black

b Starch scale: 1 = whole surface black-blue, 2 = some or most of the core clear, 3 = clear just past core, 4 = most of cortex clear (50%), 5 = 90% of the cortex clear (black under the skin) and 6 = all clear of starch.

Appendix 4: Productivity, appearance and eating quality ratings and consistency scores of pear selections, based on averaged data from season 2009 through to 2013.

Selection	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-0101	2.2	2.0	158	4	3	4	3
ANP-0114	1.5	0.8	248	3	4	2	4
ANP-0118	2.6	3.7	111	4	3	3	3
ANP-0120	2.8	3.0	220	2	4	2	3
ANP-0121	1.9	3.0	181	3	3	4	3
ANP-0131	3.1	4.0	177	3	4	4	4
ANP-0132	1.9	3.0	171	3	2	4	3
ANP-0302	2.4	1.6	239	3	3	3	3
ANP-0304	2.7	3.9	166	3	2	5	3
ANP-0308	2.4	2.3	166	3	5	4	3
ANP-0310	2.8	3.9	174	4	3	4	3
ANP-0311	3.2	4.8	119	3	3	2	3
ANP-0312	3.1	4.4	167	3	3	5	2
ANP-0316	2.3	2.8	151	2	3	2	3
ANP-0320	2.9	2.7	374	2	4	4	2
ANP-0323	3.3	4.7	195	3	3	4	3
ANP-0325	3.4	4.6	198	2	4	4	4
ANP-0333	2.9	2.9	263	4	3	4	4
ANP-0341	3.8	4.5	312	4	3	2	4
ANP-0345	3.0	2.6	242	4	4	4	4
ANP-0406	3.1	3.5	222	3	2	5	4
ANP-0409	2.6	2.8	195	4	4	4	4
ANP-0410	2.5	4.0	143	2	3	5	3
ANP-0411	2.9	2.9	300	2	5	5	5
ANP-0421	2.5	2.9	178	4	3	4	2
ANP-0423	2.9	3.2	248	3	3	2	4
ANP-0425	2.2	3.3	118	3	3	4	3
ANP-0427	2.5	2.0	195	4	2	3	3
ANP-0428	2.7	2.9	157	3	3	2	3
ANP-0429	2.7	2.8	228	2	4	4	3
ANP-0432	3.4	4.2	162	2	4	5	3
ANP-0506	3.2	3.5	234	2	4	4	3
ANP-0514	2.2	2.9	177	3	3	5	4
ANP-0518	3.8	3.9	210	4	3	3	3
ANP-0520	4.1	6.1	168	3	3	3	4
ANP-0521	3.3	3.6	231	1	5	4	3
ANP-0528	3.0	2.9	169	3	4	2	4
ANP-0532	3.3	4.2	217			3	5
ANP-0534	3.2	3.5	166	3	4	5	4
ANP-0535	3.4	5.8	155	2	3	5	3
ANP-0543	4.2	4.5	187	2	3	4	3
ANP-0549	2.6	2.9	166	2	4	5	4
ANP-0608	3.1	3.1	321	3	3	1	5
ANP-0612	3.4	3.9	307	2	3	3	4
ANP-0613	2.1	1.8	267	1	5	2	4
ANP-0615	2.0	2.3	147	1	5	4	3

Selection	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-0616	1.5	1.0	214	1	5	4	3
ANP-0620	2.1	1.9	191	2	4	5	3
ANP-0621	2.0	1.8	232	2	3	5	4
ANP-0622	2.2	2.5	198	2	4	3	3
ANP-0624	2.3	2.9	211	1	5	3	5
ANP-0625	2.4	2.2	232	3	4	5	4
ANP-0626	2.2	3.4	151	2	4	4	3
ANP-0627	2.0	2.8	145	2	4	5	3
ANP-0628				3	2	5	3
ANP-0629				4	3	5	3
ANP-0630	3.1	3.4	336	2	4	5	4
ANP-0632	1.8	2.3	154	3	4	5	3
ANP-0634	1.9	1.8	214	1	5	5	3
ANP-0638	2.0	2.6	150	2	3	5	4
ANP-0639	2.4	3.3	215	1	5	3	4
ANP-0642	2.2	3.0	176	1	5	3	3
ANP-0643	2.0	2.4	209	4	4	2	5
ANP-0644	2.5	2.8	292	3	3	3	4
ANP-0645	2.1	2.6	202	4	2	4	3
ANP-0646	2.6	3.3	221	2	5	4	3
ANP-0647	1.9	2.1	190	2	4	5	4
ANP-0648	2.0	2.1	214	3	4	5	3
ANP-0650	2.3		189	2	3	5	4
ANP-0651	2.4	3.3	213	4	2	2	3
ANP-0652	2.9	2.2	331	3	3	4	3
ANP-0701	0.5	0.5		1	5	4	5
ANP-0703	2.1	1.4	189	1	5	2	4
ANP-0705	0.8	0.5	120	5	3	3	4
ANP-0708	1.6	1.7	105	3	3	4	4
ANP-0710	1.1	0.9	112	3	3	3	4
ANP-0711	2.3	1.3	180	3	5	2	4
ANP-0712	1.5	0.5	144	3	4	2	4
ANP-0713	1.3	1.3	182	2	5	2	4
ANP-0714	2.8	4.0	151	3	3	4	4
ANP-0715	1.9	2.3	168	3	3	3	3
ANP-0716	2.2	3.0	185	3	4	2	3
ANP-0717	2.0	2.0	160	4	4	5	4
ANP-0719	2.5	6.0	97	2	3	5	4
ANP-0720	2.0	1.8	165	2	4	5	4
ANP-0721	2.2	3.5	149	5	4	4	3
ANP-0722	1.5	1.2	139	2	3	1	5
ANP-0724	2.9	3.3	273	1	5	3	4
ANP-0725	1.8	1.8	135	2	3	4	4
ANP-0726	0.8	0.7		2	4	1	5
ANP-0727	2.1	2.3	168	3	3	1	5
ANP-0801	3.4	4.5	229	4	3	4	3
ANP-0901	1.6	2.2	80	2	3	2	3
ANP-0902	1.1	1.1	59	3	4	2	4
ANP-0903	1.3		150	3	3	3	4
ANP-0904	1.1	0.8	170	3	4	3	3

Selection	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-0905	1.1	0.5	103	3	5	5	4
ANP-0906	1.3	2.7	100	2	4	5	4
ANP-0907	1.5	1.5		4	4	4	4
ANP-0908	2.3	2.3	207	2	3	4	3
ANP-0909	2.4	4.5	122	3	4	4	3
ANP-0910	2.0	1.3	213	4	5	3	4
ANP-0911	2.1	2.2	249	4	4	2	4
ANP-0912	1.6	0.5	153	2	4	4	4
ANP-0913	1.8	2.3	208	1	5	5	5
ANP-0914	1.6	1.4	161	3	3	3	3
ANP-0915	2.0	0.3	190	2	3	3	5
ANP-0916	2.0	1.5	176	3	4	4	3
ANP-0917	1.9	4.0	109	3	5	2	3
ANP-0918	1.4	1.3	113	2	3	5	3
ANP-0919	1.8	2.0	187	3	4	2	3
ANP-0920	2.0	5.0	95	3	5	5	4
ANP-0921	2.0	1.4	261	3	3	3	3
ANP-0922	2.2	1.6	192	5	3	3	4
ANP-0923	1.9	1.5	137	3	4	4	3
ANP-0924	2.4	2.4	241	2	3	3	3
ANP-0925	2.0	0.8	249	3	3	4	4
ANP-0926	2.1	0.8	142	3	3	3	4
ANP-0927	2.4	3.1	169	1	5	5	4
ANP-0928	1.6	0.7	156	3	3	4	4
ANP-0929	2.2	3.4	117	3	5	4	4
ANP-0930	1.6	2.3	132	3	3	2	4
ANP-0931	2.8	0.3	255	2	3	5	3
ANP-0932	1.9	0.8	180	2	4	4	3
ANP-0933	1.5	1.1	183	4	3	4	3
ANP-0934	1.5	0.3	117	4	3	5	5
ANP-0935	2.3	1.0	205	3	3	5	5
ANP-0936	3.0	2.5		3	4	5	5
ANP-0937	2.1	2.7	149	2	4	4	3
ANP-0938	1.7	2.4	117	3	3	5	4
ANP-0939	1.6	1.3	157	1	5	4	4
ANP-0940	2.3	3.8	126	3	3	3	4
ANP-0941	1.9	4.5	67	3	5	4	3
ANP-0942	1.4	0.3	290	2	5	3	5
ANP-0943	1.5	1.8	132	4	4	3	3
ANP-0944	1.9	2.5	101	3	5	4	3
ANP-0945	1.7	0.8	131	2	3	5	4
ANP-0946	1.8	0.3	390	3	5	4	5
ANP-0947	1.9	1.3	117	3	3	5	3
ANP-0948	2.5	3.0	138	3	5	1	5
ANP-0949	2.5	4.0	116	3	3	4	4
ANP-0950				3	5	5	5
ANP-0951	1.2	0.5	125	3	5	1	5
ANP-0952				3	5	3	5
ANP-0953	1.4	1.3	200	4	5	1	5
ANP-0954	1.3	1.1	142	3	4	3	3

Selection	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-0955	2.2	0.5	410	3	5	5	5
ANP-0956	2.2	3.3	136	4	4	4	4
ANP-0957	1.5	0.5	230	2	5	3	5
ANP-0958				1	5	3	5
ANP-0959	3.7	6.5	142	2	4	4	3
ANP-0960	2.2	1.4	252	3	4	2	4
ANP-0961	2.1	3.0	134	3	3	5	3
ANP-0962	2.0	1.1	260	3	3	3	4
ANP-0963	1.4	1.2	163	3	3	4	3
ANP-0964	1.4	1.5	174	2	4	3	3
ANP-0965	1.9	2.0	135	3	4	4	3
ANP-1001	1.3	1.0	63	2	4	2	4
ANP-1002	3.6	4.2	293	3	4	2	5
ANP-1003	2.7	3.7	226	2	5	4	4
ANP-1004	3.3	5.0	127	4	4	5	3
ANP-1005	2.9	4.0	113	3	4	4	5
ANP-1006	1.9	2.5	105	2	5	3	4
ANP-1007	2.0	1.3	158	3	4	3	3
ANP-1008	1.8	2.3	136	3	4	5	4
ANP-1009	2.5	4.0	99	2	5	5	4
ANP-1010	1.8	0.5	128	3	3	3	3
ANP-1011	2.2	0.5	282	3	5	3	3
ANP-1012	2.1	3.0	140	3	3	4	4
ANP-1013	2.1	4.0	112	2	3	4	3
ANP-1014	2.5	5.0	113	2	4	4	5
ANP-1015	2.0	1.0	140	2	4	3	5
ANP-1016	2.1	5.0	118	3	3	3	4
ANP-1017	1.8	0.5	130	2	3	4	4
ANP-1018	2.4	6.0	117	1	5	5	4
ANP-1019	2.1	4.0	113	3	3	5	3
ANP-1020	1.8	0.0	87	2	5	4	4
ANP-1021	2.4	4.0	151	3	5	4	4
ANP-1022	3.4	7.0	231	2	3	4	5
ANP-1023	1.5	0.5	119	3	5	5	4
ANP-1024	2.0	1.0	178	3	4	3	4
ANP-1025	2.0	3.0	128	2	4	4	4
ANP-1026	2.4	1.0	177	3	3	3	4
ANP-1027	2.3	0.5	152	2	3	3	3
ANP-1028				3	5	2	5
ANP-1029	1.5	1.0	295	2	5	3	5
ANP-1030	2.8	5.5	70	1	5	5	4
ANP-1031	3.8	6.0	200	2	3	5	4
ANP-1032	1.4	1.0	125	2	3	3	4
ANP-1033	2.8	4.0	73	3	4	4	5
ANP-1034	2.3	3.0	162	2	4	4	5
ANP-1035	0.5			1	5	4	5
ANP-1036	1.0			2	5	4	5
ANP-1101	1.8	2.0	88	2	4	2	4
ANP-1102	2.7	3.0	96	4	5	2	5
ANP-1103	2.0	1.5	265	2	4	4	4

Selection	Productivity rating ^a	Flower density ^b	Fruit weight (g)	Appearance rating ^c	Appearance consistency ^d	Eating quality rating ^e	Eating quality consistency ^f
ANP-1104	2.0	3.0	90	3	4	5	4
ANP-1105	2.0	3.0	159	3	4	4	4
ANP-1106	1.8	2.0	144	4	4	4	5
ANP-1107	1.5	2.0	102	3	5	2	4
ANP-1108	2.7	3.5	179	4	4	4	5
ANP-1109	1.8	2.5	124	2	5	3	3
ANP-1110	1.7	2.5	109	2	5	4	5
ANP-1111	1.3	1.5	136	3	5	2	5
ANP-1112	1.5	1.5	138	3	3	3	4
ANP-1113	1.8	2.5	87	2	5	2	5
ANP-1114	1.8	2.5	126	1	5	4	4
ANP-1115	2.7	4.5	117	2	4	4	4
ANP-1116	2.2	2.5	75	3	5	3	3
ANP-1117	1.7	2.5	121	2	4	4	4
ANP-1118	2.2	3.0	152	3	4	5	5
ANP-1201	2.0	2.0	110	3	5	4	5
ANP-1202	1.7	2.0	79	3	5	4	5
ANP-1203	1.7	2.0	92	3	5	3	5
ANP-1204	2.3	4.0	95	4	5	2	5
ANP-1205	1.7	3.0	82	3	5	2	5
ANP-1206	2.0	3.0	114	3	5	3	5
ANP-1207	2.0	3.0	95	4	5	3	5
ANP-1208	2.3	4.0	134	5	5	3	5
ANP-1209	1.3	2.0	79	4	5	2	5
ANP-1210	2.0	3.0	115	3	5	5	5
ANP-1211	2.3	4.0	57	5	5	2	5
ANP-1212	1.7	2.0	105	4	5	4	5
ANP-1213	3.3	5.0	103	3	5	4	5
ANP-1214	2.7	4.0	107				
ANP-1215	1.7	2.0	112	4	5	1	5
ANP-1216	2.3	3.0	111	3	5	4	5
ANP-1217	2.7	3.9	133	3	5	4	5
ANP-1218	2.7	4.0	195	2	5	2	5
Corella	2.4	3.0	158	3	4	4	3
Packham	3.8	5.6	191	1	5	3	3
WBC	2.5	3.0	192	2	4	2	4

a Productivity rating: Average of flower density, fruit weight and tree yield ratings; Fruit weight rating 1 < 100g, 2 = 100-199g, 3 = 200-299g, 4 = 300-400 and 5 = >400; Tree yield rating 1 <5kg, 2 = 5 - 9.9, 3 = 10-14.9, 4 = 15 - 20 and 5 >20kg/tree.

b Flower density rating: 1 <20, 2 <40, 3 < 60, 4 <80, 5 <100, 6 <120 and 7 >120 flower clusters (For trees on stock ratings increase by an increment of 30 flower clusters).

c Appearance rating: Based on 1 to 7 likeness scale for shape, colour, overall where 1 = dislike very much to 7 = like very much on data from 2008 to 2011. 1 = rating < 5,5,5; 2 = rating 5,5,5; 3 = rating 6 for at least one attribute; 4 = rating 6,6,6 and 5 = rating 7 for at least one attribute.

d Appearance consistency rating: Based on consistency of appearance rating on data from 2008 to 2011 where 1 = low, 2 = low - medium, 3 = medium, 4 = medium to high and 5 = high.

e Eating quality rating: Based on 1 to 7 likeness scale for texture, taste, overall where 1 = dislike very much to 7 = like very much on data from 2008 to 2011. 1 = rating < 5,5,5; 2 = rating 5,5,5; 3 = rating 6 for at least one attribute; 4 = rating 6,6,6 and 5 = rating 7 for at least one attribute

f Eating quality consistency: Based on consistency of eating quality rating on data from 2009 to 2011 where 1 = low, 2 = low - medium, 3 = medium, 4 = medium to high and 5 = high.

Appendix 5: Blush and russet attributes of pear selections, based on averaged data from season 2009 through to 2012 and bloom data from 2009 to 2013.

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-0101	30-Sep	6		H	M	100	30-50	4	5
ANP-0114	29-Sep	6		M	L	60	10-30	1	4
ANP-0118	25-Sep	7	L	M	L-H	100	10-50	2	4
ANP-0120	01-Oct	7	L						4
ANP-0121	02-Oct	9	L	H	L	30	20-30	1	5
ANP-0131	23-Sep	10		L-M	L-H	90	20-70	3	4
ANP-0132	04-Oct	9	L	H	L	50	10-30	1	2
ANP-0302	29-Sep	7		M	L-H	70	10-20	1.5	3
ANP-0304	03-Oct	8	M-H	M	L-H	70	0-50	2	5
ANP-0308	26-Sep	7		M-H	H	100	20-60	5.5	2
ANP-0310	21-Sep	7		M	L-M	80	20-50	1.5	4
ANP-0311	24-Sep	7	L	M-H	L	10	10-20	1	
ANP-0312	01-Oct	10	L	M-H	H		0-60	5	4
ANP-0316	04-Oct	8	L	L	L	50	5-20	1	4
ANP-0320	27-Sep	7		L-M	L-M	80	10-30	1.5	4
ANP-0323	01-Oct	5		M	L	30	5-30	1	3
ANP-0325	25-Sep	6	L	M	L-M	20	10-40	1.5	2
ANP-0333	27-Sep	7	L	M	M	100	10-50	2	4
ANP-0341	27-Sep	4							3
ANP-0345	28-Sep	7	L	M-H	L-M	90	20-60	2	3
ANP-0406	23-Sep	6		M	L-H	10	10-50	2	4
ANP-0409	29-Sep	5			H	80	20-50	5	3
ANP-0410	01-Oct	6	M	H	L-M	100	30-60	3	3
ANP-0411	27-Sep	5	M-H	M	L	20	20	1	4
ANP-0421	28-Sep	6		L	L-H	60	10-50	4	4
ANP-0423	28-Sep	6	H						3
ANP-0425	06-Oct	7	L	M	L-M	50	20-50	1.5	3
ANP-0427	28-Sep	7	L	M	L-H	10	10-40	2.5	2
ANP-0428	01-Oct	9	L	L-M	L-H	20	20-50	2	4
ANP-0429	04-Oct	10	L	M-H	L	50	0-30	1	2
ANP-0432	25-Sep	6		L-M	L	20	10-40	1	4
ANP-0506	03-Oct	6							2
ANP-0514	04-Oct	7	L						3
ANP-0518	15-Sep	10	L	M-H	L	25	5-20	1	3
ANP-0520	02-Oct	7							1
ANP-0521	29-Sep	6							4
ANP-0528	24-Sep	6		L	L-H	50	20-50	3	2
ANP-0532	20-Sep	7							
ANP-0534	25-Sep	8	L	M	L-H	100	40-80	4.5	3
ANP-0535	28-Sep	6	M						2
ANP-0543	03-Oct	11		L	L-H	40	10-40	2	2
ANP-0549	26-Sep	5		L-M	L-H	50	10-50	4	3
ANP-0608	04-Oct	5	L	H	L	50	10-30	1	2
ANP-0612	26-Sep	5							4
ANP-0613	27-Sep	4							4
ANP-0615	28-Sep	4	H						5
ANP-0616	25-Sep	4	L						4
ANP-0620	27-Sep	3		M	L-H	100	20-60	2.5	5
ANP-0621	26-Sep	4	M	H	H	65	10-80	6	2
ANP-0622	03-Oct	4		M-H	M-H	100	60-80	5	5
ANP-0624	27-Sep	4	M-H	M	L-H	50	30-80	2	2
ANP-0625	28-Sep	4	L	L	L-H	100	25-75	4	2

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-0626	03-Oct	5		M	L-H	80	10-80	4	2
ANP-0627	29-Sep	5	H	M-H	M	70	20-40	3.5	1
ANP-0628				M	L-H	100	20-50	3.5	2
ANP-0629			L	L	L-H	80	20-50	2.5	3
ANP-0630	26-Sep	5	H	M	L-H	100	30-90	5	3
ANP-0632	07-Oct	3		H	H	100	50-90	7	3
ANP-0634	30-Sep	4		L-M	L-H	100	20-70	3	2
ANP-0638	01-Oct	5	L	L	L-M	70	10-50	2	4
ANP-0639	27-Sep	5	L-M						4
ANP-0642	28-Sep	5		M	L	65	20-40	1	3
ANP-0643	05-Oct	6		H	L-H	100	100	7	4
ANP-0644	28-Sep	5	H	M-H	L-H	80	20-80	4	5
ANP-0645	29-Sep	4		M	L-H	80	20-60	2	3
ANP-0646	28-Sep	5		H	H	100	30-70	6	5
ANP-0647	28-Sep	5	M-H	M	L-H	100	20-80	2.5	3
ANP-0648	27-Sep	5	L-M	M-H	L-M	50	20-50	2	3
ANP-0650				L	L-H	60	10-70	3	4
ANP-0651	29-Sep	4		L-M	L-M	100	20-80	3.5	2
ANP-0652	30-Sep	5	M	M	M-H	90	20-80	3.5	4
ANP-0701	03-Oct	3							
ANP-0703	24-Sep	6		M-H	L	80	10-30	1	1
ANP-0705	05-Oct	3		H	M	100	70-90	4	3
ANP-0708	24-Sep	5		L	L-H	100	30-80	4	5
ANP-0710	03-Oct	6		H	L-M	100	30-50	3	3
ANP-0711	27-Sep	5		M	L-H	100	10-80	3	5
ANP-0712	23-Sep	5							1
ANP-0713	19-Sep	6		M	L	100	30-50	1	4
ANP-0714	03-Oct	3		M	M-H	100	30-90	5	3
ANP-0715	29-Sep	4		H	H	100	50-90	7	2
ANP-0716	29-Sep	5		H	H	100	50-100	7	3
ANP-0717	27-Sep	5	L	M	M-H	100	40-80	5	1
ANP-0719	29-Sep	5	L-M	M	L-H	100	30-90	5	2
ANP-0720	28-Sep	6	M-H	H	M-H	100	40-100	5.5	1
ANP-0721	08-Oct	4		H	H	100	100	7	1
ANP-0722	09-Oct	4	M	M	M-H	100	30-80	4.5	4
ANP-0724	29-Sep	9		M	L	20	10-50	1	2
ANP-0725	26-Sep	4	M	M	M-H	100	30-80	4.5	4
ANP-0726	29-Sep	4							3
ANP-0727	24-Sep	4		H	L	66	20-40	1	3
ANP-0801	27-Sep	6		H	L	20	0-10	3	3
ANP-0901	19-Sep	7							3
ANP-0902	18-Sep	8							3
ANP-0903									2
ANP-0904	20-Sep	5							3
ANP-0905	28-Sep	2							3
ANP-0906	19-Sep	4							4
ANP-0907	30-Sep	4							5
ANP-0908	30-Sep	5		M-H	M	90	20-60	3	4
ANP-0909	27-Sep	4		H	H	100	30-90	6.5	5
ANP-0910	02-Oct	3		H	H	100	50-100	7	3
ANP-0911	29-Sep	5		L	L-H	100	30-80	4	3
ANP-0912	01-Oct	3	M	M	L-H	100	20-90	2.5	4
ANP-0913	29-Sep	6	M-H	M	L	90	20-70	1	3
ANP-0914	01-Oct	4	L	M-H	L-H	100	30-80	3.5	3
ANP-0915	27-Sep	4		L-M	L-H	90	20-80	4	4
ANP-0916	03-Oct	4		M-H	L-H	100	20-90	3	3

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-0917	01-Oct	5	L	M-H	MOH	100	50-90	5.5	3
ANP-0918	01-Oct	3	M	H	H	100	40-90	6	1
ANP-0919	25-Sep	4		M	L-H	100	30-60	4	3
ANP-0920	30-Sep	4	L	M-H	M-H	100	40-90	6	2
ANP-0921	30-Sep	4	M	H	H	100	40-100	6.5	2
ANP-0922	01-Oct	4		H	H	100	50-90	7	3
ANP-0923	29-Sep	4		H	M-H	100	50-90	5.5	1
ANP-0924	30-Sep	5		L-M	L-H	70	5-80	2.5	5
ANP-0925	28-Sep	3	L	L-M	L-M	60	20-70	1.5	4
ANP-0926	29-Sep	8		L	L-M	60	10-60	2	3
ANP-0927	28-Sep	6	M-H	L-M	L-H	100	20-50	2.5	2
ANP-0928	30-Sep	4	M-H	H	H	100	50-70	7	3
ANP-0929	26-Sep	6		M	L-M	100	10-70	3.5	2
ANP-0930	29-Sep	5			H	100	50-60	7	2
ANP-0931	28-Sep	4		L	L-H	50	30-70	2.5	5
ANP-0932	04-Oct	3	M-H	M	M-H	100	10-70	3	2
ANP-0933	01-Oct	4		M-H	H	90	10-80	5	2
ANP-0934	01-Oct	4		L	M	80	10-40	2	3
ANP-0935	02-Oct	3	M	M-H	M-H	90	20-60	5	3
ANP-0936	06-Oct	4	M		H	100	60-90	7	5
ANP-0937	04-Oct	5		H	L-H	20	40-90	4	3
ANP-0938	03-Oct	4		M	L-H	50	20-70	3	4
ANP-0939	28-Sep	5	M	M	L-M	20	10-50	2	2
ANP-0940	28-Sep	5	L	M	M-H	100	20-70	4.5	5
ANP-0941	02-Oct	5		H	H	100	70-90	7	2
ANP-0942	24-Sep	3							3
ANP-0943	27-Sep	5		H	M-H	100	50-100	6	2
ANP-0944	21-Sep	8		H	M	100	60-80	4	4
ANP-0945	30-Sep	5		L	L-H	50	20-90	4	3
ANP-0946	30-Sep	4							3
ANP-0947	22-Sep	6	L	M	L-H	100	20-80	4	1
ANP-0948	21-Sep	8		M-H	M-H	100	20-80	5	4
ANP-0949	01-Oct	6		L	L-H	100	30-70	3	2
ANP-0950									4
ANP-0951	03-Oct	6							3
ANP-0952	14-Sep								2
ANP-0953	01-Oct	5							1
ANP-0954	28-Sep	2							4
ANP-0955	20-Sep	3							3
ANP-0956	28-Sep	4	L	H	M-H	100	50-90	4.5	3
ANP-0957	23-Sep	3							3
ANP-0958									3
ANP-0959	29-Sep	6	M	M	M-H	100	30-90	5.5	2
ANP-0960	02-Oct	3		H	H	100	20-70	6	2
ANP-0961	28-Sep	4	M	M	L-H	100	20-80	4.5	4
ANP-0962	01-Oct	4		M	M-H	100	30-90	5	3
ANP-0963	27-Sep	4		M	L-M	40	20-60	2.5	5
ANP-0964	27-Sep	3							3
ANP-0965	28-Sep	4		L-M	L-H	100	15-50	3.5	3
ANP-1001	22-Sep	6							4
ANP-1002	20-Sep	7		L-M	L-M	20	10-20	1.5	
ANP-1003	27-Sep	5							3
ANP-1004	29-Sep	6		L-M	L-H	75	20-60	5	3
ANP-1005	23-Sep	5		M-H	H	100	40-80	6.5	3
ANP-1006	02-Oct	5			H	100	40-90	7	3
ANP-1007	29-Sep	5		M	L-H	100	10-80	4.5	3

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-1008	29-Sep	4		L-M	L-H	100	10-70	3	3
ANP-1009	30-Sep	4		M	M-H	100	20-60	4.5	2
ANP-1010	29-Sep	4	L	H	H	100	0-90	7	4
ANP-1011	28-Sep	4		H	H	100	30-50	6	3
ANP-1012	04-Oct	4	L	L-M	L-H	100	20-80	4	4
ANP-1013	02-Oct	4		M	M-H	100	30-70	4.5	2
ANP-1014	29-Sep	4	M	L	M-H	90	20-60	4.5	
ANP-1015	01-Oct	5	L	L-M	L-M	50	20-50	1.5	4
ANP-1016	26-Sep	4	L	L-M	L-H	100	30-60	3	2
ANP-1017	26-Sep	4		M	L-H	90	20-60	3.5	3
ANP-1018	30-Sep	5	L	L	L-M	40	20-40	1.5	5
ANP-1019	25-Sep	4		M	M-H	100	20-80	5.5	4
ANP-1020	12-Oct	4		L-M	L-H	100	20-50	4	3
ANP-1021	23-Sep	7	L	M	L-H	100	30-70	3	3
ANP-1022	22-Sep	7	L	M	L-H	90	5-80	3	5
ANP-1023	30-Sep	4	L	M	H	100	10-70	5	3
ANP-1024	08-Oct	4		M-H	H	100	50-95	6	3
ANP-1025	28-Sep	4	L-M	M	L-H	100	20-70	4.5	3
ANP-1026	28-Sep	4		L	L-H	60	10-60	3	1
ANP-1027	03-Oct	5		L-M	L-H	50	30-70	2.5	5
ANP-1028									3
ANP-1029	23-Sep	4							
ANP-1030	01-Oct	5	H	M-H	L-H	80	10-60	3.5	4
ANP-1031	01-Oct	4	M-H	M	M-H	100	40-80	4.5	2
ANP-1032	29-Sep	5			L	40	10-20	1	
ANP-1033	30-Sep	4		H	H	100	50-90	7	4
ANP-1034	01-Oct	5		H	M-H	100	30-70	6	4
ANP-1035									3
ANP-1036									5
ANP-1101	20-Sep	4		M	L-M	90	20-40	2	3
ANP-1102	24-Sep	3							3
ANP-1103	24-Sep	2		M	H	50	30	5	2
ANP-1104	20-Sep	6		M	L-M	80	30-50	2	5
ANP-1105	24-Sep	4		M	L	50	20-30	1	4
ANP-1106	25-Sep	4		L-M	L-M	80	20-40	2	3
ANP-1107	21-Sep	4							3
ANP-1108	24-Sep	4	L	M-H	M-H	100	20-50	4	2
ANP-1109	20-Sep	6		H	L	100	20-30	1	4
ANP-1110	23-Sep	6		L-M	L	30	40	1	3
ANP-1111	23-Sep	4							2
ANP-1112	24-Sep	2		L	L-H	100	10-50	3	5
ANP-1113	23-Sep	4		M	L	100	20-50	1	4
ANP-1114	23-Sep	6		M	L-M	100	20-30	2	2
ANP-1115	25-Sep	5		M-H	L	80	20-40	1	3
ANP-1116	24-Sep	5							3
ANP-1117	24-Sep	5		L	L-M	60	20-40	2	3
ANP-1118	29-Sep	3							3
ANP-1201	23-Sep	6	L	M-H	H	100	40-90	6	4
ANP-1202	22-Sep	7		M-H	H	100	60-80	6	3
ANP-1203	01-Oct	8		M-H	H	100	40-60	5	
ANP-1204	18-Sep	7	L	M-H	M-H	100	30-40	4	4
ANP-1205	19-Sep	8	L	H	H	100	30-50	5	2
ANP-1206	27-Sep	5							3
ANP-1207	23-Sep	2		M-H	M-H	90	20-50	4	2
ANP-1208	30-Sep	7		H	H	100	60-80	7	3
ANP-1209	27-Sep	5		M	L-M	100	30-50	2	4

Selection	Average full bloom	Bloom period (days)	Russet rating ^a	Blush					Shape rating ^c
				Consistency	Strength & brightness	% fruit	% coverage range	Blush rating ^b	
ANP-1210	29-Sep	6		H	M-H	100	40-60	5	3
ANP-1211	22-Sep	6		H	H	100	30-50	6	4
ANP-1212	22-Sep	5		M-H	M	100	50-90	4	3
ANP-1213	22-Sep	6	L	M	M-H	100	30-70	4	2
ANP-1214	20-Sep	7							
ANP-1215	28-Sep	4	L-M	M	L-M	80	10-40	2	4
ANP-1216	20-Sep	6		M	M-H	75	20-40	4	2
ANP-1217	22-Sep	6		L-M	L	30	30-40	1	3
ANP-1218	06-Oct	3		H	H	100	40-50	6	1
Corella	19-Sep	11		M	L-H	95	20-70	3	3
Packham	29-Sep	7	L						4
WBC	08-Oct	8	L	M	L	15	10-20	1	4

a Russet rating: L=neck and/or calyx russet or low lenticel and/or general russet, M=medium lenticel and/or general russet, H=high lenticel and/or general russet.

b Blush rating: Based on strength/brightness and consistency where L, M, and H = low, medium and high blush and % coverage on 2011 data; 1 = L 10-90%, 2 = L-M, M (M,L consistency) 10-90%, 3 = L-M & L-H (H consistency), 10-90%, 4 = M (H consistency), M-H (M consistency), 10-90%, 5 = H (M consistency) <50%, 6 = H (H consistency) <50% and 7 = H (H consistency) >50%.

c Shape rating: 1 = round to flat round, 2 = rounded oblong or obovate pyriform, 3 = globular-acute pyriform or triangular, 4 = oblong-ovate pyriform or turbinate and 5 = oblong to elongated oblong pyriform.

Appendix 6: Levels of leaf scab on pear selections in late March 2012 and Nov 2013 and on fruit at harvest in 2012 and 2013.

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-0101	BPM	Corella	4			
ANP-0114	BPM	Corella	6	1		
ANP-0118	BPM	Corella	4	2?		
ANP-0120	Comice	Yali	5?			
ANP-0121	HW606	Packham	3?			
ANP-0131	Corella	Comice	4	2		
ANP-0132	Dr Jules Guyot	Comice	4?	2		
ANP-0302	Dr Jules Guyot	Comice	5?	3		
ANP-0304	WBC	Howell	5	4		
ANP-0308	BPM	Corella	4	3		
ANP-0310	BPM	Corella	4	3		
ANP-0311	HW606	Packham	4	2		
ANP-0312	Harrow Delight	Packham	5	2		
ANP-0316	WBC	BPM	7	4		
ANP-0320	WBC	Howell	4	1		
ANP-0323	WBC	Howell	5	1		
ANP-0325	BPM	Comice	6	3		
ANP-0333	Dr Jules Guyot	Corella	5	3		
ANP-0341	WBC	Howell	3	2		
ANP-0345	BPM	Corella	3	2		
ANP-0406	BPM	Comice	5	7		
ANP-0409	Comice	BPM	6	5		
ANP-0410	Comice	BPM	5	2		
ANP-0411	Comice	BPM	9	3		
ANP-0421	Dr Jules Guyot	Corella	4	5		
ANP-0423	US 56112-146	Packham	5	3		
ANP-0425	WBC	BPM	9	2		
ANP-0427	WBC	BPM	5	3		
ANP-0428	WBC	BPM	8	4		
ANP-0429	WBC	BPM	5	3		
ANP-0432	Dr Jules Guyot	Corella	5	3	3	
ANP-0506	Comice	Howell	5	2		
ANP-0514	Josephine	Comice	6	2		
ANP-0518	BPM	YaLi		1		
ANP-0520	I11-13B-83	Packham	4	1		
ANP-0521	I11-13B-83	Packham	6	2		
ANP-0528	Dr Jules Guyot	Corella	3?	3		
ANP-0532	Dr Jules Guyot	Corella	5	2	2	
ANP-0534	Dr Jules Guyot	Corella	3?	5		
ANP-0535	Packham	Comice	4	3		
ANP-0543	Dr Jules Guyot	Rogue Red		2	2	5
ANP-0549	Dr Jules Guyot	Rogue Red	6	2	2	2

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-0608	Dr Jules Guyot	Comice	8	4		
ANP-0612	Packham	Comice	3	3		
ANP-0613	Packham	Comice	3	1?		
ANP-0615	Packham	Comice	3	2		
ANP-0616	Packham	Comice	4	2		
ANP-0620	Rogue Red	Eldorado	3	3		
ANP-0621	Dr Jules Guyot	Rogue Red	7	6	3	5
ANP-0622	Dr Jules Guyot	Rogue Red	6	6	6	3
ANP-0624	Dr Jules Guyot	Rogue Red	3	4	2	3
ANP-0625	Dr Jules Guyot	Rogue Red	5	4	3	3
ANP-0626	Dr Jules Guyot	Rogue Red	8	6	3	5
ANP-0627	Dr Jules Guyot	Rogue Red	7	3	3	2
ANP-0628	Dr Jules Guyot	Rogue Red	4	6		
ANP-0629	Dr Jules Guyot	Rogue Red	3?	3		
ANP-0630	Dr Jules Guyot	Rogue Red	5	8	2	7
ANP-0632	Dr Jules Guyot	Rogue Red	4	3	3	3
ANP-0634	Dr Jules Guyot	Rogue Red	7	4	3	3
ANP-0638	Rogue Red	Josephine	3	4		
ANP-0639	Packham	Comice	3	2		
ANP-0642	Eldorado	Rogue Red	3	3		6
ANP-0643	Rogue Red	Dr Jules Guyot	2?	3	2	2
ANP-0644	Dr Jules Guyot	Rogue Red	4?	3	2	3
ANP-0645	Dr Jules Guyot	Rogue Red	6	5	4	1
ANP-0646	Dr Jules Guyot	Rogue Red	4	3	2	6
ANP-0647	Dr Jules Guyot	Rogue Red	4	3	3	3
ANP-0648	Dr Jules Guyot	Rogue Red	3?	6	3	8
ANP-0650	Dr Jules Guyot	Rogue Red		4		4
ANP-0651	Dr Jules Guyot	Rogue Red	4	3	3	5
ANP-0652	Dr Jules Guyot	Rogue Red	3	7	2	3
ANP-0701	Comice	Josephine	3			
ANP-0703	Packham	Comice	3	3		
ANP-0705	Dr Jules Guyot	Corella	3		2	
ANP-0708	Dr Jules Guyot	Corella	3	3	2	
ANP-0710	Dr Jules Guyot	Corella	2?		3	
ANP-0711	Dr Jules Guyot	Corella	5	1	3	
ANP-0712	Corella	Dawn	3			
ANP-0713	Dr Jules Guyot	Corella	3	1		
ANP-0714	Dr Jules Guyot	Rogue Red	4	5	2	6
ANP-0715	Dr Jules Guyot	Rogue Red	3	3	3	3
ANP-0716	Dr Jules Guyot	Rogue Red	3	2	3	3
ANP-0717	Dr Jules Guyot	Rogue Red	8	4	7	6
ANP-0719	Rogue Red	Dr Jules Guyot	5	3	3	8
ANP-0720	Rogue Red	Dr Jules Guyot	6	4	3	7
ANP-0721	Rogue Red	Dr Jules Guyot	3?	2	2	4
ANP-0722	Dr Jules Guyot	Rogue Red	5?	4	7	7

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-0724	Dr Jules Guyot	Rogue Red	4	4	2	7
ANP-0725	Dr Jules Guyot	Rogue Red	5	5	3	4
ANP-0726	Concord	BPM	9			
ANP-0727	Clapps ?	20th Century ?	2	1		
ANP-0801	Comice	Howell	5	3		
ANP-0901	Comice	ANP-0118	7			
ANP-0902	Precoco di Fiorano	ANP-0118	9			
ANP-0903	BPM	Forelle	2			
ANP-0904	BPM	Forelle	9			
ANP-0905	BPM	Forelle	3			
ANP-0906	BPM	Forelle	3			
ANP-0907	Josephine	Rogue Red	6			
ANP-0908	Dr Jules Guyot	Rogue Red	4	5	2	2
ANP-0909	Dr Jules Guyot	Rogue Red	7	3	7	4
ANP-0910	Dr Jules Guyot	Rogue Red	8	3	3	3
ANP-0911	Dr Jules Guyot	Rogue Red	4	4	3	3
ANP-0912	Dr Jules Guyot	Rogue Red	8	6	4	6
ANP-0913	Dr Jules Guyot	Rogue Red	6	3	3	5
ANP-0914	Dr Jules Guyot	Rogue Red	6	4	3	4
ANP-0915	Dr Jules Guyot	Rogue Red	5	5	3	4
ANP-0916	Dr Jules Guyot	Rogue Red	5	1	3	3
ANP-0917	Dr Jules Guyot	Rogue Red	6	6	3	3
ANP-0918	Dr Jules Guyot	Rogue Red	7	4	3	3
ANP-0919	Dr Jules Guyot	Rogue Red	8	2	3	3
ANP-0920	Dr Jules Guyot	Rogue Red	5	7	3	3
ANP-0921	Dr Jules Guyot	Rogue Red	7	5	3	7
ANP-0922	Dr Jules Guyot	Rogue Red	5	4	3	4
ANP-0923	Dr Jules Guyot	Rogue Red	6	5	3	6
ANP-0924	Dr Jules Guyot	Rogue Red	3	7	2	4
ANP-0925	Dr Jules Guyot	Rogue Red	3	6	2	1
ANP-0926	Dr Jules Guyot	Rogue Red	5	7	2	6
ANP-0927	Dr Jules Guyot	Rogue Red	6	5	5	2
ANP-0928	Dr Jules Guyot	Rogue Red	5		2	7
ANP-0929	Dr Jules Guyot	Rogue Red	6	2	2	2
ANP-0930	Dr Jules Guyot	Rogue Red	6	2	3	1
ANP-0931	Rogue Red	Dr Jules Guyot	6	3	2	1
ANP-0932	Rogue Red	Dr Jules Guyot	5	7	2	6
ANP-0933	Rogue Red	Dr Jules Guyot	5	2	4	3
ANP-0934	Rogue Red	Dr Jules Guyot	4		2	1
ANP-0935	Rogue Red	Dr Jules Guyot	8	7	3	6
ANP-0936	Rogue Red	Dr Jules Guyot	6		3	
ANP-0937	Rogue Red	Dr Jules Guyot	7	6	3	3
ANP-0938	Rogue Red	Dr Jules Guyot	8	4	7	4
ANP-0939	Rogue Red	Dr Jules Guyot	6	3	3	1
ANP-0940	Rogue Red	Dr Jules Guyot	2?	3	2	1

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-0941	Dr Jules Guyot	Corella	4	3	2	
ANP-0942	Dr Jules Guyot	Corella	4			
ANP-0943	Dr Jules Guyot	Corella	7	4	4	1
ANP-0944	Dr Jules Guyot	Corella	3	3	3	2
ANP-0945	Dr Jules Guyot	Corella	3	3	2	
ANP-0946	Dr Jules Guyot	Corella	4			
ANP-0947	Dr Jules Guyot	Corella	7	4	2	
ANP-0948	Dr Jules Guyot	Corella	4	4	2	5
ANP-0949	Dr Jules Guyot	Corella	3	2	2	1
ANP-0950	Dr Jules Guyot	Corella	8			
ANP-0951	Dr Jules Guyot	Corella	6			
ANP-0952	Corella	Dawn	3?			
ANP-0953	Rogue Red	WBC	5			
ANP-0954	Rogue Red	WBC	7			
ANP-0955	Josephine	Rogue Red	4			
ANP-0956	Josephine	Rogue Red	4	3		3
ANP-0957	Eldorado	Rogue Red	3			
ANP-0958	Eldorado	Rogue Red	3			
ANP-0959	Rogue Red	Josephine	3?	3	5	3
ANP-0960	Dr Jules Guyot	Rogue Red	4	5	2	2
ANP-0961	Dr Jules Guyot	Rogue Red	6	4	2	3
ANP-0962	Dr Jules Guyot	Rogue Red	5	7	3	4
ANP-0963	Dr Jules Guyot	Rogue Red	2?	3	2	6
ANP-0964	Josephine	Rogue Red	6			
ANP-0965	Josephine	Rogue Red	6	3	2	4
ANP-1001	Precoce di Fiorano	ANP-0118	8			
ANP-1002	BPM	YaLi	4	1		
ANP-1003	Unknown		3			
ANP-1004	Dr Jules Guyot	Corella	2?	3	2	
ANP-1005	Dr Jules Guyot	Corella	2	4	2	
ANP-1006	Dr Jules Guyot	Rogue Red	4		2	3
ANP-1007	Dr Jules Guyot	Rogue Red	2	5	2	3
ANP-1008	Dr Jules Guyot	Rogue Red	4	5	2	5
ANP-1009	Dr Jules Guyot	Rogue Red	5	5	3	3
ANP-1010	Dr Jules Guyot	Rogue Red	3	7	4	5
ANP-1011	Dr Jules Guyot	Rogue Red	3		2	5
ANP-1012	Dr Jules Guyot	Rogue Red	4	7	3	4
ANP-1013	Dr Jules Guyot	Rogue Red	6	5	2	4
ANP-1014	Dr Jules Guyot	Rogue Red	7	5	7	4
ANP-1015	Dr Jules Guyot	Rogue Red	5	5	3	5
ANP-1016	Dr Jules Guyot	Rogue Red	5	5	3	5
ANP-1017	Dr Jules Guyot	Rogue Red	7		2	5
ANP-1018	Dr Jules Guyot	Rogue Red	4	5	3	3
ANP-1019	Dr Jules Guyot	Rogue Red	6	4	3	3
ANP-1020	Dr Jules Guyot	Rogue Red	9	5	4	5

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-1021	Rogue Red	Yali	2		2	
ANP-1022	Rogue Red	Yali	2	3	2	
ANP-1023	Dr Jules Guyot	Rogue Red	5?	7	2	5
ANP-1024	Dr Jules Guyot	Rogue Red	6	4	2	6
ANP-1025	Rogue Red	Dr Jules Guyot	4	7	2	7
ANP-1026	Rogue Red	Dr Jules Guyot	5	4	3	4
ANP-1027	Rogue Red	Dr Jules Guyot	6	6	3	6
ANP-1028	Eldorado	ANP-0118 (BPM x Corella)	5			
ANP-1029	Rogue Red	Yali	4			
ANP-1030	Vicar of Winkfield	Eldorado	4	5		3
ANP-1031	Josephine	Rogue Red	4	6		5
ANP-1032	Rogue Red	Dr Jules Guyot	5	5	3	5
ANP-1033	Rogue Red	Dr Jules Guyot	8	3	8	4
ANP-1034	Dr Jules Guyot	Rogue Red	4	3	3	6
ANP-1035	Concord	BPM	3			
ANP-1036	Concord	BPM	3			
ANP-1101	Precoce di Fiorano	ANP-0118 (BPM x Corella)	9	3		
ANP-1102	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)	8			
ANP-1103	Comice	ANP-0118 (BPM x Corella)	9			
ANP-1104	Comice	ANP-0118 (BPM x Corella)	8			
ANP-1105	ANP-0305 (Comice x BPM)	ANP-0429 (WBC x BPM)	8			
ANP-1106	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	9	4		
ANP-1107	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	8			
ANP-1108	Comice	ANP-0422 (Guyot x Hood)	3	3		
ANP-1109	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	9			
ANP-1110	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	8			
ANP-1111	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	9			
ANP-1112	Comice	ANP-0131 (Corella x Comice)	8	5		
ANP-1113	ANP-0411 (Comice x BPM)	ANP-0309 (BPM x Corella)	9			
ANP-1114	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)	9			
ANP-1115	Rogue Red	ANP-0311 (HW606 x Packham)	8			
ANP-1116	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	7			
ANP-1117	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)	8			
ANP-1118	Rogue Red	ANP-0420 (Guyot x Corella)	4	3		

Selection	Female	Male	2012		2013	
			Leaf Scab	Fruit Scab	Leaf Scab	Fruit Scab
ANP-1201	Corella	ANP-0411 (Comice x BPM)				
ANP-1202	Rogue Red	ANP-0420 (Guyot x Corella)				
ANP-1203	Rogue Red	ANP-0420 (Guyot x Corella)				
ANP-1204	Rogue Red	ANP-0420 (Guyot x Corella)				
ANP-1205	Corella	ANP-0423 (US 56112-146)				
ANP-1206	Corella	ANP-0423 (US 56112-146)				
ANP-1207	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)				
ANP-1208	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)				
ANP-1209	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)				
ANP-1210	ANP-0305 (Comice x BPM)	ANP-0420 (Guyot x Corella)				
ANP-1211	ANP-0131 (Corella x Comice)	ANP-0118 (BPM x Corella)				
ANP-1212	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)				
ANP-1213	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)				
ANP-1214	ANP-0118 (BPM x Corella)	ANP-0112 (Corella x Packham)				
ANP-1215	Rogue Red	ANP-0311 (HW606 x Packham)				
ANP-1216	Corella	ANP-0518 (BPM x Yali)				
ANP-1217	Howell	ANP-0422 (Guyot x Hood)				
ANP-1218	Rogue Red	ANP-0420 (Guyot x Corella)				
Corella	Forelle?	op	5	2		
Packham	Uvedale St. Germain	WBC ?	5	2		
WBC	Unknown		3?	4		

1 = highly resistant (no visible symptoms); 2 = resistant (few small scab spots detectable on close scrutiny); 3 and 4 = slightly resistant (scab infection immediately apparent); 5 and 6 = slightly susceptible (infection widespread over tree); 7 and 8 = susceptible (multiple lesions per leaf/fruit or large surface covered by scab on most leaves/fruit); and 9 = highly susceptible (nearly all leaves/fruit black with scab, leaves eventually fall off).

