

**Project title:** Evaluation and development of new rootstocks for apples – new work on new plantings

**Project number:** TF 172b

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**Report:** Annual report, April 2013

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**Date project completed (or expected completion date):** 30 April 2016

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

**AUTHENTICATION**

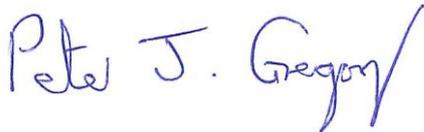
We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Gary M. Saunders  
Horticultural Services Manager - Science  
East Malling Research

Signature ..... Date .....

**Report authorised by:**

Professor Peter J. Gregory  
Chief Executive  
East Malling Research



29 April 2013

Signature ..... Date .....

# CONTENTS

<b>GROWER SUMMARY</b> .....	<b>1</b>
Headline.....	1
Background and expected deliverables .....	1
Summary of the project and main conclusions .....	2
Financial benefits.....	2
Action points for growers .....	2
<b>SCIENCE SECTION</b> .....	<b>3</b>
Introduction .....	3
Materials and methods .....	4
Results.....	5
Discussion .....	7
Conclusions .....	7
Knowledge and Technology Transfer .....	8

## GROWER SUMMARY

### Headline

- Nine Canadian apple rootstock selections have been obtained for evaluation with a combination of Gala and Braeburn scions and three *Pyrus* and four quince pear rootstock selections for pear have been taken forward for evaluation after budding with Conference.

### Background and expected deliverables

A review of HDC-funded rootstock research projects (Project TF 158) acknowledged that there was a strong need for new or improved rootstocks for apples, pears, plums and cherries that are dwarfing, precocious, high yielding and offer some measure of drought tolerance. The report recognised that rootstocks are a vital part of the currently used growing systems for tree fruits but those currently used in tree fruit production have been grown for decades and all have some limitations. Breeding programmes in the UK and abroad have generated a number of promising rootstocks in recent years which are becoming increasingly available to growers. The TF 158 report recommended that UK trialling of promising UK and overseas material should continue and that technology transfer should be improved. This work was then undertaken in HDC project TF 172 (*Evaluation and development of new rootstocks for apples, pears, cherries and plums*).

This new project is a continuation of HDC project TF 172 but focuses only on apple and pear rootstocks. The main aim of the project is to acquire, evaluate and develop (in UK growing conditions), new apple and pear rootstocks produced by breeding programmes both at EMR and abroad. This project provides continuity of the trialling of fruit tree rootstocks at EMR - in apple looking for rootstocks of intermediate vigour between M27 and M9 and a replacement for M26, and in pear a rootstock with increased dwarfing using quince or preferably *Pyrus*.

Selection and release of improved rootstocks to the industry will be of benefit as the introduction of new rootstocks with increased precocity and yield with fewer requirements for chemical or mechanical growth control will have a huge impact on the profitability of UK orchards.

## **Summary of the project and main conclusions**

Nine selections of Canadian apple rootstocks, selected for winter hardiness, disease resistance, dwarfing habit, precocity and ease of propagation, were obtained and grafted with Braeburn and Gala. The selections were from a breeding programme initially in Morden, Manitoba then transferred to St-Jean-sur-Richelieu, Quebec and comprised: SJM15, SJM127, SJM167, SJM188, SJM189, SJP84-5217, SJP84-5231, SJP84-5162 and SJP84-5174. These were grafted alongside M9, M26, M27 and MM106.

Pear rootstocks were propagated from seven promising selections from the East Malling Rootstock Club, three of which were *Pyrus* and four of which were quince. Budding will be carried out on those selections successfully propagated to produce trees for evaluation.

## **Financial benefits**

It is too early in the project for any financial benefits to be apparent, although a selected *Pyrus* rootstock would be of great benefit to the industry as this would overcome many incompatibility problems and remove the need for an interstock.

## **Action points for growers**

- There are no action points at present.

## SCIENCE SECTION

### Introduction

A review of HDC-funded rootstock research projects (project TF158) acknowledged that there was a strong need for new or improved rootstocks for apples, pears, plums and cherries that are dwarfing, precocious, high yielding and offer some measure of drought tolerance. The report recognised that rootstocks are a vital part of the currently used growing systems for tree fruits but those currently used in tree fruit production have been grown for decades and all have some limitations. Breeding programmes in the UK and abroad have generated a number of promising rootstocks in recent years, which are becoming increasingly available to growers. The TF 158 report recommended that UK trialling of promising UK and overseas material should continue and that technology transfer should be improved. This work was then undertaken in HDC project TF172 - Evaluation and development of new rootstocks for apples, pears, cherries and plums.

This new project is a continuation of HDC project TF172 but focusing only on apple and pear rootstocks. The main aim of the project was to acquire, evaluate and develop in UK growing conditions new apple and pear rootstocks produced by breeding programmes both at EMR and abroad. This project provided continuity of the trialling of fruit tree rootstocks at EMR. The specific objectives were:

### ***Apple***

- To select and develop apple rootstocks with intermediate vigour between M27 and M9, which perform well in the nursery and which produce precocious and consistently abundant yields of high quality fruits of the marketable size grades
- To select and develop a replacement rootstock in the M26 vigour category, which does not suffer from burr knotting, poor calcium uptake or physiological disorders in the scion fruit. This rootstock should also induce precocious and abundant yields of high quality fruits
- To select and develop dwarfing rootstocks for apple which exhibit improved resistance to drought, (weed competition) replant disease and soil borne diseases (e.g. collar/crown rot)

## **Pear**

- To select and develop quince rootstocks more dwarfing than Quince C with improved precocity of cropping
- To select dwarfing Pyrus rootstocks that are easy to propagate, and that induce good yield precocity/productivity

Selection and release of improved rootstocks to the industry will be of benefit as the introduction of new rootstocks with increased precocity and yield with fewer requirements for chemical or mechanical growth control will have a huge impact on the profitability of UK orchards.

## **Materials and methods**

Work was split between two sites, EMR and Brogdale (Fast Ltd).

At Brogdale one planting of six rootstock selections with Braeburn and Gala scions was planned for winter 2012/13. The trees were potted up on 7 March 2012 into 10L pots using Sinclair SHL tree and shrub compost (N 210, P<sub>2</sub>O<sub>5</sub> 210, K<sub>2</sub>O 270 g/m<sup>3</sup>, pH 6.0). Osmacote Exact Standard (15+9+11) was applied at planting which has a release time of 8-9 months. The trees were cut back to 1m to allow regrowth to take place as in the nursery production of trees. The trees were sprayed every 7 to 10 days with a standard programme of foliar feeds and fungicides for mildew and scab. On two occasions, the trees were sprayed for aphid with Aphox and Mainman respectively.

At EMR two new plantings of six Canadian apple rootstock selections with Braeburn and Gala scions and one new planting of three East Malling Rootstock Club pear rootstock selections with Conference as scion was planned for 2013/14. Propagation of apple trees by grafting Braeburn and Gala on to the range of rootstocks was carried out in February 2013. The Canadian selections were SJM and SJP84 series selected for winter hardiness, disease resistance, dwarfing habit, precocity and ease of propagation. Hardwood cuttings of quince and Pyrus rootstocks selected from the East Malling Rootstock Club trials were taken in February 2013 for budding in August.

## Results

### *Brogdale site*

The data presented in Tables 1 and 2 below show the shoot measurements conducted on 7 February 2013. The growth of the leader was recorded by measuring the length of growth and by counting the number of buds produced. In addition the number of laterals produced on the leader was also recorded.

**Table 1.** The leader length, number of buds and number of laterals produced by the Braeburn trees

	Shoot length (cm)	Number of buds	Number of laterals
M9	68.1	34.9	1.2
F56	69.8	35.2	0.9
P16	67.3	36.2	1.0
P22	68.9	35.8	1.6
P66	63.3	32.3	1.4
LSD	17.35	6.46	1.03
P-VALUE	0.85	0.55	0.49

**Table 2.** The leader length, number of buds and number of laterals produced by the Gala trees

	Shoot length (cm)	Number of buds	Number of laterals
M9	65.8	33.3	0.1
F56	68.6	35.4	0.1
P16	68.8	33.8	0.1
P22	71.1	33.8	0.5
P66	65.8	33.2	0.4
LSD	9.52	4.68	0.5
P-VALUE	0.56	0.71	0.24

The effect of rootstock was not significant for either variety and the variability between trees was such that the LSDs for each parameter were much greater than the overall difference between rootstocks. For example, a difference in shoot length for Braeburn of 17cm would be required for the difference to be significant at this level of variability. In addition, the

number of laterals produced by the trees means that were the trial to be continued, a further year's establishment would be required. For this reason and combined with the variability seen, it has been decided that this part of the rootstock project should not continue.

**EMR site**

Apple: the plan was to evaluate two orchard plots with six Canadian rootstock selections. Nine selections were available but some were only in limited numbers. The scion / rootstock combinations are shown in Table 3. There was sufficient material for planting out eight replicates of six different Canadian selections along with M9, M26, M27 and MM106 for each of the scions.

**Table 3.** Number of Braeburn and Gala trees produced February 2013

<b>Rootstock</b>	<b>Braeburn</b>	<b>Gala</b>
M9	12	13
M26	13	13
M27	12	12
MM106	12	13
SJM15	-	14
SJM127	8	-
SJM167	10	10
SJM188	12	-
SJM189	-	17
SJP84-5217	10	10
SJP84-5231	-	15
SJP84-5162	15	-
SJP84-5174	10	10

**Pear**

The plan was to evaluate one orchard plot with three rootstocks with Conference as the scion variety. Hardwood cuttings were taken in February 2013 of three Pyrus and four Quince selections (Table 4) which have showed promise in East Malling Rootstock Club trials. These were potted on when roots or callus was visible, with the number of cuttings showing roots at potting recorded. Selections from this range will be made at planting.

**Table 4.** Number of cuttings taken and subsequent potting February/March 2013

<b>Rootstock</b>	<b>Cuttings taken</b>	<b>Number potted</b>	<b>Number rooted at potting</b>
Pyrus PQ 34-3	24	24	2
Pyrus PQ 34-6	23	23	12
Pyrus PQ 35-2	25	24	0
Quince PQ 5-12	17	17	0
Quince PQ 5-13	20	19	0
Quince PQ 5-16	18	18	6
Quince PQ 5-18	19	19	4

## **Discussion**

Due to the variability within each of the rootstock / scion combination of the trees managed by Fast Ltd. it was decided that continuing this portion of the trial was not worthwhile. However the orchard site had been prepared and will be kept clear for any future plantings requiring HDC rootstock projects.

More of the Canadian apple rootstocks were available than initially expected. These were then obtained and grafted with Braeburn and Gala, enabling a greater range of this rootstock series to be evaluated within the trial as it progresses.

Pear rootstocks were propagated from seven promising selections from the East Malling Rootstock Club, three of which were *Pyrus*. Budding will be carried out on those selections to produce trees for evaluation. A selected *Pyrus* rootstock would be of great benefit to the industry as this would overcome many incompatibility problems and remove the need for an interstock.

## **Conclusions**

- The evaluation of rootstocks at Brogdale Farm under the management of Fast Ltd. has been terminated
- Nine Canadian rootstock selections have been obtained for evaluation with a combination of Gala and Braeburn scions
- Three *Pyrus* and four quince rootstock selections have been taken for evaluation after budding with Conference

## **Knowledge and Technology Transfer**

An *HDC News* article is planned for June 2013.