

APRC Project Report

Project: SP123: Evaluation and propagation of new apple and pear rootstocks

Project Staff: A.D. Webster, J.E. Spencer, E. Bonham (until June 2000 only)

Date: Report to 30 September 2000

Pear Rootstock Trials

Much interest is being shown currently in the USA in the new rootstock Pyrodwarf. Professor Jacob at Geisenheim in Germany developed this clonal *Pyrus* rootstock. USA pear growers cannot use quince rootstocks, on account of their sensitivity to winter cold injury and are keen to find a dwarfing clone of *Pyrus communis*. A dwarfing clonal stock of *Pyrus communis* could also be of value to UK growers as it would exhibit better compatibility with pear scions than quinces and should also prove more tolerant of drought and poor soil conditions.

Pyrodwarf was selected from seedlings of the variety Louise Bonne d'Avranches. A trial in Germany showed it to be dwarfing and to induce good yield precocity and productivity. The stock is also reasonably easy to propagate vegetatively, which is unusual for clones of *Pyrus communis*.

Following negotiations with the breeder one-year-old trees of Conference and Comice were obtained on Pyrodwarf from a nursery in the Netherlands for planting in spring 1997. These are compared with trees of the same varieties planted on QA and QC. Unfortunately, the trees raised on Pyrodwarf were much smaller than trees on QC and QA at the time of planting.

The results from this preliminary trial of Pyrodwarf are presented in Tables 1 and 2. It can be seen that, although the Conference trees on Pyrodwarf were very small (whips of only just over 30cm in height) at the time of planting, by 1999 they were making more shoot growth than trees on QC and similar growth to trees on QA. The seasonal increase in the rate of growth of Comice on Pyrodwarf has been less than that of Conference and in 1999 growth was less than on the two quince clones. However, observations in 2000 indicate suggest that Comice on Pyrodwarf may be sensitive to Pear Decline and this may be having a negative influence on shoot growth. Further observations on sensitivity of trees on Pyrodwarf to Pear Decline are being made.

The trunk girths of the trees on Pyrodwarf are also increasing at a more rapid rate than the trees on the quince rootstocks. This preliminary evidence may indicate that, unless this rate of growth moderates, trees on Pyrodwarf may not prove as dwarfing as the German results suggest.

Table 2 shows the numbers of floral buds and yields produced on the trees. The numbers of flowers developing on the trees grafted on Pyrodwarf were initially very few, but this is probably explained by the much smaller tree size. By spring 2000, the numbers of flowers had increased and were similar on trees grafted on Pyrodwarf and QA. Yields to date are insignificant and similar on all the rootstocks.

Table 1: Growth of Conference and Comice trees planted on Pyrodwarf, QA or QC in spring 1997

Rootstk.	Leader ht. at planting (cm)	Total extension shoot length (m)				Trunk girth (cm)		
		1996*	1997	1998	1999	1997	1998	1999
Conference								
Pyro.	34	0.94	3.1	3.5	9.4	4.6	6.2	9.4
QC	115	0.01	7.6	8.8	5.8	6.9	9.1	10.3
QA	111	0.07	5.0	6.3	10.4	6.3	8.7	10.7
Comice								
Pyro.	37	1.17	2.4	10.4	12.8	4.1	7.6	10.2
QC	134	0.05	2.3	12.7	20.5	5.9	9.0	11.2
QA	143	0.08	2.5	8.7	19.1	6.4	8.9	11.3

* Feathers on trees at the time of planting

Table 2: Flowering and yields of Conference and Comice trees planted on Pyrodwarf, QA or QC in spring 1997

Rootstock	Floral bud numbers/tree*			Fruit numbers/tree	
	1998	1999	2000	1999	2000
Conference					
Pyro	0.2	17	49	1.2	1.0
QC	4.0	74	98	2.0	1.1
QA	4.4	30	36	1.8	0.2
Comice					
Pyro	3.0	12	62	1.8	0.6
QC	16.8	28	75	6.4	0.4
QA	27.6	24	64	2.4	0.0

*Total of spur + terminal + axillary

The full merits of Pyrodwarf can only be assessed if trials are planted with trees of better quality. Accordingly, well-feathered two-year-old trees were planted in a new trial in spring 2000.

Trials of the HRI quince rootstock selection QR193-16

A decision was taken recently by the Head Licensees of the Apple and Pear Breeding Club to move towards a release of the HRI-East Malling quince rootstock clone QR193-16. Trials in France, Spain, and Italy all support the earlier results obtained in a trial with Conference as scion conducted at HRI-East Malling. In the trials conducted abroad the rootstock has produced trees slightly more invigorating than similar trees on QC. Yield precocity has been poorer than on QC but fruit size and grade out much better.

In a trial planted in spring 1990, QR 193-16 was compared with QA, QC and another new selection QR 193-2 as rootstocks for the pear varieties Concorde and Comice.

As in previous trials, the trees on QR 193-16 are slightly larger than trees on QC but smaller than trees on QA rootstock (Table 3). The trees yielded very well in 2000 on a site which unfortunately is not ideal for pollination and fruit set in the spring. Yields in 1998 and 1999 were poor and no fruits were harvested in 1997 following severe frost damage. In the three years prior to 1997 yields were as expected on young pear trees.

Although Comice trees on QR 193-16 did exhibit slightly poorer precocity than trees of the same variety on QC, this was not the case with Concorde, which in the first four cropping years bore higher yields on QR 193-16.

Table 3: Tree size and yields of Concorde and Comice trees planted in spring 1990 on four clonal quince rootstocks

Rootstock	Trunk girth 1999/2000 (cm)	Yield/tree 2000 (kg)	Cum. yield/tree 1994-2000* (kg)	Cum yield/tree Class I 1998-2000 (kg)
Concorde				
QR 193-16	23.9	16.1	42	7.2
QR 193-2	26.5	17.9	41	5.4
QC	22.3	15.2	37	4.5
QA	26.6	18.3	38	7.2
Comice				
QR 193-16	28.3	18.4	48	12.5
QR 193-2	31.9	19.5	47	9.8
QC	26.3	17.0	52	10.0
QA	29.9	20.1	49	10.1

* No yields in 1997 on account of severe frost damage at flowering time.

Cumulative yields per tree (1994-2000) for the variety Concorde are best on QR 193-16, whilst for Comice trees on QC yielded highest. In the last three cropping seasons trees on QR 193-16 have produced the highest quantities of Class I fruits of Comice. Grade out of Concorde has proved equally good on QR 193-16 and QA.

Although inducing slightly poorer precocity of cropping of the variety Comice, QR 193-16 appears to have some significant benefits as a rootstock and seems better than QC for the variety Concorde.

Trials of Apple Rootstocks

The most recent results of the trials comparing Polish, Czech, Swedish, USA and Canadian apple rootstocks will be presented in the March report.

Efforts are continuing to bulk up the new HRI apple rootstock clone AR 86-1-25. This rootstock which has performed particularly well in New Zealand is of MM106 vigour. In many respects, including induction of yield precocity and abundance it is similar to MM.106. However, unlike MM.106, AR 86-1-25 is resistant to collar rot (*Phytophthora cactorum*). This should make of particular value on heavy clay soils where collar rot is a problem. Such soils are common in many areas of cider production.

