

## APRC Project Report

**Project SP105** Evaluation of new thinning chemicals

**Contractor:** Horticulture Research International – East Malling

**Project Staff:** Dr. A.D. Webster and Ms. Jane Spencer

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### Royal Gala apples

In 1996, Royal Gala trees were sprayed for a second successive year with the blossom thinner ammonium thiosulphate (ATS), endothallic acid (TD) or the fruitlet thinning chemical benzyl adenine (Paturyl).

Spray treatments or hand thinning in the previous year increased the numbers of flower clusters/tree in spring 1996 (Table 1). This effect was still evident after correction for flower numbers to take account of any differences in tree size, by expressing them per unit trunk cross sectional area.

**Table I.** The effects of blossom or fruitlet thinning treatments applied at high volume (ca. 100 gallons/acre) in 1995 and 1996 on the flowering and fruit set of Royal Gala/M.9 trees in 1996

Treatment*	Numbers of flower clusters (spring 1996)		Initial fruit set		Final fruit set	
	/tree	/cm <sup>2</sup>	/100 clusters	/cm <sup>2</sup> **	/100 clusters	/cm <sup>2</sup> **
ATS 0.5% (w/v)	101	7.6	172	13	155	12
ATS 1.0% (w/v)	142	9.1	156	14	133	12
ATS 1.5% (w/v)	207	13.9	146	21	95	13
TD 25mg l <sup>-1</sup>	107	8.1	253	22	210	17
TD 50mg l <sup>-1</sup>	158	11.2	149	16	134	15
TD 100mg l <sup>-1</sup>	161	11.2	123	14	107	12
Paturyl 50mg l <sup>-1</sup>	133	11.0	321	35	245	26
Paturyl 100mg l <sup>-1</sup>	109	8.8	307	27	242	21
Paturyl 200mg l <sup>-1</sup>	126	10.3	346	36	241	23
Control Unthinned	76	5.6	328	18	313	17
Hand thinned <sup>+</sup>	144	9.8	97	9	115	11
LSD P = < 0.05	56.1	3.84	43.6	11.5	44.6	6.4

<sup>+</sup> to singles when fruitlets were 12 mm diameter

\* spray concentrations are of active ingredient

\*\* flower clusters/cm trunk cross sectional area

Of the treatments applied in 1995, hand thinning ATS at 1.5% (w/v), TD at 50 mg l<sup>-1</sup> or 100 mg l<sup>-1</sup> and Paturyl at 50 mg l<sup>-1</sup> or 100 mg l<sup>-1</sup> all increased flowering significantly in 1996, in some cases more than doubling floral abundance in comparison with the untreated controls.

Although all the ATS and TD blossom thinning treatments applied in spring 1996 reduced initial fruit set/100 floral clusters, none of the treatments reduced initial set as severely as the hand thinning treatment. Also, calculations of set per tree (adjusted for tree size using trunk cross sectional area) showed that in 1996 none of the thinning treatments reduced set to the levels established on the hand thinned trees.

All thinning treatments reduced final set/100 blossom clusters significantly but only two treatments, ATS at 1.5% (w/v) and TD at 100 mg l<sup>-1</sup>, thinned to the same levels as hand thinning. Final fruit set/tree, adjusted for tree size, was similar on hand-thinned trees and those treated with any of the ATS and the highest TD concentrations.

Total yield/tree was similar for most treated and control trees in 1996 (Table 2). The largest fruits were picked from the hand-thinned trees but, even on these trees, only 50% of the harvested total weight was in the > 65 mm diameter category. The best of the chemical treatments were TD at 100 mg l<sup>-1</sup> and ATS at 0.5% (w/v) or 1.0% (w/v).

**Table 2.** The effects of blossom and fruitlet thinning treatments applied in 1995 and 1996 on the yield and grade-out of Royal Gala/M.9 in 1996

Treatment	Yield (kg/tree)			Mean fruit wt (g)
	Total	> 65 mm diameter	% > 65 mm	
ATS 0.5% (w/v)	14.8	4.6	32	100
ATS 1.0% (w/v)	17.4	3.2	22	99
ATS 1.5% (w/v)	17.1	1.6	10	91
TD 25 mg l <sup>-1</sup>	17.6	1.6	14	89
TD 50 mg l <sup>-1</sup>	17.7	2.1	13	91
TD 100 mg l <sup>-1</sup>	15.2	3.4	27	97
Paturyl 50 mg l <sup>-1</sup>	23.3	0.5	2	76
Paturyl 100 mg l <sup>-1</sup>	19.9	0.8	4	86
Paturyl 200 mg l <sup>-1</sup>	21.9	1.8	10	81
Control Unthinned	20.2	2.3	16	92
Hand thinned	17.7	8.5	50	112
LSD P = < 0.5%	5.64	2.79	-	15.3

The poorer response to the chemical treatments in 1996, compared with 1995, is explained partly by the very dry summer, but mainly by the excessive blossom abundance stimulated by the 1995 treatments. This resulted in too many fruits being retained on the trees at initial set, even after achieving significant blossom thinning using ATS and TD. Future trials will examine methods of alleviating this problem.

## Queen Cox apples

The Queen Cox trees treated in 1995 were treated again in 1996. As with the Royal Gala, blossom cluster numbers in spring 1996 were increased greatly by the treatments in the previous year (Table 3).

**Table 3.** The effects of blossom and fruitlet thinning treatments applied at high volume (ca. 100 gallons/acre) in 1995 and 1996 on the flowering and fruit set of Queen Cox/M.9 trees in 1996

Treatment*	Numbers of flower clusters (spring 1996)		Initial fruit set		Final fruit set	
	/tree	/cm <sup>2</sup>	/100 clusters	/cm <sup>2</sup> **	/100 clusters	/cm <sup>2</sup> **
ATS 0.5% (w/v)	166	10.0	100	9.6	108	10.1
ATS 1.0% (w/v)	253	15.0	73	10.9	62	9.3
ATS 1.5% (w/v)	212	12.1	78	9.3	63	7.6
TD 25mg l <sup>-1</sup>	157	9.7	131	12.3	123	11.3
TD 50mg l <sup>-1</sup>	203	12.7	90	11.2	81	10.0
TD 100mg l <sup>-1</sup>	293	16.2	37	5.7	40	5.7
Paturyl 50mg l <sup>-1</sup>	139	9.2	96	7.7	96	8.2
Paturyl 100mg l <sup>-1</sup>	151	10.7	153	15.4	118	11.3
Paturyl 200mg l <sup>-1</sup>	219	12.9	194	22.6	106	11.8
Control Unthinned	90	5.5	144	7.3	165	7.2
Hand thinned <sup>+</sup>	93	6.0	116	6.4	121	6.7
LSD P = < 0.05	86.2	4.5	41.0	4.8	46.8	4.1

<sup>+</sup> to singles when fruitlets were 12 mm diameter

\* spray concentrations are of active ingredient

\*\* flower clusters/cm trunk cross sectional area

Hand thinning the Queen Cox trees to 2 fruits/cluster in 1995 did not increase floral density/tree in 1996, whereas the two higher concentration sprays of all three chemicals did and, in several cases, blossom abundance was more than doubled.

Initial fruit set per 100 flower clusters was reduced on trees treated with any of the ATS concentrations, or those sprayed with either of the two higher concentrations of TD and by those treated with the lowest concentration of Paturyl. However, initial fruit set/tree adjusted for tree size was not reduced by any of the thinning treatments when compared with the controls. Indeed, initial set/tree was significantly higher on the trees treated with the two higher concentrations of Paturyl and the lowest TD concentration. Records of final fruit set showed similar treatment effects.

Only one treatment bore yields significantly different from the unthinned trees in 1996 (Table 4); trees sprayed with Paturyl at 200 mg l<sup>-1</sup> bore increased yields. No treatment increased yields of fruits > 65 mm diameter, although the hand thinned trees bore the largest percentage of their crop (64%) in this desired size range.

The results on Queen Cox were very similar to those described previously for Royal Gala. Although many of the thinning treatments reduced significantly the fruit set per 100 blossom clusters, this was

more than compensated for by the increased floral density on the trees, following similar treatments in 1995. Set/tree was not reduced enough and fruit size was not, therefore, increased.

**Table 4.** The effects of blossom and fruitlet thinning treatments applied in 1995 and 1996 on the yield and grade-out of Queen Cox/M.9 in 1996

Treatment	Yield (kg/tree)			Mean fruit wt (g)
	Total	> 65 mm diameter	% > 65 mm	
ATS 0.5% (w/v)	14.0	4.5	31	95
ATS 1.0% (w/v)	13.8	3.6	28	92
ATS 1.5% (w/v)	12.7	5.0	40	106
TD 25 mg l <sup>-1</sup>	13.9	2.8	31	85
TD 50 mg l <sup>-1</sup>	13.5	3.9	28	98
TD 100 mg l <sup>-1</sup>	11.5	5.8	40	118
Paturyl 50 mg l <sup>-1</sup>	11.1	3.7	43	106
Paturyl 100 mg l <sup>-1</sup>	12.6	3.8	36	96
Paturyl 200 mg l <sup>-1</sup>	16.5	4.2	24	85
Control Unthinned	11.0	4.5	44	123
Hand thinned	11.6	6.7	64	125
LSD P = < 0.5%	4.50	3.13	-	26.5

+ to singles when fruitlets were 12 mm diameter

#### Pear - Conference

Sprays of pure ATS (3%) and a proprietary brand of the same product Thio-Sul (at 2% or 3% active ingredient) reduced final fruit set significantly on Conference pear trees, as did sprays of another blossom thinner, TD (50 mg l<sup>-1</sup> or 100 mg l<sup>-1</sup>) or the fruitlet thinner Paturyl (200 mg l<sup>-1</sup>) (Table 5).

**Table 5.** The effects of blossom and fruitlet thinning treatments in 1996 on the fruit set yield and fruit size of Conference pear tree

Treatment	Final set/ 100 flower clusters	Yield (kg/tree)			Mean fruit wt (g)
		Total	> 65 mm	> 55 mm	
Control	69	17.7	0.3	10.1	96
Hand thin	63	18.7	0.3	11.2	106
ATS 2% (w/v)	65	17.4	0.4	10.3	105
ATS 3% (w/v)	46	16.2	2.2	12.7	132
Thio-Sul 2% (w/v)	46	16.3	2.1	12.4	130
Thio-Sul 3% (w/v)	46	16.1	2.4	12.6	132
TD 50 mg l <sup>-1</sup>	41	14.9	1.7	11.0	129
TD 100 mg l <sup>-1</sup>	32	15.0	6.1	12.3	161
Paturyl 200 mg l <sup>-1</sup>	44	17.0	2.3	14.6	135
LSD	13.3	3.6	0.46	3.02	16.1

None of the treatments had any statistically significant effect on total yield of fruits/tree but several of the treatments increased the percentage of fruit picked in the > 65 mm size category. Mean fruit weight was increased by all the chemical thinning treatments except ATS 2% (w/v).