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CONTRACT REPORT

HNS 39/39a

The use of growth regulators on container grown hardy nursery stock

Undertaken for HDC
1992/96

PRINCIPAL WORKERS

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AUTHENTICATION

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

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Container grown nursery stock growth regulation 1992/96

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Commenced: June 1992

Key words: Container grown nursery stock, growth regulator, paclobutrazol, Bonzi, daminozide, B-Nine, chlormequat, New 5C Cycocel, vigour control, flowering

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Thanks are also extended to ZENECA Agrochemicals (in particular Ray Tucker) and to Hortichem (Peter Moring and Peter Hingley) for their financial support for the PGR Seminar held at HRI Efford in September 1995.

RELEVANCE TO GROWERS AND PRACTICAL APPLICATION

APPLICATION

The work carried out in this Project, from 1992 to 1996, investigated the use of plant growth regulators on hardy nursery stock subjects, including climbers. All treatments were applied to liners recently potted into their final pot size, after formative pinching/pruning to establish a good basic branch framework. Foliar sprays of Bonzi (containing paclobutrazol) applied at the beginning of, and/or throughout, the growing season achieved growth control on a wide range of species, but proved ineffective at the rates tested on several subjects such as *Choisya, Mahonia* and *Senecio*. However, the rates and number of sprays required for growth control varied widely from species to species, and even cultivar to cultivar. On some species such as *Fuchsia* 'Alice Hoffman' and *Clematis* 'Jackmanii Superba' a marked enhancement of flowering was recorded. The results achieved with drenches of Bonzi applied at the growing season were also variable, with little growth control recorded on species such as *Fremontodendron*, and excessive, very persistent control on subjects such as *Abutilon*. Daminozide as B-Nine showed potential on subjects such as *Penstemon* and *Weigela*. Chlormequat was generally ineffective in controlling growth at the rates used, but caused some transient leaf discoloration on *Fuchsia* and *Weigela*.

SUMMARY

Although much has been done in recent years to improve the quality of container grown plants of hardy nursery stock, growth control remains a problem to producers of some inherently vigorous shrubby subjects and climbers such as *Clematis*. Pruning by hand is time consuming and expensive, and the use of chemical growth regulators may offer a potentially cheaper alternative.

In addition, some flowering subjects can be shy to bud as young plants, hence the interest in the use of growth regulators as a tool in the manipulation of growth to improve quality and enhance flowering.

The use of chemical plant growth regulators (PGRs) for growth control (and manipulation of flowering) is widely documented and routinely practised in the pot and bedding plant industries. However, information on the response of hardy nursery stock subjects to this group of chemicals is limited.

From the summer of 1992 to spring 1996, a comprehensive programme of trials was funded through HDC and limited continued sponsorship by ZENECA Agrochemicals evaluating the use of several PGRs on a range of nursery stock subjects, including climbers, with a view to achieving

a) growth control to produce more compact plants for the point of sale
b) growth control to reduce labour costs for trimming
c) improved flowering

The majority of the work used paclobutrazol as Bonzi as the test growth regulator, but in 1994 and 1995 daminozide as B-Nine and chlormequat as Fargro Chlormequat or New 5C Cycocel were evaluated.

Good control of growth was achieved on a range of subjects, especially with Bonzi, using single foliar sprays applied at the beginning of the season or several sequential foliar sprays of 'low' rates applied throughout the season. The application of a drench of Bonzi to the growing media in the spring gave more variable results, in some cases producing unacceptably 'dwarfed' plants. With some species such as *Fuchsia* 'Alice Hoffman' and *Clematis viticella* 'Polish Spirit', *Clematis* 'Ernest Markham', *Clematis* 'Jackmanii' and *Clematis* 'Ville de Lyon', a significant enhancement of flowering was also recorded. The need for trimming was reduced or even eliminated on some *Clematis* species/varieties, with a consequent saving in labour costs.

While results have indicated the potential of PGRs for controlling growth, experience has shown that a number of factors must be borne in mind when considering their use:

- **Subject to be treated**: different species or even cultivars of the same species respond very differently to a given rate of PGR, especially Bonzi. For example, in 1995, 4 foliar sprays of Bonzi at 75 ml/litre gave only very short term growth control of *Lonicera japonica* 'Halliana', whilst 2 foliar sprays of the same rate eliminated the need for trimming *Clematis* 'Polish Spirit', and a single foliar spray of 50 ml/litre 'stopped' growth of *Clematis* 'Carnaby' at the stage of treatment. Two sprays of Bonzi at 75 ml/litre gave good growth control of *Hebe* 'Autumn Glory', whilst 5 sprays of the same rate were required to give adequate control of *Hebe* 'Blue Gem'.

- **Rate of PGR applied**: since different species and cultivars vary enormously in their response to a given rate of PGR, especially Bonzi, no blanket recommendations for rates can be given, but the results recorded for the 60 shrubby/herbaceous subjects and two dozen climbers tested have established valuable guidelines for rates for various subjects. A summary of species/ treatment combinations which have given acceptable growth control is given at the end of this Summary. If too high a rate of Bonzi is applied, plants will be unacceptably dwarfed, and growth control can persist for 2 or more years. For

example, plants of *Ceanothus arboreus* 'Trewithen Blue' given a single foliar spray of 200 ml/litre in August 1992 were still significantly smaller than untreated plants two years after planting in the field; the lower rate of 50 ml/litre gave more acceptable growth control.

- **Age of plant**: results from earlier trials (1990-92) sponsored by ZENECA Agrochemicals, in which 'older' plants were treated, were very different from those recorded in this series of trials where newly potted plants were used. In the early trials a single foliar spray of Bonzi at 100 ml/litre applied at the beginning of the season to plants of *Forsythia* 'Lynwood' potted the year before treatment gave excellent control of growth and a significant enhancement of flowering the following spring. In contrast, in 1995, 4 foliar sprays of Bonzi at 75 ml/litre, applied throughout the summer to liners potted into 3 litre pots, gave no visible control of growth, and no enhancement of flowering the following spring. So, a given rate of Bonzi will give significantly greater growth control when applied to older 'pot bound' plants, than when applied to newly potted vigorously growing plants.

- **Stage of growth/time of treatment**: generally results showed that treatments applied early in the season, when new growth was only a few centimetres long, gave better control than those applied later. However, too high a rate of Bonzi applied at the beginning of the season could effectively 'stop' growth for the rest of the season! Inevitably, within a batch of plants, only a proportion of plants will be at the optimum stage for treatment at any one time. Unless some sort of selection is undertaken prior to spraying variable results will be achieved.

  Timing of sprays will need to vary depending on the vigour of the subject to be treated and the persistence of the growth control required. For example in 1995, three schedules of treatment proved successful on the various *Clematis* tested. Firstly, for the more vigorous subjects such as *C. montana*, several sequential sprays of a relatively 'low' rate applied throughout the growing season, commencing early on at 'first flush' produced the best result. Secondly, for the less vigorous species e.g. 'Niobe', a single spray of a 'medium' rate, applied when growth had almost reached the top of the cane, was sufficient to give short term growth control several weeks prior to sale. Thirdly, a single foliar spray of a 'high' rate applied after trimming - gave a 'fire brigade' approach to 'hold' plants if target marketing dates were to be deferred for any reason.

- **Method of application:** Bonzi applied as a drench to the growing media tended to give much greater growth control than foliar sprays, but this tended to be very persistent. However, if used with caution this approach may be worth considering on species which are not affected by foliar sprays of high rates of Bonzi. Since very little if any B-Nine

is taken up by the roots, drenches of this material are ineffective. Foliar sprays - particularly sequential sprays of 'low' rates (as used in the pot plant sector) offer a much more flexible approach, allowing applications to be made as and when needed in response to speed of growth throughout the season. Alternatively a single application (usually of a slightly higher rate) can be given just prior to the time of sale to 'hold' plants at the required stage of growth for marketing.

- **Spray volume:** high volume sprays are usually recommended to ensure good coverage, but if using Bonzi it is important to avoid run off into the growing media, which may then be taken up by the roots. Foliar sprays are usually applied at higher rates than drenches and the consequences of 'run off' onto the growing media could be serious.

- **Growing environment:** environmental conditions, especially temperature at the time of spraying will influence the efficacy of the treatment - for example, since B-Nine is absorbed through the leaves, the longer it stays wet on the foliage, the better the uptake. The majority of species evaluated were grown under protection (unheated polythene tunnels), and this should be borne in mind when interpreting results.

- **Target sales period:** for the majority of species tested the target sales period was the spring, with the exception of *Ceratostigma* which would be sold in the autumn. The timing of treatment application will therefore need to be varied, with the sales period in mind.

Other factors such as the pH of the water in which sprays are applied are reported to affect the activity of PGRs, and the addition of wetters/humectants such as Cell-U-Wet are also claimed to improve their efficacy. The investigation of these variables was outside the scope of this Project but warrants further work.

The use of PGRs involves an added cost in the production cycle, but if a superior quality end product can be produced and labour saved by eliminating one or more trimming during the season the additional cost may well be worthwhile, especially for specialist crop production.

In summary, results from this Project have shown the potential of PGRs in controlling growth to achieve improved quality and reduce trimming of climbers especially *Clematis*, and in some cases enhancing flowering on a range of species. The summary tables provide guidelines as to rates/number of sprays which have given acceptable growth control, but these should not be interpreted as firm recommendations. Small scale trials must be undertaken on individual nurseries before treatments are applied as a matter of routine.

Important note: the results reported in this document were, of necessity, recorded on a small numbers of plants and the comments are not intended to constitute recommendations or endorsements of any treatment.

Whilst the best available information has been used in this report, neither HRI or HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure used.

Summary of 'shrubby' species/treatment combinations showing where acceptable and excessive growth control was achieved

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Abelia x grandiflora	✓ (2)	✓ (2)	* (2)							✓ (3)		
Abutilon 'Kentish Belle'	?✓ (3)	✓ (3)	✓ (3)				✓ D					
Buddleia 'Black Knight'		?✓ (2)	?✓ (2)			?✓ (1)						
Buddleia 'Pink Delight'										?✓ (3)		
Buddleia 'Royal Red'		?✓ (2)	?✓ (2)									
Ceanothus arboreus 'Trewithen Blue'		✓ (1)		* (1)		* (1)						
Ceanothus 'Blue Mound'		* (1)		* (1)		* (1)	✓ 6ml (x1)					
Ceratostigma griffithii		✓ (1)		* (1)		* (1)	✓ 25ml (x 1)					
Ceratostigma willmottianum	✓ (1)	✓ (1)		* (1)		* (1)	✓ D					
Convolvulus cneorum	✓ (1)	✓ (1)		* (1)		* (1)	* D					
Cytisus 'Burkwoodii'		?✓ (1)		?✓ (1)	?✓ (1)							
	✓ (3)	✓ (3)	✓ (3)					✓ (3)	✓ (3)	✓ (3)		

✓ Acceptable growth control achieved
* Excessive growth control achieved
D Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season
?✓ Growth control not sufficiently persistent
F Enhanced flowering
?* Growth control bordering on excessive

(Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Cytisus x praecox 'Allgold'		?✓ (6)	?✓ (6)							?✓ (6)		
Cytisus 'Mrs Norman Henry		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus scoparius 'Golden Sunlight'		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus 'Windlesham Ruby'		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus 'Zeelandia'	✓ (2)	✓ (2)	✓ (2)							✓ (2)		
Escallonia 'Peach Blossom'		✓ (1)		✓ (1)		✓ (1)						
Fremontodendron 'California Glory'		✓ (1)		✓ (1)		* (1)						
Fuchsia 'Alice Hoffman'		✓ (1)F		✓ (1)F		* (1)						
Fuchsia 'Genii'												?✓ 0.5% (2) ?✓ 0.75% (2)
Fuchsia magellicana 'Versicolor'		✓ (2)										?✓ 0.5% (2) ?✓ 0.75% (2)
Fuchsia 'Mrs Popple'		✓ (2)										
Hebe 'Autumn Glory'		✓ (2)	✓ (2)			✓ (1)						

✓ Acceptable growth control achieved
* Excessive growth control achieved
D Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season
?✓ Growth control not sufficiently persistent
F Enhanced flowering
?* Growth control bordering on excessive

(Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Hebe x franciscana 'Blue Gem'	✓ (5)	✓ (5)	✓ (5)					✓ (5)	✓ (5)	✓ (5)		
Hebe x franciscana 'Variegata'		✓ (4)	✓ (4)									
Hebe 'Great Orme'		✓ (3)	* (3)					?✓ (3)	?✓ (3)	✓ (3)		
Hebe 'Midsummer Beauty'		✓ (2)	* (2)					?✓ (2)	?✓ (2)	?✓ (2)		
Hebe 'Mrs Winder'		✓ (1)										
Hypericum 'Hidcote'	✓ (3)	✓ (3)	✓ (3)				* D					
Lavatera olbia 'Rosea'			?✓ (2)			✓ (1)						
Pernettya mucronata 'Cherry Ripe' & 'Pink Pearl'		?✓ (1)		?✓ (1)		?✓ (1)						
Photinia x fraseri 'Red Robin'	✓ (4)	✓ (4)	✓ (4)	?✓ (1)		?✓ (1)	✓ D					

✓	Acceptable growth control achieved	?✓	Growth control not sufficiently persistent
*	Excessive growth control achieved	F	Enhanced flowering
D	Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season	?*	Growth control bordering on excessive

(Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Pieris japonica 'Blush'				✓ (1)		✓ (1)						
Santolina rosmarinifolia		✓ (1)		? *		? *						
Weigela florida 'Foliis Purpureis'		✓ (4)	✓ (4)						✓ (4)			
Weigela florida 'Variegata'		✓ (5)	✓ (5)						?✓ (5)			
Weigela florida 'Victoria'				✓ (2)						✓ (2)		

✓	Acceptable growth control achieved	?✓	Growth control not sufficiently persistent
*	Excessive growth control achieved	F	Enhanced flowering
D	Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season	?*	Growth control bordering on excessive

Note: No growth control was achieved on the following species with single foliar sprays of Bonzi applied at rates up to 200 ml/litre:

Choisya 'Aztec Pearl'	*Cotinus* 'Grace'	*Senecio* 'Sunshine'
Choisya 'Sundance'	*Hypericum beanii* 'Gold Cup'	*Magnolia x soulangeana*
Cistus 'Peggy Samnions'	*Mahonia* 'Charity'	*Magnolia x loebneri* 'Leonard Messel'

Similarly, no growth control was achieved on:

Buddleia 'Lochinch', *Forsythia* 'Lynwood' with 4 foliar sprays of Bonzi at 75 ml/litre or 4 foliar sprays of B-Nine at 7.5 g/litre
and on *Potentilla* 'Goldfinger', 'Gold Star', 'Primrose Beauty', 'Princess' and 'Tangerine' with single foliar sprays of Bonzi up to 150 ml/litre.

Summary of 'herbaceous' species/treatment combinations showing where acceptable growth control was achieved

Species/Cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	200	300	Other	2.5	5.0	7.5	10.0	Other
Arabis 'Corfe Castle'		✓ (2)										
Penstemon 'King George'												✓ 0.25% (2) ✓ 0.5% (2)
Phygelius capensis/xrectus				✓ (1)	✓ (1)							

Key: ✓ Acceptable growth control achieved

Note: No growth control was achieved on *Delphinium* 'Pacific Hybrids' with a single foliar spray of Bonzi at 25 or 50 ml/litre, Fargro Chlormequat at 6 or 9 ml/litre of B-Nine at 0.25 or 0.5%

No growth control was achieved on Lupin 'My Castle' with 2 foliar sprays of Bonzi at 25 or 50 ml/litre, Fargro Chlormequat at 6 or 9 ml/litre or B-Nine at 0.25 or 0.5%

Summary of *Clematis* treatment combinations (1995) showing where acceptable and excessive growth control was achieved

Species/Cultivar	Stage of growth treated	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)					Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)			
		37.5	50	75	100	200	2.5	5.0	7.5	10.0
C. alpina 'Blue Dancer'	'First Flush' and 5 days later Trimmed to top of cane			✓ (2)	?* (2) ✓ (1)	(1)		? (2)	? (2) ? (1)	? (1)
C. macropetala 'Floralia'	'First Flush' and 21 days later Trimmed to top of cane			✓ (2)	?* (2) ?✓ (1)	? (1)		? (2)	? (2) ? (1)	? (1)
C. montana 'Odorata'	'First Flush' and 5 days later Trimmed to top of cane			✓ (2)	(2) ✓ (1)	(1)		(2)	(2) ? (1)	? (1)
C. viticella 'Polish Spirit'	'First Flush' and 5 days later Trimmed to top of cane			* (2)F	* (2)F ✓ (1)F	(1)F		✓ (2)	? (1)	
Recent introductions										
'Arctic Queen'	'First Flush' Top of cane		✓ (2)	(2)			(2)	(2)		
'Royal Velvet'	'First Flush' Top of cane		✓ (2)	(2)	✓ (1)	(1)				
'Sugar Candy'	'First Flush' Top of cane		✓ (1)	(1)		✓ (1)				

Key: ✓ Acceptable growth control achieved
?✓ Growth control not sufficiently persistent
F Enhanced flowering
* Excessive growth control achieved
?* Growth control bordering on excessive

(continued)

Species/Cultivar	Stage of growth treated	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets) 37.5	50	75	100	200	Rate of B-Nine applied in g/litre (No. of sprays shown in brackets) 2.5	5.0	7.5	10.0
'Early' large flowered cultivars										
'Bee's Jubilee'	Almost at top of cane		✓ (1)							
'Carnaby'	Almost at top of cane			?✓(1)						
'Lasurstern'	Almost at top of cane	✓ (1)	✓ (1)							
'Miss Bateman'	Almost at top of cane	✓ (1)	?✓ (1)	?✓ (1)						
'Niobe'	Almost at top of cane									
'The President'	Almost at top of cane	?✓ (1)	?✓ (1)	✓ (1)			?✓ (1)	✓ (1)	✓ (1)	
'Late' large flowered cultivars										
'Ernest Markham'	'First Flush' Trimmed to top of cane		✓ (1)	✓ (1)	✓ (1)	✓ (1)F		?✓ (1)	?✓ (1)	?✓ (1)
'Hagley Hybrid'	'First Flush' Trimmed to top of cane		✓ (3)	* (1)	✓ (1)	?* (1)	?✓ (3)	✓ (2)		
'Jackmanii'	'First Flush' Trimmed to top of cane		✓ (2)F	?✓ (2)F	✓ (1)F	✓ (1)F				
'Ville de Lyon'	'First Flush' Trimmed to top of cane		✓ (2)F	* (2)F	✓ (1)	✓ (1)	✓ (2)			

Key: ✓ Acceptable growth control achieved
?✓ Growth control not sufficiently persistent
F Enhanced flowering
* Excessive growth control achieved
?* Growth control bordering on excessive

INTRODUCTION

Although much has been done in recent years to improve the quality of container grown plants of hardy nursery stock, growth control remains a problem to producers of some inherently vigorous shrubby subjects and climbers such as *Clematis*. Pruning by hand is time consuming and expensive, and the use of chemical growth regulators may offer a potentially cheaper alternative.

In addition, some flowering subjects can be shy to bud as young plants, hence the interest in the use of growth regulators as a tool in the manipulation of growth to improve quality and enhance flowering.

The use of chemical plant growth regulators (PGR's) for growth control (and manipulation of flowering) is widely documented and routinely practised in the pot and bedding plant industries. However, information on the response of hardy nursery stock subjects to this group of chemicals is limited.

Early work funded by ZENECA Agrochemicals (then ICI) carried out at HRI Efford in 1990-92 demonstrated the potential of foliar sprays of paclobutrazol as Bonzi for growth control on a range of nursery stock species.

From the summer of 1992 to spring 1996 a comprehensive programme of trials was funded through HDC and limited continued sponsorship by ZENECA Agrochemicals evaluating the use of several PGR's on a range of nursery stock subjects, including climbers.

In 1992, a range of shrubby species were treated with single foliar sprays of a range of rates of Bonzi from 50-200 ml/litre.

In 1993 the residual effects of the previous year's treatments were monitored, and lower rates evaluated for 'sensitive' species.

In 1994 additional species were screened, and the more flexible approach of using several sequential sprays of 'low' rates of Bonzi investigated. Other growth regulants such as chlormequat and daminozide as B-Nine were tested.

In 1995 the main emphasis of the work was on climbers, especially *Clematis*, and the production of 'demonstration' material for the HDC/HRI seminar held at HRI Efford in September 1995.

OBJECTIVES

To investigate the concentration and timing of application of several plant growth regulators with a view to achieving:

a) growth control to produce more compact plants for the point of sale
b) growth control to reduce labour costs for trimming and tying
c) improved flowering

This report summarises the four years work carried out in this Project. Full details of trials undertaken in 1992-93 and 1993-94 are presented in separate reports available from HDC (HNS 39).

MATERIALS AND METHODS

Treatments (1992)

'Shrubby' subjects

***Ceanothus arboreus* 'Trewithen Blue'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 13 August

untreated control

***Ceanothus* 'Blue Mound'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 29 July

untreated control

Ceratostigma griffithii

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 10 July

untreated control

Ceratostigma willmottianum

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 16 July

untreated control

***Choisya* 'Aztec Pearl'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 16 July

untreated control

Convolvulus cneorum

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 10 July

untreated control

***Cotinus* 'Grace'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 29 July

untreated control

***Cytisus* 'Burkwoodii', 'Allgold', 'Mrs Norman Henry', 'Golden Sunlight', 'Windlesham Ruby'**

1 foliar spray of Bonzi at 50, 100 or 150 ml/litre, applied in mid June

untreated control

***Escallonia* 'Peach Blossom'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 12 September

untreated control

***Fremontodendron* 'California Glory'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 13 August

untreated control

***Hypericum beanii* 'Gold Cup'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 13 August

untreated control

Magnolia x soulangeana

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 29 July

untreated control

***Magnolia x loebneri* 'Leonard Messel'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 25 July

untreated control

***Mahonia* 'Charity'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 7 August

untreated control

***Pernettya mucronata* 'Cherry Ripe' and 'Pink Pearl'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 13 August

untreated control

***Photinia x fraseri* 'Red Robin'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 16 or 29 July

untreated control

***Pieris japonica* 'Blush'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 16 July

untreated control

Potentilla **'Goldfinger', 'Gold Star', 'Primrose Beauty', 'Princess', 'Tangerine'**

1 foliar spray of Bonzi at 50, 100 or 150 ml/litre, applied on 9 June (untrimmed plants) or 18 June (trimmed plants)

untreated control

Senecio **'Sunshine'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 10 July (on plants grown outside) and on 29 July (on plants grown under protection)

untreated control

Weigela **'Bristol Ruby'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 13 August

untreated control

Climbers

Clematis **'Carnaby'**

1 foliar spray of Bonzi at 50, 100 or 150 ml/litre, applied to first flush of growth after pruning/potting (7 August)

1 foliar spray of Bonzi at 75, 150 or 200 ml/litre applied:

a) when growth mid way up cane (13 August)
b) when growth at top of cane (26 August)

untreated control

***Clematis* 'Jackmanii Superba'**

1 foliar spray of Bonzi at 50, 100 or 150 ml/litre applied:

a) to first flush of growth after pruning/potting (2 July)
b) to first flush of growth after pruning/potting and repeated when growth mid way up cane (16 July and 7 August)

1 foliar spray of Bonzi at 100, 200 or 300 ml/litre, applied when growth at top of cane (13 August)

untreated control

Clematis montana rubens

1 foliar spray of Bonzi at 50, 100 or 150 ml/litre applied:

a) to first flush of growth after pruning/potting (2 July)
b) to first flush of growth after pruning/potting and repeated when growth mid way up cane (16 July and 29 July)

1 foliar spray of Bonzi at 100, 200 or 300 ml/litre, applied when growth at top of cane (7 August)

untreated control

***Lonicera japonica* 'Halliana' and *Lonicera periclylenum* 'Belgica'**

a) 'first flush': Bonzi at 50, 100 or 150 ml/litre, applied on 16 July

b) when growth mid way up cane: Bonzi at 75, 150 or 200 ml/litre, applied 29 July

c) when growth almost at top of cane: Bonzi at 100, 200 or 300 ml/litre, applied on 13 August

Treatments (1993)

'Shrubby' species

***Buddleia davidii* 'Black Knight'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 2 April

untreated control

***Ceanothus arboreus* 'Trewithen Blue'**

1 foliar spray of Bonzi at 6, 12.5, 25 or 50 ml/litre, applied on 3 August

untreated control

***Ceanothus* 'Blue Mound'**

1 foliar spray of Bonzi at 6, 12.5, 25 or 50 ml/litre, applied on 3 August

untreated control

Ceratostigma griffithii* and *Ceratostigma willmottianum

1 foliar spray of Bonzi at 12.5, 25 or 50 ml/litre, applied in early August

untreated control

***Cistus* 'Peggy Sammons'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 18 March

untreated control

Convolvulus cneorum

1 foliar spray of Bonzi at 6, 12.5, 25 or 50 ml/litre, applied on 3 August

untreated control

***Fuchsia* 'Alice Hoffman'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 15 April

untreated control

***Hebe* 'Autumn Glory'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 2 April

untreated control

***Hebe* 'Mrs Winder'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 2 April

untreated control

***Lavatera olbia* 'Rosea'**

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 18 March

untreated control

Phygelius capensis/x rectus

1 foliar spray of Bonzi at 25, 50, 100 or 200 ml/litre, applied in early August

untreated control

Santolina rosmarinifolia

1 foliar spray of Bonzi at 50, 100 or 200 ml/litre, applied on 18 February

untreated control

Climbers

Clematis 'Carnaby'

1 foliar spray of Bonzi at 6, 12.5, 25, 37.5 or 50 ml/litre, applied:

a) to first flush of growth after pruning/potting (10 August)
b) when growth mid way up cane (16 August)
c) when growth at top of cane (25 August)

untreated control

Clematis 'Jackmanii Superba'

1 foliar spray of Bonzi at 25, 37.5, 50, 62.5 or 75 ml/litre, applied:

a) to first flush of growth after pruning/potting (10 August)
b) to first flush of growth after pruning/potting and repeated when growth mid way up cane (10 and 25 August)
c) when growth mid way up cane (16 August)
d) when growth mid way up cane and repeated when growth at top of cane (16 August and 1 September)
e) 1 foliar spray of Bonzi at 75, 100, 200 or 300 ml/litre, applied when growth at top of cane (25 August)

untreated control

Clematis montana rubens

1 foliar spray of Bonzi at 37.5, 50, 62.5 or 75 ml/litre, applied to first flush of growth after pruning (10 August)

1 foliar spray of Bonzi at 25, 37.5, 50, 62.5 or 75 ml/litre, applied:

a) when growth mid way up cane (10 August)
b) when growth mid way up cane and repeated when growth at top of cane (10 and 16 August)

1 foliar spray of Bonzi at 75, 100, 200 or 300 ml/litre, applied when growth at top of cane (16 August)

untreated control

Treatments (1994)

'Shrubby' species

***Arabis* 'Corfe Castle'**

1 or 2 foliar sprays of Bonzi at 25 or 50 ml/litre, applied on 9 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 9 ml/litre, applied on 9 and 24 May

1 or 2 foliar sprays of B-Nine at 0.25 or 0.5%, applied on 9 and 24 May

untreated control

***Buddleia davidii* 'Black Knight'**

1 or 2 foliar sprays of Bonzi at 25, 50 or 75 ml/litre, applied on 10 March and 21 April

untreated control

***Buddleia davidii* 'Royal Red'**

1 or 2 foliar sprays of Bonzi at 25, 50 or 75 ml/litre, applied on 10 March and 21 April

untreated control

***Choisya* 'Aztec Pearl'**

1 or 2 foliar sprays of Bonzi at 50 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 12 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of B-Nine at 0.5 or 0.75%, applied on 5 and 24 May

untreated control

***Choisya* 'Sundance'**

1 or 2 foliar sprays of Bonzi at 50 ml/litre, applied on 9 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 12 ml/litre, applied on 9 and 24 May

1 or 2 foliar sprays of B-Nine at 0.5 or 0.75%, applied on 9 and 24 May

untreated control

***Delphinium* 'Pacific Hybrids'**

1 foliar spray of Bonzi at 25 or 50 ml/litre, applied on 5 May

1 foliar spray of Fargro Chlormequat at 6 or 9 ml/litre, applied on 5 May

1 foliar spray of B-Nine at 0.25 or 0.5%, applied on 5 May

untreated control

***Fuchsia* 'Genii', *Fuchsia magellanica* 'Versicolor' and *Fuchsia* 'Mrs Popple'**

1 or 2 foliar sprays of Bonzi at 25 or 50 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 9 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of B-Nine at 0.5 or 0.75%, applied on 5 and 24 May

untreated control

***Lavatera olbia* 'Rosea'**

1 or 2 foliar sprays of Bonzi at 25, 50 or 75 ml/litre, applied on 16 February and 10 March

untreated control

Lupin 'My Castle'

1 or 2 foliar sprays of Bonzi at 25 or 50 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 9 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of B-Nine at 0.25 or 0.5%, applied on 5 and 24 May

untreated control

***Penstemon* 'King George'**

1 or 2 foliar sprays of Bonzi at 25 or 50 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 9 ml/litre, applied on 5 and 24 May

1 or 2 foliar sprays of B-Nine at 0.25 or 0.5%, applied on 5 and 24 May

untreated control

***Weigela florida* 'Victoria'**

1 or 2 foliar sprays of Bonzi at 100 ml/litre, applied on 9 and 24 May

1 or 2 foliar sprays of Fargro Chlormequat at 6 or 12 ml/litre, applied on 9 and 24 May

1 or 2 sprays of B-Nine at 0.5 or 0.75%, applied on 9 and 24 May

untreated control

Treatments (1995)

'Shrubby' subjects

Abelia x grandiflora

2 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 20 June and 3 July

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 20 June, 3 and 19 July

untreated control

***Abutilon* 'Kentish Belle'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 7 September, 2 and 18 October

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 7 September, 2 and 18 October

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 7 September

untreated control

***Buddleia davidii* 'Black Knight'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June, and 3 July

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June, and 3 July

untreated control

***Buddleia davidii* 'Pink Delight'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June

untreated control

***Buddleia* 'Lochinch'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June, and 3 July

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June, and 3 July

untreated control

***Ceanothus* 'Blue Mound'**

1 foliar spray of Bonzi at 6 ml/litre, applied on 26 July

untreated control

Ceratostigma willmottianum

2 foliar sprays of Bonzi at 37.5 or 50 ml/litre, applied on 3 and 17 August

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 3 August

untreated control

Convolvulus cneorum

1 foliar spray of Bonzi at 37.5 or 50 ml/litre, applied on 26 July

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 26 July

untreated control

***Cytisus* 'Burkwoodii'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 29 June, 13 July and 17 August

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 29 June, 13 July and 17 August

untreated control

Cytisus x praecox **'Allgold'**

6 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 29 June, 13 and 19 July, 3, 17 and 31 August

6 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 29 June, 13 and 19 July, 3, 17 and 31 August

untreated control

Cytisus **'Zeelandia'**

2 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 13 and 19 July

2 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 13 and 19 July

untreated control

Escallonia **'Peach Blossom'**

1 foliar spray of Bonzi at 37.5 or 50 ml/litre, applied on 3 August

untreated control

Forsythia **'Lynwood'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June and 3 July

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June and 3 July

untreated control

Fremontodendron **'California Glory'**

1 foliar spray of Bonzi at 37.5 or 50 ml/litre, applied on 26 July

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 26 July

untreated control

***Hebe* 'Autumn Glory'**

2 foliar sprays of Bonzi at 50 or 75 ml/litre, applied on 8 June and 3 July

untreated control

***Hebe x franciscana* 'Blue Gem'**

5 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 20 June, 3 July, 3, 17 and 31 August

5 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 20 June, 3 July, 3, 17 and 31 August

untreated control

***Hebe x franciscana* 'Variegata'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 20 June, 3 July, 17 and 31 August

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 20 June, 3 July, 17 and 31 August

untreated control

***Hebe* 'Great Orme'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 20 June, 3 July and 31 August

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 20 June, 3 July and 31 August

untreated control

***Hebe* 'Midsummer Beauty'**

2 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 8 and 29 June

2 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 8 and 29 June

untreated control

***Hypericum* 'Hidcote'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 25 May

untreated control

***Photinia x fraseri* 'Red Robin'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 26 July, 3, 17 and 31 August

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 26 July, 3, 17 and 31 August

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot, on 26 July

untreated control

***Weigela florida* 'Foliis Purpureis'**

4 foliar sprays of Bonzi at 50 or 75 ml/litre, applied on 8 and 29 June, 26 July and 31 August

4 foliar sprays of B-Nine at 5.0 g/litre, applied on 8 and 29 June, 26 July and 31 August

untreated control

***Weigela florida* 'Variegata'**

5 foliar sprays of Bonzi at 50 or 75 ml/litre, applied on 3 and 19 July, 3, 17 and 31 August

5 foliar sprays of B-Nine at 5.0 g/litre, applied on 3 and 19 July, 3, 17 and 31 August

untreated control

Treatments (1995)

Climbers

***Clematis alpina* 'Blue Dancer'**

a) 'first flush': Bonzi at 75 or 100 ml/litre
B-Nine at 5 or 7.5 g/litre

foliar sprays applied on 29 June and repeated on 3 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) after growth trimmed to top of cane: Bonzi at 200 ml/litre
B-Nine at 10 g/litre

foliar spray applied on 12 September

d) untreated control

***Clematis macropetala* 'Floralia'**

a) 'first flush': Bonzi at 75 or 100 ml/litre
B-Nine at 5 or 7.5 g/litre

foliar sprays applied on 29 June and repeated on 19 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) after growth trimmed to top of cane: Bonzi at 200 ml/litre
B-Nine at 10 g/litre

foliar spray applied on 12 September

d) untreated control

***Clematis montana* 'Odorata'**

a) 'first flush': Bonzi at 75 or 100 ml/litre
B-Nine at 5 or 7.5 g/litre

foliar sprays applied on 29 June and repeated on 3 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 3 July

c) after growth trimmed to top of cane: Bonzi at 200 ml/litre
B-Nine at 10 g/litre
'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

foliar spray applied on 12 September

d) untreated control

***Clematis viticella* 'Polish Spirit'**

a) 'first flush': Bonzi at 75 or 100 ml/litre
B-Nine at 5 or 7.5 g/litre

foliar sprays applied on 29 June and repeated on 3 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) growth mid way up cane: Bonzi at 50 ml/litre
B-Nine at 10 g/litre
'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

foliar spray applied on 12 September

d) untreated control

'Early' large flowered cultivars

'Bee's Jubilee'

a)	when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
	foliar spray applied on 13 July	
b)	after growth trimmed to top of cane:	Bonzi at 200 ml/litre B-Nine at 10 g/litre
	foliar spray applied on 12 September	
c)	untreated control	

'Carnaby'

a)	when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
	foliar spray applied on 13 July	
b)	after growth trimmed to top of cane:	Bonzi at 100 ml/litre B-Nine at 7.5 g/litre 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre
	foliar spray applied on 12 September	
c)	growth mid way up cane:	Bonzi at 37.5 ml/litre
	foliar spray applied on 12 September	
d)	untreated control	

'Lasurstern'

a)	when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
	foliar spray applied on 13 July	
b)	when growth almost at top of cane:	Bonzi at 75 ml/litre B-Nine at 7.5 g/litre 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre
	foliar spray applied on 12 September	
c)	untreated control	

'Miss Bateman'

a)	when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
	foliar spray applied on 13 July	
b)	when growth almost at top of cane:	Bonzi at 200 ml/litre B-Nine at 10 g/litre 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre
	foliar spray applied on 12 September	
c)	untreated control	

'Niobe'

a) when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
foliar spray applied on 17 August	
b) when growth almost at top of cane:	Bonzi at 100 ml/litre
foliar spray applied on 12 September	
c) untreated control	

'The President'

a) when growth almost at top of cane:	Bonzi at 37.5, 50 or 75 ml/litre B-Nine at 2.5, 5 or 7.5 g/litre
foliar spray applied on 13 July	
b) when growth almost at top of cane:	Bonzi at 100 ml/litre
foliar spray applied on 12 September	
c) 'first flush':	'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre
foliar spray applied on 12 September	
d) untreated control	

'Late' large flowered cultivars

'Ernest Markham'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre

foliar sprays applied on 3 July (a second spray of B-Nine at 2.5 g/litre was applied on 19 July).

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) 'first flush': Bonzi at 75 ml/litre

foliar spray applied on 12 September

d) growth mid way up cane: Bonzi at 75 ml/litre
B-Nine at 7.5 g/litre

foliar spray applied on 12 September

e) when growth almost at top of cane: Bonzi at 200 ml/litre

foliar spray applied on 12 September

f) untreated control

'Hagley Hybrid'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre

foliar sprays applied on 29 June (a second spray of B-Nine at 5 g/litre was applied on 19 July, and two further sprays of B-Nine at 2.5 g/litre and Bonzi at 50 ml/litre were applied on 13 & 19 July).

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) when growth mid way up cane: Bonzi at 75 ml/litre
'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

foliar spray applied on 12 September

'Hagley Hybrid' continued

d) when growth almost at top of cane: Bonzi at 200 ml/litre
foliar spray applied on 12 September

e) untreated control

'Jackmanii'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre
foliar sprays applied on 3 July (a second spray of Bonzi and B-Nine was applied on 13 July, and a third spray of B-Nine on 19 July).

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre
foliar spray applied on 13 July

c) when growth almost at top of cane: Bonzi at 75 ml/litre
'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre
foliar spray applied on 12 September

d) untreated control

'Ville de Lyon'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre
foliar sprays applied on 3 July and repeated on 13 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre
foliar spray applied on 13 July

c) when growth almost at top of cane: Bonzi at 200 ml/litre
foliar spray applied on 12 September

d) untreated control

Recent introductions

'Arctic Queen'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre

foliar sprays applied on 13 July, repeated on 19 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) untreated control

'Royal Velvet'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 or 5 g/litre

foliar sprays applied on 3 July, repeated 13 July (a third spray of B-Nine was applied on 19 July).

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) untreated control

'Sugar Candy'

a) 'first flush': Bonzi at 50 or 75 ml/litre
B-Nine at 2.5 g/litre

foliar sprays applied on 13 July

b) after growth trimmed to top of cane: Bonzi at 100 or 200 ml/litre
B-Nine at 7.5 or 10 g/litre

foliar spray applied on 13 July

c) growth mid way up cane: Bonzi at 50 ml/litre
foliar spray applied on 13 July

d) untreated control

Honeysuckles

***Lonicera japanica* 'Halliana'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June and 3 July

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot on 25 May

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June and 3 July

untreated control

***Lonicera periclymenum* 'Belgica'**

4 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 25 May, 8 and 20 June and 3 July

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot on 25 May

4 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 25 May, 8 and 20 June and 3 July

untreated control

Miscellaneous

Passiflora caerulea

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 12 September, 7 and 23 October

drench of bonzi applied to growing media at 1.5 ml in 100 ml water/pot on 12 September

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 12 September, 7 and 23 October

untreated control

Solanum crispum **'Glasnevin'**

3 foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre, applied on 12 September, 7 and 23 October

drench of Bonzi applied to growing media at 1.5 ml in 100 ml water/pot on 12 September

3 foliar sprays of B-Nine at 2.5, 5.0 or 7.5 g/litre, applied on 12 September, 7 and 23 October

untreated control

Important Note:

All foliar sprays were applied using a small hand held sprayer delivering droplets of a medium size to just before the point of 'run off', giving good coverage of the foliage.

No modification of pH was undertaken. (The pH of mains water at HRI Efford is between 7.8-8.2 and this should be borne in mind when interpreting the results.)

Experimental design

All trials were unreplicated with 5 or 10 plants of each subject in each treatment.

Husbandry

Plants were grown on drained capillary sand beds with seephose irrigation in an unheated polythene tunnel or outside, depending on species. Liners were potted into a peat-based growing media containing appropriate rates of magnesian limestone and Osmocote Plus 12-14 month Spring formulation 15+9+11+2. Details of potting date, etc. are given in the Results section under individual species, in order to make interpretation easier.

RESULTS

'Shrubby' subjects

Abelia x grandiflora (Appendix A, Plates 1 and 2)

1995: **Bonzi:** by September, two foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre (applied 20 June and 3 July) gave good growth control (although arguably the higher rates may have 'dwarfed' plants excessively).

B-Nine: three foliar sprays of B-Nine at 7.5 g/litre (applied 20 June, 3 and 19 July) controlled growth better than the lower rates of 2.5 and 5 g/litre, but did not give such good control as the Bonzi sprays.

[Plants supplied potted in 3 litre pots in early June 1995, and grown under protection].

Abutilon **'Kentish Belle'** (Appendix A, Plates 3 and 4)

1995: **Bonzi:** three foliar sprays of Bonzi applied on 7 September and 2 and 18 October gave good control of growth persisting until flowering in April of the following year. The highest rate (75 ml/litre) gave the best growth control (Table 1).

A drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 7 September gave similar growth control to that achieved with three foliar sprays of the highest rate (75 ml/litre).

B-Nine: foliar sprays of B-Nine appeared to have little effect on plant size at the rates tested.

None of the treatments had any significant effect on flowering.

[Plants supplied potted in deep 3 litre pots in late August 1995, and grown under protection.]

Table 1: ***Abutilon*** **'Kentish Belle', plant height (cm) recorded 19 April 1996**

Treatment	Plant height (cm)
3 foliar sprays of Bonzi at 37.5 ml/litre	41.9
3 foliar sprays of Bonzi at 50 ml/litre	37.4
3 foliar sprays of Bonzi at 75 ml/litre	33.0
drench of Bonzi at 1.5 ml in 100 ml water/pot	39.6
3 foliar sprays of B-Nine at 2.5 g/litre	68.2
3 foliar sprays of B-Nine at 5 g/litre	64.5
3 foliar sprays of B-Nine at 7.5 g/litre	65.2
untreated control	59.0

Arabis **'Corfe Castle'** (Appendix A, Plate 5)

1994: **Bonzi:** two foliar sprays of Bonzi at 50 ml/litre (applied 9 and 24 May) gave some growth control. Single sprays of Bonzi at 25 or 50 ml/litre, two sprays of Bonzi at 25 ml/litre had little if any effect on growth.

B-Nine/chlormequat: 2 sprays of chlormequat (at 6 and 9 ml/litre) and B-Nine (at 0.25 and 0.5%) proved ineffective in controlling growth.

[Plants supplied in 9 cm pots in late April 1994 and grown under protection].

***Buddleia davidii* 'Black Knight'**

1993: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied 2 April) gave some short lived (4-6 weeks) growth control.

[Liners potted into 3 litre pots mid September 1992, cut back to 10-15 cm mid February 1993. Plants grown under protection until early May 1993, when they were moved outdoors].

1994: **Bonzi:** two foliar sprays of Bonzi at 50 or 75 ml/litre (applied on 10 March and 21 April) gave growth control persisting until late April, but not through to flowering. Two sprays of the lowest rate tested (25 ml/litre) and a single spray of 50 or 75 ml/litre had little effect on growth. However, plants were not moved outside and therefore growth may have been more vigorous under protection.

[Liners potted into 3 litre pots in September 1993, and shoots pinched in spring 1994 to improve the branch framework. Plants grown under protection]

1995: **Bonzi:** four foliar sprays of Bonzi at the highest rate tested (75 ml/litre) applied on 25 May, 8 June, 20 June and 3 July) gave very little control of growth.

B-Nine: four foliar sprays of the highest rate of B-Nine tested (7.5 g/litre) were unsuccessful in achieving growth control.

[Liners potted into 3 litre pots in early April 1995, and grown outdoors]

***Buddleia davidii* 'Pink Delight'**

1995: **Bonzi:** three foliar sprays of Bonzi at 75 ml/litre (applied on 25 May, 8 and 20 June) gave very little control of growth.

B-Nine: three foliar sprays of B-Nine (at 7.5 g/litre) gave some control of growth although results were very variable. (The lower rates of Bonzi and B-Nine tested had no visible effect on growth.)

[Liners potted into 3 litre pots in early April 1995, and grown outdoors]

***Buddleia davidii* 'Royal Red'**

1994: as 'Black Knight'.

***Buddleia* 'Lochinch'**

1995: **Bonzi:** four foliar sprays of Bonzi at 75 ml/litre (applied on 25 May, 8 June, 20 June and 3 July) gave very little control of growth.

B-Nine: four foliar sprays of B-Nine (at 7.5 g/litre) were unsuccessful in achieving growth control.

[Liners potted into 3 litre pots in early April 1995, and grown outdoors]

***Ceanothus arboreus* 'Trewithen Blue'** (Appendix A, Plate 6)

1992: **Bonzi:** a single foliar spray of the lowest rate of Bonzi tested (50 ml/litre), applied on 13 August, gave unacceptably dwarfed plants, and effects of higher rates (100 and 200 ml/litre) persisted until the end of the 1994 season. (The average height of plants recorded in late April 1993 is given in the 1992/93 Report.)

[Liners potted into deep 4 litre pots in early June, and grown as a caned crop, trimmed and trained in late June and late July. Plants grown under protection]

1993: **Bonzi:** single foliar sprays of Bonzi at 12.5 and 25 ml/litre applied on 3 August gave some short term growth control, but only 50 ml/litre gave control which persisted until the following spring. The lowest rate of 6 ml/litre had little effect on growth. (The average height of plants recorded in mid April 1994 is given in the 1993/94 Report.)

[Liners potted into deep 4 litre pots in early June 1993, and grown under protection].

Ceanothus **'Blue Mound'** (Appendix A, Plates 7, 8 and 9)

1992: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (the lowest rate tested) applied on 29 July gave a significant reduction in growth, and effects of 200 ml/litre persisted until the end of the 1994 season, after planting in the field.

[Liners potted into 3 litre pots in early June 1992, trimmed one week after potting and again at the end of June. Plants grown under protection].

1993: **Bonzi:** a single foliar spray of Bonzi at 6 ml/litre (applied on 3 August) gave good control of growth which persisted until the following spring. Although higher rates (i.e. 12.5, 25 and 50 ml/litre) gave greater growth control, plants appeared 'dwarfed' and may have been commercially unacceptable. Flowering was a few days earlier on treated plants, and appeared to be more profuse, but this could have been an optical illusion as a result of the more compact plants.

[Liners potted into deep 3 litre pots in early June 1993, and grown under protection].

1995: **Bonzi:** a single foliar spray of Bonzi at 6 ml/litre (applied on 26 July) gave good growth control which persisted through to flowering.

[Liners potted into 3 litre pots in early June 1995, plants grown outdoors].

Ceratostigma griffithii

1992: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 10 July) gave good control of growth, with higher rates giving 'dwarfer' plants.

[Liners potted into 2 litre pots in early June 1992, and trimmed a week after potting and again during the last week of June. Plants were grown under protection].

1993: **Bonzi:** a single foliar spray of Bonzi at 25 ml/litre (applied in early August) gave similar control of growth as 50 ml/litre. A single spray of 12.5 ml/litre produced no visible effect on growth.

[Liners potted into 2 litre pots in early June 1993, and grown under protection].

Ceratostigma willmottianum (Appendix A, Plates 10 and 11)

1992: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 16 July) gave good control of growth, with higher rates giving 'dwarfed' plants.

[Liners potted into 2 litre pots in early June 1992, and trimmed a week after potting and again during the last week of June. Plants were grown under protection].

1993: **Bonzi:** a single foliar spray of Bonzi at 25 ml/litre applied in early August, did not give sufficiently persistent growth control, with 50 ml/litre giving a better result. A single spray of 12.5 ml/litre had little effect on growth.

[Liners potted into 2 litre pots in early June 1993, and grown under protection].

1995: **Bonzi:** two foliar sprays of Bonzi at 37.5 or 50 ml/litre (applied on 3 and 17 August) gave good growth control but a drench of 1.5 ml Bonzi applied in 100 ml water/pot to the growing media on 3 August gave the best and most persistent control of growth.

[Liners potted into 2 litre pots in early June 1995, and grown under protection].

Choisya **'Aztec Pearl'**

1992: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied in mid July) had no visible effect on plants grown under protection or outdoors.

[Liners potted into 3 litre pots in early June 1992, and trimmed a week later].

1994: **Bonzi:** two foliar sprays of Bonzi at 50 ml/litre (applied on 5 and 24 May) proved ineffective in controlling growth.

B-Nine/chlormequat: two sprays of chlormequat (at 6 and 12 ml/litre) and B-Nine (at 0.5 and 0.75%) proved equally ineffective.

[Plants supplied in 3 litre pots in April 1994].

Choisya **'Sundance'**

1994: as *Choisya* 'Aztec Pearl'.

Cistus 'Peggy Sammons'

1993: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied on 18 March) had no visible effect on growth.

[Liners potted into 3 litre pots in mid September 1992. Plants grown under protection].

Convolvulus cneorum (Appendix A, Plate 12)

1992: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 10 July) gave good growth control, with higher rates producing 'dwarf' plants

[Liners potted into 2 litre pots in early June 1992, plants trimmed to 10-15 cm a week after potting. Plants grown under protection].

1993: **Bonzi:** single foliar sprays of Bonzi at 6 and 12.5 ml/litre (applied on 3 August) gave little growth control and rates of 25 or 50 ml were required to give good control.

[Liners potted into 2 litre pots in early June 1993, and grown under protection].

1995: **Bonzi:** a single foliar spray of Bonzi at 37.5 or 50 ml/litre (applied on 26 July) gave good control of growth, with the higher rate giving the best control. A drench of 1.5 ml Bonzi applied in 100 ml water/pot to the growing media on 26 July produced unacceptably 'dwarfed' plants.

[Liners potted into 2 litre pots in early June 1995, trimmed in early July, and grown under protection]

Cotinus 'Grace'

1992: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied on 29 July) produced no obvious growth control.

[Liners potted into 4 litre pots in early June 1992. Shoots cut back to 5-8 cm at the end of June, and soft laterals 'pinched' to encourage bushiness. Plants grown outdoors].

Cytisus **'Burkwoodii'** (Appendix A, Plate 13)

1992: **Bonzi:** some early control of growth was achieved with a single foliar spray of Bonzi at rates of 50, 100 or 150 ml/litre (applied in mid June). However, this did not persist beyond early-mid September. No enhancement of flowering was recorded in the following spring.

[Plants were received potted in early June, and grown outdoors].

1995: **Bonzi:** three foliar sprays of Bonzi (applied on 29 June, 13 July and 17 August) at 37.5, 50 or 75 ml/litre gave good growth control which persisted until the following spring, with the highest rate giving the best control.

B-Nine: some growth control was also achieved with three foliar sprays of B-Nine (2.5, 5 or 7.5 g/litre). No enhancement of flowering was recorded.

[Liners potted into 3 litre pots in April 1995 and grown outdoors].

Cytisus x praecox **'Allgold'**

1992: as *Cytisus* 'Burkwoodii'

1995: **Bonzi:** very little growth control had been achieved by three foliar sprays of Bonzi (37.5, 50 or 75 ml/litre) by late July, and a further three sprays were applied in early, mid and late August. Some growth control was achieved by the end of the season.

B-Nine: less growth control was achieved by the 6 spray programme of the highest rate of B-Nine compared to the Bonzi treated plants.

[*Liners potted onto 3 litre pots in April 1995 and grown outdoors*].

Cytisus **'Mrs Norman Henry'**, *C. scoparius* **'Golden Sunlight' and** *C.* **'Windlesham Ruby'**

1992: **Bonzi:** some early control of growth was achieved with a single foliar spray of Bonzi at rates of 50, 100 or 150 ml/litre (applied in mid June). However, this did not persist beyond early-mid September. No enhancement of flowering was recorded in the following spring.

[Plants were received potted in early June, and grown outdoors].

Cytisus **'Zeelandia'**

1995: **Bonzi:** two foliar sprays of Bonzi (at 37.5, 50 or 75 ml/litre) applied on 13 and 19 July gave good growth control which persisted until the following spring. The highest rates gave the best control of growth.

B-Nine: two foliar sprays of B-Nine at 7.5 g/litre applied on 13 and 19 July gave similar growth control to that achieved by two foliar sprays of Bonzi at 75 ml/litre.

[*Liners potted into 3 litre pots in April 1995 and grown outdoors*].

Delphinium **'Pacific Hybrids'**

1994: **Bonzi/B-Nine/chlormequat:** a single foliar spray of Bonzi (at 25 or 50 ml/litre), chlormequat (6 or 9 ml/litre) and B-Nine (at 0.25 and 0.5%) proved unsuccessful in controlling growth.

Escallonia **'Peach Blossom'**

1992: **Bonzi:** good control of growth was achieved with a single foliar spray of Bonzi applied at 50 ml/litre (applied on 12 September), with effects persisting until the following spring. Higher rates (100 and 200 ml/litre) gave greater (?unacceptable) and more persistent control of growth.

[Liners potted into 3 litre pots in early August 1992, and trimmed to 10 cm a week later. Plants grown under protection].

1995: **Bonzi:** no growth control was achieved with a single foliar spray of Bonzi applied at 37.5 or 50 ml/litre in early August 1995.

[Liners potted into 3 litre pots in early August 1995, and trimmed to 10 cm a week later. Plants grown outdoors].

Forsythia 'Lynwood'

1995: **Bonzi/B-Nine:** four foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre and B-Nine at 2.5, 5 or 7.5 g/litre (applied on 25 May, 8 and 20 June and 3 July) had little effect on growth or flowering in the following spring.

[Plants supplied in 3 litre pots and grown outdoors].

Fremontodendron **'California Glory'** (Appendix A, Plate 14)

1992: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 13 August) gave some growth control, with higher rates being slightly more effective. However, variability in growth confused results somewhat. (Average plant heights recorded in late April 1993 are presented in the 1992/93 Report.) The growth control achieved with 200 ml/litre was very persistent, with effects still obvious at the end of the 1994 season.

[Liners potted into deep 4 litre pots in early June 1992. Plants were grown under protection as a caned crop, and pruned and trained accordingly].

1995: **Bonzi:** a single foliar spray of Bonzi applied at 37.5 or 50 ml/litre (applied on 26 July) gave good growth control, but a drench of 1.5 ml applied in 100 ml water/pot had less effect on growth.

[Liners potted into deep 4 litre pots in mid June 1995. Plants grown under protection as a caned crop, and pruned and trained accordingly].

Table 2: ***Fremontodendron*** **'California Glory', plant height (cm) recorded 19 April 1996**

Treatment	Plant height (cm)
1 foliar spray of Bonzi at 37.5 ml/litre	76.0
1 foliar spray of Bonzi at 50 ml/litre	72.0
drench of Bonzi at 1.5 ml in 100 ml water/pot	81.3
untreated control	99.6

***Fuchsia* 'Alice Hoffman'** (Appendix A, Plate 15)

1993: **Bonzi:** a single foliar spray of Bonzi at 50 or 100 ml/litre (applied on 15 April) produced compact plants carrying more flowers than the untreated controls. The highest rate (200 ml/litre) unacceptably dwarfed plants.

[Liners potted into 2 litre pots in early March 1993. Plants grown under protection].

***Fuchsia* 'Genii'**

1994: **Bonzi:** two foliar sprays of Bonzi at 50 ml/litre (applied on 5 and 24 May) had little effect on growth, but reduced leaf size and slightly advanced flowering.

Chlormequat: foliar sprays of Fargro Chlormequat (at 6 and 9 ml/litre) gave some transient leaf discoloration. A single spray had little effect on growth but two sprays gave some reduction in leaf size but little effect on overall plant size.

B-Nine: two foliar sprays of B-Nine (0.5 and 0.75%) gave some short term control of growth.

[Liners potted into 2 litre pots in March 1994 and grown under protection].

***Fuchsia magellanica* 'Versicolor'**

1994: **Bonzi:** the best growth control was achieved with two foliar sprays of Bonzi at 50 ml/litre applied on 5 and 24 May.

B-Nine/chlormequat: some growth control was achieved with two foliar sprays of B-Nine (0.5 and 0.75%) and Fargro Chlormequat (6 and 9 ml/litre).

[Liners potted into 2 litre pots in March 1994 and grown under protection].

Fuchsia 'Mrs Popple'

1994: **Bonzi:** two foliar sprays of Bonzi at 50 ml/litre (applied on 5 and 24 May) gave good growth control, but no enhancement of flowering.

B-Nine/chlormequat: two foliar sprays of B-Nine (at 0.5 and 0.75%) and Fargro Chlormequat (6 and 9 ml/litre) had little effect on growth.

[Liners potted into 2 litre pots in March 1994 and grown under protection].

***Hebe* 'Autumn Glory'**

1993: **Bonzi:** some short term growth control was achieved with a single foliar spray of Bonzi at 200 ml/litre (applied on 2 April).

[Liners potted into 3 litre pots in early March 1993. Plants grown under protection].

1995: **Bonzi:** two foliar sprays of Bonzi at 50 or 75 ml/litre (applied on 8 June and 3 July) gave some control of growth.

[Liners potted into 3 litre pots in late April 1995, and grown under protection].

***Hebe x franciscana* 'Blue Gem'**

1995: **Bonzi/B-Nine:** five foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre or B-Nine at 2.5, 5 or 7.5 g/litre (20 June, 3 July, 3, 17 and 31 August) were required to achieve adequate growth control.

[Liners potted into 3 litre pots in late April 1995, and grown under protection].

***Hebe x franciscana* 'Variegata'**

1995: **Bonzi:** four foliar sprays of Bonzi at 50 or 75 ml/litre were required to achieve control of growth; the lower rate of 37.5 ml/litre gave little growth control.

B-Nine: at 2.5, 5 or 7.5 g/litre (20 June, 3 July, 17 and 31 August) proved ineffective in controlling growth.

[Liners potted into 3 litre pots in late April 1995, and grown under protection].

***Hebe* 'Great Orme'** (Appendix A, Plates 16 and 17)

1995: **Bonzi:** three foliar sprays of Bonzi applied at 50 ml/litre (applied on 20 June, 3 July and 31 August) gave the best growth control. The higher rate of 75 ml/litre 'dwarfed' plants.

B-Nine: some growth control was achieved with three foliar sprays of B-Nine at 2.5, 5 or 7.5 g/litre.

[Liners potted into 3 litre pots in late April 1995, and grown under protection].

Hebe 'Midsummer Beauty' (Appendix A, Plates 18 and 19)

1995: **Bonzi/B-Nine:** two foliar sprays of Bonzi and B-Nine at the rates used on 'Great Orme' gave similar results with this cultivar

[Liners potted into 3 litre pots in late April 1995, and grown under protection].

***Hebe* 'Mrs Winder'**

1993: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 2 April) gave good growth control

[Liners potted into 3 litre pots in early March 1993. Plants grown under protection].

***Hypericum beanii* 'Gold Cup'**

1992: **Bonzi:** single foliar sprays of Bonzi at rates up to 200 ml/litre (applied on 13 August) produced no obvious control of growth.

[Plants supplied already potted in 3 litre pots in early August 1992, and probably past the optimal stage for treatment. Plants grown outdoors].

Hypericum **'Hidcote'** (Appendix A, Plates 20 and 21)

1995: **Bonzi:** three foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre (applied on 25 May, 8 and 20 June) gave good growth control, especially where the higher rates were used. A drench of Bonzi at 1.5 ml applied to the growing media in 100 ml water/pot on 25 May unacceptably dwarfed plants with growth control persisting until the following spring.

B-Nine: three foliar sprays of B-Nine at 2.5, 5 or 7.5 g/litre had little effect on growth.

[Liners potted into 2 litre pots in mid April 1995, and grown outdoors].

Lavatera olbia **'Rosea'** (Appendix A, Plates 22 and 23)

1993: **Bonzi:** a single foliar spray of Bonzi at 200 ml/litre (applied on 18 March) gave growth control which persisted until flowering.

[Liners potted into 3 litre pots in mid September 1992, and growth trimmed to 15-20 cm in mid February 1993. Plants grown under protection].

1994: **Bonzi:** two foliar sprays of Bonzi at 75 ml/litre (applied on 16 February and 10 March) gave good early growth control, but this did not persist until flowering.

[Liners potted into 3 litre pots in September 1993, and grown under protection].

Lupin 'My Castle'

1994: **Bonzi/B-Nine/chlormequat:** two foliar sprays of Bonzi (25 or 50 ml/litre), Fargro Chlormequat (6 or 9 ml/litre) and B-Nine (at 0.25 or 0.5%) gave no visible growth control.

Magnolia x soulangeana, M. x loebneri **'Leonard Messel'**

1992: **Bonzi:** single foliar sprays of Bonzi of up to 200 ml/litre (applied in late July) had little effect on growth or flowering.

[Liners potted into 5 litre pots in early June 1992, and grown outdoors].

Mahonia **'Charity'**

1992: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied on 7 August) produced no obvious growth control.

[Plants supplied already potted in 3 litre pots in early August 1992, and grown under protection].

Penstemon **'King George'** (Appendix A, Plate 24)

1994: **Bonzi:** two foliar sprays of Bonzi at 50 ml/litre (applied on 5 and 24 May) gave no visible control of growth.

B-Nine: the best growth control was achieved with two foliar sprays of B-Nine (at 0.25 or 0.5%).

Chlormequat: two foliar sprays of Fargro Chlormequat (6 or 9 ml/litre) were ineffective in controlling growth.

Pernettya mucronata **'Cherry Ripe' and 'Pink Pearl'**

1992/93: **Bonzi:** although some early reduction in growth was obvious in 1993 (after foliar sprays of Bonzi at 50, 100 or 200 ml/litre were applied in mid August 1992), this did not persist to the end of the season. The number of berries carried on individual plants varied greatly, and no consistent effect of treatment was recorded.

[Liners treated on receipt in August 1992, potted into 2 litre pots in mid March 1993, and grown under protection.]

***Photinia x fraseri* 'Red Robin'** (Appendix A, Plates 25 and 26)

1992: **Bonzi:** a single foliar spray of Bonzi at 100 or 200 ml/litre gave some short term growth control until the autumn, but this did not persist until the following spring.

[Liners potted into 3 litre pots in early June 1992, and grown under protection].

1995: **Bonzi:** four foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre (applied on 26 July, 3, 17 and 31 August) gave good control of growth. A drench of Bonzi at 1.5 ml applied to the growing media in 100 ml water/pot on 26 July gave the best growth control.

B-Nine: four sprays of B-Nine at 2.5, 5 or 7.5 g/litre were ineffective in achieving growth control.

[Liners potted into 3 litre pots in mid June 1995, and grown outdoors].

Phygelius capensis/ x rectus

1993: **Bonzi:** a mixed batch of two varieties was supplied. However, a single foliar spray of Bonzi at 100 or 200 ml/litre applied in early August gave good growth control but appeared to reduce the length of the flower spike.

[Liners potted into 3 litre pots in mid June 1995, and grown outdoors].

***Pieris japonica* 'Blush'**

1992: **Bonzi:** a single foliar spray of Bonzi at 100 or 200 ml/litre (applied on 16 July) gave good control of growth but no enhancement of flowering. Growth control persisted until May 1994.

[Liners potted into 2 litre pots in early June 1992, and grown under protection].

Potentilla **'Goldfinger', 'Gold Star', 'Primrose Beauty', 'Princess', and 'Tangerine'**

1992: **Bonzi:** single foliar sprays of Bonzi at rates of up to 150 ml/litre (applied in mid June) produced no visible effect on growth or flowering on any of the cultivars tested.

[Plants were received already potted in 3 litre pots in early June 1992, and grown outdoors].

Santolina rosmarinifolia

1993: **Bonzi:** a single foliar spray of Bonzi at 50 ml/litre (applied on 18 February) gave growth control which persisted until the following spring. Although the higher rates of 100 ml and 200 ml/litre gave better growth control the plants were very much smaller than the untreated controls.

[Liners potted into 2 litre pots in mid September 1992, and grown under protection].

Senecio **'Sunshine'**

1992: **Bonzi:** single foliar sprays of Bonzi at rates up to 200 ml/litre (applied in mid-late July) produced no visible control of growth, on plants grown under protection or outdoors.

[Liners potted into 3 litre pots in early June 1992, trimmed to 10 cm a week after potting, and grown either under protection or outdoors].

Weigela **'Bristol Ruby'**

1992: **Bonzi:** a single foliar spray of Bonzi at rates up to 200 ml/litre (applied on 13 August) produced no visible effect on growth.

[Liners potted into 3 litre pots in early June 1992, trimmed to 10-15 cm a week after potting, and the tips of subsequent regrowth 'pinched' in mid July. Plants grown outdoors].

Weigela florida **'Foliis Purpureis'** (Appendix A, Plates 27 and 28)

1995: **Bonzi/B-Nine:** four foliar sprays of Bonzi at 50 or 75 ml/litre (8, 29 June, 26 July and 31 August) gave good growth control. Four sprays of B-Nine at 5 g/litre also gave some control of growth. However, plants treated with both Bonzi and B-Nine were less upright than the untreated controls.

[Liners potted into 3 litre pots in mid May 1995, and grown outdoors].

Weigela florida **'Variegata'** (Appendix A, Plate 29)

1995: **Bonzi:** five foliar sprays of Bonzi at 50 or 75 ml/litre (applied on 3, 19 July, 3, 17 and 31 August) gave good growth control.

B-Nine: five sprays of B-Nine at 5 g/litre also gave some control of growth. As with the previous cultivar, treated plants were less upright than the untreated controls.

[Liners potted into 3 litre pots in mid May 1995, and grown outdoors].

Weigela florida **'Victoria'** (Appendix A, Plates 30 and 31)

1994: **Bonzi:** two foliar sprays of Bonzi at 100 ml/litre gave good growth control.

B-Nine: the smallest plants were produced after treatment with two foliar sprays of B-Nine at 0.75%.

Chlormequat: some discoloration of the foliage resulted after treatment with Fargro Chlormequat (at 6 and 12 ml/litre).

[Plants supplied in 2 litre pots and grown under protection].

Climbers

Clematis alpina 'Blue Dancer' (Table 3)

1995: **Bonzi**: by 22 July growth on plants treated with 75 or 100 ml/litre at 'first flush' and again 5 days later had not reached the top of the cane, in contrast to untreated plants, where some trimming was necessary. These differences in growth were still obvious a month later, and minimal trimming was necessary by mid September on those plants given two sprays of 100 ml/litre.

A single foliar spray of Bonzi (at 100 or 200 ml/litre) applied when growth had been trimmed back to the top of the cane in mid July reduced subsequent growth compared to untreated plants.

A record of flower number taken in early October 1995 showed few flowers present on treated plants and none on the untreated controls.

By mid April 1996 all of the plants treated with Bonzi in late June/early July were less vigorous than the untreated controls particularly those given 2 foliar sprays in 1995.

A single foliar spray of Bonzi at 200 ml/litre applied on 12 September, (after a late trim to the top of the cane) gave growth control persisting until mid April of the following year, with little growth beyond the top of the cane and therefore little trimming required.

B-Nine: B-Nine was less effective than Bonzi in controlling growth when applied as a foliar spray (at 5 or 7.5 g/litre) at 'first flush' and again 5 days later, or as a foliar spray (at 7.5 or 10 g/litre) when growth had been trimmed to the top of the cane in mid July. Although some reduction in growth was achieved, this did not effectively reduce the need for trimming and tying in the season of treatment and growth control did not persist to the following spring. However in April 1996 there was little new growth on plants treated with a single spray of B-Nine at 10 g/litre in mid September, after growth had been trimmed to the top of the cane.

None of the B-Nine treatments appeared to affect flowering.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 3: *Clematis alpina* 'Blue Dancer', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score *	Flowering score **
							mid April 1996	
'First Flush' and 5 days later	Bonzi 75 ml (x 2)	0.0	17.6	0.0	17.6	2.0	1.0	3.0
	Bonzi 100 ml (x 2)	0.0	8.7	2.2	10.9	0.8	0.4	1.8
	B-Nine 5 g (x 2)	5.0	33.2	3.3	41.5	0.0	2.0	2.8
	B-Nine 7.5 g (x 2)	4.5	29.4	6.6	40.5	0.6	2.0	1.8
Trimmed to top of cane	Bonzi 100 ml (x 1)	0.0	16.2	1.7	17.9	0.4	1.6	2.2
	Bonzi 200 ml (x 1)	3.8	8.3	6.2	18.3	0.2	2.0	2.0
	B-Nine 7.5 g (x 1)	5.3	23.4	1.5	30.2	0.2	2.8	2.0
	B-Nine 10 g (x 1)	3.1	10.1	11.6	24.8	1.2	1.8	1.8
	Bonzi 200 ml (x 1)⌀	NR	NR	NR	NR	NR	0.0	2.6
	B-Nine 10 g (x 1)⌀	NR	NR	NR	NR	NR	0.0	2.4
Untreated control		9.5	44.9	5.1	59.5	0.0	2.3	1.3

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⌀ : plants treated after a late trim on 12 September 1995
NR: not recorded

Clematis macropetala **'Floralia'** (Table 4)

1995: **Bonzi**: most of the plants given two foliar sprays of 75 ml/litre at 'first flush' and three weeks later had almost reached the top of the cane by 22 July. A month later some trimming was necessary, but less than on the untreated plants. However, plants given two sprays of 100 ml/litre had only just reached mid cane by 22 July, and the top of the cane a month later - almost no trimming was required. There was still a clear effect of these Bonzi treatments in the following spring.

A single foliar spray of 100 or 200 ml/litre applied after growth had been trimmed to the top of the cane in mid July produced only a small reduction in growth compared to untreated plants.

Few flowers were present in early October on treated or untreated plants.

A single spray of Bonzi at 200 ml/litre applied after a late trim in mid September 1995 gave growth control persisting until mid April of the following year, eliminating the need for trimming in early spring.

B-Nine: B-Nine was less effective than Bonzi in controlling growth when applied as a foliar spray (at 5 or 7.5 g/litre) at 'first flush' and again 3 weeks later, and when growth had been trimmed to the top of the cane in mid July. Although some reduction in growth was achieved, this did not eliminate the need for subsequent trimming.

A single spray of B-Nine at 10 g/litre applied after a late trim in mid September gave equally good control of growth the following spring as a spray of Bonzi at 200 ml/litre applied at the same time.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 4: *Clematis macropetala* 'Floralia', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * mid April 1996	Flowering score ** mid April 1996
'First Flush' and 21 days later	Bonzi 75 ml (x 2)	0.0	15.4	0.0	15.4	1.4	0.7	1.7
	Bonzi 100 ml (x 2)	0.0	3.4	0.0	3.4	0.8	0.0	1.3
	B-Nine 5 g (x 2)	2.1	13.7	7.5	23.3	1.8	1.2	1.8
	B-Nine 7.5 g (x 2)	2.8	18.3	10.0	31.1	0.8	2.8	1.8
Trimmed to top of cane	Bonzi 100 ml (x 1)	2.9	21.3	0.0	24.2	1.2	2.0	1.4
	Bonzi 200 ml (x 1)	2.0	30.7	3.4	36.1	1.6	0.6	2.6
	B-Nine 7.5 g (x 1)	2.7	16.3	8.0	27.0	0.8	1.2	2.0
	B-Nine 10 g (x 1)	3.0	14.1	4.8	21.9	1.0	1.8	1.6
	Bonzi 200 ml (x 1)$^{\oplus}$	NR	NR	NR	NR	NR	0.0	2.0
	B-Nine 10 g (x 1)$^{\oplus}$	NR	NR	NR	NR	NR	0.0	2.2
Untreated control		3.5	36.4	0.0	39.9	1.4	2.8	1.5

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

$^{\oplus}$: plants treated after a late trim on 12 September 1995
NR: not recorded

Clematis montana **'Odorata'** (Table 5)

1995: **Bonzi**: two foliar sprays of 75 or 100 ml/litre applied at 'first flush' and 5 days later significantly reduced growth compared to untreated plants, with little difference in growth control achieved by the two rates. By the end of August very little trimming had been necessary. A small amount of trimming was required by mid September. The higher rate resulted in some growth control persisting until the following spring.

A single foliar spray of 100 or 200 ml/litre applied when growth had been trimmed to the top of the cane in early July also gave good control of growth, although some subsequent trimming was required. The higher rate resulted in marked residual growth control the following spring.

A single foliar spray of Bonzi at 200 ml/litre applied after a late trim in mid September gave good early growth control the following spring.

There was little consistent effect of Bonzi treatment on flowering.

B-Nine: two foliar sprays applied at 'first flush' and 5 days later did not control growth as well as the Bonzi treatments applied at this stage, although some control was achieved compared to the untreated controls. Sprays applied when growth had reached the top of the cane did not significantly reduce the amount of trimming subsequently required. None of the B-Nine treatments applied in early July gave any persistent effect on growth control when recorded in April 1996.

However, a 'late' spray of B-Nine at 10 g/litre applied after trimming in mid September gave good growth control early in the following spring.

A 'tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre applied at the same time gave equally good control.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 5: *Clematis montana* 'Odorata', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * mid April 1996	Flowering score ** mid April 1996
'First Flush' and 5 days later	Bonzi 75 ml (x 2)	2.2	0.0	9.2	11.4	0.0	2.8	2.5
	Bonzi 100 ml (x 2)	0.0	3.6	13.0	16.6	0.0	1.6	2.4
	B-Nine 5 g (x 2)	2.7	24.1	6.4	33.2	0.0	2.8	2.3
	B-Nine 7.5 g (x 2)	3.1	28.3	6.2	37.6	0.0	3.0	1.8
Trimmed to top of cane	Bonzi 100 ml (x 1)	3.3	11.0	6.9	21.2	0.0	3.0	1.8
	Bonzi 200 ml (x 1)	4.5	7.6	13.9	26.0	0.0	0.8	3.0
	B-Nine 7.5 g (x 1)	5.8	52.2	8.1	66.1	0.0	3.0	1.8
	B-Nine 10 g (x 1)	5.2	43.0	13.7	61.9	0.0	3.0	1.4
	Bonzi 200 ml (x 1)⊘	NR	NR	NR	NR	0.0	1.3	2.5
	B-Nine 10 g (x 1)⊘	NR	NR	NR	NR	0.0	0.0	2.6
	B-Nine/New 5C Cycocel (x 1)†⊘	NR	NR	NR	NR	0.0	0.0	2.2
Untreated control		14.0	57.7	6.4	78.1	0.0	2.7	1.4

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis montana rubens

1992: **Bonzi:** a single foliar spray of Bonzi (at 50, 100 or 150 ml/litre) applied at 'first flush' gave some growth control, especially at the higher rates, but the effect was relatively short lived. By the beginning of September the amount of growth trimmed was similar to that removed from untreated plants.

Where a second spray was applied two weeks after the first (when growth was approximately half way up the cane) good growth control was achieved, with little if any trimming required later in the season. However, some of the plants treated with two sprays of 100 or 150 ml/litre did not reach the top of the cane by the end of the growing season. A single spray of Bonzi applied when growth had reached the top of the cane also controlled vigour but the effect was not as marked as that achieved by the two sequential sprays. (Records of fresh weight of growth trimmed to top of the cane in 1992/93 are presented in the 1992/93 Report.)

[Plugs potted into deep 3 litre pots in early June, trimmed back, and treatments applied on 2 July 1992].

1993: **Bonzi:** two foliar sprays of Bonzi (at 37.5, 50, 62.5 or 75 ml/litre), applied when growth was mid way up the cane (10 August) and a week later (when growth had almost reached the top of the cane), gave good control of growth where the higher rates were used. However, some trimming was required at the end of September, but only half as much growth was trimmed from the sprayed plants compared to the untreated controls. Two foliar sprays of 25 ml/litre had little effect on growth. Plants grown to the top of the cane, trimmed and treated with Bonzi at 200 or 300 ml/litre in mid August still required trimming at the end of September, but growth was less vigorous and less 'tangled' than that on the untreated controls, and therefore quicker and easier to remove. (Records of fresh weight of growth trimmed to top of the cane in 1993 are presented in the 1993/94 Report.)

[Liners potted into deep 3 litre pots in mid June 1993, and trimmed back two weeks later].

Clematis viticella **'Polish Spirit'** (Table 6)

1995: **Bonzi**: by 22 July plants treated with two foliar sprays of Bonzi (at 75 or 100 ml/litre) at 'first flush' and five days later had only just reached mid cane, whilst untreated plants needed trimming to the top of the cane. Little further growth had occurred on these treated plants by early September, and no trimming was necessary.

A single foliar spray at 100 or 200 ml/litre applied when growth had reached the top of the cane also gave good control of growth, with little trimming required thereafter. Although growth looked 'atypical' and 'bunchy' on the Bonzi treated plants as a result of the very short internodes, the increased number of flowers carried on the top half of the stems, gave enhanced 'sales appeal'.

A count of flowers/seed heads in October 1995 showed that plants sprayed with Bonzi (particular those treated after growth had been trimmed back to the top of the cane) carried significantly more flowers than the untreated plants.

By April 1996 there was no evidence of any residual effects of treatment on growth.

A 'late' application of Bonzi at 50 ml/litre in mid September to plants which had been cut down and allowed to regrow to mid cane height had little effect on growth in the following spring.

B-Nine: None of the B-Nine treatments had any consistent, significant effect on growth, but the earlier sprays appeared to improve flowering, although to a lesser extent than the Bonzi treatments. A foliar spray of B-Nine at 7.5 g/litre and a 'tank mix' of B-Nine and New 5C Cycocel applied in mid September to growth part way up the cane had little effect on growth and by April 1996 plants were as vigorous as the untreated controls.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 6: *Clematis viticella* 'Polish Spirit', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * mid April 1996	Flowering score ** mid April 1996
'First Flush' and 5 days later	Bonzi 75 ml (x 2)	0.0	0.0	0.0	0.0	7.6	3.0	0.0
	Bonzi 100 ml (x 2)	0.0	0.0	0.0	0.0	2.8	3.0	0.0
	B-Nine 5 g (x 2)	0.0	0.4	2.7	3.1	6.6	3.0	0.0
	B-Nine 7.5 g (x 2)	1.6	7.7	2.6	11.9	4.4	3.0	0.0
Trimmed to top of cane	Bonzi 100 ml (x 1)	1.5	2.1	0.0	3.6	10.4	3.0	0.0
	Bonzi 200 ml (x 1)	1.6	0.5	0.0	2.1	16.6	3.0	0.0
	B-Nine 7.5 g (x 1)	2.0	5.8	0.0	7.8	0.8	3.0	0.0
	B-Nine 10 g (x 1)	2.0	12.8	0.0	14.8	0.4	3.0	0.0
Mid cane	Bonzi 50 ml (x 1)⊘	NR	NR	NR	NR	NR	3.0	0.0
	B-Nine 10 g (x 1)⊘	NR	NR	NR	NR	NR	3.0	0.0
	B-Nine/New 5C Cycocel (x 1)†⊘	NR	NR	NR	NR	NR	3.0	0.0
Untreated control		2.3	5.4	0.0	7.7	1.4	3.0	0.0

*** Vigour Score**

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

**** Flower score**

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

'Early' large flowered cultivars

Clematis 'Bee's Jubilee' (Table 7)

1995: **Bonzi**: effects of a single foliar spray were inconsistent, with growth control not increasing with the rate applied. Although all treatments gave some control of growth, the amount of trimming necessary was not significantly reduced compared to the untreated plots.

A late treatment (12 September) with Bonzi at 200 ml/litre applied when growth had been trimmed to the top of the cane resulted in growth control persisting through to the following June.

B-Nine: results with B-Nine were similarly inconsistent, but generally there was no marked reduction in growth with any of the rates used. However, a late treatment of B-Nine at 10 g/litre applied on 12 September when growth had been trimmed to the top of the cane gave growth control persisting into the following year.

None of the PGR treatments had any obvious effect on flowering.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 7: *Clematis* 'Bee's Jubilee', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * early June 1996	Flowering score ** early June 1996
Almost at top of cane	Bonzi 37.5 ml	3.5	3.2	2.5	9.2	5.2	2.8	2.0
	Bonzi 50 ml	3.1	0.4	2.5	6.0	5.2	2.8	1.8
	Bonzi 75 ml	3.0	7.4	0.0	10.4	4.8	2.4	2.2
	B-Nine 2.5 g	3.3	4.7	2.8	10.8	4.6	2.8	2.0
	B-Nine 5 g	3.3	6.4	1.3	11.0	4.6	2.3	2.5
	B-Nine 7.5 g	3.5	8.3	0.0	11.8	5.0	2.4	2.6
Trimmed to top of cane	Bonzi 200 ml ⊘	NR	NR	NR	NR	NR	1.2	2.6
	B-Nine 10 g ⊘	NR	NR	NR	NR	NR	1.6	2.4
Untreated control		3.8	9.4	1.3	14.5	5.4	3.0	2.2

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded

Clematis **'Carnaby'** (Table 8) (Appendix A, Plate 32)

1992/93: *(Note: growth on this cultivar was weak and slow this year, with only a few of the untreated plants reaching the tops of the canes by the end of the season.)*

Bonzi: a single foliar spray of the lowest rate of Bonzi used (50 ml/litre) effectively 'stopped' growth at the stage of application (i.e. 'first flush', mid cane and at top of cane) for the rest of the season. (This effect persisted on treated material planted in the field the following year). Flower size was slightly reduced by the higher rates used (100, 150 or 200 ml/litre), but flower number did not appear to be affected.

[Plugs potted into deep 3 litre pots in early June, trimmed back, and treatments applied early/mid/late August 1992 depending on growth stage treated].

1993/94: *(Note: growth was much more vigorous this year with most of the untreated plants reaching the tops of the canes and requiring trimming before the end of the season.)*

Bonzi: rates of Bonzi as low as 6 ml/litre 'stopped' growth at the stage of application for the rest of the season.

[Liners potted into deep 3 litre pots in mid June 1993, and trimmed back two weeks later. Treatments applied early/mid/late August 1993 depending on growth stage treated].

1995: *(Note: growth moderately vigorous this year.)*

Bonzi: the highest rate gave the best control of growth, with very little trimming required on plants treated with a single foliar spray of 75 ml/litre when growth had almost reached the top of the cane. (No reduction in flower size was recorded this year). By late May 1996 no residual effect of this treatment was evident.

A 'late' application of Bonzi at 37.5 ml/litre in mid September when growth was mid way up the cane, and of Bonzi at 100 ml/litre after growth had been trimmed to the top of the cane resulted in no residual growth control in the following spring.

B-Nine: foliar sprays of B-Nine also gave some growth control but effects were inconsistent, with the highest rate apparently giving the poorest control.

A 'tank mix' of B-Nine and New 5C Cycocel applied 'late' in the season had little effect on growth or flowering.

None of the growth regulator treatments had any obvious effect on flower size or number.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 8: *Clematis* 'Carnaby', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * end of May 1996	Flowering score ** end of May 1996
Almost at top of cane	Bonzi 37.5 ml	5.2	1.7	2.7	9.6	8.2	3.0	2.8
	Bonzi 50 ml	5.7	1.7	1.1	8.5	9.6	2.8	1.8
	Bonzi 75 ml	2.4	2.1	0.0	4.5	11.0	3.0	2.2
	B-Nine 2.5 g	2.8	4.8	0.0	7.6	7.0	2.6	1.6
	B-Nine 5 g	2.8	7.1	0.0	9.9	7.8	3.0	1.8
	B-Nine 7.5 g	4.7	9.7	0.4	14.8	4.4	3.0	2.4
Mid cane	Bonzi 37.5 ml ⊘	NR	NR	NR	NR	NR	2.8	0.8
Trimmed to top of cane	Bonzi 100 ml ⊘	NR	NR	NR	NR	NR	2.3	1.5
	B-Nine 7.5 g ⊘	NR	NR	NR	NR	NR	1.5	1.5
	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	2.0	1.4
Untreated control		4.1	5.7	2.8	12.6	10.4	1.8	2.4

*** Vigour Score**

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

**** Flower score**

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis **'Lasurstern'** (Table 9)

1995: *(Note: this cultivar was only moderately vigorous with little pruning required even on untreated control plants.)*

Bonzi: results were inconsistent, with the highest rate apparently resulting in the poorest growth control. None of the treatments gave any persistent growth control.

B-Nine: results were inconsistent.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 9: *Clematis* 'Lasurstern', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * end of May 1996	Flowering score ** end of May 1996
Almost at top of cane	Bonzi 37.5 ml	0.0	0.0	0.5	0.5	2.4	2.0	2.0
	Bonzi 50 ml	0.0	1.0	0.0	1.0	3.4	2.6	1.6
	Bonzi 75 ml	2.3	1.7	2.6	6.6	2.8	2.8	1.8
	B-Nine 2.5 g	0.0	3.7	0.0	3.7	1.6	2.2	2.2
	B-Nine 5 g	4.3	8.7	0.0	13.0	2.6	2.8	2.6
	B-Nine 7.5 g	1.8	0.0	0.8	2.6	2.8	2.4	2.6
	Bonzi 75 ml ⊘	NR	NR	NR	NR	NR	2.6	1.6
	B-Nine 7.5 g ⊘	NR	NR	NR	NR	NR	1.0	1.8
	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	2.0	1.4
Untreated control		2.5	0.0	1.8	4.3	2.6	3.0	1.6

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis **'Miss Bateman'** (Table 10)

1995: *(Note: this variety was not excessively vigorous, with only a small amount of trimming required on the untreated plants.)*

Bonzi: although all treatments (37.5, 50 or 75 ml/litre applied when growth had almost reached the top of the cane) gave some growth control soon after application, this was not proportional to the amount of chemical used, and did not significantly reduce the amount of trimming required. Growth control did not persist into the following spring.

A single foliar spray of Bonzi at 200 ml/litre applied in mid September resulted in some residual growth control in the following spring.

B-Nine: after some early growth control, growth was similar to that produced on untreated plants, irrespective of the rate used.

'Late' applications of B-Nine at 10 g/litre, or a 'tank mix' of B-Nine and New 5C Cycocel sprayed in mid September did not result in any marked effect on growth, in the autumn or in the following spring.

None of the PGR treatments affected flower number or size.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 10: *Clematis* 'Miss Bateman', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * late May 1996	Flowering score ** late May 1996
Almost at top of cane	Bonzi 37.5 ml	2.2	1.4	0.0	3.6	2.0	2.0	2.6
	Bonzi 50 ml	2.4	5.5	0.0	7.9	2.0	1.4	2.2
	Bonzi 75 ml	4.0	3.0	1.8	8.8	1.2	2.0	2.8
	B-Nine 2.5 g	4.6	4.9	0.0	9.5	1.8	2.8	2.8
	B-Nine 5 g	3.1	5.1	0.8	9.0	0.8	1.6	2.8
	B-Nine 7.5 g	4.2	6.2	0.0	10.4	1.2	2.4	3.0
	Bonzi 200 ml ⊘	NR	NR	NR	NR	NR	1.3	2.0
	B-Nine 10 g ⊘	NR	NR	NR	NR	NR	2.3	1.5
	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	1.8	1.4
Untreated control		7.1	5.5	1.2	13.8	1.0	2.2	2.8

*** Vigour Score**

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

**** Flower score**

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis 'Niobe'

1995: *(Note: no trimming was required, even on untreated plants.)*

None of the PGR treatments appeared to affect growth or flowering in the year of treatment, or in the following spring.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 11: *Clematis* **'Niobe', growth and flowering records 1996**

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	No. of buds/flowers seed heads early October 1995	Vigour score * late May 1996	Flower score ** late May 1996
Almost at top of cane	Bonzi 37.5 ml	6.6	1.2	1.8
	Bonzi 50 ml	4.8	1.2	1.2
	Bonzi 75 ml	5.3	2.2	1.4
	B-Nine 2.5 g	6.4	1.4	1.8
	B-Nine 5 g	6.2	1.4	1.8
	B-Nine 7.5 g	5.6	1.0	1.6
	Bonzi 100 ml ⊘	NR	1.6	1.8
Untreated control		6.2	1.4	2.4

*** Vigour Score**

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

**** Flower score**

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded

Clematis **'The President'** (Table 12)

1995: *Note: this variety was not especially vigorous and only a small amount of trimming was required on the untreated controls.*

Bonzi: a single foliar spray of all three rates gave some growth control - the best being achieved with the highest rate (75 ml/litre) where almost no trimming was necessary.

Growth control did not persist through to the following spring from these treatments or as a result of a 'late' application of Bonzi at 100 ml/litre in mid September.

B-Nine: B-Nine appeared to be as effective as Bonzi in controlling growth, with the highest rates (5 & 7.5 g/litre) giving the best control, and virtually eliminating the need for trimming after spraying.

A 'late' spray of a 'tank mix' of B-Nine and New 5C Cycocel applied in mid September gave some growth control which persisted through until late May 1996.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 12: *Clematis* 'The President', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * late May 1996	Flowering score ** late May 1996
Almost at top of cane	Bonzi 37.5 ml	2.5	1.5	2.9	6.9	4.6	1.6	1.6
	Bonzi 50 ml	1.7	0.0	2.6	4.3	6.6	2.6	1.2
	Bonzi 75 ml	2.0	0.4	0.4	2.8	4.2	2.0	1.4
	B-Nine 2.5 g	0.0	1.8	4.4	6.2	5.8	2.5	1.8
	B-Nine 5 g	3.2	0.1	0.4	3.7	3.8	2.4	1.6
	B-Nine 7.5 g	2.9	0.1	0.0	3.0	4.6	2.8	2.0
	Bonzi 100 ml ⊘	NR	NR	NR	NR	NR	2.2	1.2
'first flush'	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	1.4	0.8
Untreated control		4.1	2.6	4.7	11.4	4.4	2.6	1.6

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

'Late' large flowered cultivars

Clematis **'Ernest Markham'** (Table 13) (Appendix A, Plate 33)

1995: **Bonzi**: a single foliar spray of 50 or 75 ml/litre applied at 'first flush' gave good growth control, with treated plants not reaching the tops of the canes until mid August, whilst the untreated plants needed trimming in late July.

A single foliar spray applied when growth had been trimmed to the top of the cane also gave good control especially at the higher rate (200 ml/litre).

None of these treatments had any persistent effect on growth, with little difference in growth being recorded in the following spring.

Foliar sprays applied 'late' in the season had little effect on growth in the following spring.

B-Nine: although less effective than Bonzi at the rates tested, B-Nine did give some early control of growth especially at the higher rates. Two sprays of 2.5 g/litre gave poorer control than a single spray of 5 g/litre, when applied early in the season.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 13: *Clematis* 'Ernest Markham', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * early June 1996	Flowering score ** early June 1996
'First Flush'	Bonzi 50 ml (x 1)	0.0	5.2	0.2	5.4	4.2	3.0	1.0
	Bonzi 75 ml (x 1)	0.0	4.3	0.8	5.1	3.4	3.0	2.0
	B-Nine 2.5 g (x 2)	2.7	23.4	0.4	26.5	4.2	3.0	2.4
	B-Nine 5 g (x 1)	0.0	14.4	0.0	14.4	6.8	3.0	2.0
Trimmed to top of cane	Bonzi 100 ml (x 1)	2.6	1.1	4.0	7.7	5.4	3.0	1.4
	Bonzi 200 ml (x 1)	3.0	0.8	0.0	3.8	16.4	3.0	1.4
	B-Nine 7.5 g (x 1)	3.8	6.3	3.6	13.7	2.6	3.0	2.0
	B-Nine 10 g (x 1)	3.9	9.0	0.0	12.9	1.2	3.0	2.0
Almost at top of cane	Bonzi 200 ml (x 1) ⊘	NR	NR	NR	NR	NR	3.0	1.8
mid cane	Bonzi 75 ml (x 1) ⊘	NR	NR	NR	NR	NR	3.0	0.8
	B-Nine 7.5 g (x 1) ⊘	NR	NR	NR	NR	NR	3.0	0.8
'First Flush'	Bonzi 75 ml (x 1) ⊘	NR	NR	NR	NR	NR	3.0	0.8
Untreated control		3.1	17.7	0.0	20.8	2.8	3.0	1.6

*** Vigour Score**

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

**** Flower score**

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded

Clematis **'Hagley Hybrid'** (Table 14)

1995: **Bonzi**: a single foliar spray of 75 ml/litre applied at 'first flush' gave very good growth control, with treated plants not quite at the top of the cane by the middle of September. Three foliar sprays of 50 ml/litre applied at 'first flush', and 2 and 3 weeks thereafter did not give such good control of growth, but reduced the need for trimming throughout August.

A single foliar spray (of 100 or 200 ml/litre) applied after trimming to the top of the cane in mid July gave good growth control thereafter, irrespective of the rate used.

The effects of these treatments did not persist until the following spring.

B-Nine: two foliar sprays of 5 g/litre applied early in the season gave better growth control than three sprays of 2.5 g/litre. Single sprays applied after growth had been trimmed to the top of the cane in mid July were generally ineffective in controlling growth thereafter at the rates tested.

A 'tank mix' of B-Nine and New 5C Cycocel had little effect on growth.

Plants treated with PGR's carried more flowers than the untreated controls but there appeared to be no direct link with type or rate of PGR used.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 14: *Clematis* 'Hagley Hybrid', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * late May 1996	Flowering score ** late May 1996
'First Flush'	Bonzi 50 ml (x 3)	4.0	0.9	3.0	7.9	2.0	3.0	1.8
	Bonzi 75 ml (x 1)	0.0	0.0	0.0	0.0	4.0	3.0	1.2
	B-Nine 2.5 g (x 3)	3.0	8.1	0.0	11.1	3.6	3.0	1.8
	B-Nine 5 g (x 2)	4.3	3.2	0.0	7.5	5.4	3.0	1.8
Trimmed to top of cane	Bonzi 100 ml (x 1)	2.8	0.4	1.6	4.8	7.8	3.0	2.0
	Bonzi 200 ml (x 1)	2.9	0.0	0.0	2.9	4.0	3.0	2.0
	B-Nine 7.5 g (x 1)	3.7	14.7	0.3	18.7	1.8	3.0	1.6
	B-Nine 10 g (x 1)	3.1	9.0	0.0	12.1	3.0	3.0	1.2
Almost at top of cane	Bonzi 200 ml (x 1) ⊘	NR	NR	NR	NR	NR	3.0	1.6
Mid cane	Bonzi 75 ml (x 1) ⊘	NR	NR	NR	NR	NR	3.0	1.0
	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	3.0	1.2
Untreated control		4.3	12.5	0.0	16.8	1.2	3.0	2.0

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis **'Jackmanii'** (Table 15)

1995: **Bonzi**: two foliar sprays of 75 ml/litre applied at 'first flush' and 10 days later gave very good control of growth, and eliminated the need for trimming throughout the season. Two sprays of 50 ml/litre were not quite so effective, with some trimming necessary in late August. These 'early' sprays significantly improved flowering, with flowers being carried on the top 50% of the plant, whilst untreated plants carried few, if any, flowers.

A single foliar spray applied after trimming to the top of the cane in mid July gave some growth control thereafter, and treated plants carried flowers on the top 10% of growth.

B-Nine: foliar sprays of B-Nine were largely ineffective in controlling growth/ influencing flowering, at the rates tested, irrespective of the time of application.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Clematis **'Jackmanii Superba'** (Appendix A, Plate 34)

1992/93: a single foliar spray of Bonzi (at 50, 100 & 150 ml/litre) applied at 'first flush' reduced the need for trimming and improved flowering, irrespective of the rate used. When a second spray was applied when growth had reached mid cane, growth control persisted until the end of the season, eliminating the need for trimming. Treated plants produced flowers on the top 50% of the stem length, compared to untreated plants which carried none. The number of flower buds/flowers recorded in August 1992 and April 1993 is presented in the 1992/93 report together with the fresh weight of growth removed by trimming throughout the season.

[Plugs potted into deep 3 litre pots in early June, trimmed back and treatments applied in August].

1993/94: single foliar sprays of Bonzi at rates as low as 25 ml/litre gave some early control of growth, but a second spray of higher rates (50 or 75 ml/litre) was necessary to give more persistent control. A similar effect on flowering was recorded as in 1992/93. The fresh weight of growth removed by trimming throughout the seaon is given in the 1993/94 report.

[Liners potted into deep 3 litre pots in mid June 1993, and trimmed back two weeks later. Treatments applied in August].

Table 15: *Clematis* 'Jackmanii', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score *	Flowering score **
'First Flush'	Bonzi 50 ml (x 2)	0.0	7.3	0.0	7.3	12.6	3.0	NR
	Bonzi 75 ml (x 2)	0.0	0.0	0.0	0.0	12.4	3.0	NR
	B-Nine 2.5 g (x 3)	0.0	18.6	1.0	19.6	0.8	3.0	NR
	B-Nine 5 g (x 3)	2.3	16.1	0.0	18.4	3.5	3.0	NR
Trimmed to top of cane	Bonzi 100 ml (x 1)	4.3	5.3	3.5	13.1	5.6	3.0	NR
	Bonzi 200 ml (x 1)	3.0	5.0	4.3	12.3	9.6	3.0	NR
	B-Nine 7.5 g (x 1)	5.0	19.5	0.0	24.5	1.6	3.0	NR
	B-Nine 10 g (x 1)	3.3	15.6	0.0	18.9	2.2	3.0	NR
Almost at top of cane	Bonzi 75 ml ⊘	NR	NR	NR	NR	NR	3.0	NR
	B-Nine/New 5C Cycocel † ⊘	NR	NR	NR	NR	NR	3.0	NR
Untreated control		3.0	19.9	0.0	22.9	2.0	3.0	NR

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded
† : 'Tank mix' of B-Nine at 7.5 g/litre and New 5C Cycocel at 2 ml/litre

Clematis **'Ville de Lyon'** (Table 16)

1995: **Bonzi**: two foliar sprays of 75 ml/litre applied at 'first flush' and 10 days later gave the best control of growth, with no trimming necessary during the growing season. Two sprays of 50 ml/litre gave some growth control but did not eliminate the need for trimming.

A single foliar spray applied when growth had been trimmed to the top of the cane, in mid July, reduced subsequent growth compared to untreated plants. Little trimming was necessary after late July on plants treated with 200 ml/litre.

Some growth control from these Bonzi sprays persisted until the following spring.

Plants treated early in the season carried noticeably more flowers than those of other treatments, and the untreated controls.

B-Nine: the effect of foliar sprays applied at 'first flush' and again 10 days later was inconsistent, with the lower rate (2.5 g/litre) apparently giving better growth control than the 5 g/litre spray. A single foliar spray (of 7.5 or 10 g /litre) applied after growth had been trimmed to the top of the cane had little effect of growth.

None of the B-Nine treatments had any significant effect on flowering.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 16: *Clematis* 'Ville de Lyon', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * mid May 1996	Flowering score ** mid May 1996
'First Flush'	Bonzi 50 ml (x 2)	3.5	5.2	0.0	8.7	11.4	2.6	1.2
	Bonzi 75 ml (x 2)	0.0	0.0	0.0	0.0	12.6	2.8	1.4
	B-Nine 2.5 g (x 2)	4.6	5.2	0.0	9.8	3.4	3.0	1.0
	B-Nine 5 g (x 2)	3.3	11.2	0.0	14.5	4.8	3.0	1.2
Trimmed to top of cane	Bonzi 100 ml (x 1)	3.5	3.7	0.0	7.2	3.2	2.4	1.2
	Bonzi 200 ml (x 1)	6.4	0.3	0.7	7.4	5.8	2.0	1.6
	B-Nine 7.5 g (x 1)	5.6	10.0	0.0	15.6	2.2	3.0	1.2
	B-Nine 10 g (x 1)	8.2	11.1	0.0	19.3	2.0	3.0	1.4
Almost at top of cane	Bonzi 200 ml (x 1) ⊘	NR	NR	NR	NR	NR	2.2	0.6
Untreated control		8.6	8.0	0.0	16.6	2.6	2.8	1.2

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded

Recent introductions

Note: While none of these cultivars were especially vigorous in 1995, some trimming was required towards the end of the growing season.

Clematis **'Arctic Queen'** (Table 17)

1995: **Bonzi**: two foliar sprays of 50 or 75 ml/litre applied at 'first flush' and again a week later gave growth control persisting throughout the growing season, eliminating the need for trimming. A single foliar spray applied when growth had reached the top of the cane in mid July (the most advanced plants were selected for this treatment) did not significantly affect growth thereafter.

B-Nine: two foliar sprays of 2.5 & 5 g/litre applied at 'first flush' and repeated 7 days later gave as much growth control as Bonzi sprays applied at this time. A single spray of 10 g/litre applied when growth had reached the top of the cane also gave good control.

None of the PGR treatments influenced flowering or affected growth in the following spring.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 17: *Clematis* 'Arctic Queen', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * early June 1996	Flowering score ** early June 1996
'First Flush' and 6 days later	Bonzi 50 ml (x 2)	0.0	0.0	0.0	0.0	5.4	3.0	1.0
	Bonzi 75 ml (x 2)	0.0	0.0	0.0	0.0	9.2	2.8	0.8
	B-Nine 2.5 g (x 2)	0.0	0.0	0.0	0.0	NR	3.0	1.0
	B-Nine 5 g (x 2)	0.0	0.0	0.0	0.0	6.8	3.0	1.0
Trimmed to top of cane	Bonzi 100 ml (x 1	2.0	3.0	0.0	5.0	9.6	3.0	1.0
	Bonzi 200 ml (x 1)	0.0	8.8	0.0	8.8	9.8	3.0	1.4
	B-Nine 7.5 g (x 1)	1.8	4.2	0.0	6.0	9.6	3.0	1.4
	B-Nine 10 g (x 1)	0.0	3.4	0.0	3.4	11.2	3.0	1.2
Untreated control		0.0	9.6	0.0	9.6	7.2	3.0	1.4

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

NR: not recorded

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

Clematis **'Royal Velvet'** (Table 18)

1995: **Bonzi**: by the end of July growth on plants treated with two foliar sprays of 50 or 75 ml/litre was only three quarters of the way up the canes, whilst untreated plants had reached the tops of the canes, but did not yet require trimming. By mid September, little additional growth had occurred on the treated plants and no trimming was needed.

A single foliar spray of 100 or 200 ml/litre applied after growth had been trimmed back to the top of the cane also gave good growth control, with little trimming required thereafter.

B-Nine: three foliar sprays of 2.5 g/litre applied throughout the growing season did not markedly affect growth, but the higher rate of 5 g/litre was more effective, with only minimal trimming required in mid September.

Results from a single spray applied when growth had been trimmed back to the top of the cane were inconclusive, with sprays generally being ineffective in controlling growth.

None of the PGR treatments significantly affected flowering.

By late May 1996 there was little difference in vigour between treated and untreated plants.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 18: *Clematis* 'Royal Velvet', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * end of May 1996	Flowering score ** end of May 1996
'First Flush'	Bonzi 50 ml (x 2)	0.0	0.0	0.0	0.0	2.6	0.4	1.8
	Bonzi 75 ml (x 2)	0.0	0.0	0.0	0.0	3.8	0.6	2.0
	B-Nine 2.5 g (x 3)	0.0	3.8	1.8	5.6	5.2	1.2	2.6
	B-Nine 5 g (x 3)	0.0	0.0	2.1	2.1	NR	0.8	2.8
Trimmed to top of cane	Bonzi 100 ml (x 1)	0.0	0.0	1.9	1.9	5.0	1.0	2.2
	Bonzi 200 ml (x 1)	0.0	0.0	0.0	0.0	5.0	1.2	1.8
	B-Nine 7.5 g (x 1)	0.0	0.0	2.5	2.5	5.6	1.4	2.8
	B-Nine 10 g (x 1)	0.0	5.3	0.0	5.3	2.2	2.4	2.8
Untreated control		0.0	2.4	4.7	7.1	4.8	1.0	2.6

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

NR: not recorded

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

Clematis **'Sugar Candy'** (Table 19)

1995: **Bonzi**: a single foliar spray of 50 ml/litre applied at 'first flush' gave good growth control throughout the season, with no trimming required. Plants treated with the higher rate of 75 ml/litre had only reached three quarters of the way up the cane by the end of the season.

A single spray of 200 ml/litre was required to control growth after trimming to the top of the cane.

B-Nine: a single spray of 2.5 g/litre gave some control of growth early in the season, but effects did not persist beyond mid August. Foliar sprays applied when growth had reached the top of the cane proved ineffective at the rates tested.

None of the PGR treatments applied appeared to significantly affect flowering.

By late May 1996 there was little difference in vigour between treated and untreated plants.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 19: *Clematis* 'Sugar Candy', growth and flowering records 1995/96

Stage of growth treated	Chemical and rate applied per litre (1 spray only)	Fresh weight of growth removed above top of cane (g) (mean/plant) 22 July	24 August	11 September	Total (1995)	No. of buds/flowers/ seed heads (mean/plant) early October 1995	Vigour score * end of May 1996	Flowering score ** end of May 1996
'First Flush'	Bonzi 50 ml	0.0	0.0	0.0	0.0	3.0	3.0	1.6
	Bonzi 75 ml	0.0	0.0	0.0	0.0	1.0	3.0	1.0
	B-Nine 2.5 g	0.0	5.2	0.7	5.9	NR	2.6	1.6
Trimmed to top of cane	Bonzi 100 ml	3.1	0.7	6.2	10.0	2.0	3.0	1.8
	Bonzi 200 ml	1.9	0.7	0.0	2.6	3.2	3.0	1.6
	B-Nine 7.5 g	4.0	5.5	3.5	13.0	1.4	3.0	1.6
	B-Nine 10 g	4.2	6.3	0.0	10.5	1.6	3.0	2.0
Mid cane	Bonzi 50 ml ⊘	NR	NR	NR	NR	NR	2.8	1.0
Untreated control		1.6	6.4	1.4	9.4	0.8	2.8	1.4

* Vigour Score

0 = growth at top of cane
1 = growth up to 15 cm beyond top of cane
2 = growth 15-30 cm beyond top of cane
3 = growth > 30 cm beyond top of cane

** Flower score

0 = no flowers/buds
1 = few flowers/buds
2 = moderate number of flowers/buds
3 = many flowers/buds

⊘ : plants treated after a late trim on 12 September 1995
NR: not recorded

Honeysuckles

Lonicera japonica 'Halliana'

1992: **Bonzi:** single foliar sprays of Bonzi applied at 'first flush' (50, 100 & 150 ml/litre), when growth was mid way up the cane (75, 150 or 200 ml/litre), or when growth had reached the top of the cane (100, 200 or 300 ml/litre) gave some reduction in growth, especially when applied later in the season. However, this proved insufficient to reduce the need for trimming throughout the season. Records of fresh weight of growth removed by trimming during the season are given in the 1992/93 report. *[Liners potted into deep 3 litre pots in early June, and grown outdoors. Treatments applied mid/late July/mid August depending on stage of growth to be treated].*

1995: **'Bonzi'**: four foliar sprays applied throughout the growing season had little effect on growth, with regular trimming required. A drench applied to the growing media had some short term effect on growth, but by mid August plants were as vigorous as the untreated controls.

'B-Nine': four foliar sprays of 7.5 g/litre gave some control of growth up until mid July.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 20: *Lonicera japonica* **'Halliana', growth records 1995**

Chemical & rate applied per litre	Number of sprays applied	Fresh weight (g) of growth removed beyond top of cane (mean/plant) 13 July	11 August	9 September	Total
Bonzi 37.5 ml	4	11.1	30.4	16.2	57.7
Bonzi 50 ml	4	14.5	31.7	16.8	63.0
Bonzi 75 ml	4	11.7	34.3	20.4	66.4
Bonzi drench	1 (drench)	5.9	42.5	21.9	70.3
B-Nine 2.5 g	4	8.2	27.3	12.8	48.3
B-Nine 5 g	4	4.4	37.1	19.8	61.3
B-Nine 7.5 g	4	2.8	33.1	13.2	49.1
Untreated control	0	11.2	43.5	19.6	74.3

Lonicera periclymenum **'Belgica'**

1992: as *Lonicera japonica* 'Halliana'.

1995: **Bonzi**: four foliar sprays gave some growth control, with the best results achieved from the highest rate (75 ml/litre), where the need for trimming in July was eliminated. A drench applied to the growing media at the beginning of the growing season also gave some early growth control.

B-Nine: some growth control was achieved early in the season by the higher rates of B-Nine, but this did not persist, or significantly reduce the need for trimming.

[Plugs potted into deep 3 litre pots in early June, and grown under protection.]

Table 21: ***Lonicera periclymenum*** **'Belgica', growth records 1995**

Chemical & rate applied per litre	Number of sprays applied	Fresh weight (g) of growth removed beyond top of cane (mean/plant)		
		11 July	11 August	Total
'Bonzi' 37.5 ml	4	7.8	27.3	35.1
'Bonzi' 50 ml	4	11.3	26.4	37.7
'Bonzi' 75 ml	4	1.4	19.2	20.6
'Bonzi' drench	1 (drench)	5.1	23.2	28.3
'B-Nine' 2.5 g	4	24.3	28.9	53.2
'B-Nine' 5 g	4	22.4	20.8	43.2
'B-Nine' 7.5 g	4	17.5	30.8	48.3
Untreated control	0	30.9	32.2	63.1

Miscellaneous

Passiflora caerulea (Appendix A, Plates 35 and 36)

1995: **Bonzi:** three foliar sprays of Bonzi applied at 'first flush', 3½ and 6 weeks later resulted in some reduction in plant height the following spring. However the growth control achieved did not appear to be proportional to the rate used, with the lowest rate (37.5 ml/litre) giving almost as much control as the highest rate (75 ml/litre).

A drench of Bonzi at 1.5 ml in 100 ml water/pot was less effective in controlling growth than the foliar spray programmes.

B-Nine: the greatest growth control was achieved using 3 foliar sprays of B-Nine at 7.5 g/litre, but these plants were arguably too 'dwarf' for market requirements.

[Plants supplied already potted in deep 3 litre pots in mid August.]

Table 22: ***Passiflora caerulea*, growth records 1996**

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Plant height (cm) 19 April 1996
'First flush', 25 & 41 days later	Bonzi 37.5 ml (x 3)	106.2
	Bonzi 50 ml (x 3)	93.4
	Bonzi 75 ml (x 3)	96.3
	Bonzi drench (x 1 drench)	121.7
	B-Nine 2.5 g (x 3)	98.3
	B-Nine 5 g (x 3)	81.2
	B-Nine 7.5 g (x 3)	58.5
Untreated control		147.2

Solanum crispum **'Glasnevin'** (Appendix A, Plate 37)

1995: **Bonzi:** three foliar sprays of Bonzi at 37.5, 50 or 75 ml/litre applied at 'first flush' and repeated 24 and 41 days later gave good growth control the following spring with treated plants being approximately half the height of the untreated plants.

A single drench of Bonzi at 1.5 ml applied in 100 ml water/pot unacceptably dwarfed plants, producing 'bunchy' growth as a result of the very short internodes.

B-Nine: the three spray programme of B-Nine gave similar growth control to that achieved with the foliar sprays of Bonzi.

[Plants supplied already potted in deep 3 litre pots in mid August.]

Table 23: *Solanum crispum* **'Glasnevin'**

Stage of growth treated	Chemical and rate applied per litre (no. of sprays)	Plant height (cm) 16 April 1996
'First flush', 25 & 41 days later	Bonzi 37.5 ml (x 3)	78.8
	Bonzi 50 ml (x 3)	70.1
	Bonzi 75 ml (x 3)	84.8
	Bonzi drench (x 1 drench)	29.8
	B-Nine 2.5 g (x 3)	77.5
	B-Nine 5 g (x 3)	74.7
	B-Nine 7.5 g (x 3)	64.9
Untreated control		148.3

DISCUSSION

Very simplistically, plant growth rate can be regarded as an interaction of species/cultivar, culture, environment, and the influence of applied PGRs. Growth regulators are routinely used in the pot/bedding and glasshouse industries for both growth control and manipulation of flowering, but little information is available on their use in the nursery stock sector. The growth control required within the objectives of this Project can be defined as 'relatively short term', ideally persisting only up to or just beyond, the point of sale, without altering the natural habit of the plant. This control of growth by chemicals could eliminate the need for trimming throughout the season (particularly important with climbers such as *Clematis*), but is in no way intended to reduce/eliminate the need for the very important pruning treatments required to establish the basic plant framework. More persistent control could lead to disappointed customers, when plants do not grow away with their expected vigour after planting. Conversely, if plants are sold while still 'under the influence' of a PGR treatment, customers may expect them to remain small, and have cause for complaint when they grow away 'normally'. Good labelling will therefore be extremely important.

A number of PGRs are available for use on bedding/pot plants, flowers, ornamentals, hedges and trees in the UK, but Bonzi (containing paclobutrazol at 4 g/litre), B-Nine (containing daminozide at 85% w/w) and chlormequat are the most widely used, and were selected to assess their potential for growth control on a range of shrubs, climbers and herbaceous subjects.

Bonzi is the most 'active' of these 3 materials, and carries a label recommendation for use on Azaleas, bedding plants, begonias, chrysanthemums, *Kalanchoe*, lilies, roses and tulips, to achieve growth control by stem shortening. However, it must be noted that the rates recommended for these subjects are considerably lower than those required to achieve growth control on nursery stock species (with obvious economic implications which are discussed further later). Bonzi is not transported through the plant in the phloem: it is absorbed through green stems and roots, and through the leaves, but is not moved through them - 'lop-sided' plants have been recorded when uneven, low volume applications have been made. It is relatively persistent in the soil, and the label recommendation is restricted to container grown plants.

B-Nine has a label recommendation for use on chrysanthemums, azaleas, hydrangeas, bedding and pot plants, and Poinsettias for internode reduction. It can also be used at a reduced rate in a 'tank mix' with New 5C Cycocel - the two chemicals are reported to have a synergistic effect when mixed together. In contrast to Bonzi, B-Nine is absorbed through the leaves, and as a result is less active at high temperatures when the spray dries quickly.

Thirty one products containing chlormequat are currently listed in the UK Pesticide guide, but only 3 have label recommendations for use on ornamentals (for stem shortening), the two Atlas formulations and Fargro Chlormequat. The latter, containing 460 g/litre active ingredient, was used in the 1994 trials. Phytotoxicity can occur at 'high' rates on some species, resulting in leaf discoloration.

While results have indicated that PGRs have potential for growth control of HNS subjects, experience has shown that a number of factors must be borne in mind when considering their use, and that there is an interaction between these factors which will determine the success of the PGR treatment.

Subject to be treated: results have demonstrated that different species, or even cultivars of the same species, respond very differently to a given rate of PGR, especially Bonzi. For example, in 1995 4 foliar sprays of Bonzi at 75 ml/litre gave only very short term growth control of *Lonicera japonica* 'Halliana', whilst 2 foliar sprays of the same rate eliminated the need for trimming *Clematis* 'Polish Spirit', and a single foliar spray of 50 ml/litre 'stopped' growth of *Clematis* 'Carnaby' at the stage of treatment. Two sprays of Bonzi at 75 ml/litre gave good growth control of *Hebe* 'Autumn Glory', whilst 5 sprays of the same rate were required to give adequate control of *Hebe* 'Blue Gem'.

Rate of PGR applied: since different species and cultivars vary enormously in their response to a given rate of PGR, especially Bonzi, no blanket recommendations for rates can be given, but the results recorded for the 60 shrubby/herbaceous subjects and two dozen climbers tested have established valuable guidelines for rates for various subjects. A summary of species/treatment combinations which have given acceptable growth control is given in Tables 24, 25 and 26 at the end of the Discussion. If too high a rate of Bonzi is applied, plants will be unacceptably dwarfed, and growth control can persist for 2 or more years. The natural vigour of a species is not a reliable guide to the rate of PGR required for growth control. For example, plants of *Ceanothus arboreus* 'Trewithen Blue' given a single foliar spray of 200 ml/litre in August 1992 were still significantly smaller than untreated plants two years after planting in the field; the lower rate of 50 ml/litre gave more acceptable growth control.

Age of plant: results from earlier trials (1990-92) sponsored by ZENECA Agrochemicals, in which 'older' plants were treated, were very different from those recorded in this series of trials where newly potted plants were used. In the early trials a single foliar spray of Bonzi at 100 ml/litre applied at the beginning of the season to plants of *Forsythia* 'Lynwood' potted the year before treatment gave excellent control of growth and a significant enhancement of flowering the following spring. In contrast, in 1995, 4 foliar sprays of Bonzi at 75 ml/litre, applied throughout the summer, gave no visible control of growth, and no enhancement of flowering the following spring. So, a given rate of Bonzi will give significantly greater growth control when applied to older 'pot bound' plants, than when applied to newly potted vigorously growing plants.

Stage of growth/time of treatment: generally results showed that treatments applied early in the season, when new growth was only a few centimetres long, gave better growth control than those applied later. However, too high a rate of Bonzi applied at the beginning of the season could effectively 'stop' growth for the rest of the season! Inevitably, within a batch of plants, only a proportion of plants will be at the optimum stage for treatment at any one time. Unless some sort of selection is undertaken prior to spraying variable results will be achieved.

Timing of sprays will need to vary depending on the vigour of the subject to be treated and the persistence of the growth control required. For example in 1995, three schedules of treatment proved sucessful on the various *Clematis* tested. Firstly, for the more vigorous subjects such as *C. montana*, several sequential sprays of a relatively 'low' rate applied throughout the growing season, commencing early on at 'first flush' produced the best result. Secondly, for the less vigorous species e.g. 'Niobe', a single spray of a 'medium' rate applied when growth had almost reached the top of the cane, was sufficient to give short term growth control several weeks prior to sale. Thirdly, a single foliar spray of a 'high' rate applied after trimming - gave a 'fire brigade' approach to 'hold' plants if target marketing dates were to be deferred for any reason.

Method of application: Bonzi applied as a drench to the growing media appeared to give much greater growth control than foliar sprays, but this tended to be very persistent. Since very little if any B-Nine is taken up by the roots, drenches of this material are ineffective. Foliar sprays offer a much more flexible approach, allowing applications to be made as and when needed in response to speed of growth throughout the season. Alternatively a single application (usually of a slightly higher rate) can be given just prior to the time of sale to 'hold' plants at the required stage of growth for marketing.

Spray volume: high volume sprays are usually recommended to ensure good coverage, but if using Bonzi it is important to avoid run off into the growing media, which may then be taken up by the roots. Foliar sprays are usually applied at higher rates than drenches and the consequences of 'run off' onto the growing media could result in unacceptable dwarfing of growth.

Growing environment: environmental conditions, especially temperature at the time of spraying will influence the efficacy of the treatment - for example since B-Nine is absorbed through the leaves, the longer it stays wet on the foliage, the better the uptake. The majority of the species evaluated were grown under protection (unheated polythene tunnels), and this should be borne in mind when interpreting results.

Target sales period: for the majority of species tested the target sales period was the spring, with the exception of *Ceratostigma* which would be sold in the autumn. The timing of treatment application will therefore need to be varied bearing in mind the sales period.

Successful growth control with, in some cases, the added benefit of improved flowering (e.g. with *Clematis* 'Jackmanii Superba' and *Fuchsia* 'Alice Hoffman' can be achieved on a wide range of hardy nursery stock subjects. It must be emphasised that firm recommendations of rates for individual subjects cannot be given since a number of factors including those discussed above will interact to determine the efficacy of treatment. Other factors such as the pH of the water in which sprays are applied are reported to affect the activity of PGRs, and the addition of wetters/humectants such as Cell-U-Wet are also claimed to improve their efficacy. The investigation of these variables was outside the scope of this Project but warrants further work.

The use of PGRs involves an added cost in the production cycle, but if a superior quality end product can be produced and labour saved by eliminating one or more trimming during the season the additional cost may be worthwhile.

The current cost of Bonzi is approximately £38.90 per litre and that of B-Nine £94 for 900g. The number of plants that can be treated with a litre of diluted spray will vary according to size and the rate used, but in order to compare costs of the two materials, the following assumptions have been made:

a) 100 plants can be treated with 1 litre of diluted spray (probably a very conservative estimate)
b) a single spray of 75 ml/litre of Bonzi is used
c) a single spray of 10 g/litre of B-Nine is used

Cost/plant of Bonzi treatment = 3p
Cost/plant of B-Nine treatment = 1p

Within this Project, the majority of treatments have utilised Bonzi, but the potential of B-Nine should not be ignored since it may be a cheaper option (depending on the rates used) with less risk of overdosing. Tank mixes with New 5C Cycocel should also be evaluated further.

In summary, results from this Project have shown the potential of PGRs in controlling growth and in some cases enhancing flower on a range of species. The summary tables provide guidelines as to rates/number of sprays which have given acceptable growth control, but these should not be interpreted as firm recommendations. Small scale trials must be undertaken on individual nurseries before treatments are applied as a matter of routine.

Important note: the results reported in this document were, of necessity, recorded on a small numbers of plants and the comments are not intended to constitute recommendations or endorsements of any treatment.

Whilst the best available information has been used in this report, neither HRI or HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure used.

Table 24: Summary of 'shrubby' species/treatment combinations showing where acceptable and excessive growth control was achieved

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Abelia x grandiflora	✓ (2)	✓ (2)	* (2)							✓ (3)		
Abutilon 'Kentish Belle'	?✓ (3)	✓ (3)	✓ (3)				✓ D					
Buddleia 'Black Knight'		?✓ (2)	?✓ (2)			?✓ (1)						
Buddleia 'Pink Delight'										?✓ (3)		
Buddleia 'Royal Red'		?✓ (2)	?✓ (2)									
Ceanothus arboreus 'Trewithen Blue'		✓ (1)		* (1)		* (1)						
Ceanothus 'Blue Mound'		* (1)		* (1)		* (1)	✓ 6ml (x1)					
Ceratostigma griffithii		✓ (1)		* (1)		* (1)	✓ 25ml (x 1)					
Ceratostigma willmottianum	✓ (1)	✓ (1)		* (1)		* (1)	✓ D					
Convolvulus cneorum	✓ (1)	✓ (1)		* (1)		* (1)	* D					
Cytisus 'Burkwoodii'		?✓ (1)		?✓ (1)	?✓ (1)							
	✓ (3)	✓ (3)	✓ (3)					✓ (3)	✓ (3)	✓ (3)		

✓	Acceptable growth control achieved	?✓	Growth control not sufficiently persistent
*	Excessive growth control achieved	F	Enhanced flowering
D	Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season	?*	Growth control bordering on excessive

Table 24 (Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Cytisus x praecox 'Allgold'		?✓ (6)	?✓ (6)							?✓ (6)		
Cytisus 'Mrs Norman Henry		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus scoparius 'Golden Sunlight'		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus 'Windlesham Ruby'		?✓ (1)		?✓ (1)	?✓ (1)							
Cytisus 'Zeelandia'	✓ (2)	✓ (2)	✓ (2)							✓ (2)		
Escallonia 'Peach Blossom'		✓ (1)		✓ (1)		✓ (1)						
Fremontodendron 'California Glory'		✓ (1)		✓ (1)		* (1)						
Fuchsia 'Alice Hoffman'		✓ (1)F		✓ (1)F		* (1)						
Fuchsia 'Genii'												?✓ 0.5% (2) ?✓ 0.75% (2)
Fuchsia magellicana 'Versicolor'		✓ (2)										?✓ 0.5% (2) ?✓ 0.75% (2)
Fuchsia 'Mrs Popple'		✓ (2)										
Hebe 'Autumn Glory'		✓ (2)	✓ (2)			✓ (1)						

✓ Acceptable growth control achieved
* Excessive growth control achieved
D Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season
?✓ Growth control not sufficiently persistent
F Enhanced flowering
?* Growth control bordering on excessive

Table 24 (Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Hebe x franciscana 'Blue Gem'	✓ (5)	✓ (5)	✓ (5)					✓ (5)	✓ (5)	✓ (5)		
Hebe x franciscana 'Variegata'		✓ (4)	✓ (4)									
Hebe 'Great Orme'		✓ (3)	* (3)					?✓ (3)	?✓ (3)	✓ (3)		
Hebe 'Midsummer Beauty'		✓ (2)	* (2)					?✓ (2)	?✓ (2)	?✓ (2)		
Hebe 'Mrs Winder'		✓ (1)										
Hypericum 'Hidcote'	✓ (3)	✓ (3)	✓ (3)				* D					
Lavatera olbia 'Rosea'			?✓ (2)			✓ (1)						
Pernettya mucronata 'Cherry Ripe' & 'Pink Pearl'		?✓ (1)		?✓ (1)		?✓ (1)						
Photinia x fraseri 'Red Robin'	✓ (4)	✓ (4)	✓ (4)	?✓ (1)		?✓ (1)	✓ D					

✓ Acceptable growth control achieved
* Excessive growth control achieved
D Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season
?✓ Growth control not sufficiently persistent
F Enhanced flowering
?* Growth control bordering on excessive

Table 24 (Continued)

Species/cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	150	200	Other	2.5	5.0	7.5	10.0	Other
Pieris japonica 'Blush'				✓ (1)		✓ (1)						
Santolina rosmarinifolia		✓ (1)		? *		? *						
Weigela florida 'Foliis Purpureis'		✓ (4)	✓ (4)						✓ (4)			
Weigela florida 'Variegata'		✓ (5)	✓ (5)						?✓ (5)			
Weigela florida 'Victoria'				✓ (2)						✓ (2)		

✓	Acceptable growth control achieved	?✓	Growth control not sufficiently persistent
*	Excessive growth control achieved	F	Enhanced flowering
D	Drench of 1.5 ml Bonzi in 100 ml water/pot applied at beginning of growing season	?*	Growth control bordering on excessive

Note: No growth control was achieved on the following species with single foliar sprays of Bonzi applied at rates up to 200 ml/litre:

Choisya 'Aztec Pearl'	*Cotinus* 'Grace'	*Senecio* 'Sunshine'
Choisya 'Sundance'	*Hypericum beanii* 'Gold Cup'	*Magnolia x soulangeana*
Cistus 'Peggy Sammons'	*Mahonia* 'Charity'	*Magnolia x loebneri* 'Leonard Messel'

Similarly, no growth control was achieved on:

Buddleia 'Lochinch', *Forsythia* 'Lynwood' with 4 foliar sprays of Bonzi at 75 ml/litre or 4 foliar sprays of B-Nine at 7.5 g/litre
and on *Potentilla* 'Goldfinger', 'Gold Star', 'Primrose Beauty', 'Princess' and 'Tangerine' with single foliar sprays of Bonzi up to 150 ml/litre.

Table 25: Summary of 'herbaceous' species/treatment combinations showing where acceptable growth control was achieved

Species/Cultivar	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)							Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)				
	37.5	50	75	100	200	300	Other	2.5	5.0	7.5	10.0	Other
Arabis 'Corfe Castle'		✓ (2)										
Penstemon 'King George'												✓ 0.25% (2) ✓ 0.5% (2)
Phygelius capensis/xrectus				✓ (1)	✓ (1)							

Key: ✓ Acceptable growth control achieved

Note: No growth control was achieved on *Delphinium* 'Pacific Hybrids' with a single foliar spray of Bonzi at 25 or 50 ml/litre, Fargro Chlormequat at 6 or 9 ml/litre of B-Nine at 0.25 or 0.5%

No growth control was achieved on Lupin 'My Castle' with 2 foliar sprays of Bonzi at 25 or 50 ml/litre, Fargro Chlormequat at 6 or 9 ml/litre or B-Nine at 0.25 or 0.5%

Table 26: Summary of *Clematis* treatment combinations (1995) showing where acceptable and excessive growth control was achieved

Species/Cultivar	Stage of growth treated	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)					Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)			
		37.5	50	75	100	200	2.5	5.0	7.5	10.0
C. alpina 'Blue Dancer'	'First Flush' and 5 days later			✓ (2)	?* (2)			?✓ (2)	?✓ (2)	
	Trimmed to top of cane				✓ (1)	✓ (1)			?✓ (1)	?✓ (1)
C. macropetala 'Floralia'	'First Flush' and 21 days later			✓ (2)	?* (2)			?✓ (2)	?✓ (2)	
	Trimmed to top of cane				?✓ (1)	?✓ (1)			?✓ (1)	?✓ (1)
C. montana 'Odorata'	'First Flush' and 5 days later			✓ (2)	✓ (2)			✓ (2)	✓ (2)	
	Trimmed to top of cane				✓ (1)	✓ (1)			?✓ (1)	?✓ (1)
C. viticella 'Polish Spirit'	'First Flush' and 5 days later			* (2)F	* (2)F			✓ (2)		
	Trimmed to top of cane				✓ (1)F	✓ (1)F			?✓ (1)	
Recent introductions										
'Arctic Queen'	'First Flush'		✓ (2)	✓ (2)			✓ (2)	✓ (2)		
	Top of cane									
'Royal Velvet'	'First Flush'		✓ (2)	✓ (2)						
	Top of cane				✓ (1)	✓ (1)				
'Sugar Candy'	'First Flush'		✓ (1)	✓ (1)						
	Top of cane					✓ (1)				

Key: ✓ Acceptable growth control achieved
?✓ Growth control not sufficiently persistent
F Enhanced flowering
* Excessive growth control achieved
?* Growth control bordering on excessive

Table 26 continued

Species/Cultivar	Stage of growth treated	Rate of Bonzi applied in ml/litre (No. of sprays shown in brackets)					Rate of B-Nine applied in g/litre (No. of sprays shown in brackets)			
		37.5	50	75	100	200	2.5	5.0	7.5	10.0
'Early' large flowered cultivars										
'Bee's Jubilee'	Almost at top of cane		✓ (1)							
'Carnaby'	Almost at top of cane			?✓(1)						
'Lasurstern'	Almost at top of cane	✓ (1)	✓ (1)							
'Miss Bateman'	Almost at top of cane	✓ (1)	?✓ (1)	?✓ (1)						
'Niobe'	Almost at top of cane									
'The President'	Almost at top of cane	?✓ (1)	?✓ (1)	✓ (1)			?✓ (1)	✓ (1)	✓ (1)	
'Late' large flowered cultivars										
'Ernest Markham'	'First Flush'		✓ (1)	✓ (1)				?✓ (1)		
	Trimmed to top of cane				✓ (1)	✓ (1)F			?✓ (1)	?✓ (1)
'Hagley Hybrid'	'First Flush'		✓ (3)	* (1)			?✓ (3)	✓ (2)		
	Trimmed to top of cane				✓ (1)	?* (1)				
'Jackmanii'	'First Flush'		✓ (2)F	?✓ (2)F						
	Trimmed to top of cane				✓ (1)F	✓ (1)F				
'Ville de Lyon'	'First Flush'		✓ (2)F	* (2)F			✓ (2)			
	Trimmed to top of cane				✓ (1)	✓ (1)				

Key: ✓ Acceptable growth control achieved
?✓ Growth control not sufficiently persistent
F Enhanced flowering
* Excessive growth control achieved
?* Growth control bordering on excessive

CONCLUSIONS

- The response of different species to foliar sprays/drenches of Bonzi varied widely, depending on rate and time of application.

- The growth of some species, e.g. *Ceanothus* 'Blue Mound' and *Clematis* 'Carnaby' was controlled by a single foliar spray of Bonzi at 6 ml/litre applied at the beginning of the season.

- The growth of a number of the test species was satisfactorily controlled by one or more foliar sprays of Bonzi at 50 or 75 ml/litre. The use of several sequential sprays of 'low' rates applied throughout the season often gave more acceptable growth control than a single spray of a higher rate applied at the beginning of the season.

- Other species such as *Choisya* 'Aztec Pearl', *Mahonia* 'Charity' and *Senecio* 'Sunshine' proved unresponsive to foliar sprays of Bonzi at rates up to 200 ml/litre.

- A drench of Bonzi at 1.5 ml in 100 ml water/pot gave little growth control of *Passiflora caerulea*, but unacceptably dwarfed plants of *Solanum crispum* 'Glasnevin'.

- The flowering of some subjects such as *Fuchsia* 'Alice Hoffman', *Clematis* 'Jackmanii Superba' and *C.* 'Ernest Markham' was significantly improved after treatment with foliar sprays of Bonzi.

- The need for trimming several of the *Clematis* species/cultivars tested was reduced/eliminated by some of the treatment schedules applied.

- Foliar sprays of B-Nine gave acceptable growth control of some subjects, e.g. *Abelia x grandiflora* and *Cytisus* 'Burkwoodii', but had little effect on other species at the rates tested (up to 10 g/litre).

- Chlormequat generally did not give good growth control at the rates tested.

RECOMMENDATIONS FOR FURTHER WORK

- The potential for the use of PGR's on a wide range of HNS species has been demonstrated, but work to date has been confined to liners potted on into their final pot size. Further work is needed to investigate the effect of treating plants as an earlier stage in the production cycle (i.e. as liners). This could result in earlier control of internode length producing a more compact plant for potting on and, in addition, may 'prime' the plant to respond to lower rates of PGR thereafter, reducing the total costs of treatment.

- Further work is needed to fully evaluate PGR's such as B-Nine and New 5C Cycocel, since the likelihood of 'overdosing' is less with these less persistent materials.

- The addition of wetters/humectants/adjuvants, together with the influence of pH of the water used for spraying may also increase the efficacy of PGR treatment, resulting in more cost effective application rates. These factors warrant further investigation.

APPENDIX A

Plate 1: ***Abelia x grandiflora***

Left: untreated control
Right: 2 foliar sprays of Bonzi at 37.5 ml/litre applied on 20 June and 3 July 1995
[Photograph taken early October 1995]

Plate 2: ***Abelia x grandiflora***

Left: untreated control
Right: 2 foliar sprays of Bonzi at 75 ml/litre applied on 20 June and 3 July 1995
[Photograph taken early October 1995]

APPENDIX A

Plate 3: ***Abutilon*** **'Kentish Belle'**

Left to right: untreated control/3 foliar sprays of Bonzi at 37.5 ml, 50 ml and 75 ml/litre applied on 12 September, 2 and 18 October 1995
[Photograph taken late April 1996]

Plate 4: ***Abutilon*** **'Kentish Belle'**

Left: untreated control
Right: drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 7 September 1995
[Photograph taken late April 1996]

APPENDIX A

Plate 5: ***Arabis*** **'Corfe Castle'**

Left: untreated control
Centre: 2 foliar sprays of Bonzi at 25 ml/litre applied on 9 and 24 May 1994
Right: 2 foliar sprays of Bonzi at 50 ml/litre applied on 9 and 24 May 1994.
[Photograph taken late June 1994]

Plate 6: ***Ceanothus arboreus*** **'Trewithen Blue'**

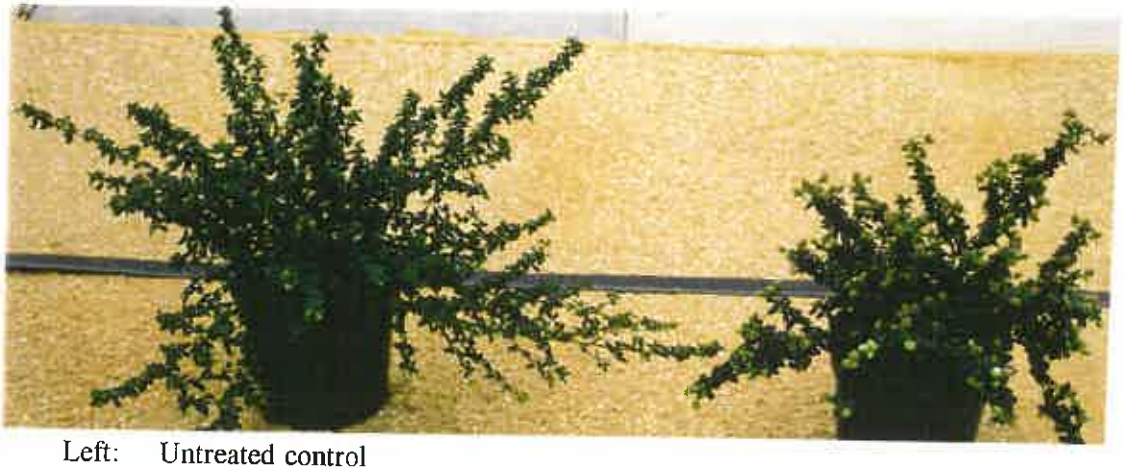
Left: untreated control
Right: 1 foliar spray of Bonzi at 200 ml/litre applied on 13 August 1992
[Photograph taken early March 1993]

APPENDIX A

Plate 7: ***Ceanothus*** **'Blue Mound'**

Left: Untreated control
Right: 1 foliar spray of Bonzi at 6 ml/litre applied on 3 August 1993
[Photograph taken late March 1994]

Plate 8: ***Ceanothus*** **'Blue Mound'**



Left: Untreated control
Right: 1 foliar spray of Bonzi at 25 ml/litre applied on 3 August 1993
[Photograph taken late March 1994]

Plate 9: ***Ceanothus*** **'Blue Mound'**

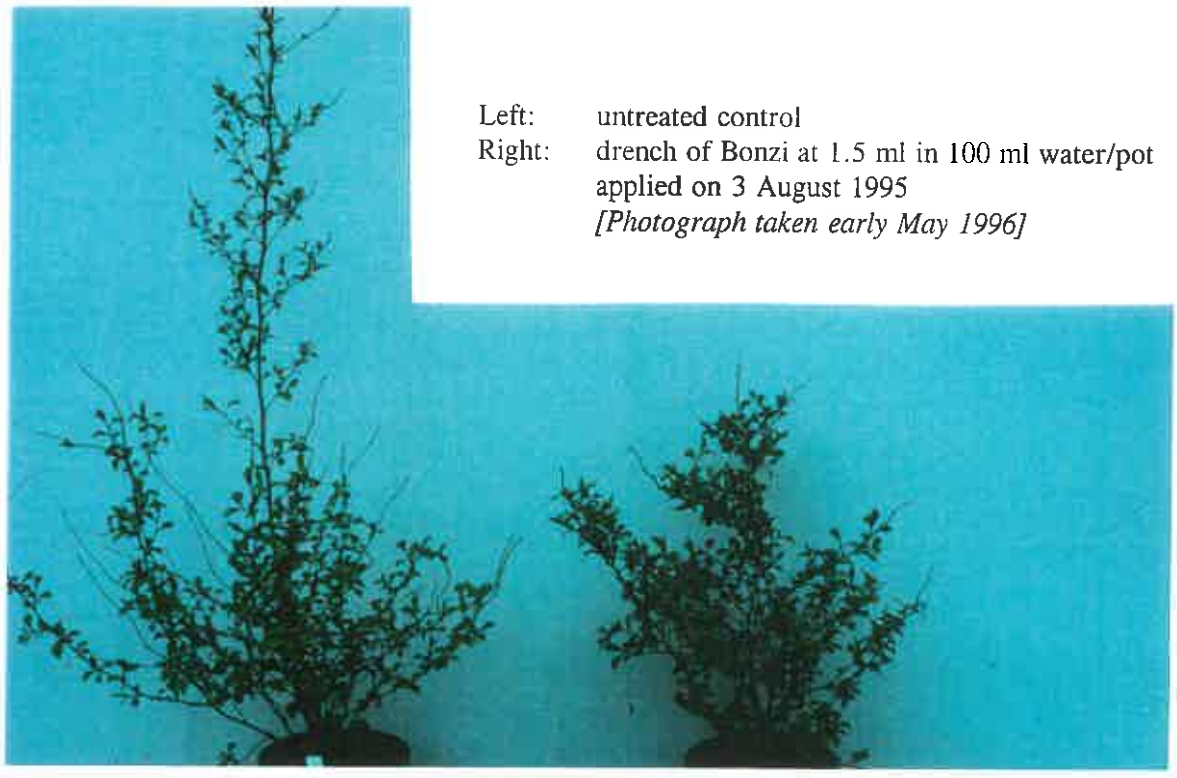
Top: Bonzi treated plants
Bottom: Untreated control plants
[Photograph taken early May 1994]

APPENDIX A

Plate 10: *Ceratostigma willmottianum*

Left: untreated control
Centre: 2 foliar sprays of Bonzi at 37.5 ml/litre applied on 3 and 17 August 1995
Right: 2 foliar sprays of Bonzi at 50 ml/litre applied on 3 and 17 August 1995
[Photograph taken early May 1996]

Plate 11: *Ceratostigma willmottianum*



Left: untreated control
Right: drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 3 August 1995
[Photograph taken early May 1996]

APPENDIX A

Plate 12: *Convolvulus cneorum*

Left to right: untreated control/1 foliar spray of Bonzi at 37.5 ml and 50 ml applied on 26 July 1995 and a drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 26 July 1995
[Photograph taken early October 1995]

Plate 13: *Cytisus* **'Burkwoodii'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 75 ml/litre applied on 29 June and 13 July 1995
[Photograph taken late July 1995]

APPENDIX A

Plate 14: ***Fremontodendron*** **'California Glory'**

Left to right: untreated control/1 foliar spray of Bonzi at 37.5 ml and 50 ml applied on 26 July 1995 and a drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 26 July 1995
[Photograph taken early October 1995]

Plate 15: ***Fuchsia*** **'Alice Hoffman'**

Left: untreated control
Right: 1 foliar sprays of Bonzi at 100 ml/litre applied on 15 April 1993
[Photograph taken mid June 1993]

APPENDIX A

Plate 16: ***Hebe*** **'Great Orme'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 50 ml/litre applied on 20 June and 3 July 1995
[Photograph taken late July 1995]

Plate 17: ***Hebe*** **'Great Orme'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 75 ml/litre applied on 20 June and 3 July 1995
[Photograph taken late July 1995]

APPENDIX A

Plate 18: *Hebe* **'Midsummer Beauty'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 50 ml/litre applied on 20 June and 3 July 1995
[Photograph taken late July 1995]

Plate 19: *Hebe* **'Midsummer Beauty'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 75 ml/litre applied on 20 June and 3 July 1995
[Photograph taken late July 1995]

APPENDIX A

Plate 20: ***Hypericum*** **'Hidcote'**

Left to right: untreated control/3 foliar sprays of Bonzi at 37.5 ml, 50 ml and 75 ml/litre applied on 25 May, 8 and 20 June 1995
[Photograph taken early October 1995]

Plate 21: ***Hypericum*** **'Hidcote'**

Left: untreated control
Right: drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 25 May 1995
[Photograph taken late July 1995]

APPENDIX A

Plate 22: ***Lavatera olbia*** **'Rosea'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 75 ml/litre applied on 16 February and 10 March 1994
[Photograph taken late March 1994]

Plate 23: ***Lavatera olbia*** **'Rosea'**

Left to right: untreated control/1 foliar spray of Bonzi at 75 ml/litre, applied on 16 February, 2 foliar sprays of Bonzi at 50 ml/litre applied on applied on 16 February and 10 March 1994
[Photograph taken late April 1994]

APPENDIX A

Plate 24: ***Penstemon*** **'King George'**

Left: 2 foliar sprays of Bonzi at 25 ml/litre applied on 5 and 24 May 1994

Centre: 2 foliar sprays of B-Nine at 0.25% applied on 5 and 24 May 1994

Right: 2 foliar sprays of B-Nine at 0.5% applied on 5 and 24 May 1994

[Photograph taken late June 1994]

APPENDIX A

Plate 25: ***Photinia x fraseri*** **'Red Robin'**

Left: untreated control
Right: 4 foliar sprays of Bonzi at 37.5 ml/litre applied on 26 July, 3, 17 and 31 August 1995
[Photograph taken early October 1995]

Plate 26: ***Photinia x fraseri*** **'Red Robin'**

Left: untreated control
Right: 4 foliar sprays of B-Nine at 7.5 g/litre applied on 26 July, 3, 17 and 31 August 1995
[Photograph taken early October 1995]

APPENDIX A

Plate 27: ***Weigela florida*** **'Foliis Purpureis'**

Left: untreated control
Right: 4 foliar sprays of Bonzi at 50 ml/litre applied on 8 and 29 June, 26 July and 31 August
[Photograph taken early October 1995]

Plate 28: ***Weigela florida*** **'Foliis Purpureis'**

Left: untreated control
Right: 4 foliar sprays of Bonzi at 75 ml/litre applied on 8 and 29 June, 26 July and 31 August
[Photograph taken early October 1995]

APPENDIX A

Plate 29: *Weigela florida* **'Variegata'**

Left: untreated control
Right: 5 foliar sprays of B-Nine at 5 g/litre applied on 3 and 19 July, 3, 17 and 31 August 1995
[Photograph taken early October 1995]

APPENDIX A

Plate 30: ***Weigela florida*** **'Victoria'**

Left: untreated control
Right: 2 foliar sprays of Bonzi at 100 ml/litre applied on 9 and 24 May 1994
[Photograph taken late June 1994]

Plate 31: ***Weigela florida*** **'Victoria'**

Left: untreated control
Right: 2 foliar sprays of B-Nine at 0.75% applied on 9 and 24 May 1994
[Photograph taken late June 1994]

APPENDIX A

Plate 32: ***Clematis*** **'Carnaby'**

Left to right: untreated control, 1 foliar spray of Bonzi applied at 50 ml, 100 ml or 200 ml/litre at 'first flush' 1992.
[Photograph taken late October 1992]

Plate 33: ***Clematis*** **'Ernest Markham'**

Left: untreated control
Right: 1 foliar spray of Bonzi at 200 ml/litre applied after growth trimmed to top of cane (1995)
[Photograph taken mid October 1995]

APPENDIX A

Plate 34: ***Clematis* 'Jackmanii Superba'**

Left to right: untreated control/1 foliar spray of Bonzi applied at 50 ml, 100 ml or 150 ml/litre at 'first flush' 1992
[Photograph taken late October 1992]

Plate 35: ***Passiflora caerulea***

Left to right: untreated control/3 foliar sprays of Bonzi at 37.5 ml, 50 ml or 75 ml/litre applied on 12 September, 7 and 23 October 1995
[Photograph taken mid April 1996]

APPENDIX A

Plate 36: *Passiflora caerulea*

Left to right: untreated control/3 foliar sprays of B-Nine at 2.5 g, 5 g (2 pots) or 7.5 g/litre applied on 12 September, 7 and 23 October 1995
[Photograph taken mid April 1996]

Plate 37: *Solanum crispum* **'Glasnevin'**

Left: untreated control
Right: drench of Bonzi at 1.5 ml in 100 ml water/pot applied on 12 September 1995
[Photograph taken mid April 1996]

Contract, Terms & Conditions and Schedule

Contract between HRI (hereinafter called the "Contractor") and the Horticultural Development Council (hereinafter called the "Council") for a research/development project.

1. TITLE OF PROJECT:

Contract No: HNS 39a
Contract Date: 18.05.95

GROWTH REGULATION OF CONTAINER GROWN NURSERY STOCK

2. BACKGROUND AND COMMERCIAL OBJECTIVES

Work to date has demonstrated the efficacy of the plant growth regulator paclobutrazol as 'Bonzi' for the control of growth, and with some species, enhancement of flowering. The rates required, and the frequency of application vary widely between species, and in many cases, between cultivars within a specie group. Work carried out at HRI Efford last year also indicated the potential of daminozide ('B-Nine') for controlling growth, a cheaper alternative to 'Bonzi'.

The work has reached the stage for demonstration of schedules for a range of species (*Clematis, Ceanothus, Convolvulus* etc.) but further work on rates and method of application is required with other species, along with comparisons with 'B-Nine'. With more vigorous species, and those with long internodes, sequential spray programmes may be more effective in producing the quality required, rather than a single application at specific growth stages. This will be investigated.

In the light of the success so far achieved, interest has been expressed by rose growers for the control of growth/vigour to produce quality well balanced plants in containers (with any enhancement in flowering being an added bonus). An observation on whether growth regulants have potential with roses will be included in this work.

Results of this work will be used at a specialist HNS growth regulant day planned for the autumn of 1995.

3. POTENTIAL FINANCIAL BENEFITS TO THE INDUSTRY

Improved quality of plants in terms of compactness will not only improve appearance at the point of sale, but also facilitate handling and help reduce toppling of plants in the wind thus reducing labour input. The possibility of growing these more compact plants at a closer spacing will also have important economic implications. There is also a large potential saving in labour for the reduction of trimming and tying of climbers. Enhancement of flowering will improve marketability of flowering shrubs and could increase 'impulse sales' in the garden centre.

4. SCIENTIFIC/TECHNICAL ASPECTS OF THE WORK

To compare 'B-Nine' with 'Bonzi' as a growth regulator for HNS in respect of rates and timing of application. To produce schedules for use for a range of HNS species and to determine whether containerised roses are responsive to these growth regulators.

5. CLOSELY RELATED WORK COMPLETED OR IN PROGRESS

There is an increasing data base accumulating from research with other species in other countries. Work undertaken in Project HNS39 at HRI Efford has yielded useful information on the potential of 'Bonzi' and also in the last year of work, 'B-Nine' as useful growth regulators for HNS species.

6. DESCRIPTION OF WORK

Proposed Treatments:

Trial 1: **Evaluation of sequential sprays of 'Bonzi' and 'B-Nine' applied to a range of species with 'long' internodes, and climbers (excluding *Clematis*)**

Species:
Abelia x *grandiflora*
Buddleia davidii ('Black Knight', 'Lochinch', 'Pink Delight')
Cytisus 'Zeelandia'
Cytisus praecox 'Allgold'
Cytisus 'Burkwoodii'
Forsythia 'Lynwood'
Hypericum 'Hidcote'
Lavatera olbia 'Rosea'
Photinia x fraseri 'Red Robin'

Abutilon 'Kentish Belle'
Lonicera japonica 'Halliana'
Lonicera periclymenum 'Belgica'
Passiflora caerulea
Solanum crispum 'Glasnevin'

Growth regulator treatments (applied as foliar sprays unless otherwise specified)

2 rates of 'Bonzi' :	37.5, 50 or 75 ml/litre (depending on species)
2 rates of 'B-Nine':	2.5, 5.0, 7.5 g/litre (0.25%, 0.5% or 0.75%, depending on species)
Number of sprays :	2 or 3 throughout the season as required

'Bonzi' as a drench at 10-15 ml/litre at 100 ml/pot (applied to guard plants only)

Untreated control

Trial 2: **Evaluation of sequential sprays of 'Bonzi' and 'B-Nine' applied to a range of *Clematis* cultivars/species, with a view to providing guidelines for application in the industry**

Species/cultivar:

Clematis macropetala 'Blue Dancer'
Clematis alpina 'Willy'
Clematis montana 'Odorata'
Clematis 'Carnaby'
Clematis 'Lasurstern'
Clematis 'Bees Jubilee'
Clematis 'The President'
Clematis 'Miss Bateman'

Clematis 'Ernest Markham'
Clematis 'Hagley Hybrid'
Clematis 'Jackmanii'
Clematis 'Niobe'
Clematis 'Ville de Lyon'

Clematis viticella 'Polish Spirit'

Growth regulator treatments (applied as foliar sprays):

2 rates of 'Bonzi':

C. alpina, montana and *viticella*

a) 2 rates of 'Bonzi' : 75 or 100 ml/litre
2 rates of 'B-Nine' : 5.0 or 7.5 g/litre (0.5 or 0.75%).

Number of sprays : 2 or 3 throughout the season as required commencing at first flush after pruning.

b) 2 rates of 'Bonzi' : 100 or 200 ml/litre
2 rates of 'B-Nine' : 7.5 or 10 g/litre (0.75 or 1.0%).

Number of sprays : a single spray aplied when growth pinched back to top of cane.

Late large flowered cultivars ('Ernest Markham','Hagley Hybrid', 'Jackmanii', 'Ville de Lyon')

c)	2 rates of 'Bonzi'	:	50 or 75 ml/litre
	2 rates of 'B-Nine'	:	2.5 or 5.0 g/litre (0.25 or 5%).
	Number of sprays	:	2 or 3 throughout the season as required commencing at first flush after pruning.
d)	2 rates of 'Bonzi'	:	100 or 200 ml/litre
	2 rates of 'B-Nine'	:	7.5 or 10 g/litre (0.75 or 1.0%).
	Number of sprays	:	a single spray aplied when growth plucked back to top of cane.

Early large flowered culitvars ('Carnaby', Lasurstern', 'Bees Jubilee', 'The President', 'Niobe', 'Miss Bateman')

3 rates of 'Bonzi'	:	37.5, 50 or 75 ml/litre
3 rates of 'B-Nine'	:	2.5, 5.0 or 7.5 g/litre (0.25, or 0.5 or 0.75%).
Number of sprays	:	1 or 2 throughout the season when growth almost at top of cane.

7. COMMENCEMENT DATE AND DURATION

Start date: 01.04.95, duration 1¼ years

The experimental work will be completed by May 1996 and the final report will be produced by the end of June 1996.

8. STAFF RESPONSIBILITIES

Lyn Andrews

9. LOCATION

HRI Efford.

10. COSTS

£11,700.

11. PAYMENT

On each quarter day the Council will pay to the Contractor in accordance with the following schedule:

QUARTER/YEAR	1995	1996
1	-	2340
2	2340	2340
3	2340	-
4	2340	-

TERMS AND CONDITIONS

The Council's standard terms and conditions of contract shall apply.

Signed for the Contractor(s)

Signature.....

Position.....

Date.....

Signed for the Contractor(s)

Signature.....

Position.....

Date.....

Signed for the Council

Signature.....

Position.....

Date.....