

## FINAL REPORT

July 1995

**Project No:** 35e

**Project Title:** Chemical Weed Control in Outdoor  
Container Grown Herbaceous Perennial  
Nursery Stock

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# RELEVANCE TO GROWERS AND PRACTICAL APPLICATION

## Application

### Objective

This series of trials aims to test herbicide treatments designed to give a broad spectrum of weed control whilst causing minimal phytotoxicity to a range of herbaceous species.

### Key Results

Ronstar 2G, Flexidor, and Venzar can be used on a range of herbaceous subjects with minimal damage providing no more than 2 applications of Venzar and Flexidor are made.

A programme of Ronstar 2G starting from potting with a single application of Flexidor, has been relatively safe.

2 applications of low rate Venzar plus Flexidor was safe to a more limited range of subjects providing that re application was made at least 18 weeks after the initial treatment.

Both programmes gave good weed control including Hairy Bittercress and Willowherb.

### Opportunity for application

The programmes applied gave very significant degree of weed control. The plants would otherwise have been unsaleable without a considerable amount of hand weeding.

There is considerable scope for herbaceous plant growers to make more use of herbicides, even a single application would give a benefit.

## Summary & Fact Sheet

This fact sheet presents the findings from a 3 year HDC funded project to find suitable herbicide treatments for container grown herbaceous perennial plants.

The withdrawal of Tenoran, Surflan and Enide has limited the herbicide options on container herbaceous perennials. Herbaceous perennials are very susceptible to herbicide damage, consequently many growers have had to resort to hand weeding which is expensive and not always effective. This series of trials aims to test alternative treatments designed to give a broad spectrum of weed control whilst causing minimal phytotoxicity to a range of herbaceous subjects.

### The Herbicides Tested

Over the 3 years of the trial we have looked at the following herbicides;

- Ronstar 2G
- Flexidor (Original and 125)
- Venzar
- Enide 50W
- Devrinol
- Butisan S
- Propachlor
- Dacthal W75

Of these Ronstar 2G, Dacthal W75, Flexidor and Venzar were suitable for use in herbicide programmes. The other treatments were either too damaging (Butisan S), not sufficiently effective (Propachlor, Devrinol), or were withdrawn from the market during the trial (Enide 50W). Venzar was withdrawn during the trial but the active ingredient is still available in similar brands.

A number of the herbaceous subjects tested were found to be very sensitive to herbicides, with virtually any treatment causing some damage. However there was a range of subjects that could be treated with Ronstar 2G, Flexidor or Venzar. The results are tabulated overleaf.

**Caution - because of the range of species tested, in most cases individual species results relate to only one years trials. Crop tolerance can vary from year to year**

## Susceptibility to herbicides

Key T = Tolerant  
 MS = Moderately Susceptible  
 S = Susceptible

	Ronstar 2G	Flexidor	Venzar
<i>Alchemilla mollis</i>	T	T	T
<i>Althea</i> Chaters Double	T	S	S
<i>Anemone</i> xh. Alba	T	T	T
<i>Aquilega</i> Milkana Hybrid	T	T	T
<i>Aquilegia</i> Crimson Star	T	T	T
<i>Arenaria montana</i>	T	MS	MS
<i>Aruncus kneiffii</i>	S	S	S
<i>Aster</i> Snow Cushion	T	T	T
<i>Astilbe</i> Finale	T	MS	T
<i>Astilbe</i> Spirit	T	MS	T
<i>Bergenia</i> Bressingham Salmon	T	T	T
<i>Bergenia</i> Bressingham White	T	T	T
<i>Campanula</i> White Pouffe	S	S	S
<i>Campanula glomerata</i>	T	MS	T
<i>Campanula persicifolia</i>	T	T	T
<i>Carex</i> Evergold	T	T	T
<i>Chrysanthemum</i> Brightness	MS	MS	MS
<i>Chrysanthemum</i> Clara Curtis	S	S	S
<i>Crocsmia</i> Lucifer	T	T	T
<i>Delphineum</i> Black Knight	S	MS	S
<i>Delphineum</i> Cameliard	S	MS	S
<i>Delphineum</i> Galahad	S	MS	S
<i>Dianthus</i> Flashing Light	T	T	T
<i>Diascia elegans</i>	T	S	MS
<i>Dierama</i> Pendulum	T	T	T
<i>Digitalis</i> Lutea	S	S	S
<i>Digitalis grandiflora</i>	S	S	S
<i>Erigeron</i> Dunkelste Aller	T	T	T
<i>Eryngium planum</i>	T	S	S
<i>Euphorbia</i> Characias	T	T	S
<i>Euphorbia polychroma</i>	T	T	S
<i>Gaillardia</i> Goblin	T	S	S
<i>Geranium</i> X Cambridge	T	T	T
<i>Geranium sanguineum</i>	T	T	T
<i>Geum</i> Lady Strathedon	MS	T	T
<i>Geum</i> Mrs Bradshaw	MS	T	T
<i>Helenium</i> Waltraut	T	T	T

	Ronstar 2G	Flexidor	Venzar
<i>Heuchera</i> Bressingham	T	T	MS
<i>Hosta</i> Francis Williams	MS	T	T
<i>Iberis</i> Snowflake	T	T	T
<i>Iris foetidissima</i>	T	T	T
<i>Kniphofia</i> Bressingham	T	T	T
<i>Lavendula</i> Munstead	T	T	T
<i>Lupinus</i> My Castle	T	T	T
<i>Lupinus</i> Noble Maiden	T	T	T
<i>Lychnis arkwrightii</i>	T	T	MS
<i>Nepeta</i> Snow Flake	T	S	MS
<i>Oenothera</i> Fireworks	S	MS	S
<i>Oenothera missouriensis</i>	MS	MS	MS
<i>Origanum</i> Herrenhausen	S	S	S
<i>Origanum</i> Hopleys	S	S	S
<i>Pachysandra</i> Green Carpet	T	T	T
<i>Papaver</i> Turkish Delight	T	S	T
<i>Papaver</i> Allegro	T	S	S
<i>Phlox maculata</i> Alpha	T	T	T
<i>Physostegia</i> Vivid	T	S	S
<i>Potentilla recta</i> Warrenii	T	T	MS
<i>Primula auricula</i>	T	T	T
<i>Primula denticulata</i>	T	T	T
<i>Pulsatilla</i> Rubra	T	T	T
<i>Pulsatilla vulgaris</i>	T	T	T
<i>Sedum</i> Autumn Joy	S	T	T
<i>Sedum</i> Ruby Glow	S	S	T
<i>Sidalcea</i> Party Girl	T	S	S
<i>Silene schafta</i>	T	T	T
<i>Veronica gentianoides</i> Variegata	S	S	S
<i>Veronica pedunculata</i> Georgia	T	S	MS
<i>Veronica</i> Shirley Blue	T	T	T

These results refer to the following rates of use.

Ronstar 2G 200 kg/ha  
 Flexidor 125 1 l/ha  
 Venzar 1.7 kg/ha

**Caution - because of the range of species tested, in most cases individual species results relate to only one years trials. Crop tolerance can vary from year to year**

Ronstar 2G was generally the safest treatment and would be particularly useful as a treatment applied after potting before foliage covers the pot surface.

Flexidor was not so effective when applied alone as the control of groundsel and willowherb was not as good as the other treatments. However a programme of Ronstar 2G with a single application of Flexidor gave an extended weed control period and would reduce the risk of resistant weeds building up. It was found to be unnecessary to re apply Flexidor at intervals of less than 18 - 24 weeks. More frequent applications increased the risk of damage.

Venzar gave excellent weed control including liverwort and was quite safe in 1992 and 1993. It was more damaging under the hotter conditions of 1994, but a combination of Venzar and Flexidor could safely be used on a range of subjects (see table) giving the benefit of long term weed control and good spray cover. As with Flexidor, re application was not necessary or desirable before 18 - 24 weeks.

Dacthal 75W was used as a supplement to Ronstar 2G in 1994 and no additional damage was noted but it was not possible to confirm if the weed control was improved over the use of Ronstar 2G alone.

## Action Points

(See Caution below)

- After potting apply Ronstar 2G avoiding susceptible subjects
- Do not apply Ronstar 2G to wet foliage or crops under protection
- Follow up with Flexidor or Flexidor + Venzar, avoiding susceptible subjects
- Subjects susceptible to Flexidor or Venzar could receive follow up treatments of Ronstar 2G.
- Do not apply more than one re application of Venzar or Flexidor
- Do not reapply Venzar or Flexidor until at least 18 weeks after the first application.

The benefits of effective herbicide use are, improved plant quality and the avoidance of time consuming and labour intensive pot cleaning.

**CAUTION** - Because of the wide range of subjects grown by herbaceous plant growers, it has been only possible to test a proportion of the range and individual results reported may only apply to one year of trials. Unfortunately not all varieties of a species may respond in a similar way, and results can vary from year to year. For this reason please treat these results with caution and note that use of these herbicides on herbaceous plant is not covered by label recommendations. When treating subjects for the first time check for signs of damage and do not re apply if damage is noted as effects can be cumulative.

**Whilst reports issued under the auspices of the HDC are prepared from the best available information, neither the authors nor the HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure discussed.**

# EXPERIMENTAL SECTION

## Introduction and objectives

Container grown herbaceous plants are an increasingly important crop. The withdrawal of Tenoran, Surflan and Enide has limited the herbicide options on container herbaceous perennials. Herbaceous perennials are susceptible to herbicide damage. This series of trials aims to test alternative treatments designed to give a broad spectrum of weed control whilst causing minimal phytotoxicity to a range of herbaceous subjects.

## Materials and methods

### Trial layout

All plants were potted into 9 cm pots shortly before each trial started. There were three replicates of each variety (20 varieties years 1 and 2, 40 varieties year 3), with 5 plants of each variety used for each replicate of each treatment. All plants were set out in a randomised layout on a gravel container bed (Mypex ground cover, Year 3), overhead irrigated.

### Plant material

The plant material used was either small bare root divisions, module raised cuttings or seedlings. In the year 3 trial seed raised subjects were direct seeded into the pot and herbicides applied when the plants were established in the pot.

### Compost

In year 1 and 2 Fisons Container G peat based compost was used, in year 3 Blooms nursery mix of Peat, Grit, Loam and Leca.



## Treatments

### Year 1

1. Untreated.
2. Ronstar 2G 200 kg/ha every 12 wk.,
3. Ronstar 2G 200 kg/ha, Flexidor 250 ml/ha, alternating every 6 weeks
4. Flexidor 250 ml/ha every 12 weeks
5. Flexidor 250 ml/ha + Venzar 1.7 kg/ha every 12 weeks
6. Flexidor 250 ml/ha + Enide 50W 7.5 kg/ha every 12 weeks
7. Flexidor 250 ml/ha + Devrinol 3.5 l/ha every 12 weeks
8. Flexidor 250 ml/ha + Butisan S 2.5 l/ha every 12 weeks
9. Venzar 2.8 kg/ha every 12 weeks
10. Venzar 1.7 kg/ha + Enide 50W 7.5 kg/ha every 12 weeks
11. Flexidor 150 ml/ha + Devrinol 7 l/ha every 12 weeks
12. Enide 50W 7.5 kg/ha every 6 weeks
13. Butisan S 1.25 l/ha every 6 weeks
14. Devrinol 7 l/ha one application

### Year 2

1. Untreated.
2. Ronstar 2G 200 kg/ha every 12 wk.
3. Ronstar 2G 200 kg/ha every 12 wk, Flexidor 125, 1 l/ha after 12 wk. (1 application).
4. Flexidor 125, 1 l/ha + Venzar 1.7 kg/ha every 24 wk. (2 applications).
5. Flexidor 125, 1 l/ha + Enide 50W 7.5 kg/ha. Flexidor 125, 1 l/ha + Propachlor 9 l/ha after 24 wk.
6. Flexidor 125, 0.5 l/ha + Devrinol 3.5 l/ha every 12 wk.
7. Flexidor 125, 0.5 l/ha + Venzar 1.7 kg/ha every 12 wk.
8. Venzar 2.8 kg/ha every 24 wk. (2 applications).
9. Venzar 1.7 kg/ha + Enide 50 W 7.5 kg/ha repeated after 12 wk. Venzar 1.7 kg/ha + Propachlor 9 l/ha every 12 wk.
10. Venzar 2.2 kg/ha + Devrinol 3.5 l/ha every 24 wk. (2 applications).

### Year 3

1. Untreated.
2. Ronstar 2G 200 kg/ha every 12 wk., Dacthal 6 kg/ha after 3 wk.
3. Ronstar 2G 200 kg/ha every 12 wk., Flexidor 125 l/ha after 18 wk.
4. Flexidor 125 l/ha + Venzar 1.7 kg/ha every 24 wk. ( 2 applications).
5. Flexidor 125 0.5 l/ha + Venzar 1.7 kg/ha every 12 wk.
6. Venzar 2.8 kg/ha every 24 wk. ( 2 applications)

All spray treatments applied in 2500 l/ha water.

## Treatment Dates

31/7/92	All herbicides applied after standing out
11/9/92	Alternating treatments and treatments 3, 12, and 13 applied
22/10/92	All 12 week treatments applied
4/12/92	Alternating treatments and 6 week treatments applied
18/1/93	All 12 week treatments applied
8/3/93	Alternating treatments and 6 week treatments applied
2/7/93	All herbicides applied after standing out.
24/9/93	All 12 week herbicides applied.
17/12/93	All 12 and 24 week herbicides applied.
11/3/94	All 12 week herbicides applied.
30/6/94	All herbicides applied after standing out
22/7/94	Dacthal applied
22/9/94	12 week treatments applied
16/12/94	18 week treatments applied
13/3/95	24 week treatments applied

# Results

## Crop Vigour Assessments

- Score :
- 0 Dead
  - 1 Severely stunted, barely alive
  - 2 More stunted and/or scorched
  - 3 Moderately stunted but saleable
  - 4 Slight suppression of growth
  - 5 Healthy

Year 1

Treatment Number

Table 1

29/03/93	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Aruncus kneiffii</i>														
<i>Astilbe Spirit</i>														
<i>Bergenia Bressingham Salmon</i>	5	5	5	4.5	4	4	4	4.5	5	5	4.5	5	3.5	5
<i>Bergenia Bressingham White</i>	5	5	5	4.5	5	5	5	4.5	5	5	4.5	5	3.5	5
<i>Chrysanthemum Brightness</i>	5	3.5	2.5	3.5	2.5	3.5	4	2.5	3	3.5	4.5	4.5	1	4.5
<i>Coreopsis Zagreb</i>														
<i>Correopsis Moonbeam</i>														
<i>Diascia elegans</i>	5	4	0	0.5	1	1	1.5	0.5	4.5	4	2.5	4	0.5	5
<i>Erigeron Dunkelste Aller</i>	5	5	5	4.5	5	5	5	5	5	4.5	3	5	3.5	5
<i>Helenium Waltraut</i>	5	5	3.5	3.5	3.5	4.5	3	4	4.5	3.5	5	4.5	1.5	5
<i>Nepeta Snow Flake</i>	4	4.5	1	2.5	1	2	3.5	3.5	3.5	3.5	2.5	2	2.5	4.5
<i>Oenothera Fireworks</i>	5	3	3.5	3.5	0.5	4.5	4	4.5	0	0	4.5	2	4.5	5
<i>Origanum Herrenhausen</i>	4.5	2.5	3	2.5	3.5	2.5	2.5	3.5	0	3.5	4	4.5	2.5	5
<i>Origanum Hopleys</i>	5	2	1	1.5	0.5	1	1	1.5	3.5	2.5	3	3	1	5
<i>Pachysandra Green Carpet</i>	5	5	5	5	5	4.5	5	5	5	4	5	4	5	5
<i>Physostegia Vivid</i>	5	5	0	0	0	0	0	0	1	4	0	3	0	4
<i>Saponaria Albo Plena</i>														
<i>Sedum Ruby Glow</i>	5	1.5	0	3.5	3.5	2.5	3	4.5	4.5	4.5	4	2	3.5	1
<i>Veronica gentianoides Variegata</i>	4	3	0	0	0	0	0	0	3	2	0	1	2	4
<i>Veronica pedunculata Georgia</i>	4.5	4.5	1	2.5	1	2	1.5	2.5	4.5	3.5	3	2.5	3.5	5

Year 2

Treatment Number

Table 2

29/07/93	1	2	3	4	5	6	7	8	9	10
<i>Carex Evergold</i>	5	5	5	5	5	5	5	5	5	5
<i>Dierama pendulum</i>	5	5	5	5	5	5	5	5	5	5
<i>Crocsmia Lucifer</i>	5	5	5	5	5	5	5	5	5	5
<i>Astilbe Finale</i>	5	5	5	5	5	5	5	5	5	5
<i>Anemone Alba</i>	5	5	5	5	5	5	5	5	5	5
<i>Geranium xc. Cambridge</i>	5	5	5	5	5	5	5	5	5	5
<i>Crososmia Emily McKenzie</i>	5	5	5	5	5	5	5	5	5	5
<i>Sedum Autumn Joy</i>	5	5	5	5	5	5	5	5	5	5
<i>Campanula White Pouffe</i>	5	3.5	4	1.5	3.5	3	2	3.5	4.5	1.5
<i>Lavendula Munstead</i>	5	5	5	5	5	5	5	5	5	5
<i>Geum Lady Stratheden</i>	5	5	5	5	5	5	5	5	5	5
<i>Euphorbia Characias</i>	5	5	5	5	5	5	5	5	5	5
<i>Hosta Francis Williams</i>	5	5	5	5	5	5	5	5	5	5
<i>Aster Snow Cushion</i>	5	5	5	5	5	5	5	5	5	5
<i>Digitalis Lutea</i>	5	5	5	2.5	1.5	2.5	4.5	5	1.5	2.5
<i>Physostegia Vivid</i>	5	4	4.5	1.5	1	2	2.5	4.5	2.5	4
<i>Phlox Alpha</i>	5	5	5	5	5	5	5	5	5	5
<i>Chrysanthemum Clara Curtis</i>	5	5	5	3	5	5	3	3	3	3
<i>Papaver Turkish Delight</i>	5	5	5	5	5	5	5	5	5	5

Plant vigour scores assessed 9/3/94

VARIETY

Treatment Number

Table 3

	1	2	3	4	5	6	7	8	9	10
<i>Carex</i> Evergold	5	5	4.5	5	5	5	4.5	4.5	4.5	5
<i>Dierama pendulum</i>	5	5	5	5	5	5	5	5	5	5
<i>Crocsmia</i> Lucifer*										
<i>Astilbe</i> Finale*										
<i>Anemone</i> Alba*										
<i>Geranium</i> xc. Cambridge	5	5	5	5	5	5	5	4.5	4.5	4.5
<i>Crososmia</i> Emily McKenzie*										
<i>Sedum</i> Autumn Joy	5	4	4	5	5	5	5	5	5	5
<i>Campanula</i> White Pouffe*										
<i>Lavendula</i> Munstead*										
<i>Geum</i> Lady Stratheden	5	3	3.5	5	4.5	4	4.5	5	5	5
<i>Euphorbia</i> Characias*										
<i>Hosta</i> Francis Williams*										
<i>Aster</i> Snow Cushion*										
<i>Digitalis</i> Lutea	4.5	5	5	4.5	5	4.5	4.5	5	4	4
<i>Physostegia</i> Vivid*										
<i>Phlox</i> Alpha*										
<i>Chrysanthemum</i> Clara Curtis	1.5	2	4	2.5	3.5	2	1.5	3.5	3.5	4.5
<i>Papaver</i> Turkish Delight	5	5	4.5	5	5	4	4	5	5	4.5

\* Insufficient new growth for recording

Plant vigour scores assessed 20/4/94

VARIETY

Treatment Number

Table 4

	1	2	3	4	5	6	7	8	9	10
<i>Carex</i> Evergold	5	4.5	4.5	5	4.5	4.5	4.5	4.5	4.5	4.5
<i>Dierama</i> pendulum	5	4.5	4.5	4.5	5	5	5	5	4.5	3.5
<i>Crocsmia</i> Lucifer	4.5	3.5	3.5	4	4.5	4	3	3.5	3	2.5
<i>Astilbe</i> Finale	4.5	3.5	3	4.5	4.5	4	3.5	5	4.5	5
<i>Anemone</i> Alba	4.5	3	3.5	3.5	3.5	2.5	2.5	4	3	2.5
<i>Geranium</i> xc. Cambridge	4.5	4.5	5	5	4.5	3.5	3.5	4	4	4.5
<i>Crososmia</i> Emily McKenzie*										
<i>Sedum</i> Autumn Joy	4.5	2	2.5	4.5	4	4.5	5	5	5	5
<i>Campanula</i> White Pouffe	5	3.5	4.5	2	4.5	2.5	3.5	4	4	2.5
<i>Lavendula</i> Munstead*										
<i>Geum</i> Lady Stratheden	4.5	2.5	2.5	4.5	3.5	3.5	4.5	4	3.5	4.5
<i>Euphorbia</i> Characias*										
<i>Hosta</i> Francis Williams	4.5	3.5	3.5	5	5	4.5	3.5	4.5	4.5	4.5
<i>Aster</i> Snow Cushion	2.5	3.5	3.5	3.5	2.5	3	1	3	1.5	3.5
<i>Digitalis</i> Lutea	2.5	2.5	2	2	1	1.5	1.5	4	2.5	2.5
<i>Physostegia</i> Vivid	1.5	0.5	1.5	1.5	0.5	0	0.5	3.5	1.5	3.5
<i>Phlox</i> Alpha*										
<i>Chrysanthemum</i> Clara Curtis	3	1.5	4	2	2	2	1	2.5	2.5	3.5
<i>Papaver</i> Turkish Delight	4.5	4.5	3.5	4.5	4.5	3	2	4.5	3.5	3.5

\* Insufficient new growth for recording

Year 3

Treatment Number

Table 5

14/07/94	1	2	3	4	5	6
<i>Alchemilla mollis</i>	5.0	4.0	4.0	4.0	4.0	4.0
<i>Althea</i> Chaters Double	5.0	4.7	4.3	4.0	4.0	4.0
<i>Aquilega</i> Milkana Hybrid	4.7	4.7	5.0	4.3	4.0	4.7
<i>Aquilegia</i> Crimson Star	4.0	3.3	3.7	3.3	3.3	3.0
<i>Arenaria montana</i>	5.0	4.0	4.0	3.0	3.0	2.0
<i>Campanula glomerata</i>	4.3	4.0	3.3	4.0	4.3	3.7
<i>Campanula persicifolia</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Delphinium</i> Black Knight	5.0	4.7	4.7	3.7	3.3	2.7
<i>Delphinium</i> Cameliard	4.7	4.3	4.7	3.0	3.3	2.7
<i>Delphinium</i> Galahad	4.7	5.0	5.0	4.0	4.0	4.0
<i>Dianthus</i> Flashing Light	5.0	5.0	5.0	5.0	5.0	5.0
<i>Digitalis grandiflora</i>	4.3	5.0	4.7	2.7	3.0	2.7
<i>Doronicum caucasicum</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Echinacea purpurea</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Eryngium planum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Euphorbia polychroma</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Gaillardia</i> Goblin	5.0	5.0	5.0	3.0	3.3	3.0
<i>Geranium sanguineum</i>	4.7	4.7	4.7	4.7	4.0	4.3
<i>Geum</i> Lady Strathedon	5.0	4.0	4.0	4.0	4.0	4.0
<i>Geum</i> Mrs Bradshaw	5.0	4.0	4.0	4.0	4.0	4.0
<i>Heliopsis</i> Summer Sun	5.0	5.0	5.0	1.0	1.3	1.3
<i>Heuchera</i> Bressingham	5.0	4.7	4.3	3.7	4.0	3.7
<i>Iberis</i> Snowflake	5.0	5.0	5.0	5.0	5.0	5.0
<i>Iris foetidissima</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Kniphofia</i> Bressingham	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> My Castle	5.0	5.0	5.0	4.7	4.7	4.3
<i>Lupinus</i> Noble Maiden	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lychnis arkwrightii</i>	5.0	5.0	5.0	3.0	3.0	3.0
<i>Oenothera missouriensis</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Papaver</i> Allegro	4.7	4.0	4.0	1.7	2.3	1.3
<i>Platycodon grandiflorum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Potentilla recta warrenii</i>	4.7	5.0	5.0	3.7	3.7	4.0
<i>Primula auricula</i>	5.0	5.0	5.0	4.0	3.0	3.0
<i>Primula denticulata</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Pulsatilla</i> Rubra	5.0	5.0	5.0	5.0	5.0	5.0
<i>Pulsatilla vulgaris</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Pyrethrum tommasinii</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Sidalcea</i> Party Girl	5.0	4.3	4.7	3.7	3.3	2.7
<i>Silene schafta</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Veronica</i> Shirley Blue	5.0	5.0	4.3	4.0	4.3	4.0



Treatment Number

Table 6

27/09/94	1	2	3	4	5	6
<i>Alchemilla mollis</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Althea</i> Chaters Double	5.0	4.7	3.3	3.0	3.0	3.7
<i>Aquilegia</i> Milkana Hybrid	5.0	5.0	5.0	5.0	4.7	5.0
<i>Aquilegia</i> Crimson Star	5.0	5.0	5.0	5.0	5.0	5.0
<i>Arenaria montana</i>	5.0	5.0	5.0	4.7	4.7	3.3
<i>Campanula glomerata</i>	5.0	5.0	4.7	5.0	4.7	5.0
<i>Campanula persicifolia</i>	5.0	5.0	5.0	4.3	3.7	3.3
<i>Delphinium</i> Black Knight	4.3	4.3	4.3	4.0	3.3	1.7
<i>Delphinium</i> Cameliard	5.0	4.0	5.0	5.0	5.0	2.7
<i>Delphinium</i> Galahad	0.0	0.7	0.0	0.3	0.0	0.0
<i>Dianthus</i> Flashing Light	5.0	5.0	5.0	5.0	5.0	5.0
<i>Digitalis grandiflora</i>	5.0	4.7	5.0	3.0	4.0	4.0
<i>Doronicum caucasicum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Echinacea purpurea</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Eryngium planum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Euphorbia polychroma</i>	3.7	5.0	4.3	4.3	3.0	2.7
<i>Gaillardia</i> Goblin	5.0	5.0	5.0	1.3	4.0	0.0
<i>Geranium sanguineum</i>	5.0	4.3	4.7	4.3	4.3	5.0
<i>Geum</i> Lady Strathedon	5.0	4.7	4.7	4.7	4.7	4.0
<i>Geum</i> Mrs Bradshaw	5.0	5.0	5.0	5.0	5.0	5.0
<i>Heliopsis</i> Summer Sun	3.3	5.0	3.3	2.7	2.0	1.7
<i>Heuchera</i> Bressingham	5.0	5.0	5.0	5.0	5.0	5.0
<i>Iberis</i> Snowflake	5.0	4.7	5.0	5.0	5.0	4.7
<i>Iris foetidissima</i>	5.0	5.0	5.0	4.7	5.0	4.3
<i>Kniphofia</i> Bressingham	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> My Castle	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> Noble Maiden	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lychnis arkwrightii</i>	5.0	5.0	4.7	4.7	4.3	3.7
<i>Oenothera missouriensis</i>	4.7	4.7	4.7	4.7	4.3	4.7
<i>Papaver</i> Allegro	5.0	5.0	5.0	1.3	2.0	0.7
<i>Platycodon grandiflorum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Potentilla recta warrenii</i>	5.0	5.0	5.0	5.0	5.0	3.7
<i>Primula auricula</i>	5.0	5.0	4.7	5.0	4.7	3.7
<i>Primula denticulata</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Pulsatilla</i> Rubra	5.0	5.0	5.0	4.7	5.0	4.0
<i>Pulsatilla vulgaris</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Pyrethrum tommasinii</i>	5.0	4.7	5.0	5.0	5.0	5.0
<i>Sidalcea</i> Party Girl	4.0	4.0	3.0	0.7	0.3	0.0
<i>Silene schafta</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Veronica</i> Shirley Blue	5.0	5.0	5.0	5.0	5.0	5.0



Treatment Number

Table 7

23/03/95	1	2	3	4	5	6
<i>Alchemilla mollis</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Althea</i> Chaters Double	1.3	2.0	0.7	1.0	1.3	2.3
<i>Aquilega</i> Milkana Hybrid	5.0	5.0	5.0	5.0	5.0	5.0
<i>Aquilegia</i> Crimson Star	5.0	5.0	5.0	5.0	5.0	5.0
<i>Arenaria montana</i>	5.0	5.0	5.0	4.0	4.0	3.7
<i>Campanula glomerata</i>	4.7	4.3	4.0	4.0	4.7	3.0
<i>Campanula persicifolia</i>	4.7	4.0	4.7	4.3	3.3	3.7
<i>Delphinium</i> Black Knight	0.0	0.0	0.0	0.0	0.0	0.0
<i>Delphinium</i> Cameliard	0.0	0.0	0.0	0.0	0.0	0.0
<i>Delphinium</i> Galahad	0.0	0.0	0.0	0.0	0.0	0.0
<i>Dianthus</i> Flashing Light	5.0	5.0	5.0	5.0	5.0	5.0
<i>Digitalis grandiflora</i>	4.0	2.3	3.3	1.0	1.7	2.0
<i>Doronicum caucasicum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Echinacea purpurea</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Eryngium planum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Euphorbia polychroma</i>	3.3	4.0	4.0	3.3	2.3	1.0
<i>Gaillardia</i> Goblin	5.0	4.7	4.0	1.7	3.3	0.0
<i>Geranium sanguineum</i>	3.3	3.7	4.0	3.3	3.3	3.7
<i>Geum</i> Lady Strathedon	5.0	4.3	4.3	5.0	4.7	4.7
<i>Geum</i> Mrs Bradshaw	5.0	4.3	4.0	5.0	4.7	4.3
<i>Heliopsis</i> Summer Sun	0.0	0.0	0.0	0.0	0.0	0.0
<i>Heuchera</i> Bressingham	5.0	4.7	5.0	5.0	4.7	5.0
<i>Iberis</i> Snowflake	5.0	5.0	4.3	4.3	4.0	5.0
<i>Iris foetidissima</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Kniphofia</i> Bressingham	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> My Castle	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> Noble Maiden	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lychnis arkwrightii</i>	4.3	4.7	5.0	5.0	4.7	4.3
<i>Oenothera missouriensis</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Papaver</i> Allegro	5.0	5.0	4.0	1.7	1.3	0.3
<i>Platycodon grandiflorum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Potentilla recta warrenii</i>	5.0	5.0	5.0	5.0	4.0	3.3
<i>Primula auricula</i>	5.0	5.0	4.3	5.0	4.7	4.3
<i>Primula denticulata</i>	5.0	5.0	4.3	4.7	4.3	3.7
<i>Pulsatilla</i> Rubra	5.0	4.7	5.0	5.0	5.0	5.0
<i>Pulsatilla vulgaris</i>	5.0	5.0	5.0	5.0	4.3	5.0
<i>Pyrethrum tommasinii</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sidalcea</i> Party Girl	5.0	5.0	4.3	0.0	0.0	0.0
<i>Silene schafta</i>	4.3	5.0	5.0	4.7	4.7	5.0
<i>Veronica</i> Shirley Blue	5.0	5.0	5.0	5.0	5.0	5.0

Treatment Number

Table 9

15/05/95	1	2	3	4	5	6
<i>Alchemilla mollis</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Althea</i> Chaters Double	0.0	0.0	0.0	0.0	0.0	0.0
<i>Aquilegia</i> Milkana Hybrid	5.0	5.0	5.0	5.0	5.0	5.0
<i>Aquilegia</i> Crimson Star	5.0	4.7	4.7	4.7	5.0	4.3
<i>Arenaria montana</i>	5.0	5.0	5.0	4.7	3.3	2.3
<i>Campanula glomerata</i>	3.3	4.7	2.0	4.7	3.7	2.0
<i>Campanula persicifolia</i>	4.7	4.7	4.3	3.3	4.7	3.3
<i>Delphinium</i> Black Knight	0.0	0.0	0.0	0.0	0.0	0.0
<i>Delphinium</i> Cameliard	0.0	0.0	0.0	0.0	0.0	0.0
<i>Delphinium</i> Galahad	0.0	0.0	0.0	0.0	0.0	0.0
<i>Dianthus</i> Flashing Light	5.0	5.0	5.0	5.0	5.0	5.0
<i>Digitalis grandiflora</i>	5.0	3.3	2.7	2.3	1.0	2.7
<i>Doronicum caucasicum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Echinacea purpurea</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Eryngium planum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Euphorbia polychroma</i>	4.3	4.7	5.0	3.3	1.3	1.0
<i>Gaillardia</i> Goblin	4.7	4.3	3.7	0.7	1.0	0.0
<i>Geranium sanguineum</i>	4.7	4.7	4.3	4.0	4.3	4.0
<i>Geum</i> Lady Strathedon	5.0	4.0	4.0	4.0	4.0	4.0
<i>Geum</i> Mrs Bradshaw	5.0	5.0	5.0	5.0	4.7	5.0
<i>Heliopsis</i> Summer Sun	0.0	0.0	0.0	0.0	0.0	0.0
<i>Heuchera</i> Bressingham	4.0	4.3	4.3	4.0	3.3	3.7
<i>Iberis</i> Snowflake	5.0	5.0	5.0	5.0	5.0	5.0
<i>Iris foetidissima</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Kniphofia</i> Bressingham	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> My Castle	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lupinus</i> Noble Maiden	5.0	5.0	5.0	5.0	5.0	5.0
<i>Lychnis arkwrightii</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Oenothera missouriensis</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Papaver</i> Allegro	4.7	4.7	3.3	0.0	0.3	0.0
<i>Platycodon grandiflorum</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Potentilla recta warrenii</i>	5.0	5.0	5.0	4.7	3.7	3.0
<i>Primula auricula</i>	5.0	5.0	4.7	5.0	4.7	3.7
<i>Primula denticulata</i>	5.0	5.0	5.0	4.7	4.7	3.3
<i>Pulsatilla</i> Rubra	5.0	4.7	5.0	4.7	4.0	4.0
<i>Pulsatilla vulgaris</i>	5.0	4.7	5.0	4.7	4.0	4.0
<i>Pyrethrum tommasinii</i>	0.0	0.0	0.0	0.0	0.0	0.0
<i>Sidalcea</i> Party Girl	4.7	2.7	1.7	0.0	0.0	0.0
<i>Silene schafta</i>	5.0	5.0	5.0	5.0	5.0	5.0
<i>Veronica</i> Shirley Blue	5.0	4.7	4.7	4.0	2.0	5.0



## Weed Control Assessments

Year 1

18/01/93

Weed Numbers (average/plot)

Table 10

Treatment Number	Bittercress	Groundsel	Willow Herb	Sow-Thistle	Mouse Ear Chickweed	Annual Meadow Grass	Small Nettle	Total Weed Number
1	49	.3	0	2	18	1	3	73
2	0	0	0	0	1	1	0	2
3	1	0	0	.3	.3	0	0	2
4	6	3	1	.3	0	1	0	11
5	0	0	0	0	0	0	0	0
6	1	.3	0	1	0	0	0	2
7	1	0	0	0	0	0	0	1
8	0	1	0	0	0	0	0	1
9	1	.3	0	0	0	0	0	1
10	7	1	0	0	0	0	0	8
11	0	0	0	0	0	0	0	0
12	20	0	1	.3	0	0	1	23
13	4	0	0	0	0	0	0	4
14	40	0	0	1	0	0	1	43

LSD = 14.6 (p = 0.05, 26 df)

Year 2

15/11/93

Weeds Present (average/plot)

Table 11

Treatment Number	Bittercress	Groundsel	Willow Herb	Sow-Thistle	Mouse Ear Chickweed	Annual Meadow Grass	Liverwort	Total Weed Number
1	*	*	*	*	*	*	*	13
2		*		*		*		6
3	*			*				4
4								1
5	*	*					*	6
6	*			*			*	6
7								0
8	*							1
9			*					3
10	*							4

LSD = 6.3 (p = 0.05, 18 df)

9/3/94

Weeds Present (average/plot)

Table 12

Treatment Number	Bittercress	Groundsel	Willow Herb	Sow-Thistle	Mouse Ear Chickweed	Annual Meadow Grass	Liverwort	Total Weed Number
1	*	*	*	*	*	*	*	13
2				*	*	*	*	2
3						*		0
4						*		0
5	*		*	*		*	*	6
6	*						*	2
7								0
8								0
9								0
10	*							2

LSD = 4.7 (p = 0.05, 18 df)

Year 3

Table 13

Treatment Number	% Weed	Cover		Weeds Present
	27/09/94	16/01/95	15/05/95	
1	58	87	100	BC,AG,GR,ST,WH,LW,MS,GS
2	3	7	5	BC,AG,GR,ST,WH,MC,GS.
3	3	6	8	BC,AG,GR,WH, LW,MS,GS.
4	3	4	7	BC,AG,GR,WH, GS.
5	5	3	7	BC,AG,ST,WH.
6	5	3	8	BC,AG,GR,WH, GS
LSD (p = 0.05, 10df)	14.5	7.7	7.3	

**Weeds**

- BC Hairy Bittercress
- AG Annual Meadow Grass
- GR Groundsel
- ST Sow - Thistle
- WH Willowherb
- LW Liverwort
- MS Moss
- MC Mouse Eared Chickweed
- GC Other grasses

### Weed Control

The predominant weed present in years 1 and 2 (Tables 10-12) was Hairy Bittercress, with Groundsel, Willowherb, Sow Thistle, Mouse Ear Chickweed, Annual Meadow Grass and Liverwort also present. In the year 3 site (Table 13) Willowherb was more prevalent than the other weeds. Over the 3 years of the trial good weed control was achieved by Flexidor/Venzar, Venzar, Ronstar 2G, Ronstar 2G/Venzar. Flexidor and Devrinol as single treatments were less effective. Flexidor/Butisan S was very effective but was not continued with as it was more damaging than other treatments. Treatments including Enide 50W were also discontinued as it became unavailable.

In year 1 treatments were generally applied every 12 weeks, subsequently in years 2 and 3 it was found that good weed control could still be achieved from treatments including Flexidor and Venzar by applying every 18 - 24 weeks depending on the rate used. These less frequent programmes were also less damaging to sensitive subjects. Ronstar 2G programmes however were still applied at the 12 week interval to achieve acceptable weed control.

### Crop Safety

A very wide range of subjects were tested over the 3 years of the trial (Tables 1-9), with the 3rd year trial concentrating on seed raised subjects.

A number of subjects were found to be generally sensitive to any herbicide, with most treatments causing damage;

*Althea*  
*Aruncus*  
*Campanula* (depending on variety)  
*Diascia*  
*Delphineum*  
*Digitalis*  
*Gaillardia*  
*Heliopsis*  
*Papaver*  
*Physostegia*  
*Sidalcea*  
*Veronica* (depending on variety)

Ronstar 2G was one of the safest treatments and is particularly useful when applied after potting. Apart from a number of the sensitive species listed above, *Sedum*, *Origanum* and *Geums* were damaged on occasions by Ronstar 2G.

Flexidor was used in a programmes with Ronstar 2G or in mixtures with Venzar. Providing no more than 2 applications were made to the crop only *Iberis* in addition to the above list was susceptible to the Flexidor component.

Venzar was used alone, or in mixtures with Flexidor. In years 1 and 2 this was a relatively safe treatment, with any damage limited to the subjects listed above and only when mixed with Flexidor.

However in year 3, 1994 (Tables 7-9) the Venzar treatments caused a veinal yellowing on *Aquilegia*, *Arenaria*, *Delphineum*, *Digitalis*, *Gaillardia*, *Heliopsis*, *Heuchera*, *Lychnis*, *Papaver*, *Primula* and *Sidalcea*. The effect was less severe at the lower 1.7 kg/ha rate compared with the 2.8 kg/ha rate. The *Aquilegia* and *Primula* eventually grew away from the damage. Conversely, *Althea* and *Euphorbia* showed signs of Venzar damage only after subsequent treatments.

Venzar treatments were more damaging than in previous years, where very little damage was seen, this may have been due to high temperatures after spraying. Year 3 treatments 5 and 6 had a higher total quantity of Venzar applied over the season, and this proved to be more damaging. Treatment 4 with a lower rate of Venzar, plus Flexidor, 2 applications only, proved acceptably safer. Only *Digitalis*, *Papaver*, *Gaillardia* and *Euphorbia* remained significantly affected by the spring with this treatment.

## CONCLUSIONS

Good weed control was achieved by Flexidor/Venzar, Venzar, Ronstar 2G and Ronstar 2G/Venzar treatments. Flexidor and Devrinol as single treatments were less effective. Flexidor/Butisan S was very effective but was more damaging than other treatments.

Treatments including Flexidor and Venzar only need to be applied every 18 - 24 weeks depending on the rate used. These less frequent programmes were also less damaging to sensitive subjects. Ronstar 2G programmes however were still applied at the 12 week interval to achieve acceptable weed control.

Overall, the Ronstar 2G has proved to be one of the safest treatments, with only *Digitalis*, *Geum*, *Origanum*, *Sedum* and *Delphineum* showing significant damage.

The addition of a single Flexidor application to the Ronstar programme only affected in addition *Althea*, *Euphorbia*, *Heliopsis*, *Sidalcea*, *Iberis*, and *Papaver*. These may be classed as sensitive to Flexidor, but with the exception of *Iberis*, all these are generally sensitive to herbicides.

A programme of 2 applications of lower rate Venzar and Flexidor could be considered as an alternative to the Ronstar 2G programme for a more limited range of subjects, offering good weed control from a minimum of applications.

Contract between ADAS (hereinafter called the "Contractor") and the Horticultural Development Council (hereinafter called the "Council") for a research/development project.

## PROPOSAL

1. TITLE OF PROJECT Contract No: HNS/35c

CHEMICAL WEED CONTROL IN OUTDOOR CONTAINER GROWN HERBACEOUS PERENNIAL NURSERY STOCK

2. BACKGROUND AND COMMERCIAL OBJECTIVE

Container grown herbaceous plants are an increasingly important crop. The withdrawal of Tenoran 50WP and the non-availability of Surflan has limited the herbicide options for container herbaceous perennials. Further information on efficacy and phytotoxicity of potential alternatives is essential. Herbaceous perennials are notoriously susceptible to herbicide damage.

3. POTENTIAL FINANCIAL BENEFIT TO THE INDUSTRY

The recommendations produced from the results of the herbicide evaluation will enable herbaceous plant growers to improve current weed control practices. This will result in more efficient use of herbicides which will have financial benefits to the industry and improve the image of the industry to its consumers.

4. SCIENTIFIC/TECHNICAL TARGET OF THE WORK

The trial aims to test treatments designed to give a broad spectrum of weed control with minimal phytotoxicity by using novel herbicide combinations. Additional benefits to HDC in funding this trial include:

- a. An assessment of herbicide performance in a commercial nursery situation.
- b. Assessment over a wide range of herbaceous species for phytotoxicity.
- c. Assessment under different weather and growing conditions and weed population/spectrum.

5. CLOSELY RELATED WORK - COMPLETED OR IN PROGRESS

The trial will be complimentary to the HDC funded work at HRI-Efford.

6. DESCRIPTION OF THE WORK

### Treatments

1. Untreated control
2. Ronstar 2G 200 kg/ha every 12 weeks.



J Rowell.

Project Co-ordinator: Mr D Howard, Howard and Kooij Nurseries.

9. LOCATION

Howard & Kooij Nurseries, Wortham, Diss, Norfolk.

Contract between ADAS (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/35e  
(extension for a second year)  
Contract date: 4.11.93

CHEMICAL WEED CONTROL IN OUTDOOR CONTAINER GROWN HERBACEOUS PERENNIAL NURSERY STOCK

2. BACKGROUND AND COMMERCIAL OBJECTIVE

As for HNS 35e

3. POTENTIAL FINANCIAL BENEFIT TO THE INDUSTRY

As for HNS 35e

4. SCIENTIFIC/TECHNICAL TARGET OF THE WORK

As for HNS 35e

5. CLOSELY RELATED WORK - COMPLETED OR IN PROGRESS

As for HNS 35c

6. DESCRIPTION OF THE WORK IN YEAR 2

Treatments in year 2

1. Untreated
2. Ronstar 2G 200 kg/ha every 12 wk.
3. Ronstar 2G 200 kg/ha every 12 wk, Flexidor 250 ml/ha after 12 wk. (1 application)
4. Flexidor 250 ml/ha + Venzar 1.7 kg/ha every 24 wk. (2 applications).
5. Flexidor 250 ml/ha + Enide 50W 7.5 kg/ha ~~every 24 wk. (2 applications)~~ followed by Flexidor 250ml/ha + Propachlor 9L/ha after 24 weeks
6. Flexidor 125 ml/ha + Devrinol 3.5 l/ha every 12 wk.
7. Flexidor 125 ml/ha + Venzar 1.7 kg/ha every 12 wk.
8. Venzar 2.8 kg/ha every 24 wk. (2 applications).
9. Venzar 1.7 kg/ha + Enide 50W 7.5 kg/ha ~~every 12 wk~~ <sup>repeated after</sup> 12 Week, followed by Venzar 1.7Kg/ha + Propachlor 9L/ha every 12 weeks.
10. Venzar 2.2. kg/ha + Devrinol 3.5 l/ha every 24 wk. (2 applications).

Site Layout and Assessment

As for HNS 35e

**TERMS AND CONDITIONS**

The Council's standard terms and conditions of contract shall apply.

Signed for the Contractor(s)

Signature..... *J. Ashdown* .....  
Position..... *Head of H&L Dev. Cent* .....  
Date..... *17/12/93* .....

Signed for the Contractor(s)

Signature.....  
Position.....  
Date.....

Signed for the Council

Signature..... *S. Humble* .....  
Position..... **CHIEF EXECUTIVE** .....  
Date..... *5.11.93* .....

Contract between ADAS (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/35e  
(extension for a third year)**

CHEMICAL WEED CONTROL IN OUTDOOR CONTAINER GROWN  
HERBACEOUS PERENNIAL NURSERY STOCK

**2. BACKGROUND AND COMMERCIAL OBJECTIVE**

As for HNS 35e

**3. POTENTIAL FINANCIAL BENEFIT TO THE INDUSTRY**

As for HNS 35e

**4. SCIENTIFIC/TECHNICAL TARGET OF THE WORK**

As for HNS 35e

**5. CLOSELY RELATED WORK - COMPLETED OR IN PROGRESS**

As for HNS 35e

**6. DESCRIPTION OF THE WORK IN YEAR 3**

**Treatments**

1. Untreated
2. Ronstar 2G 200 kg/ha every 12 wk, Dacthal 6 kg/ha after 3 wk.
3. Ronstar 2G 200 kg/ha every 12 wk, Flexidor 125 l/ha after 18 wk.
4. Flexidor 125 l/ha + Venzar 1.7 kg/ha every 24 wk. (2 applications).
5. Flexidor 125 0.5 l/ha + Venzar 1.7 kg/ha every 12 wk.
6. Venzar 2.8 kg/ha every 24 wk. (2 applications).

Site Layout and Assessment

As for HNS 35e, except 40 seed raised herbaceous subjects will be assessed.

**7. COMMENCEMENT DATE, DURATION AND REPORTING**

Start date 1.7.92; duration 3 years.

Annual reports will be produced by the end of July 1993 and 1994 and a final report detailing the results achieved over the three seasons will be produced by July 1995.

**8. STAFF RESPONSIBILITIES**

As for HNS 35e

**9. LOCATION OF WORK IN YEAR 3**

Blooms of Bressingham

Contract No: HNS/35e  
Date: 11.8.94

TERMS AND CONDITIONS

The Council's standard terms and conditions of contract shall apply.

Signed for the Contractor(s)

Signature..... M. C. Heath .....

Position... P.A.S. ACCOUNT MANAGER

Date..... 31/8/94 .....

Signed for the Contractor(s)

Signature.....

Position.....

Date.....

Signed for the Council

Signature..... [Signature] .....

Position..... CHIEF EXECUTIVE .....

Date..... 11.8.94 .....