

Agricultural Development and Advisory Service

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CONTRACT REPORT
C87/0361

Growth Regulation of Module
Raised Plants 1988


Undertaken for HDC

PRINCIPAL WORKER

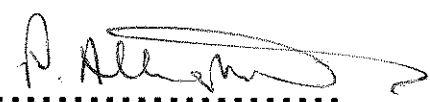
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AUTHENTICATION

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.

Signed.....
22/2/89.

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Summary

Seedlings of Impatiens, Marigold, Salvia, Petunia, Primrose and Verbena were raised in 15 mm cell module trays and sprayed with daminozide once, twice or three times at 1,250, 2,500 or 5,000 ppm and compared with an untreated control treatment.

The size of all subjects was significantly reduced at transplanting by the lowest rate of daminozide, effect increasing with rate. Increasing the number of applications had a lesser effect than increasing the rate. At marketing stage, the effects were less obvious.

It was concluded that one application of daminozide at the first pair of true leaves stage was an effective way to check the height of seedlings of these six subjects when growing in modules and that the dwarfing effect could be enhanced by increasing the strength of the spray. Even 3 sprays at the highest rate did not have an excessive effect.

Objective

The object of this trial was to compare the effects of different rates and frequencies of daminozide applied to bedding plant seedlings being raised in modules.

Introduction

Traditionally seedlings were raised from seed sown in trays and pricked out into a variety of containers for retail sales. Daminozide is widely used to make plants more compact. The technique of raising plants by direct seeding or by pricking out into individual modules and transplanting into containers for retail sales is more recent and suitable growth regulator treatments have not been developed.

The use of growth regulators while the seedlings are still in the modules could have the following beneficial effects:

- * to allow the plants to be grown longer in modules (space economy)
- * to produce more robust seedlings for transport/transplanting
- * to increase branching and consequently flower numbers
- * to improve the quality/compactness of the plants at sale stage

Trials in 1987 were inconclusive due to the way in which the trial was conducted. In 1988 the design of the trial was improved by the use of separate small module trays for each plot. Higher rates of daminozide were also used on all species.

Materials and Methods

Site: a single-span, east/west glasshouse at Lee Valley EHS

Treatments

a) Rates of daminozide spray:

- i) Control
- ii) 1250 ppm (Alar 1.5 g/litre)
- iii) 2500 " " 3.0 "
- iv) 5000 " " 6.0 "

b) number of daminozide sprays

- i) one application at first pair of true leaves stage.
- ii) as i), repeated one week later, ie two applications.
- iii) as i), repeated one and two weeks later, ie three applications

c) species and cultivars:

Impatiens cv Futura Pink
Marigold cv Yellow Boy
Salvia cv Fury
Petunia cv Ultra Red
Primrose cv Easter Bouquet
Verbena cv Romance Scarlet

Design

There was a separate experiment using a factorial design for each species. All treatments were randomised in each of three replicate blocks.

4 rates x 3 frequencies x 3 replicates = 36 plots per species.

Assessments

Records of plant height, leaf number and leaf size (the length of the largest leaf measured from the base of the petiole to the tip of the leaf) were taken at transplanting. It was not practical to measure the height of petunias or primroses because of their rosette growth form at this stage.

Marketing was defined as when half of the plants in a plot had one or more flowers open. Height was again measured. Spread was measured at the widest point and at an angle of 90° to this. The two were multiplied together to give a notional area occupied.

Analysis

The results were subjected to factorial analysis of variance.

Cultural Details

Crop diary for six bedding plant species:

Species	Sowing date	daminozide application dates			transplant date*	Sale stage
		1	2	3		
Impatiens	16 Feb	15 Mar	23 Mar	30 Mar	5 Apr	23 May
Marigold	9 Mar	23 Mar	30 Mar	6 Apr	12 Apr	13 May
Petunia	16 Feb	8 Mar	15 Mar	23 Mar	29 Mar	23 May
Primrose	13 May	29 June	6 July	15 Jul	21 Jul	16 Nov
Salvia	8 Mar	30 Mar	6 Apr	13 Apr	19 Apr	5 June
Verbena	16 Mar	6 Apr	13 Apr	20 Apr	26 Apr	10 June

* transplant date = first recording date; sale stage date = second recording commenced

Sowing: seed of Impatiens, Marigold, Petunia, Salvia and Verbena was direct sown into 15 mm modules (PG 432) filled with a peat based compost (Fisons F1). Primroses were sown into standard seed trays of compost (F1) and pricked out into 25 mm cells (Hassy 308) of peat based compost (Fisons F2). The filled trays were wrapped in polythene and placed in a germination room with a domestic level of illumination at a temperature of 20 - 22°C (18 - 19°C for primroses) until germination was well under way.

Growing on: the seedlings were grown on in a glasshouse with a heating set point of 12°C venting at 16°C.

100 ppm N + 100 ppm K₂O were applied at every watering once emergence was complete.

Additional details: when iron deficiency was suspected, Primrose trays were dipped into a solution of iron chelate (Sequestrene 1 g/litre). Primroses were also given a precautionary spray treatment with iron chelate (Fe-lo 0.1g/litre).

Transplanting: after recording, plug plants were transplanted into 70 mm pots (FP7) filled with peat based compost (Fisons F2) and grown on in the same glasshouse as the modules. Plants were fed at every watering with 200 ppm N + 200 ppm K₂O. Primroses were grown on through the summer in an unheated and uncovered cold frame. On 24 October the plants were re-housed on capillary matting benches in a glasshouse with temperature setpoints of 8°C night and day with ventilation at 12°C.

Additional details: all Petunias were sprayed with daminozide at 2500 ppm (Alar 3g/litre) while in the 70 mm pots. This was in addition to the experimental daminozide treatments applied while the seedlings were in the modules.

Results

Summary of effects of daminozide rates and application number on growth of a range of subjects at transplanting

	Plant height		Leaf No.		Leaf size	
	Rate	No.	Rate	No.	Rate	No.
Impatiens	*	ns	ns	ns	*	*
Marigold	*	*	*	*	*	*
Petunia	-	-	ns	ns	*	ns
Primrose	-	-	ns	ns	*	*
Salvia	*	*	*	ns	*	ns
Verbena	*	ns	*	ns	*	ns

Summary of effects of daminozide rates and application number on growth of a range of subjects at marketing

	Plant height		Date marketable		Area covered	
	Rate	No.	Rate	No.	Rate	No.
Impatiens	*	ns	*	ns	*	ns
Marigold	*	*	*	*	*	ns
Petunia	ns	ns	ns	ns	ns	ns
Primrose	-	-	ns	ns	ns	ns
Salvia	ns	*	*	ns	ns	ns
Verbena	ns	ns	*	ns	*	ns

* = significant effects at 95% or greater

ns = not significant

- = not recorded

Table 1 Effect of rate of daminozide on plant height (mm) at transplanting

Species	Rate ppm				LSD
	Control	1250	2500	5000	
Impatiens	34.1	32.2	30.5	30.0	1.9
Marigold	41.4	35.0	34.9	35.5	1.2
Petunia	-	-	-	-	-
Primrose	-	-	-	-	-
Salvia	29.5	25.8	25.5	26.2	1.7
Verbena	24.7	23.5	22.6	22.0	1.1

Table 2 Effect of rate of daminozide on leaf number at transplanting

Species	Rate ppm				LSD
	Control	1250	2500	5000	
Impatiens	3.6	3.7	3.4	3.4	ns
Marigold	4.0	3.7	3.8	3.7	0.15
Petunia	6.1	6.2	6.1	6.1	ns
Primrose	5.6	5.5	5.4	5.4	ns
Salvia	5.2	4.6	5.1	5.1	0.39
Verbena	6.0	6.0	5.9	6.1	0.10

Table 3 Effect of rate of daminozide on leaf size (mm) at transplanting

Species	Rate ppm				LSD
	Control	1250	2500	5000	
Impatiens	16.6	16.2	15.9	15.1	0.97
Marigold	34.4	29.5	32.0	30.6	1.52
Petunia	32.4	24.5	21.4	20.4	2.82
Primrose	72.0	65.6	60.5	56.8	4.31
Salvia	14.2	12.9	13.2	13.4	1.00
Verbena	15.2	14.7	14.1	13.9	0.94

Table 4 Effect of number of applications on plant height (mm) at transplanting

Species	Number of applications				LSD
	control	1	2	3	
Impatiens	34.1	32.0	32.1	31.0	ns
Marigold	41.4	37.7	36.5	35.8	1.0
Petunia	-	-	-	-	-
Primrose	-	-	-	-	-
Salvia	29.5	27.7	26.6	26.0	1.4
Verbena	24.7	23.3	23.0	23.3	ns

Table 5 Effect of number of applications on leaf number at transplanting

Species	Number of applications				LSD
	control	1	2	3	
Impatiens	3.6	3.5	3.6	3.5	ns
Marigold	4.0	3.9	3.9	3.7	0.13
Petunia	6.1	6.1	6.2	6.1	ns
Primrose	5.6	5.5	5.4	5.6	ns
Salvia	5.2	5.2	5.0	4.8	ns
Verbena	6.0	6.0	6.0	6.0	ns

Table 6 Effect of number of applications on leaf size at transplanting

Species	Number of applications				LSD
	control	1	2	3	
Impatiens	16.6	16.2	16.3	15.4	0.84
Marigold	34.4	32.9	31.1	30.8	1.32
Petunia	32.4	24.8	25.1	24.2	ns
Primrose	72.0	65.6	60.5	56.8	3.74
Salvia	14.2	13.9	13.1	13.2	ns
Verbena	15.2	14.8	14.3	14.4	ns

Table 7 Effect of rate of daminozide on height (mm)
at marketing

Species	Rate ppm				LSD
	control	1250	2500	5000	
Impatiens	90	111	120	115	17
Marigold	115	109	102	98	6
Petunia	118	118	118	122	ns
Primrose	-	-	-	-	-
Salvia	157	153	157	163	ns
Verbena	130	130	128	124	ns

Table 8 Effect of rate of daminozide on date marketable -
day number

Species	Rate ppm				LSD
	Control	1250	2500	5000	
Impatiens	135	138	139	140	3
Marigold	130	131	131	132	1
Petunia	140	142	141	140	ns
Primrose	340	340	332	339	ns
Salvia	149	153	152	151	2
Verbena	157	157	159	159	2

Table 9 Effect of rate of daminozide on area (cm²)
at marketing

Species	Rate ppm				LSD
	Control	1250	2500	5000	
Impatiens	165	222	253	274	55
Marigold	214	199	188	205	15
Petunia	425	416	391	427	ns
Primrose	581	562	575	594	ns
Salvia	292	313	295	283	ns
Verbena	274	287	249	252	25

Table 10 Effect of number of applications on height (mm)
at marketing

Species	Number of applications				LSD
	Control	1	2	3	
Impatiens	90	106	107	115	ns
Marigold	115	112	109	97	ns
Petunia	118	120	121	116	ns
Primrose	-	-	-	-	-
Salvia	157	161	163	150	9
Verbena	130	130	130	125	ns

Table 11 Effect of number of applications on marketing date - day number

Species	Number of applications				LSD
	Control	1	2	3	
Impatiens	135	138	139	138	ns
Marigold	130	130	131	132	1
Petunia	140	140	141	141	ns
Primrose	340	340	339	334	ns
Salvia	149	150	152	151	ns
Verbena	157	158	158	158	ns

Table 12 Effect of number of applications on area (cm²) at marketing

Species	Number of applications				LSD
	Control	1	2	3	
Impatiens	165	221	224	240	ns
Marigold	214	210	206	196	ns
Petunia	425	415	429	400	ns
Primrose	581	596	595	543	ns
Salvia	292	312	292	283	ns
Verbena	274	275	263	259	ns

Discussion

Daminozide had a significant effect on the size of all species at transplanting. The height of all species (where recorded) was reduced significantly by the lowest rate of daminozide. Higher rates further reduced the height of Impatiens and Verbena but not the other species. Leaf size was reduced by the lowest rate in all except Impatiens and Verbena. All species responded to the highest rate. Whilst the use of daminozide had a significant effect on the leaf number of several species the size of effect was small (approximately 5% difference between the largest and smallest numbers).

Application number had less effect than application rate but increasing applications did reduce leaf size of Impatiens, Marigold and Primrose; height of Marigold and Salvia. Whilst increasing application number reduced leaf number in Marigold, the effect was small.

The effects observed at marketing were less striking than those at transplanting. Marketing date of Impatiens was delayed by up to 5 days by daminozide. As the height (Table 7) and area (Table 9) of individual plots were not measured until they were ready for marketing (half the plants with at least one flower open), these measurements were taken on different dates and this probably accounts for Impatiens, being taller and occupying a larger area than the untreated plants at marketing. Only the treated Marigold plants were significantly smaller than untreated at marketing.

Conclusions

At the rates and application numbers used in this trial, daminozide had a useful but not excessive dwarfing effect at transplanting on all of the species tested. By marketing stage the effects were small and commercially unimportant.