

The Effect of Sodium 2,3:4,6-di-O-isopropylidene-2-keto-L-gulonate
(Atrinal) on the Growth and Flowering of Six Varieties
of Kalanchoe sp.

by

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Abstract

Four concentrations of sodium 2,3:4,6-di-O-isopropylidene- 2-keto-L-gulonate (Atrinal)¹, a chemical growth regulator (0.0, .075, .150, and .225%), were tested on six varieties of Kalanchoe sp. The varieties chosen were Goddess and Montezuma of the Aztec series and Rotkappchen, Feuerball, Feuerzauber, and Korall of the Swiss hybrids series. Final data was taken at full bloom on plant height, diameter, number of inflorescences, time of bloom, and phytotoxicity. Concentrations up to .150% were effective in significantly decreasing plant height and increasing number of inflorescences overall. There was no overall effect on plant diameter. Except in Goddess, blooming was more uniform in the treated plants. Phytotoxic effects of the higher concentrations were noticed in Goddess, resulting in severe stunting and delay of bloom of up to one month. Concentrations of .075% to .150% proved to be the most effective overall.

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An important aspect of the culture of Kalanchoe and many other ornamental crops is the use of growth retardants. These chemicals are used in the production of these crops to decrease internode length and thus produce a more compact, attractive plant. Often, without the application of growth retardants, stems would become spindly, leggy, and unsightly.

Atrinal, a new chemical, is currently being tested to determine its possible commercial use as a growth retardant and/or chemical pinching agent. Two of the ornamental plants that have been found to respond to treatment of Atrinal are oleander and azalea. According to the literature, Atrinal inhibits growth of the vegetative growing point and thus induces axillary buds to break. It is a systemic chemical, being absorbed by the leaves and translocated to other parts of the plant. It seems to have its best effect when applied within two days after the removal of the growing tip of a main shoot by pinching. The effect of the chemical is then on the new growth, inducing uniform lateral branching and decreasing internode length, which should result in a more compact plant with a greater number of inflorescences.

The purpose of this experiment was to determine the influence of four concentrations of Atrinal applied as a foliar spray on six varieties of Kalanchoe sp. Data was taken on plant height, diameter, number of inflorescences, time of bloom, and phytotoxicity.

¹Format follows the Journal of the American Society for Horticultural Sciences.

Materials and Methods

Two varieties of the Aztec series, Goddess and Montezuma, and four Swiss hybrid varieties, Rotkappchen, Korall, Feuerball, and Feuerzauber were chosen as the test plants. All plants were received as rooted cuttings. The Aztec varieties had been pinched prior to shipment; the Swiss hybrids had not been pinched.

All plants were shifted to 13.4 cm. plastic pots using equal parts peat and perlite by volume. Forty plants of each of six varieties were arranged on a greenhouse bench in a randomized block design. On October 2 and 3, 1978, all plants were pinched and the four concentrations, 0.0, .075, .150, and .225% plus 10 drops of HDD surfactant per liter as wetting agent, were applied as a spray using approximately 15 ml. per plant. The plants were grown in the greenhouse environment under natural short days until flowering.

Results

Two weeks following treatment, differences were noted in rate and condition of growth in treated versus untreated plants. In general, as the concentration of Atrinal increased, rate of breaking of new shoots decreased. In this early stage, treated plants seemed to lag behind the untreated controls and chlorosis of new growth also appeared. The chlorosis gradually disappeared and was not evident after two weeks.

Final data on plant height, diameter, and number of inflorescences was taken when plants were in full bloom. This information was subjected to analysis of variance and Duncan's Multiple Range Test. Table 1 shows

a comparison of these variables and their significance within each variety.

There were marked differences in response among varieties. Goddess showed the greatest reduction in plant height with increasing concentration, but visual observations revealed that the plants treated with .150 and .225% solutions were very stunted and delayed in blooming as much as a month. In contrast, Rotkappchen showed no significant decrease in plant height with increasing concentrations. Considering all six varieties together, there was a significant reduction in plant height with increasing concentration. (Fig. 1)

There were also wide varietal differences in plant diameter. Most varieties showed some increase with increasing concentrations, while Korall showed no significant difference. Overall, statistical analysis showed no significant increase in plant diameter with increasing concentrations. (Fig. 2)

The variety Rotkappchen showed no significant increase in number of inflorescences with increasing concentrations, whereas Montezuma, Feuerball, Feuerzauber, and Korall did show a significant increase in number of inflorescences up to a .150% concentration. (Fig. 3)

One of the differences observed in this experiment was time of bloom. Except for Goddess, there was little delay in time of bloom with increasing concentrations. In fact, visual observations showed that treated plants often bloomed sooner and more uniformly than the controls.

For Goddess, the delay in time of bloom was due to severe phytotoxicity. Phytotoxic effects were evident within three weeks after treatment. High concentrations of the chemical caused a die-back of the new growth, resulting in severe stunting and delay of bloom of up to a month. The

Table 1. Comparison of median plant height, diameter, and number of inflorescences within each of six varieties of *Kalanchoe* sp.

Variety	Concentration (ppm)	Height (cm)*	Diameter (cm)	Number of Inflorescences
Goddess	0	40.82 a	21.54 a	14.50 b
	750	36.65 b	19.85 b	21.30 a
	1500	32.90 c	22.10 c	19.20 a
	2250	31.05 d	19.60 b	15.30 b
Montezuma	0	43.35 a	23.25 ab	8.00 c
	750	42.51 a	21.57 b	9.90 c
	1500	39.55 b	24.75 a	14.80 b
	2250	35.95 c	23.70 a	17.10 a
Rotkappchen	0	32.04 a	24.32 b	5.60 a
	750	32.10 a	27.42 a	6.00 a
	1500	31.96 a	25.40 ab	5.70 a
	2250	31.00 a	25.34 ab	6.70 a
Feuerball	0	35.03 a	21.30 a	8.60 b
	750	34.75 ab	18.90 b	9.20 b
	1500	32.88 b	19.18 b	11.80 a
	2250	29.18 c	18.38 b	12.40 a
Feuerzauber	0	34.90 a	21.93 b	6.30 b
	750	32.83 b	23.98 a	6.40 b
	1500	28.75 c	22.40 ab	9.80 a
	2250	27.90 c	22.35 ab	8.20 a
Korall	0	36.55 a	23.23 a	4.90 b
	750	35.48 ab	23.85 a	5.20 b
	1500	34.65 ab	22.65 a	6.60 ab
	2250	33.60 b	23.85 a	7.60 a

* Mean separation by Duncan's multiple range test, 5% level.

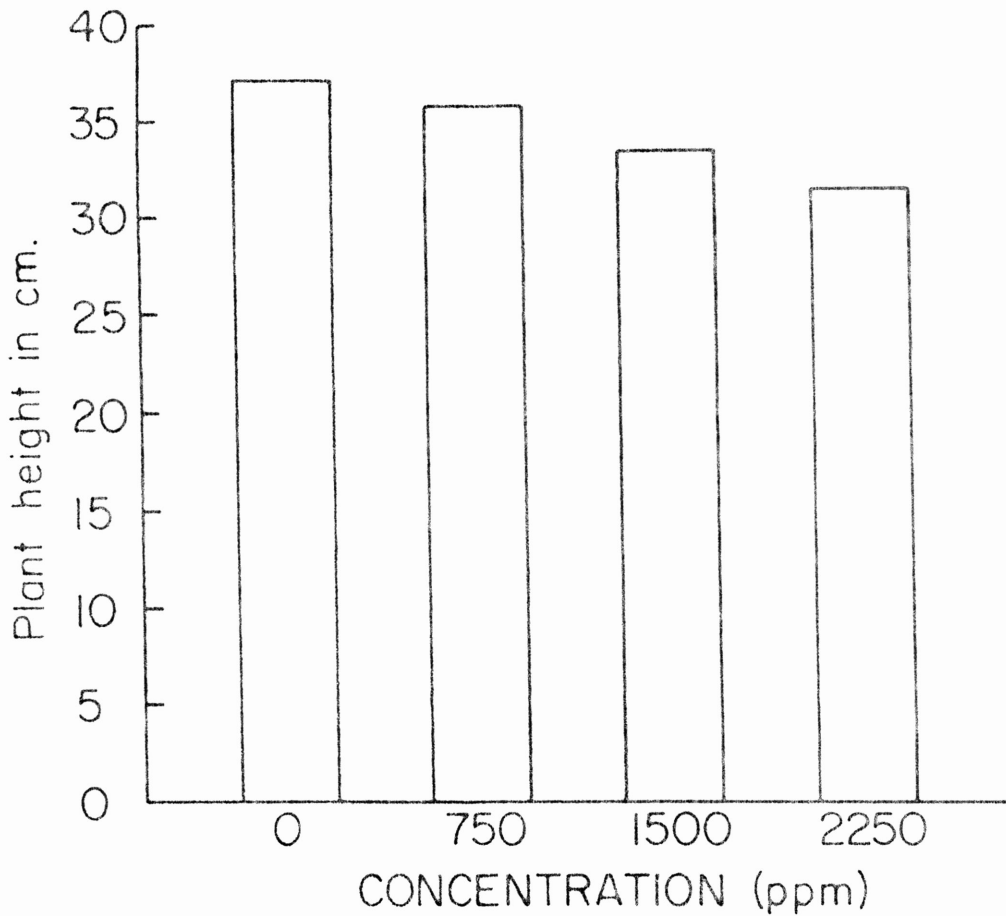


Fig. 1 The effect of four concentrations of Atrinal on overall average mean plant height of six varieties of Kalanchoe sp.

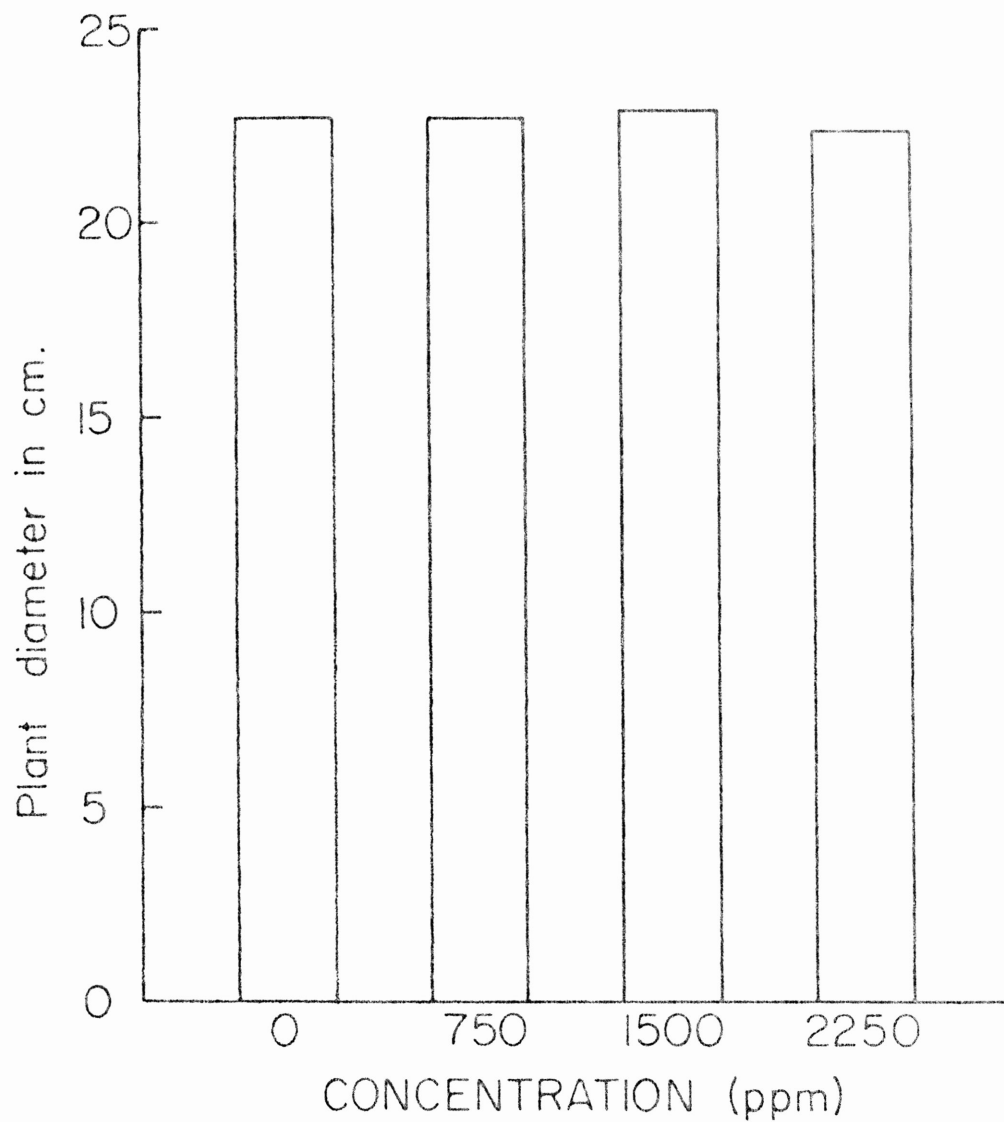


Fig. 2 The effect of four concentrations of Atrinal on overall average mean plant diameter of six varieties of kalanchoe sp.

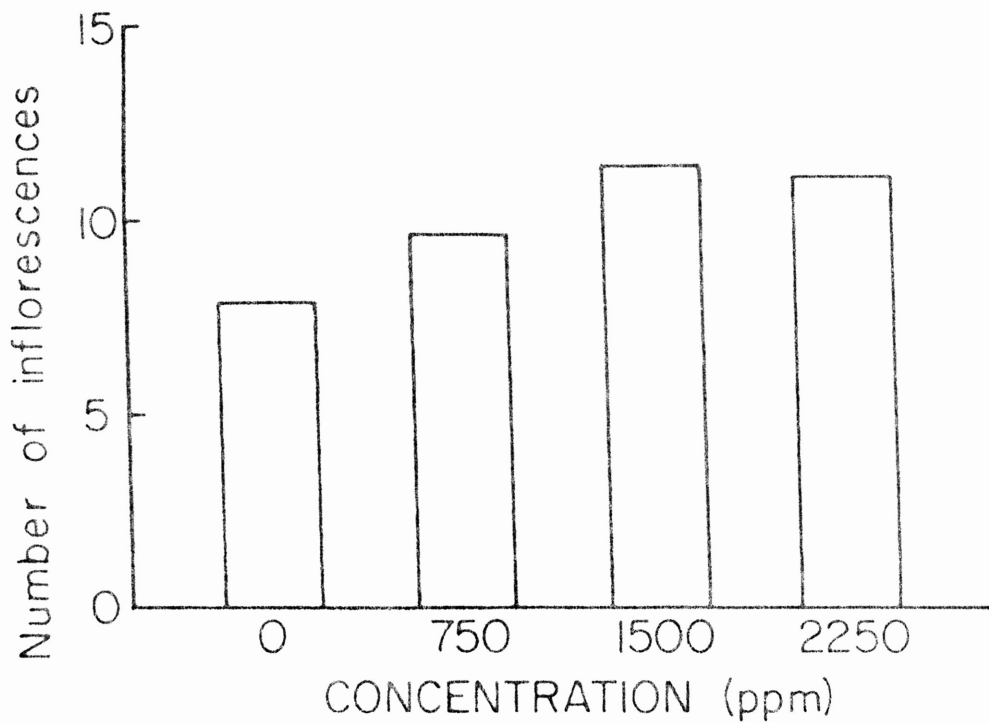


Fig. 3 The effect of four concentrations of Atrinal on overall average mean number of inflorescences varieties of kalanchoe sp.

.150 and .225% concentrations produced very unsightly plants.

Discussion

The chemical Atrinal does generally have a positive effect on these six Kalanchoe varieties in reducing plant height and increasing number of inflorescences. According to visual observation and the statistical analysis, a concentration between .075 and .150% would be most effective for all varieties in the fall months. This range of treatment will result in sturdier, heavier flowered plants which can be more easily sleeved, shipped, and marketed.

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