Chemical Control of Growth and Flowering in Hibiscus[1]

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Abstract. **Succinic acid-2,2-dimethylhydrazide (SADH) was ineffective but (2-chloroethyl)trimethylammonium chloride (chlormequat) and α-cyclopropyl-α-(4-methoxyphenyl)-5-pyrimidinemethanol (ancymidol) retarded growth of several cultivars of the Chinese hibiscus (*Hibiscus rosa-sinensis* Linn.) inducing shorter internodes and more and earlier flowering during summer months. (2-Chloroethyl)phosphonic acid (ethephon) also reduced the length of terminal shoots, but reduced flowering and stimulated the growth of lower axillary shoots of unpruned plants.**

The Chinese hibiscus, a common tropical plant, is used as a landscape plant in frost-free areas of the U. S. In more northerly areas it is frequently found in greenhouses and occasionally used as a summer flowering garden plant. Bright glossy green leaves and attractive flowers make it potentially valuable as a specimen for the patio or roof-garden as it is tolerant of high temperature and full sun.

Initial screening trials in 1963 on several Chinese hibiscus cultivars indicated that SADH[2] applied as a foliar spray to run-off at concn in excess of 1%, was ineffective in retarding internode elongation but that chlormequat[3] was effective as either a foliar spray or as a soil drench. Lemper (4) in 1965 also reported chlormequat as well as 2,4-dichlorobenzyl-tributylphosphonium chloride to be effective on hibiscus. In addition, the leaves of chlormequat treated plants were darker green and plants flowered sooner and more prolifically as described by Cathey (2), and similar to the effect on *Bougainvillea* described by Hackett and Sachs (3) and as reported for Chinese hibiscus and several other malvaceous plants by Bose et al. (1).

Table 2. Flower production per plant grown outdoors produced by 'Brilliantissima', 'Kona', and 'Double Red' hibiscus following treatment with chlormequat.

Chlormequat (ppm)	No. flowers per month				
	June	July	Aug.	Sept.	Total
Trial 1. Foliar spray applied April 5, 1966					
0	2	3	10	5	20
1,000	6	11	14	6	37
2,000	6	12	13	8	39
Trial 2. Foliar spray applied April 1, 1967					
0	0	12	12	10	34
2,000	5	22	15	12	54
4,000	2	20	14	16	52

In subsequent years chlormequat was applied to Chinese hibiscus with plants placed out-of-doors during the summer months to estimate the flowering pattern of treated plants under garden conditions. Established rooted cuttings of 'Brilliantissima', 'Kona', and 'Double Red' were planted in 10, 12.5 or 15-cm pots and the tip removed to induce branching when the plants resumed vigorous growth. Treatments were made ca. 2 weeks later as axillary shoots developed. There were 4 plants of each cultivar per treatment and shoot length was measured 6-8 weeks after chemical treatment.

Increasing levels of chlormequat progressively reduced shoot length, principally by inhibiting internode elongation, as leaf counts showed only a slight variation in the no. of nodes of treated and untreated shoots (Table 1). Treated plants produced more flowers than untreated plants throughout the summer (Table 2).

Similar results were obtained following soil application of ancymidol[4] at 4 or 8 mg per 15-cm pot (Table 3).

Ethephon[5] reduced the height of unpinched plants as did chlormequat and ancymidol but reduced flowering and did not enhance leaf color. An additional effect of ethephon on unpinched plants, was the promotion of lateral shoots in the lower portion of plants of 'Kona' (Table 4) as previously reported for several ornamental plants (5). Additional dwarfing of plants was obtained by treatment with a combination of chlormequat and ethephon. The resulting dwarf, dark green, branched plants flowered normally.

Literature Cited

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4. Lemper, J. 1965. Versuche an Hibiscus and Crassula Mit Stauchemitteln. *Gartenwelt.* 65:79-80.
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Table 1. Mean no. of nodes per shoot and mean shoot length of hibiscus following foliar sprays of chlormequat.

Chlormequat concn (ppm)	Shoot length (% of control)						No. nodes per shoot	
	Brilliantissima			Kona			Brilliantissima	Kona
	Trial			Trial			Trial	Trial
	1	2	3	1	2	3	1	1
0	100	100	100	100	100	100	18.9	13.9
500	-----	-----	52	-----	46	35	------	------
1,000	50	61	43	24	36	33	18.9	14.1
2,000	50	44	40	15	23	31	18.3	13.6
4,000	24	24	-----	13	------	------	18.9	12.7

Table 3. Shoot elongation and flowering during a 2 month period following soil application of ancymidol to hibiscus.

Ancymidol (mg/15 cm pot)	Shoot length (% of control)		No. of flowers (% of control)	
	Brilliantissima	Kona	Brilliantissima	Kona
4	66	69	200	100
8	44	68	400	72

Table 4. Mean plant height and length of 5 lowest axillary shoots of unpinched plants of hibiscus 4 months following treatment with chlormequat, ethephon, or both.

Treatment (ppm)	Plant height (% of control)		Length of lowest axillary shoots (% of control)	
	Kona	Double Red	Kona	Double Red
Soil application (50 ml/plant)				
Chlormequat (1,000)	54	60	41	41
Foliar application to run-off				
Chlormequat (1,000)	54	64	45	45
Ethephon (1,200)	76	91	109	90
Ethephon (2,400)	69	87	136	96
Ethephon (4,800)	68	85	145	79
Chlormequat (1,000) + ethephon (2,400)	44	53	59	52

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[2]B-Nine formulation, Uniroyal Chemical Co.

[3]Cycocel formulation, American Cyanamid Co.

[4]Eli Lilly & Company.

[5]Amchem Products, Inc.