

SHORT COMMUNICATION

ALTERATION OF SEX EXPRESSION IN THE CUCUMBER BY TESTOSTERONE AND ESTRADIOL

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Abstract—Treatment of monoecious cucumber plants with 17β -estradiol or testosterone induced femaleness in the flowering of the plants.

It has been reported that exogenous plant growth regulators can alter the sex expression of the cucumber.¹⁻⁴ 2-Chlorethane-phosphonic acid has also been found effective in changing the ratio of female to male flowers.⁵ The natural occurrence of the androstanes and estrogens in plants, cited in two recent review articles,^{6,7} is related to the work of Löve and Löve,⁸ in which they applied steroids to *Melandrium* and altered anther and pistil development. These facts lead us to experiment with testosterone and estradiol on the cucumber plant.

Seeds of SMR-18 cucumbers were germinated in peat pots in the greenhouse. After the appearance of a few inches of growth, they were planted, one per pot, and placed in a greenhouse. There were six plants per group.

Separate solutions of testosterone and estradiol in diethyl ether were prepared in concentrations of 0.2, 2.0 and 20.0 mg/ml. When the first true leaves had formed, five 0.1 ml applications of each concentration were applied, over a period of two weeks, to each of six plants. The oldest leaf was treated first and different leaves were used the succeeding times. Applications of 0.1 ml of pure diethyl ether were also made in an identical manner on six control plants.

The plants were watered every other day and rotated on the bench once a week. When flowering began, approximately at eight weeks, the flowers were classed and counted by sex for the succeeding five weeks. Table 1 lists the changes that were noted.

The results significantly demonstrated, by the Wilcoxin test, that 17β -estradiol and testosterone induced femaleness in monoecious cucumber plants. Recently Kopcewicz⁹

¹ W. D. MITCHEL and S. H. WITTWER, *Science* **136**, 880 (1962).

² F. LAIBACH and F. J. KRIBBEN, *Ber. Deut. Bot. Ges.* **62**, 53 (1950).

³ E. GALUN, *Phyton* **13**, 1 (1959).

⁴ C. E. PETERSON and L. D. ANHDER, *Science* **131**, 1673 (1960).

⁵ S. IWAHORI, J. M. LYONS and W. L. SIMS, *Nature* **222**, 271 (1969).

⁶ E. HEFTMANN, *Lloydia* **31**, 293 (1968).

⁷ H. SINGH, V. K. KAPOOR and A. S. CHAWLA, *J. Sci. Ind. Res.* **28**, 339 (1969).

⁸ A. LÖVE and D. LOVE, *Archiv. Bot.* **32 A** 12, 1 (1945).

⁹ J. KOPCEWICZ, *Naturwissenschaften* **57**, 136 (1970).

TABLE 1. EFFECT OF ESTRADIOL AND TESTOSTERONE ON THE FLOWERING OF CUCUMBER PLANTS. THE PERCENTAGE OF FEMALE FLOWERS AT EACH NODE IS LISTED

Treatment	Nodes							
	1	2	3	4	5	6	7	8
Control	0	0	0	8	0			
Estradiol								
0.1 mg*	0	0	9	24	21	21	23	50
1.0 mg	0	11	0	14	0	33		
10.0 mg*	14	0	24	14	14			
Testosterone								
0.1 mg	0	5	0	17	0			
1.0 mg*	7	0	9	30	18			
10.0 mg*	11	9	10	25	7	22		

* Significant at the 5% level for the first 5 nodes.

reported the influence of estrogens on flower formation in *Cichorium intybus*. Whether there is any relationship between the steroids, plant growth substances and their effect on sex expression remains to be investigated. The 0.1 mg estradiol treatment also increased the number of nodes to eight, which was greater than all the other plants.