The average weight per fruit, harvested before July 1, for all hormone treatments taken together was 166 gm as compared with 93 for the check. This difference is statistically significant. However, when the different hormone treatments are considered separately, it is found that only treatment No. 3 had significantly larger fruit size than the check. This seems to be due to high experimental errors because of 4 replications only. The weight of the fruits was decreased in the case of plants treated with α-*o*-chlorophenoxypropionic acid and 2,5-dichlorobenzoic acid after July 1 (Table 2).

TABLE 1

TOP AND ROOT GROWTH OF PLANTS AS INFLUENCED BY DIFFERENT TREATMENTS (Mean per Plant)

Treatment No.	Tops (oz.) (fresh wt.)	Roots (gm) (dry wt.)
1	19.5	11.1
2	30.25	15.7
3	28.0	10.5
4 (check)	25.5	10.3

TABLE 2

MEAN YIELD PER PLANT AND AVERAGE FRUIT WEIGHT UNDER DIFFERENT TREATMENTS (GM)

Treatment No.	Mean yield per plant	Fruit size up to July 1	Fruit size after July 1
1	1.489	147	157
2	1,592	154	104
3	1,669	196	133
4 (check)	1,549	93	101

The total yield of the plants did not seem to be influenced to any appreciable degree under these conditions.

The fruits harvested from different treatments were cut and tasted. Those treated with α-*o*-chlorophenoxypropionic acid and 2,5-dichlorobenzoic acid were rich red and more meaty than untreated ones. They were adjudged as sweeter and richer in flavor than the ones treated with *o*-chlorophenoxyacetic acid and check. However, there appeared in all the treated groups some fruits with a greenish jelly-like substance, which was not considered very desirable from the appearance point of view. There were no misshapen fruits or fruits with unfilled locules on treated plants, as are sometimes obtained when tomato blossoms are sprayed with hormones.

The first one or two fruits on each plant contained seeds, while those which matured after that were seedless. This indicates that flowers fertilized before the application of hormones to the soil developed seed and that growth in others was affected by the hormones. In these latter it may be that the pollen was rendered ineffective or that abnormal development of the ovules started before fertilization could take place. This parthenocarpic development of the fruits reveals that the hormones were absorbed by the roots and were transported through the stem to other aerial parts, (*2*, *3*, *5*).

As there were several buds on the first and second cluster at the time of application of hormones which developed into seedless fruits, it does not necessarily follow that only those buds initiated after application of hormones develop parthenocarpically, as has been suggested (*6*). The presence of seeds in the young fruits observed on July 5 shows that the hormones lost their effect within 7–8 weeks. It is possible that they were leached out of the soil, absorbed and fixed by soil colloids, or decomposed and thus rendered ineffective. This is further supported by the decrease in average fruit weight of plants treated with α-*o*-chlorophenoxypropionic acid and 2,5-dichlorobenzoic acid after July 1 (Table 2). DeRose (*1*) found 2,4-dichlorophenoxyacetic acid in leachate. Even when leaching was prevented, it was inactivated within 68–80 days, while 2,4,5-trichlorophenoxyacetic acid retained its effectiveness for a much longer period. However, Nutman, Thornton, and Quastel (*4*) reported that 2,4-dichlorophenoxyacetic acid, when applied to the soil, lost its toxicity within 3–6 days.

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Early Maturation of Calimyrna Fig Fruits by Means of Synthetic Hormone Sprays

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Maturation of Calimyrna fig fruits in approximately 60 days instead of the average 120-day period necessary for normal fruit development to maturity has been accomplished as a result of spraying unpollinated but pollen-receptive syconia with solutions of 2,4,5-trichlorophenoxyacetic acid. The fruits thus formed were comparable in size and color to mature, pollinated (caprified) fruits. Although completely devoid of achenes ("seeds"), the hormone-produced fruits were well filled with pulp and quite palatable.

These results were obtained as part of a research program initiated in 1947 and aimed at developing a commercially feasible method of setting parthenocarpically the syconia of the Calimyrna fig, a variety that requires cross-pollination for fruit development to maturity (*1*). This preliminary work showed that a spray of indole butyric acid at 1,500 ppm was effective in setting parthenocarpic fruit. As a continuation of the program this season, a number of other synthetic auxins were tried, among which were 2,4,5-trichlorophenoxyacetic acid and its isopropyl ester.

Both the acid form and the ester, in concentrations of 10, 25, 50, 75, and 100 ppm, were sprayed on fruits and foliage, using 5 branches/treatment. At the time of application each branch bore 5 figs, the oldest of which had been macroscopically evident for approximately 45 days. In 15 days the above concentrations of the acid had induced, respectively, 56%, 64%, 69%, 72%, and 65% mature fruits of average size. At the 10-ppm concentration there were 8 (32%) green, immature fruits, 1 (4%) at the 25 ppm concentration, and none at the other concentrations. Even the youngest fruits, although they did not attain full size, were yellow and soft. Comparable results were obtained with the isopropyl ester. Parallel treatments with 2,4-D failed to elicit this response.

At 10 ppm the 2,4,5-trichlorophenoxyacetic acid resulted in no injury or only a very mild leaf chlorosis. At higher concentrations, however, the injury became increasingly severe, and death of the treated branches occurred at the 75- and 100-ppm levels about 4 weeks after spraying. It is believed that the injurious effect of the treatment was accentuated because the branches were bagged for three weeks to exclude caprifying wasps. In some instances, unbagged branches adjacent to those sprayed received small quantities of spray as drift, and, although the fruit matured similarly to that fully treated, there was little or no injury, even at 100 ppm.

A similar acceleration of the ripening processes was found in 1947 following the injection of a solution of 1,500 ppm of indole butyric acid into the cavities of the receptive syconia (*1*). In this case, mature fruits were obtained 12 days after treatment, or 6 weeks previous to the normal maturity date. As far as the writers are aware, these are the first reported instances in which the normal developmental pattern of a fruit has been so radically accelerated.

Such a phenomenal speeding-up of fruit development is believed to be of considerable interest. It is a strong indication of the hormonal nature of fruit ripening. The 2,4,5-trichlorophenoxyacetic acid apparently raises the hormone level in the plant to such a high point that the mobilization in the fruit of the stored reserves is almost immediate, whereas, under the influence of the normal hormone level, the same process occurs much more slowly. The present finding, coupled with the work of van Overbeek on the hormone induction of flowering in the pineapple (*2*), indicates that the entire physiological mechanism of flower and fruit production is, at least in part, under the control of hormones.

These results further emphasize the high degree of specificity of the synthetic hormones and the responses they induce. 2,4-D, even at 100 ppm, was ineffective in hastening maturation, whereas the very closely related compound, 2,4,5-trichlorophenoxyacetic acid, was strikingly effective.

It is to be expected that this rapid mobilization of food reserves in response to hormone application would occur only in plants in which the reserves were large enough to support the accelerated development. In those plants in which there is a clear correlation between leaf area and fruit size, the food supply might become the limiting factor rather than the hormone level. However, the fig is rather unique in many respects, and it may be that the above response is peculiar to the fig alone.

What aftereffects a treatment with 2,4,5-trichlorophenoxyacetic acid would have on the continued vigor of the fig tree is not known. If no major damage results, however, it seems logical to assume that following fruit maturation the leaves could replenish the depleted reserves, and the tree would be capable of repeating the process the next season.

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Electronic Mapping of the Activity of the Heart and the Brain[1]

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The electrocardiograph and the electroencephalograph provide information concerning the activity of the heart and the brain. In recent years it has become quite common to compare the wave traces picked up at different points on the chest in studies of the heart and also those picked up at different points on the skull in studies of the brain. The present paper describes a new way of collecting and presenting such information which has been developed to assist the observer in distinguishing easily those items which are most significant in the melee of confusing data obtained by conventional electrocardiographic and electroencephalographic means. The new method involves an "area display,"[3] the development of which has been based upon considerations of perception selectivity.[4]

The conventional electrocardiograph or electroencephalograph shows the time variation of potential at a point on the surface of the body in the form of a wave trace, with time as abscissa and potential as ordinate. Except for the fact that there is no superposition of successive traces, this is similar to the so-called "type A" presentation used in radar systems. The method described

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[2] Now at Stromberg Carlson Telephone Mfg. Company, Rochester, New York.

[3] The area display was originally proposed to the senior author by Dr. Douglas Goldman for the purpose of locating brain tumors and other pathological areas in the brain.

[4] In this connection see the section on "Perception Selectivity" in the article, "Some Fundamental Considerations Concerning Noise Reduction and Range in Radar and Communication" (*Proc. I.R.E.*, May 1948).