

THE EFFECT OF HETEROAUXIN ON THE DEVELOPMENT OF DEBLADED PETIOLES OF COLEUS

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There have been numerous papers (1, 2, 3, 5) on the production of parthenocarpic fruits by the use of growth substances (hereafter g. s.) and pollen extracts. It has been postulated that "normal" fruit usually develops due to the g. s. in the pollen and that produced in the developing embryos. Gardner and Marth (4) say that "it appears that they (g. s.) prevent the formation of an abscission layer at the base of the flower pedicel, thus permitting the flow of nutrients necessary for the growth of fruits...". The literature does not indicate that the effect of g. s. on the development of the absciss layer and abscission has been fully studied. And in at least one plant, tomato, it has been found (6) that the absciss layer is formed while the flower is quite small and that abscission may take place at any time by the separation of cells in this layer.

In a preliminary report presented before this academy (7) and in a complete report (8) the effect of g. s. on the development of the absciss layer and abscission of coleus leaves was given. The results may be summarized briefly as follows: removal of the blade of a coleus leaf accelerates development of the absciss layer and abscission, but the application of g. s. inhibits abscission, partially due to a delay in the development of the absciss layer, but mostly due to a delay in the disintegration of lamellae in walls of cells in this layer. The absciss layer is formed a considerable time before abscission takes place and application of g. s. inhibits abscission of deblated leaves with mature absciss layers for a month or more. Other results indicated that the production of g. s. by the developing blades was correlated with the abscission processes in the leaves.

The effect of g. s. on petioles development was noted and due to certain

similarities between this and that of the production of parthenocarpic fruit the following experiment was carried out.

A number of coleus plants were propagated by cuttings and when they were of a suitable size, 20 plants were selected and divided into two lots. These plants bore eight pairs of leaves not counting those in the terminal bud. The leaves of one group were deblated and one of each pair of petioles at a node was treated with 1 per cent heteroauxin in lanolin and the opposite petioles were coated similarly with plain lanolin. One leaf at each node in the other group of plants was deblated and plain lanolin applied to it. The petioles of these two groups of plants were marked off into $\frac{1}{8}$ inch segments with India ink. At the end of two weeks the petioles were removed and the results tabulated as indicated in Fig. 1.

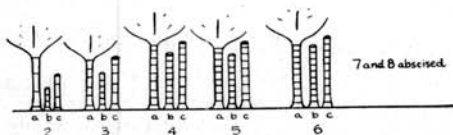


Fig. 1. Diagram indicating the amount of elongation of coleus petioles during a two week period. a, petiole of intact leaf; b, untreated deblated petiole; c, debated petioles treated with 1 per cent heteroauxin. The numbers indicate the position of the leaves below the terminal bud.

The untreated deblated petioles of the seventh and eighth pairs of leaves had abscised so these were not included.

Deblading of the blades prevented further elongation of the petioles, but the applied g. s. caused continued elongation of the petioles. The most pronounced elongation was in the petioles of the younger leaves and there was less in the older petioles. The elongation of the younger petioles was less than that of opposite petioles of the intact leaves. The older petioles that were treated became

longer than the petioles of the opposite intact leaves. Apparently a supply of g. s. favors continued development of petioles of intact and debladed leaves and this may be correlated with the inhibition of the abscission processes in the petioles. This may be similar to the production of parthenocarpic fruits by the use of g. s.

A study of the development of absciss layers and abscission in "normal" fruit and in parthenocarpic fruit produced by the use of g. s. is in progress and this may clarify the situation.

SUMMARY

1. Removal of the blades of coleus leaves stops elongation of the petioles.
2. Application of a lanolin paste containing 1 per cent heteroauxin inhibits abscission of the petioles and causes continued elongation of the petioles similar to that in the opposite intact leaves.
3. Some relationship between this and

the production of parthenocarpic fruits by the use of g. s. is suggested.

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