coneogenic action in general metabolism. Apparently, this action is accomplished, in this case, by some local mechanism in the tissue to which it is applied. It does not depend on the intermediary action of any recognized endocrine gland and, in the doses employed, affects no hair follicles not directly treated. The less significant growth-inhibiting potency of the aqueous cortical extract agrees with biological assay of the material, showing it to contain "gluconeogenic" steroids in low concentration.

Detailed histological and histochemical analysis of the treated skins and other studies of the action of adrenal cortical hormones on growth will be reported elsewhere.

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Effect of 2,4-Dichlorophenoxyacetic Acid on Root Development in Bean Cotyledons

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One of the well-known effects of plant-growth regulators on plants is the forced production of roots in various excised as well as intact organs of the shoot. In addition to being an excellent selective herbicide, the synthetic plant-growth regulator, 2,4-D, is also a good root-inducing compound.

In the course of an experiment in which the persistence of 2,4-D in soils is being studied, it was observed that the cotyledons of garden beans (*Phaseolus vulgaris* L. var. Lualualei)[1] planted in certain soils treated with 2,4-D (10 lbs/acre of 95% acid dusted on soil surface) developed roots. As far as is known to the writer, this is the first reported instance of this phenomenon. Although the root primordia are capable of developing in any part of the cotyledon, they seemed to develop more frequently in the basal portion. The first effect of the 2,4-D in the soil on the bean was the dying and rotting of the young, growing, embryonic axis, followed by the rotting of the cotyledons. After the embryonic axis died and if the cotyledons survived the effects of the 2,4-D, the latter remained turgid and developed root primordia. These rooted cotyledons, however, failed to develop any shoots when they were transferred to normal untreated soil. In a few cases, roots were observed on exposed cotyledons which were still intact on the stems of bean seedlings growing in 2,4-D-treated soil.

In order to prove that the roots observed above did not develop from axillary buds in the embryo after the primary root had died as a result of the presence of 2,4-D in the soil, the following experiment was conducted. Garden beans of the variety Bountiful were soaked in tap water at room temperature for 3 hrs. After the soaking period, the testa was removed from each swollen bean, and the cotyledons were separated. The germ end of each cotyledon (approximately one-fourth of the length of the cotyledon) was then severed to remove the embryonic axis entirely. The excised cotyledons were planted in soil previously treated with 2,4-D (5 lbs/acre of 95% acid dusted on soil surface). Similar cotyledons were planted in untreated soil. Twelve days after planting, the cotyledons were dug up and examined. It was observed that about half the number of the cotyledons in the 2,4-D–treated soil had developed roots, whereas none in the untreated soils showed any signs of root development (Fig. 1). These roots could not have developed from the axillary buds in the embryo.

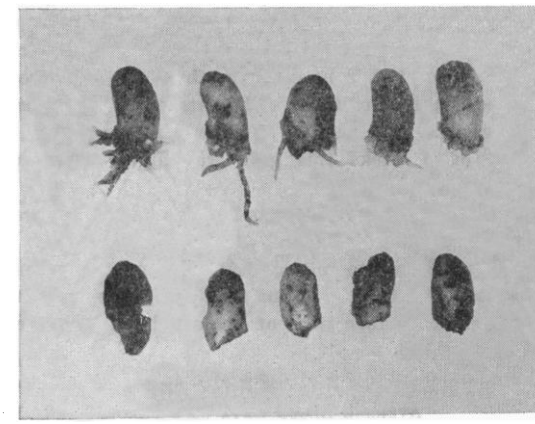

FIG. 1. Cotyledonary roots induced by 2,4-D: above, in 2,4-D-treated soil; below, in untreated soil.

An attempt was made to induce root development in bean cotyledons on filter paper in Petri dishes containing 2,4-D solutions varying in concentrations from 1 to 32 ppm. Three temperatures were employed for each concentration: room temperature (74.9°–86.0° F), 84.9°–93.5° F, and alternation between these temperatures (8 hrs at the higher and 16 hrs at the lower temperature range daily). The germ ends of Bountiful beans were excised before being placed in Petri dishes containing the 2,4-D solutions (15 cc). Two days later, the testa from each bean was removed, and the cotyledons were separated and allowed to remain in the Petri dishes. After two weeks it was observed that all concentrations of 2,4-D used induced rooting of the cotyledons. At room temperature and at alternating temperatures the cotyledons rooted most readily at 2–8 ppm of 2,4-D. At 84.9°–93.5° F they rooted most readily at 1–4 ppm. At the highest temperature range, the cotyledons rooted slightly more readily than at room temperature or at alternating temperatures, and the latter two temperatures were about equal in their root-inducing capacity. In this experiment, one cotyledon (6% of total) in the distilled water control at room temperature produced roots. In no other case did an untreated cotyledon produce roots, whether cultured in Petri dish or in soil.

[1] Supplied by Truck Crops Department, Hawaii Agricultural Experiment Station.