fore, it is then more useful to focus attention on the more physiological element, calcium.

It may be pointed out that the increased dietary calcium levels in these studies caused a decrease in the total radiostrontium retention because (i) the stable calcium was an effective diluent for radiostrontium and (ii) the increased dietary calcium levels did not cause an increased growth of the skeleton. To produce a decreased concentration of radiostrontium per unit of bone, it is only necessary that the stable calcium effectively dilute the strontium. In summary, it has been shown that supplementary uncontaminated calcium in the diet of the rat will proportionally decrease the fractional retention of continuously ingested radiostrontium under the conditions of the present experiment. Further investigations must be made to determine whether these relationships hold over broader ranges of variables that may be involved and to explore the general applicability of the present findings in the rat to man and other species.

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Inhibition of Plant Growth by Root-Drench Applications of Kinetin

The announcement of the isolation of kinetin (6-furfurylaminopurine) and of its stimulation of cell division in tobacco callus tissue (*1, 2*) has led to a search by many investigators for other types of biological activity of this compound. The effects of kinetin reported to date include substitution for red light in promoting expansion of bean leaves and germination of lettuce seed (*3*), prevention of protein degradation in detached *Xanthium* leaves (*4*), stimulation of elongation of *Avena* coleoptiles (*5*), and inhibition of regeneration of tentacles of *Hydra* (*6*). Inhibition of root development by kinetin has been reported by several workers, including Miller (*2*), who stated that the root growth of lettuce seedlings was inhibited severely when the seeds were treated with kinetin. There have been no reports of inhibition of growth with kinetin when intact plants grown to maturity were used. This paper reports such an inhibition (*7*). Our studies were conducted during November and December 1956 in a greenhouse with a temperature range of 72° to 80°F. Twenty-one-day-old seedlings of tomato, variety Bonnie Best, growing singly in sand in 5-inch clay pots were treated by adding aqueous solutions of kinetin to the surface of the sand. Fifty-milliliter portions of a 10-, 50-, or 100-ppm solution were applied to individual pots on the first, third, and fifth days of each week. On the intervening days, the plants were watered with nutrient solution. This schedule was continued for 4 weeks. It is noted that the limit of the water solubility of kinetin at room temperature is approximately 100 ppm. The average increase in height of the plants was used as an index of the over-all growth. The results are given in Table 1. It is apparent from this study that, as the dosage of kinetin was increased, the growth of the tomato plants was more strongly inhibited. Plants treated with 100 ppm of kinetin had small, atypically shaped leaves, drastically reduced root systems, and purple pigmentation similar in appearance to that associated with phosphorus deficiency. They often exhibited loss of turgor on warm days. The plants flowered approximately 2 weeks later than the control plants and produced flowers and fruit of reduced size. Although the fruit were small, seeds harvested from them were viable and produced normal seedlings.

The response of the plants treated with 50 ppm of kinetin was similar, but not so pronounced as that of plants treated with 100 ppm. The growth of plants treated with 10 ppm was significantly inhibited, but only slight indications of the other effects mentioned above were evident.

This experiment was repeated in all essential details, except that the tomato plants were grown in soil. The results are also given in Table 1. Comparatively slight inhibition of growth was obtained by treating tomato plants that were growing in soil. However, a slightly more spindly growth was evident in all treated plants. Several days' delay in flowering and slightly reduced root systems were observed in plants treated with 50 ppm and 100 ppm of kinetin.

Table 1. Average increase in height of tomato plants growing in sand or soil treated with aqueous solutions of kinetin after 4 weeks of treatment. Fifteen plants were included for each treatment. The average initial height of plants grown in sand was 6.7 cm; that of plants grown in soil was 7.8 cm.

Concentration of kinetin* (ppm)	Average increase in height (cm)
Plants grown in sand	
0	20.2
10	12.5
50	5.2
100	3.4
L.S.D.*–0.01	2.1
L.S.D.*–0.05	1.6
Plants grown in soil	
0	23.9
10	18.6
50	16.0
100	17.2
L.S.D.*–0.01	3.5
L.S.D.*–0.05	2.8

* Least significant difference.

The plants growing in soil treated with kinetin recovered—that is, they compared favorably in size with control plants—approximately 2 weeks after the treatments were discontinued. The plants grown in sand made only slight recovery, and this very slowly.

Inhibition of growth in height was observed in similar experiments in which seedlings of sunflower, bean, corn, and wheat were grown in sand. The response of the latter two species was evident only with the 100-ppm kinetin treatment, whereas the other species responded at lower concentrations. Inhibition of root growth was characteristic of all plants treated with the highest concentration.

Experiments now in progress indicate that a single watering with 100 ppm of kinetin significantly inhibits plants growing in sand. Spraying seedlings of several of the previously mentioned species to the point of run-off with aqueous solutions containing up to 100 ppm of kinetin produced no observable effects.

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