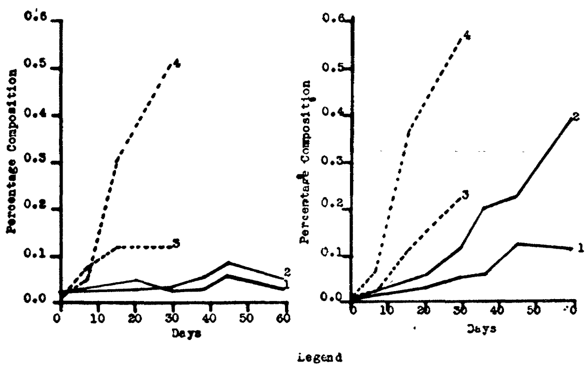
plants. The foliage was darker green. The plants were stunted and contained considerable starch. This starch, however, rapidly disappeared after four days. The leaves wilted and died in twenty-four hours after the appearance of the first symptoms without changing color, or exhibiting any of the symptoms associated with the nitrate-supplied plants.

Data from the analysis of the four groups of plants showing the ammonium nitrogen in the leaves and stems are graphically shown in Fig. 1.

Middle leaves—Ammonia N Middle stems—Ammonia N



1. Plus K Plus Nitrate N
2. Minus K Plus Nitrate N
3. Plus K Plus Ammonium N
4. Minus K Plus Ammonium N

FIG. 1. Nitrogenous fractions of Rutgers tomato plants receiving nitrate and ammonium nitrogen and plus-potassium and minus-potassium nutrient solutions.

The comparatively high concentration of ammonium nitrogen in those plants supplied with ammonium, but no potassium, apparently was responsible for the rapid deterioration and collapse of the leaf tissue. Carbohydrates likewise decreased very rapidly as ammonium increased in the foliage. However, the cause of the injury must be attributed to the lack of potassium in preventing ammonium from being converted to amino and protein nitrogen. The chemical reactions involved in the metabolic cycles of potassium-deficient plants supplied with nitrate or ammonium nitrogen differ only in the fact that the ammonium plants have at hand a large supply of readily assimilated nitrogen. The nitrate plants, on the other hand, must first form ammonia through the reduction of nitrates. These facts account for the rapid completion of the cycle of chemical reactions in the potassium deficient plants supplied with ammonium, requiring less than two weeks to bring them about, while it required three to eight weeks for similar processes to take place in the plants supplied with nitrate. This is probably responsible for the two different types of deficiency symptoms observed.

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NEW JERSEY AGRICULTURAL
EXPERIMENT STATION

POLYPLOIDY IN SOYBEAN, PEA, WHEAT AND RICE, INDUCED BY COLCHICINE TREATMENT

WHEN day-old seedlings of soybean, pea and wheat (*Mei-Yü* variety) and 2-day-old seedlings of paddy rice (*Mar-Tze-Tao* variety) were soaked in 0.05–0.1 per cent. solutions of colchicine for 24 or 48 hours under ordinary conditions of temperature and light, the plants that developed were found to be tetraploid, as shown by microscopic examination of their root-tips. Compared with normal plants, those from treated seedlings generally had thicker and rougher leaves, larger cells, larger nuclei and larger stomata. In plants grown from seedlings that had received the 24-hour treatment both shoots and roots were notably more sturdy than those of the controls. When soybean seeds were placed in 0.05 per cent. colchicine solution and allowed to germinate there, the resulting plants showed these same peculiarities. When seedlings of soybean and pea were immersed in 0.05 per cent. colchicine solution for 24 hours in darkness, their leaves soon died but new leaves were formed after a week or two. When a film of lanoline containing 1 per cent. of colchicine was applied to shoot tips of soybean and pea seedlings, or when 4–6 drops of 0.05 per cent. colchicine solution was applied in the same way, treatment resulted in shortening of internodes and curling of leaves.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A MODIFIED KENDALL TUBE FOR PURIFYING NITROGEN[1]

KENDALL[2] has described a method of purifying nitrogen in a glass tube containing a double roll of copper gauze, heated by radiation from a nichrome coil at the center of the tube. Oxygen is removed by direct combination with the heated copper gauze, which slowly becomes tarnished. The tarnished gauze is restored to bright copper by slow flushing of the tube with hydrogen, and can be so used interminably.

In our studies of bacterial enzymes, we have used

[1] This work has been aided by the Graduate Medical Research Fund of the University of Minnesota.

[2] E. C. Kendall, SCIENCE, 73: 394, 1931.