

# Potato Nutrition Studies

## investigations on the chemical composition of white potatoes grown in Kern County

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**Four different** fertilizer treatments and time of sampling—as they affect the chemical composition and nutrient uptake by potatoes grown in Kern County—were studied from plantings, on a Hesperia fine, sandy loam soil.

Comparisons were made of potatoes grown with: 1, no fertilizer; 2, 50 pounds and; 3, 100 pounds of nitrogen an acre from ammonium sulfate; and 4, a treatment containing the highest rate of nitrogen in addition to 125 pounds each of phosphoric acid and potash. These four treatments should fairly well represent the extremes in composition and nutrient uptake by potatoes grown in this area.

### Nitrogen

In plants of the first test crop the nitrogen content decreased approximately one half from the first sampling to the last. The decrease was somewhat greater in the nitrogen-fertilized plants than in those unfertilized.

During early growth plants that received nitrogen fertilizer were appreciably higher in nitrogen content than those unfertilized but in mature plants there was little or no difference. The nitrogen content of the tubers also decreased with maturity. Tubers grown on plots receiving nitrogen fertilizer were considerably higher in nitrogen content during early growth but in mature tubers there was very little difference.

At the time of field harvest—119 days after planting—tubers grown on unfertilized plots contained 1.14% nitrogen compared with 1.13% and 1.37% for those grown on plots given 50 and 100 pounds of nitrogen an acre, respectively.

The second year's test crop showed similar decreases in nitrogen content with maturity. Plants and tubers grown without nitrogen were lower in nitrogen content during the early stages of growth than those receiving nitrogen fertilizer but at maturity were even higher.

### Phosphorus

The phosphorus content of both plants and tubers showed a marked decrease from early growth until maturity.

In the young plants and tubers there was a marked increase in phosphorus content due to phosphate fertilization but in mature plants and tubers there was either no difference or only a slight increase. In the first test tubers at final harvest contained 0.34% phosphoric acid when grown on phosphorus-fertilized plots as compared with 0.31% if grown with equal amounts of nitrogen and potassium but lacking phosphorus. In the second test comparable figures were obtained showing 0.33% and 0.25% phosphoric acid.

### Potassium

The potassium content of both plants and tubers decreased with age.

Potash applications had no effect on the potassium content of either plants or tubers at any stage of growth. Mature tubers grown on the potash-treated plots contained 1.8% potassium oxide the first year and 2% in the second test year.

### Dry Matter

The dry-matter content of both plants and tubers was much less in the early stages of growth than later.

The tubers showed a gradual increase in dry matter from the first sampling until the time of harvest.

In mature tubers of the first crop there was no effect of fertilizer treatment on total dry matter; but the second year tubers produced on plots receiving nitrogen fertilizer were several per cent higher than those grown without nitrogen. Conversely in the second test crop during the

early stages of growth, tubers grown on the unfertilized plots were the highest in dry matter. The large increase in dry matter as the plants and tubers matured accounts for most of the decrease in nitrogen, phosphoric acid, and potash per unit of the dry weight.

### Findings

Nitrogen content of plants and tubers was increased by nitrogen fertilization during the early stages of growth but this was not true at maturity.

Nitrogen, phosphoric acid, and potash greatly decreased per unit of dry weight in both plants and tubers as they approached maturity.

The greatest amount of growth and the greatest intensity of nutrient absorption occurred between about 75 and 110 days after planting or between 45 and 80 days after emergence.

An unfertilized crop of potatoes grown in 1945 and producing 119 sacks contained 59 pounds of nitrogen per acre, 17 of phosphoric acid, and 126 of potash. The tubers alone removed 33 pounds of nitrogen, 14 of phosphoric acid and 79 of potash. In 1946 the highest yielding treatment produced 395 sacks per acre and absorbed 139 pounds of nitrogen, 36 of phosphoric acid and 253 of potash. The tubers alone removed 106 pounds of nitrogen, 31 of phosphoric acid, and 196 of potash.

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The two rows of potatoes on the right received no fertilizer, the other rows received 100 pounds of nitrogen an acre from ammonium sulfate.