

SUMMARY OF POTATO SOIL FERTILITY RESEARCH AT PROSSER

by
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Critical Nutrient Ranges

Along with soil testing, plant analysis has become a valuable and important tool with respect to soil fertility and plant nutrition. The primary function of soil testing is to predict fertilizer needs. For annual crops like potatoes, the primary function of plant analysis is to diagnose problems or to determine or monitor the nutrient status during the growing season.

It has become well established that there is generally a good relationship between the concentration of a nutrient in a crop and yield of that crop -- up to a point. Beyond that point, increases in nutrient concentrations have no additional effect on yield.

The critical nutrient range (CNR) is that range of concentrations, above which we are reasonably sure the crop is amply supplied and below which we are reasonably sure the crop is deficient. In potatoes, the tissue is the petiole from a recently mature leaf which is the fourth or fifth leaf down from the top of the plant. Sampling will begin at tuber initiation, usually in early June, to early senescence, usually around September 1.

Tentative CNR values for these two periods are as follows:

<u>Tuber initiation</u> <u>(Early June)</u>	<u>Early Senescence</u> <u>(Late Aug-Early Sept)</u>
NO ₃ -N, % 1.5-2.0	1.0 - 1.5
P, % 0.3-0.4	0.10 - 0.15
K, % 9.0-11.0	8.0-9.0

The preceding data are for Russet Burbank potatoes planted in early April during the 1978 and 1979 seasons.

Leaching Studies

In leaching studies with soil columns where no crop was grown, anions moved much more freely than cations. The mobility of anions was in the order NO₃⁻ > H₂BO₃⁻ > SO₄⁼. Where 36 inches of water and 600 lb K/ac were applied, K moved to a depth of 10 inches in sand, 4 inches in loamy sand, and 3 inches in silt loam. It should be emphasized that under conditions where a crop is grown and with lower rates of water and K, the movement of K would, no doubt, have been much less.

These data obviously have important implications relative to methods of fertilizing with K and other nutrients, especially on irrigated sandy soils. The studies are being continued in 1980.

Growth and Nutrient Uptake

Data from three center pivot circles showed that maximum growth of potato tops was within one month after tubers reached 3/4-inch diameter, while tubers continued to grow for at least an additional 60 days. A 600-cwt/ac potato crop removed 422 lb N, 47 lb P, and 520 lb K per acre. Additional data from these studies will be published at a later date.