Response of Irish Potatoes to Phosphorus and Potassium 
on Soils Having Different Levels of These Nutrients 
in Maine and North Carolina

W. L. NELSON AND ARTHUR HAWKINS

In 1944 a study was initiated to determine the nutrient status of the 
soils in certain of the commercial Irish potato-producing areas. 
This study was cooperative between the Division of Soils, Fertilizers, 
and Irrigation, U. S. Dept. of Agriculture, and seven states along the 
Atlantic and Gulf Coasts. A very marked accumulation of soluble 
phosphorus and exchangeable potassium was reported, with the ac-
cumulation varying with the chemical characteristics of the soils and 
with the number of years the field had been planted to potatoes and 
fertilized heavily (6).

The objective of the investigation reported in this paper is to show 
the relationship between the amounts of readily soluble phosphorus 
and exchangeable potassium in the soil and the response of Irish po-
tatoes to applications of these two nutrients. Data from Maine and 
North Carolina are reported.

REVIEW OF LITERATURE

Large quantities of fertilizer are usually applied for Irish potatoes. Data ob-
tained in 1940 and 1941 indicate that approximately 100 pounds of N, 185 pounds 
of P2O5, and 225 pounds of K2O were applied per acre on potatoes in Aroostook 
County, Maine (9, 10). Since then, most of the growers have increased the rate 
of application of these nutrients. In North Carolina the usual per acre application 
is 120 pounds of N, 160 pounds of P2O5 and 120 pounds K2O.

Under Maine conditions potatoes fertilized at the rate of 3,000 pounds of 4-8-8 
per acre contained the following amounts in pounds per acre of nutrient elements 
in the plants, tubers included (average of four varieties): Nitrogen, 113 to 151 
pounds; phosphorus, 23 to 28 pounds; P2O5, and potassium 188 to 253 pounds; 
K2O (7). It was found that the 232 hundredweights per acre yield of tubers of the 
Green Mountain variety contained approximately 95 pounds of N, 20 pounds of 
P2O5, and 117 pounds of K2O. The differences between the amounts of nutrients 
applied and the amounts actually removed in the tubers indicate that a con-
siderable accumulation of P2O5 and K2O, particularly P2O5, might be expected in 
soils planted frequently to potatoes and fertilized heavily.

Chucka, et al. (5) found 80 pounds of P2O5 in the fertilizer to be sufficient for 
the Green Mountain variety grown on Caribou loam. Bushnell (3) suggested that 
when a soil contains over 200 p.p.m. of readily soluble phosphorus (Truog method)