THE PROFITABILITY OF CONTINUOUS POTATOES VERSUS
ROTATIONS INCLUDING POTATOES AND OTHER CASH CROPS: I

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Abstract

In a continuing experiment, at two locations in Ontario, continuous Norchip and Kennebec potatoes are being compared for profitability with rotations including potatoes followed by malting barley or grain corn or soybeans. At the end of the first seven-year cycle Kennebec may have started to decline in yield in continuous production, but continuous potatoes remains the most profitable cropping sequence.

Resumen

En un experimento que aún continúa en dos localidades de Ontario, se está comparando el cultivo continuo de papa de las variedades Norchip y Kennebec en cuanto a rentabilidad, con rotaciones que incluyen papa, seguida de cebada para malta o maíz, para grano o frijol soya. Al término del primer ciclo de siete años, la variedad Kennebec puede haber comenzado a declinar en rendimiento en el régimen de cultivo continuo, pero sin embargo, el cultivo continuo de papas sigue siendo la más rentable secuencia de cultivo.

Introduction

Many potato growers in southern Ontario, as elsewhere, have abandoned all other farm enterprises to concentrate solely on potato production. This has allowed them to dispose of the specialized machinery used in producing and handling silage, hay, grain, manure, etc., as well as the need for cattle or hog barns, silos and milking parlors. Labor is reduced and the continuous supervision required by livestock is no longer needed. The resultant lifestyle of a busy growing season and a less stressful storage and marketing season appeal to many growers and they are reluctant to change it, especially for anything involving livestock.

There is some evidence from other areas that continuous cropping with potatoes may lead to reduced yields. McDole and Dallimore (3) found no adverse effects on yield or quality from five years of continuous potatoes compared with a potatoes-grain rotation in coarse, irrigated soils in Idaho, but two years later they found (4) that yields of continuous potatoes had declined

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by 14 percent, although they could not give a specific cause for this. Emmond and Ledingham (1) in Saskatchewan, comparing continuous potatoes with rotations including manure, alfalfa (*Medicago sativa*), crested wheatgrass (*Agropyron cristatum*), and sweet clover (*Melilotus spp.*), found that the rotations gave the highest yield of potatoes, as was also found by McKay (5) and Folsom (2). This was attributed to the suppression of *Verticillium albo-atrum*, but it might reasonably be assumed that improved soil structure and higher organic matter content were contributing factors.

Weinhold, et al. (8) found that barley in the rotation increased the incidence of scab (*Streptomyces scabies*) whereas soybeans prevented the build-up but did not reduce the incidence once the scab was well-established. Odland and Sheehan (6) found that continuous potatoes resulted in lower specific gravity of tubers, greater soil erosion and less soil organic matter, an increased loss of plant nutrients, and lower yields. However, only Ohms (7) emphasized that "a successful cropping rotation is one which maintains good production and *maximizes economic returns to the grower*".

This work is concentrating on the net return to the grower while studying the effects of the various treatments on the yields of the potatoes and companion crops.

**Materials and Methods**

In 1975 two sites were selected, representing two of the major potato soils of the province. The soil on the Cambridge Research Station of the University of Guelph is a Fox sandy loam, well-drained, pH 7.0-7.5, with coarse texture and low organic matter. The Alliston plots, approx. 100 km to the north-east, are Alliston sandy loam, well-drained, pH 5.5-5.8, and containing more silt and organic matter. Both locations normally produce a satisfactory crop without irrigation, though both benefit from it in some years. The number of alternative cash crops which can be grown is limited by the severe winter and the comparatively short growing season. Both locations have 120-140 frost-free days and c. 2600 corn heat units. The more southerly location of Cambridge is countered by its higher elevation.

The crops selected for the rotations were malting barley (*Hordeum vulgare*), grain corn (*Zea mays*) and soybeans (*Glycine max*), with the potato cultivars Norchip and Kennebec, two of the principal cv. grown for processing in the province. They were also chosen because Norchip is resistant to the strains of *Verticillium* wilt found in the area and Kennebec is susceptible.

Each treatment plot is 8 m long and 9.2 m wide and, in the case of the potatoes, contains six rows of Kennebec and four of Norchip. Treatments are randomized among four replicates and there is an 8 m headland between replicates to allow for the manipulation of machinery and to minimize the mixing of soil and crop residues among treatments.