

Sustainable Alternatives for Potato Nutrient Management

In-crop Manure Injection

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INTRODUCTION

Swine manure may be able to replace commercial fertilizer and so reduce the cost of inputs for potato production. Application of the liquid manure after planting should increase nutrient use efficiency by reducing the interval between application and crop use.

However, there are several concerns:

- Will hog manure increase the incidence of potato scab? Repeated use of cattle manure is known to lead to potato scab, caused by the bacterial pathogen, *Streptomyces scabies*. Scab affects the marketability of the tuber.
- Will hog manure increase the risk to human health? Survival of faecal coliform bacteria in the soil or on tubers could present a human health risk.
- Will high rates of N applied around the time of tuber formation delay tuber initiation and so decrease marketable yield?

OBJECTIVE

The purpose of this investigation was to determine the effects of in-crop injection of liquid swine manure on potato yield and quality, and to assess the related human health risks associated with this practice.

EXPERIMENTAL

A combination of liquid swine manure and commercial fertilizer were applied to the potato crop to achieve a final N-rate of 200 kg / ha by canopy closure. The project was carried out at two sites.

Sandy soil - (1999) Riverbend Hutterite Colony 1999
Clay loam - Manitoba Crop Diversification Centre 1999, 2000

Plot size: 6.0 m wide x 10 m long.

Experimental design: randomized complete block

Pre-plant fertility

P, K, & S was applied prior to planting based on soil test recommendation.

EXPERIMENTAL (cont'd)

Planting dates:

1999, plots sown on June 2.
2000, plots sown May 23.

Planting method:

Four-row commercial potato planter
Between-row spacing: 0.95 m
In-row spacing: 0.38 m.

Manure Injection method

Liquid swine manure was applied between the four centre rows of each eight-row plot using a customized liquid manure injector with a 260 mm wide sweep (Figures 1 a-d).

Manure application rates:

Manure was injected to achieve N rates of 0, 50, 150 and 200 kg ha⁻¹

Dates of manure injection:

1999: July 12 (40 days after planting).
2000: July 10, (47 days after planting).

Treatments

	At planting		In-crop		Total applied (kg ha ⁻¹)
	Fertilizer	Fertilizer	Manure	Manure	
1.	200	0	0	0	200
2.	150	0	50	0	200
3.	100	0	100	0	200
4.	50	0	150	0	200
5.	0	0	200	0	200
6.	0	200	0	0	200
7.	100	100	0	0	200

RESULTS

1. Incidence of Potato Scab

No scab was found on any treatments in either 1999 or 2000.

In general, tuber defects and diseases were no higher in manure-treated plants than in controls.

2. Presence of faecal coliforms

No faecal coliforms were detected in the soil or on mature tubers in any treatment in either 1999 or 2000.

3. Marketable yield

Marketable yield tended to be higher in commercially fertilized treatments, except for potatoes grown in clay-loam soil in 1999. (Figure 1)

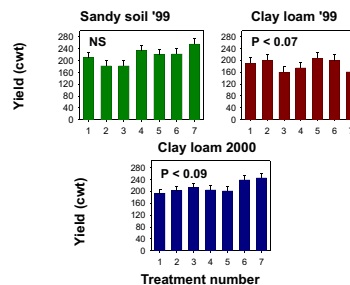


Figure 1. Effect of manure treatments on marketable yield in 1999 and 2000.

RESULTS (cont'd)

Were lower yields in manured treatments due to delayed tuber formation?

After 18 days following manure application, both tuber number and tuber mass were unaffected by manure treatment in any of the five size classes measured (Fig. 2)

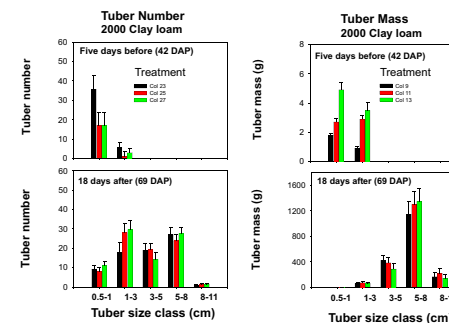


Figure 2. Effect of manure and fertilizer treatments on tuber number and tuber mass eighteen days after treatment application.

CONCLUSIONS

Liquid swine manure applied between 40 and 47 days after planting:

- did not increase the incidence of potato scab
- did not increase the incidence of faecal coliforms in soil or on harvested tubers
- tended to reduce marketable yield in two of three years, although overall treatment differences were not significant.

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