

Direct vs Traditional Potato Planting in Manitoba, 2021 Scott Graham, J.R. Simplot Co, Chad Berry, UTH Farms and <u>Vikram Bisht</u>, *MB Agriculture, Manitoba*

Introduction

- MB raised potatoes just over 78,000 acres in 2021. 75% of potatoes are for French fry processing or seed for process production.
- Productivity of Manitoba potato farms has been steadily increasing, with improvements in fertilizer and irrigation practices. Average yield of MB crop is between 325-350 cwt/ acre; being 359 cwt per acre in 2017, a record for MB.
- By acres, processing varieties share: Russet Burbank (73%), Ranger Russet (12%) Umatilla (8.2%) and Innovator (3.2%). Process varieties yield higher than provincial average.
- One of the limiting factors in some of the good and productive farms has been wind erosion. Leaving standing stubble from harvested crop and then direct planting into the stubbles is being tested in lighter soils where wind erosion is a potential problem.



- Prior to planting, soil compaction (resistance to penetrometer) was measured using a penetrometer, at multiple spots in each treatment strip, at depths of 6, 12 and 24 inches.
- Crop residue cover as affected by planting methods was recorded at every 50 cm on a 50 m long tape measure, as marked as % residue cover.



Fig. 6 Soil surface residue cover was recorded at 100 points on a 50m tape. Crop residue on soil surface holds soil.

- Russet Burbank planting was done on May 4, on both treatments Direct and Traditional plantings (Fig 7, 8).
- Hill dimensions were measured soon after planting (at emergence, prior to row closure and prior to harvest. Hill cross-section area was used as an indirect



Fig. 12. Slower emergence and growth in the direct seeded potatoes, but caught up after 6th week



Fig. 1 & 2: Wind erosion and impact on potato hills can be severe

Material and Methods

- A field scale side-by-side demonstration trial was conducted again in 2021 to evaluate the "Direct" vs "Traditional" potato planting and study impact on various production quality parameters, reduce soil erosion and promote long-term sustainability.
- The two treatments each, planted side-by-side. The treatments were repeated two times (Fig 3).
- Yield, size distribution, specific gravity, internal and external defects, impact on the hill erosion, and net economic return are parameters being evaluated.



Fig. 3 . Trial field with loamy-sand was planted by Traditional and Direct seeding. with two strips of direct measure of loss of hill size.

• Emergence and crop growth were monitored during the season, and recorded on OGS scale.



Fig. 7. Potato planting "Direct" in to standing stubble. *Fig. 8.* "Traditional" potato planting after 2-3 cultivations

- On Sept 16, harvesting was done by self-propelled Ploeger Harvester and potatoes loaded directly on to trucks (Fig 9) and corresponding area of harvest was recorded. Four truck loads per treatment were collected.
- Yield per acre was calculated for each truck load.
- Potato grade samples were collected at the storage shed at the time of unloading of trucks – for tuber quality assessment.
- Yield and potato quality parameters analyzed statistically.



Fig. 13. Diagramatic representation on hills at start and at the end of season.



Fig. 14. Traditional hills lost more top width and height at the end of season, and at harvest were significantly more eroded that Direct planted.



Fig. 15. Root depths were similar for Direct (a) and Traditional (b) plantings.

Tabe 1. Yield and tuber quality differences were not significant statistically

Planting	Yield (cwt /ac) (Gross)	Specific Gravity	Sunburn%	Knobby %
Traditional	441.5	1.091	0	0.7



- In the fall of 2000 the whole field was deep-ripped with Eco-till sub-soiler (Fig 4).
- The "Direct" potato planting was done on the old crop stubble. Only narrow strips of soil are disturbed by the equipment openers used to place fertilizer and seed in the soil without full width tillage (Fig 5). Much of the residue from the previous crop is retained on the soil surface.
- The "Traditional" potato planting involved at least two cultivations before planter pass.



Fig. 9. Potatoes harvested and collected in to a truck, 4 replications per treatment strip..

Results and Discussion

Penetrometer Readings (psi) - Beginning to End of Season 2021, Avg of 5 dates

400 300 271 265 200 165 151 100 6" 12" 24"

Fig. 10. Soil Resistance to penetrometer – no affect of planting type (Direct / Traditional) and but increased resistance as depths increased



Direct	447.2	1.093	0.1	0.1
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- There was no difference in compaction between Direct vs Traditional systems at the three depths. As depth increased there was significant increase in soil resistance to penetrometer (Fig 10).
- The direct planting treatment had significantly more crop residue on surface (Fig 11). Higher surface crop residue could help reduce erosion of sandy soil, buffer heating of top soil and reduce soil moisture loss.
- ¹ The direct planted potatoes emerged slower, but the plants were visually similar after 6 weeks (Fig 12).
- At harvest time the traditional planted hills were significantly more eroded than direct planted (Fig 13, 14).
- The root penetration was similar in both treatments (Fig 15)
- The yields and tuber quality parameters were statistically not different between direct and traditional planted potatoes (Table 1).

Conclusions

- The first year side-by-side trial showed no differences in yield and quality parameters; and the results were similar to 2020.
- Two passes of spring cultivation were saved on the direct seeded treatment.
- The Carbon Footprint There was a saving 2.5 gallons of diesel fuel per tillage pass, which would translate into

Fig. 4. Eco-till sub-soiler with 1 ¼ inch shanks at a depth of 15 inches, used to fracture compaction layers in the fall prior to potato crop.
Fig. 5. Planter : The "one-pass planting system", an innovation from Europe was used for planting the trial.

Fig. 11. Significantly more surface crop residue was present in the Direct planted potato hills as compared to the Traditionally planted areas.

reduced carbon foot-print by direct planting.

• The field study will be repeated in 2022; and include more fields and crop types for direct planting.

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