Managing Planting Density for Production of Whole Seed Potatoes

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Background

Whole seed potatoes may offer advantages to planting cut tubers. It is suggested that whole seed has higher vigor, produces increased stem counts, produces an increased tuber set, and a uniform tuber size due to the heavier set (Nolte, 2011). Eliminating seed cutting and planting whole seed potatoes may also be an effective cultural control method of reducing the tuber to tuber spread of bacterial soft rot organisms *Pectobacterium* and *Dickeya* (Charkowski, 2016).
Planting whole seed potatoes can also reduce the wounding of seed tubers associated with cutting and handling. Less handling may decrease the incidence of infection by decay organisms due to the reduction of seed piece bruising (Johnson, 2015). Eliminating seed cutting and reducing handling may also result in labor and capital cost savings to growers.

Objective

The objective of this project was to determine the volume of 2 to 2.5 ounce whole seed potatoes that could be produced in traditional 36 inch rows by decreasing in row seed spacing and planting whole seed potatoes. This trial compared 5, 6, and 8 inch in row seed spacing and cut versus whole seed.

Materials and Methods

This project was hosted by a commercial seed potato operations in New Limerick, Maine. Experimental design was randomized complete block with 6 treatments replicated 4 times. Individual treatments measured 12 feet (4 rows) wide by 20 feet long (240 square feet). Weight of seed pieces were determined by averaging 18 representative samples of cut and whole seed potatoes from growers stock. Whole seed weighed 2.28 ounces and cut seed weighed 2.3 ounces. Treatments and seeding rate per acre are described in Table 1.

Table 1: Description of Treatments and Seeding Rates

Location	Treatment	Seeding Rate (cwt/a)
NL	8 inch whole	31
	8 inch cut	31.3
	6 inch whole	41.4
	6 inch cut	41.7
	5 inch whole	49.7
	5 inch cut	50.1

The variety grown in New Limerick was a round white chipping potato. The experimental plots were managed using standard grower practices for seed treatment, in furrow fertilizer, broadcast fertilizer, and herbicide (Table 2).

Table 2: Management Practices

Location	Plant Date	Seed Trmt	Fertilizer (at planting)	Fertilizer (broadcast)	Herbicide
NL	24-May	cm, mz, mx	185-145-220	60 K_20	1.5 pt LX + 1 oz MT

cm=cruiser maxx, mz=manzate, mx=maxim 4F, mx2=maxim mz, lx=linex, mt=matrix, ad=admire

The experiment was planted on May 24. Rows were formed and fertilizer was applied in furrow by commercial 4 row potato planters. Seed pieces were hand planted at a depth of 2.5 inches and covered with soil. Soil temperature and condition was 50°F and dry. Soil test results and lime applications were obtained from grower files (Table 3). Soil type was Winooski.

Table 3: Soil Analysis

Location	Soil Type	pH	OM %	P	K	Ca	Mg	Lime
NL	Winooski	5.3	3.2	319 ppm	98 ppm	497 ppm	38 ppm	1 ton hi-mag

The experiment was monitored frequently throughout the season. Emergence data was collected on June 17. Stem counts were measured on July 8. Vine desiccation occurred on August 26 and plots were harvested on September 7. Data was collected from two 10 foot strips from the center 2 rows of each treatment.

All tubers from the data collection strips were hand harvested and sized using a mechanical grading table. Sizing cards were then used to grade the tubers into the following profiles: undersize (0 – 1.5 inches), "B" size (1.5 – 2.25 inches), total seed size (1.5 – 3.25 inches), and oversize (greater than 3.25 inches).

Results

The 2016 growing season in New Limerick was warmer than the 30 year historical average. Rainfall was slightly below average. Historical data was taken from NOAA data from 1981-2010. Weather data was obtained from a Spectrum Technologies WatchDog™ 2000 Series portable weather station located at the field site (Table 4).

Table 4. 2016 versus 30 year historic (1981-2010) weather data

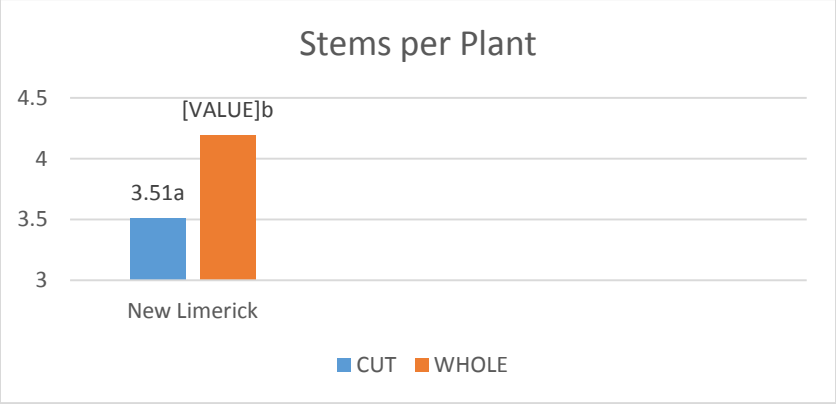
New Limerick, ME	May	June	July	August	Sept
Average Temerature (°F)	57.1	61.5	67.6	66.3	57.4
Departure from Normal	6	1.3	2.5	2.5	2.3
Rainfall (In)	1.98	2.15	3	6.74	0.99
Departure from Normal	-1.32	-0.15	0.66	3.06	-2.41

Data was analyzed using Systat software and ANOVA (anaylsis of variance) methodology. Percent emergence, stem number, and yields of undersized tubers, seed sized tubers, and oversized tubers were measured and analyzed.

Emergence data was collected on June 17. Percent emergence of whole seed treatments was 96 percent which was significantly greater than 83 percent emergence of cut seed treatments. Cut and whole seed at 6 inch spacing had significantly higher percent emergence than 5 and 8 inch cut and whole seed treatments. There was no difference in the percent emergence between 5 and 8 inch treatments.

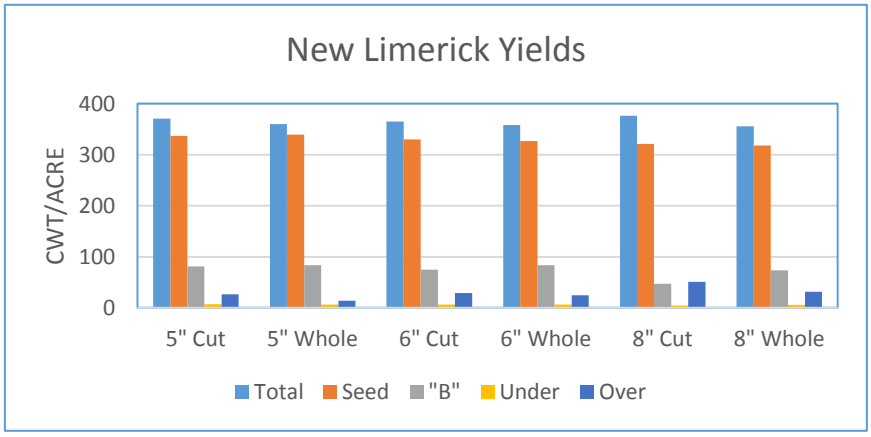
Stem counts were taken on July 8. Stem numbers per plant were significantly greater in the whole seed treatments. Whole seed averaged 4.16 stems per plant compared to 3.51 stems per plant in the cut seed treatments (Figure 1). There was no measurable difference in yield with regard to the increased stem count of whole seed.

Figure 1. Stem numbers



Total yields ranged from 355.5 cwt per acre to 376 cwt per acre (Figure 2). There was no significant difference in total yield, seed size yield, or undersize yield. 8 inch seed spacing produced significantly greater yields of oversized tubes than 5 inch spacing. "B" yields ranged from 46.9 to 83.5 cwt per acre and showed the greatest variability. Whole seed produced a significantly greater volume of "B's" than cut seed. 5 and 6 inch seed spacing produced greater "B" yields than 8 inch spacing but were not significantly different from one another. 5 inch spacing using cut seed produced significantly greater yields of "B's" than 8 inch cut seed.

Figure 2. Yield Totals – New Limerick Site



Discussion

Results from this project indicate that yields of “B” size (1.5-2.25 inch) potatoes can be increased using closer in row seed spacing. In comparing all treatments, 5 inch spacing yielded more “B” potatoes than the 8 inch spacing. The increased production of “B” potatoes did not add to the total yield or total seed size yield therefore the additional cost associated with the higher seeding rate cannot be justified. Further research investigating bed planting, decreased between row spacing, and timing of vine kill is necessary in order to determine if yield can be increased when producing whole seed potatoes.