

Storage Research – Interim Report

November 2nd, 2015

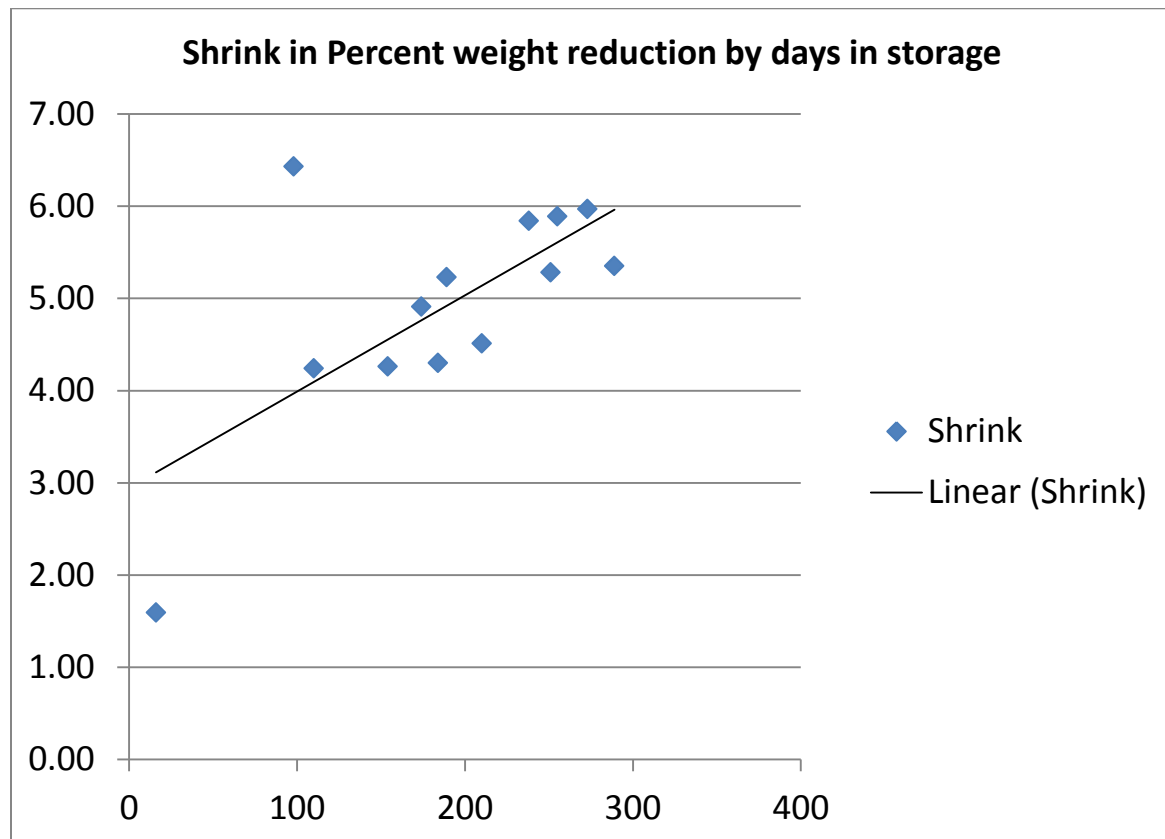
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This report outlines the results of research conducted into shrink in storage conducted with the 2014 potato crop and subsequently stored in conventional grower storages of varying size and construction. The last potatoes left storage in August 2015, after which full numerical results were tabulated and prepared. This was the first year of research into storage shrink as part of this project, with the results to be used as benchmarks and baseline data for informing follow-up research with the 2015 crop.

Research was conducted by personnel with Cavendish Agri-Services. Thirteen (13) grower storages from four varieties (Shepody, Prospect, Ranger Russet and Russet Burbank) had nine (9) pre-weighed samples of potatoes placed into onion bags and then deposited in the pile as potatoes entered storage. One bag was placed at the top, middle and bottom of the pile in each of the front, middle and rear sections of the pile, totaling nine (9) samples in each pile. Some samples were lost in the process, and not all piles were shipped at the same time, but dates for samples leaving storage were recorded.

The number of days in storage ranged from a low of 16 to a high of 289; however, the majority of samples were stored for more than 150 days after harvest. One storage was excluded from statistical analysis due to the loss of five out of nine samples, as well as extreme outlier data.

Figure 1: Shrink in percent weight reduction by days in storage.



The graph in Figure 1 plots the average percentage of storage shrink against the number of days in storage. While there is a linear line of best fit that shows a linear relationship between shrink and time, it should be noted that there was only one storage that had potatoes leaving storage after less than 90 days in storage. Literature related to storage shrink in potatoes has routinely showed in other locations that a large proportion of shrink occurs in the first 60 days after harvest and then decreases in rate over the rest of the time in storage, assuming proper storage conditions. Research in the second year will be designed to better account for the variable nature of weight reduction over the storage season.

Percentage shrink ranged from a low of 1.59 percent (16 days in storage) to a high of 6.43 percent (98 days in storage), with an average shrink of 4.98 percent across 12 storages. Some additional averages from the accumulated data included:

Position in pile (Horizontal / Vertical)	Average % shrink by position
Rear/Bottom	6.05
Rear/Middle	4.78
Rear/Top	5.22
Middle/Bottom	5.90
Middle/Middle	4.59
Middle/Top	4.69
Front/Bottom	5.41
Front/Middle	4.28
Front/Top	4.59

No clear trend is evident based on these averages, but a clearer trend is visible when grouping samples by the three horizontal and three vertical pile positions

Vert. Position	%	Hor. Position	%
Bottom	5.91	Back	5.33
Middle	4.54	Middle	5.03
Top	4.80	Front	4.73

No tests of statistical significance were conducted on this data due to the number of samples, but there does appear to be a trend of less shrink at the front of the pile across the sampled storages.

When looking at average shrink by variety:

Russet Burbank	8 storages	5.18%
Prospect	2 storages	5.15%
Ranger	1 storage	4.24%
Shepody	1 storage	4.01%

Note that it is difficult to compare varieties against each other as they were not stored in the same conditions or for the same number of days, and sample numbers for varieties other than Russet Burbank are small.

Grouping results by number of days in storage:

0 to 160 days	3 storages	4.18%
161 to 210 days	4 storages	4.72%
211 to 260 days	3 storages	5.67%
261 to 300 days	2 storages	5.62%

Overall Conclusions:

Observations from the 2014 yielded some valuable results in terms of benchmarking shrink rates in Prince Edward Island, with the intention of using this data to inform shrink research for the 2015 crop.

Overall, the range of shrink for potatoes stored for more than 150 days largely ranges between four and six percent, with an overall average close to five percent. These shrink rates are perhaps better than anticipated, and may be a reflection of improvements made to ventilation and storage practices by Island farmers in recent years. Nonetheless, a five percent shrink still represents a loss of five percent in the volume of potatoes for sale, so determining ways to reduce this shrink percentage by even fractions of a percent can result in thousands of dollars in savings for potato producers.

Future Research:

For the 2015 crop, staff from Cavendish Agri Services will find a smaller number of grower storages that are representative of the industry (age of storage, ventilation system, variety grown, end use of potatoes) in which to conduct shrink research. Total number of storages will be a maximum of eight.

This year, pre-weighed samples will once again be placed in onion bags. However, this year the bags will be placed on the top of the pile so that they can be retrieved and weighed on a more frequent basis through the storage season. The plan is to weigh each sample every two weeks at the start of the storage season with perhaps a slightly longer interval (three to four weeks) toward the end of the storage season. By weighing each sample at least ten times through the storage season, we hope to get a better picture of shrink as it occurs through the storage season. Additionally, there is a hope to pair storages with a similar entry date and variety but with slightly different storage conditions, such as type of building, ventilation capacity, or size of building. Each building will also be evaluated with thermal imaging equipment in the final phase of thermal imaging as part of this storage project.