

CONSEQUENCES OF POOR POTATO PLANTING

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Seed quality, cultural practices, and environment all come into play to produce a potato crop with acceptable yield and quality. However, failure to cut tubers into accurately sized seed pieces and plant the seed pieces properly can affect the outcome of a potato crop. Particularly for potato varieties needing a fairly long growing season, there is not time to replant a potato crop; so it needs to be properly planted the first time. This article discusses management practices for achieving a uniform plant stand.

SEED TUBER SIZE

Seed pieces that are cut to the correct size and profile will generally plant more uniformly, but correct seed piece size can only be obtained by using correctly sized seed tubers. Ideally, seed tubers should be 3 to 10 ounces. Seed tubers weighing 1.5 to 3 ounces should be sorted out and planted as single-drop seed pieces. Seed tubers that are 3 ounces should not be cut because it is not likely that a mechanical seed cutter can cut a tuber of this size exactly in half, and it is not recommended to use seed pieces smaller than 1.5 ounces. As seed tuber size increases, the number of buds (eyes) increases only slightly. Therefore, cutting tubers larger than 10 ounces will likely result in more seed pieces without buds—blind seed pieces. Another problem is that very large seed pieces are difficult to accurately plant, especially with cup-planters.

SEED PIECE SIZE AND PROFILE

For most varieties, average seed piece size should be 1.5 to 2.5 ounces. Varieties with fewer eyes per tuber may need to be cut into a slightly larger average seed piece size. Larger seed pieces will generally produce more yield, but the incremental increase in yield diminishes as the size of seed pieces surpasses 2.5 ounces.

However, more important than average seed piece size is the seed piece size profile. To determine size profile, individually weigh approximately 100 seed pieces in a representative sample. Sorting the weighed seed pieces into one-half ounce size categories, i.e. less than 1 oz., 1.0 to 1.5 oz., 1.5 to 2.0 oz., etc., will provide a better picture of the size distribution; however, using just three categories of less than desired size, desired size, and more than desired size, for example, less than 1.5 oz., 1.5 to 2.5 oz., and more than 2.5 oz., will also provide enough data to determine if the seed is being correctly cut. The cut seed should have a minimum of 70 percent of the seed pieces in the desired size range.

SEED PIECE SPACING

A survey of planting operations was completed in Idaho in 1995 and 1996. Producers were asked what seed piece spacing they were striving to plant, and then the actual seed piece spacing was measured. For cup-planters, the average desired spacing was 10.6 inches, but measured seed piece spacing was 11.9 inches. For pick planters, the desired spacing was 9.6 inches compared with 10.7 inches actual spacing. Overall, that is an average of about 1.2 inches wider spacing than desired. Consider this: if the desired in-row seed piece spacing in 36-inch rows is 12 inches, there would be 14,520 seed pieces per acre. But, if the spacing is 13.2 inches, there would be 13,200 seed pieces—about 9 percent fewer seed pieces per acre, and that's if there were no planter skips. The effect of missing plants will be discussed below.

The distance between seed pieces is important because it can affect yield as was shown in a study at the Aberdeen R & E Center to determine the effect of in-row seed piece spacing on Russet Burbank. Results from five years of data indicated that increasing the in-row seed piece spacing decreases both total and U.S. No. 1 yields (Figure 1). Results also indicated that the 6- to 16-ounce size tuber yield remained fairly consistent across the 8-, 12-, and 16-inch seed piece spacings (Figure 2), and fewer 6- to 16-ounce tubers were produced at a 20-inch seed piece spacing. An economic analysis completed on this study showed a higher gross return per cwt. as the seed piece spacing increased from

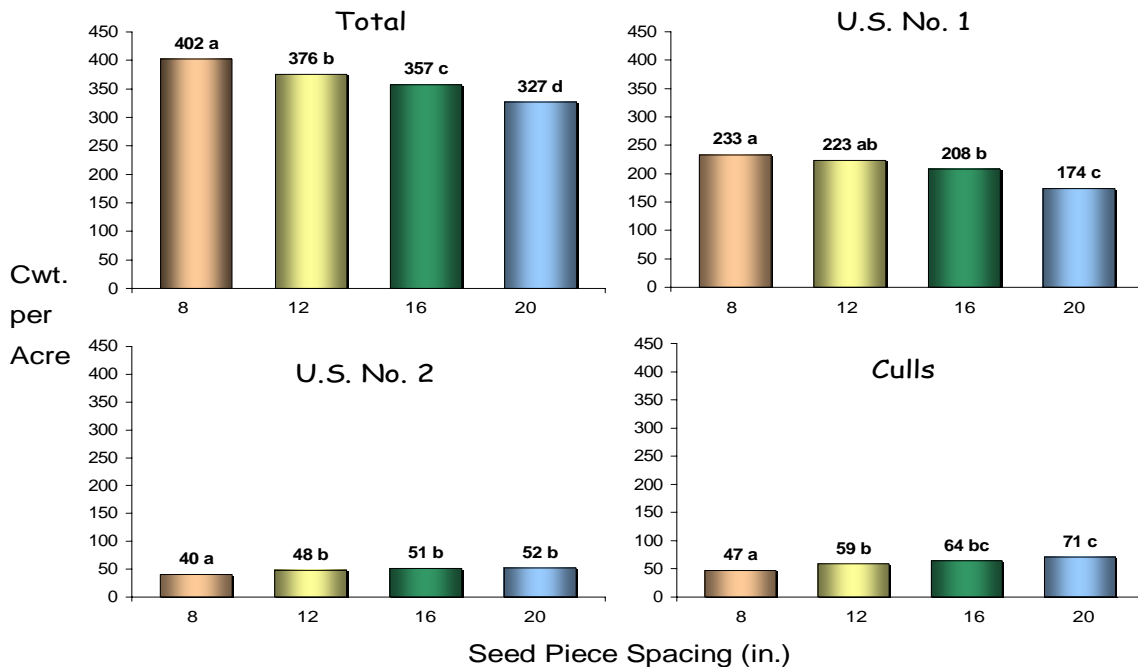


Figure 1. Yield of Russet Burbank potatoes planted at four in-row seed piece spacings in rows spaced 36 inches. Numbers followed by the same letter within a yield category are not significantly different at $P \leq .05$.

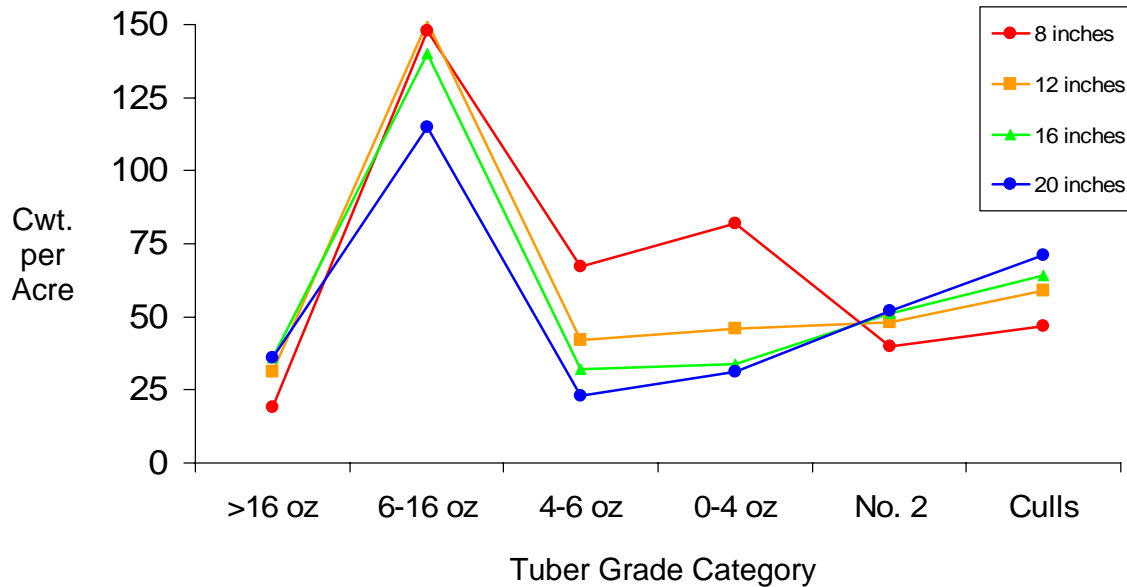


Figure 2. Yield of Russet Burbank potatoes by grade category planted at four in-row seed piece spacings in rows spaced 36 inches.

8 to 16 inches, but the highest gross receipts per acre were obtained at the 12-inch spacing. It does, however, take more seed to plant at a narrower in-row spacing. Keep in mind, too, that there is no one “best” seed piece spacing, and consider the following points when determining a seed piece spacing to use:

- Customize seed piece spacing to meet size specifications for your intended market.
- Potatoes grown in sandy soil usually have a higher number of tubers per plant, so the seed piece spacing should likely be wider.
- Potatoes grown in areas with a long growing season tend to produce larger and more malformed tubers, so the seed pieces should likely be planted at a closer spacing.

MISSING PLANTS

A three-year study using Russet Burbank, Russet Norkotah, Summit Russet, and GemStar Russet potatoes was conducted at the University of Idaho Aberdeen R & E Center to determine the effect of planter skips on yield when planted at a narrow (8 inches) or wide (16 inches) in-row seed piece spacing in rows spaced 36 inches. Some of the plots were planted with no planter skips (100 percent stand) while others were planted with either 15 percent random planter skips (85 percent stand) or 30 percent skips (70 percent stand). The effect of planter skips on yield was variety specific, and both total and U.S. No. 1 yields were decreased only when planter skips occurred at the wider in-row spacing (Tables 1 and 2). Fifteen percent plant skips did not significantly decrease total yield at either seed piece spacing for any of the varieties in the study (Table 1). This is actually good news because no potato planter can be 100 percent accurate all the time. Therefore, having a few planter skips will likely not significantly impact yield. However, 15 percent planter skips at the 16-inch spacing caused a significant U.S. No. 1 yield reduction in Russet Burbank but not for the other varieties (Table 2).

Table 1. Effect of seed piece spacing and percent stand on total yield of four potato varieties. Numbers within a variety within an in-row spacing with the same letter are not significantly different (P =.05).

	Russet Burbank	Russet Norkotah	Summit Russet	GemStar Russet
% Stand at 8 inches	-----Cwt. Per Acre-----			
100	393 a	290 a	366a	445 a
85	404 a	318 a	370 a	441 a
70	381 a	278 a	355 a	442 a
% Stand at 16 inches	-----Cwt. Per Acre-----			
100	343 a	264 a	277 b	414 a
85	315 ab	239 ab	306 a	375 ab
70	285 b	213 b	258 b	346 b

Table 2. Effect of seed piece spacing and percent stand on U.S. No. 1 yield of four potato varieties. Numbers within a variety within an in-row spacing with the same letter are not significantly different (P =.05).

	Russet Burbank	Russet Norkotah	Summit Russet	GemStar Russet
% Stand at 8 inches	-----Cwt. Per Acre-----			
100	201 a	215 a	302 a	357 a
85	209 a	244 a	307 a	370 a
70	180 a	212 a	298 a	375 a
% Stand at 16 inches	-----Cwt. Per Acre-----			
100	169 a	205 a	223 b	347 a
85	110 b	188 a	259 a	311 ab
70	93 b	167 a	209 b	279 b

Some points to keep in mind from this study:

- Planter skips will have a more pronounced effect on decreasing yield when the seed pieces are planted farther apart within the row.
- Planter skips will cause yield reductions especially when approaching 30 percent (70 percent stand).
- Effect of in-row seed piece spacing and/or planter skips is variety specific.

PLANTING DEPTH

Producers may attempt to minimize field tuber greening by planting seed pieces deeper than 6 inches. Research at the Aberdeen R & E Center has shown that for Russet

Burbank, the yield of field green tubers cannot be significantly reduced by planting seed pieces at 9 inches compared with 6 inches when measuring planting depth from the top of the hill to the top of the seed piece. Additionally, total yield was significantly reduced, and there was a trend for U.S. No. 1 yield to be lower when planting at 9 inches compared with 6 inches. For Shepody there was no difference in total and U.S. No. 1 yields when comparing a 6- vs. a 9-inch planting depth, and there was also no difference in green tuber yield. Subsequent hilling studies were conducted with Russet Burbank to determine if this operation would help minimize field tuber greening. It was found that, within the ability of commercially available potato production equipment to move soil to the top of a hill, field tuber greening could not be reduced by a hilling operation when performed just as the potato plants were beginning to emerge. From these two studies, the best recommendation for minimizing field tuber greening is to precisely plant seed pieces at a depth of 6 inches.

SEED PIECE HEALTH

Seed pieces do more than just get a plant to emerge. A research study with Russet Burbank showed that plants produced higher total yield when the seed pieces remained attached to the plants until the plants emerged, and a significantly higher U.S. No. 1 yield if the seed pieces remained attached to the plants until reaching a height of approximately 8 inches (Figure 3).

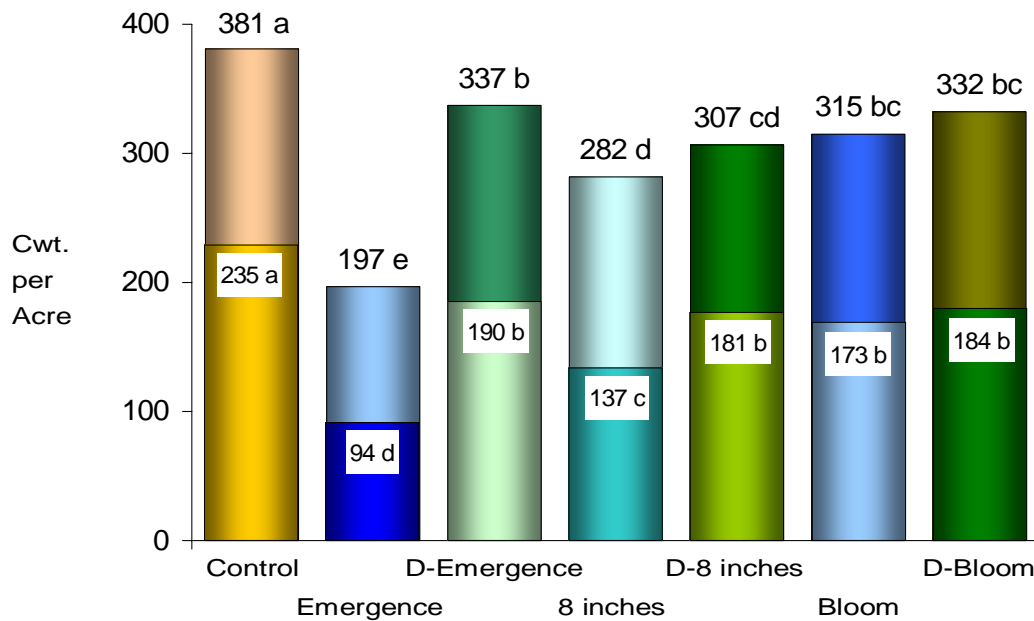


Figure 3. Total and U.S. No. 1 yields of Russet Burbank potatoes as affected by removing the seed piece or disturbing the root system. Total yields are represented by the entire bar height and U.S. No. 1 yields by the shorter bars. Emergence = seed piece removed at emergence and D-Emergence = root system disturbed at emergence, but seed piece left attached to plant, etc. Numbers followed by the same letter within a yield category are not significantly different at $P \leq 0.05$.

Information Sources:

Bohl, WH and SL Love. 2005. Effect of planting depth and hilling practices on total and U.S. No. 1, and field greening tuber yields. Amer J of Potato Res 82: 441-450.

Bohl, WH, SL Love, and AL Thompson. 2001. Effect of seed piece removal on yield and agronomic characteristics of Russet Burbank potatoes. Amer J of Potato Res 78: 397-402.

Bohl, WH, SL Love and PE Patterson. 2003. Effect of four seed piece spacings on economic return of Russet Burbank potatoes. Proc of Winter Com Schools 35: 67-73. Univ. of Idaho.

Holland, S. 1997. Potato planting for precise seed spacing. Proc of Winter Com Schools 29: 133-135. Univ. of Idaho.

Holland, S. 1997. Maximizing potato seed cutter and planter performance. Proc of Winter Com Schools 29: 111-127. Univ. of Idaho.

Iritani, WM and RE Thornton. 1992. Potatoes: Influencing seed tuber behavior. PNW 248. Wash State Univ, Univ of Idaho, and Oregon State Univ.