

AFFECTS OF REMOVING SEED PIECES AND PLANTING DEPTH ON POTATO YIELD

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AFFECT OF REMOVING SEED PIECES ON YIELD AND AGRONOMIC CHARACTERISTICS

Potato tubers used for planting are not true seeds like seeds of wheat and many other crops, but are modified stems having some of the same characteristics as aboveground potato stems. Potato seed pieces contain large amounts of energy in the form of starch. This energy should have an influence on the emergence and development of potato plants. To investigate this, we designed a study to determine the contribution of potato seed pieces to an emerging and growing potato plant.

A study using 'Russet Burbank' was conducted at the Aberdeen R & E Center during 1994, 1995, and 1997. A trowel was used to tunnel into the sides of potato hills to remove seed pieces by hand just after emergence, when plants averaged 8 inches tall, and when plants started blooming. We realized that removing seed pieces disturbed the root system and this disruption could have an impact on the plants' subsequent growth. To measure the effect of disturbing roots, we disturbed root systems of other plants on the same day by loosening roots with a fork in 1994, and by tunneling to seed pieces in 1995 and 1997, but not removing the seed pieces. Seed pieces were not removed, nor were root systems disturbed in control plots.

Compared to control plots, removing seed pieces or disturbing root systems lowered total yield regardless of when treatments were imposed (Fig. 1). Even disturbing root systems at first bloom lowered total yield nearly 50 cwt. per acre. In addition, removing seed pieces at emergence lowered total yield even further when compared with just disturbing root systems. There was no statistical difference in total yields between removing seed pieces and disturbing root systems when comparing these treatments at the 8-inch growth stage (282 vs. 307) or at first bloom (315 vs. 332).

Disturbing root systems at emergence decreased U.S. No. 1 yield to 190 cwt./a in comparison to the control yield of 235 cwt./a, and the yield was only 94 cwt./a when seed pieces were removed at emergence (Fig. 2). This same effect occurred at the 8-inch growth stage where disturbing the root systems lowered U.S. No. 1 yield to 181 cwt./a. Removing seed pieces at 8 inches decreased yield to 137 cwt./a, significantly lower compared to disturbing the root systems. At the bloom stage, removing the seed pieces and disturbing the root systems lowered the U.S. No. 1 yields compared to the control, but there was no difference between the two treatments.

Data from this study indicated that removing seed pieces or disturbing root systems at emergence and at 8 inches decreased the number of tubers per plant

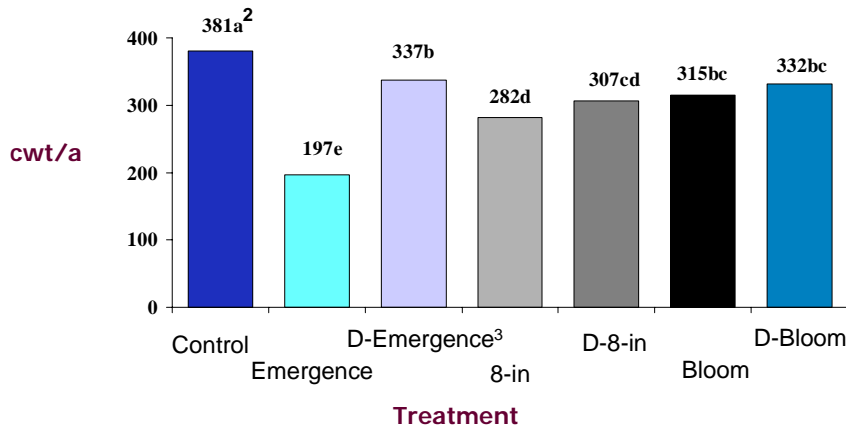
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compared with controls. Also, removing seed pieces at these two growth stages further decreased the number of tubers per plant compared with disturbing the root systems (data not shown). There was no effect on tubers per plant when treatments were imposed at first bloom.

Specific gravity was affected very little by removing seed pieces or disturbing root systems. The only significant effect was a slight lowering of specific gravity when the seed pieces were removed at first bloom compared with controls (1.079 vs. 1.081).

This study clearly shows that seed pieces are still contributing to U.S. No. 1 yield beyond when plants reach 8 inches height. We recognize that seed pieces usually do not deteriorate as rapidly as we physically removed them, but this study provides evidence that the longer seed pieces remain intact, the higher the yield may be at harvest.

Figure 1. Effect of Removing Seed Piece or Disturbing Root System on Total Yield of Russet Burbank Potatoes Averaged Over Three Years¹



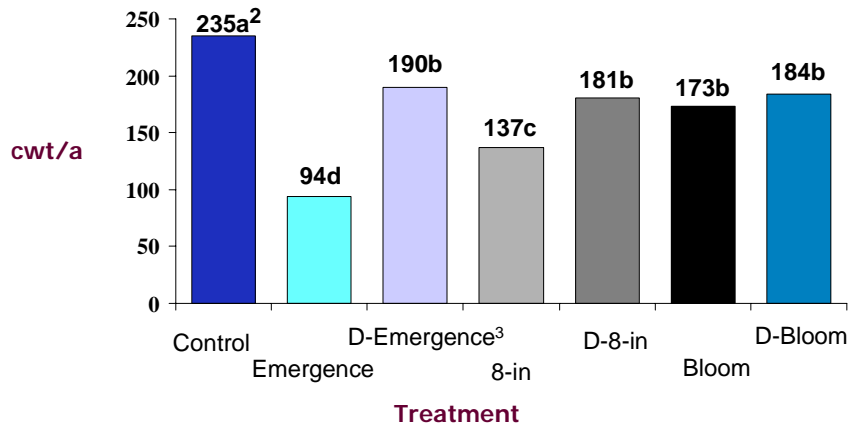
1. Study conducted in 1994, 1995, and 1997.

2. Numbers followed by the same letter are not significantly different at $P \leq .05$.

3. D is the disturbed treatment.

Bohl et al., 1997

Figure 2. Effect of Removing Seed Piece or Disturbing Root System on U.S. No. 1 Yield of Russet Burbank Potatoes Averaged Over Three Years¹



1. Study conducted in 1994, 1995, and 1997.

2. Numbers followed by the same letter are not significantly different at $P \leq .05$.

3. D is the disturbed treatment.

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AFFECT OF PLANTING DEPTH ON YIELD AND AGRONOMIC CHARACTERISTICS

Producers may be tempted to plant potato seed pieces deeper in an effort to reduce the number of tubers that become exposed to sunlight and turning green. To determine how planting depth affects greening, we conducted a study using three potato varieties. ‘Russet Burbank,’ and ‘Frontier Russet’ and were hand-planted at 3, 6, and 9 inches from the top of the hill in 1995 through 1997. ‘Shepody’ was added during 1996 and 1997. There were five plants per replication and five replications. Distance from the top of the hill to the uppermost tuber was measured before plots were harvested to determine yield and grade.

Planting deeper significantly increased the distance from the top of the hill to the uppermost tuber, but the increase in tuber depth was not equal to the deeper planting depth of the seed piece (Figure 3). For example, in Russet Burbank, increasing seed piece planting depth from 6 to 9 inches increased the depth to the uppermost tuber from 0.4 to 1.3 inches, only 0.9 inches.

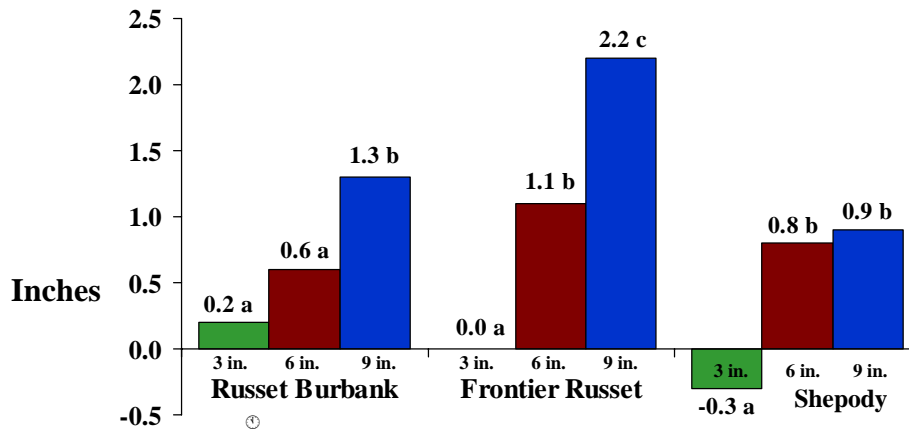


Figure 3. Effect of planting depth on distance to top tuber from top of hill averaged over years [⊙]

[⊙] Russet Burbank and Frontier Russet, 1995-1997. Shepody, 1996 and 1997.

[⊙] Numbers followed by the same letter within a variety are not significantly different at $P < 0.05$.

Interesting, though, was that planting at 9 inches compared with the other two depths, significantly decreased total yield of Russet Burbank and Frontier Russet. Russet Burbank total yield was 453 and 434 cwt./a at the 3 and 6 inch planting depths, respectively, but only yielded 359 cwt./a at the 9 inch depth. Total yield of Frontier Russet was 474, 451 and 391 cwt./a at the 3, 6 and 9 inch planting depths, respectively. Shepody total yield was not affected by planting depth (Figure 4).

Planting depth also affected U.S. No. 1 yield in Frontier Russet and Shepody. Frontier Russet U.S. No. 1 yield was reduced to 293 cwt./a when planted at 9 inches compared with 346 and 357 cwt./a at the 3 or 6 inch planting depths, respectively. Although not statistically significant, U.S. No. 1 yield of Russet Burbank was lower at the 9 inch planting depth compared with the other two depths. The U.S. No. 1 yield of Shepody was significantly decreased from 372 cwt./a at the 6 inch planting depth to 234 cwt./a at 3 inches largely because of the high yield of green tubers (Figure 5).

The amount of green tuber yield was measured in 1996 and 1997 only. For these two years, the amount of green tuber yield was not significantly decreased by planting at 9 inches compared with 6 inches in all three varieties tested (Figure 6). Planting Shepody at 3 inches greatly increased the amount of green tuber yield from 51 cwt./a at the 6 inch planting depth to 163 cwt./a at 3 inches.

This study clearly shows that planting deeper than six inches will not decrease green tuber yield, and total and/or U.S. No. 1 yields may be decreased by planting at 9 inches in the three varieties tested.

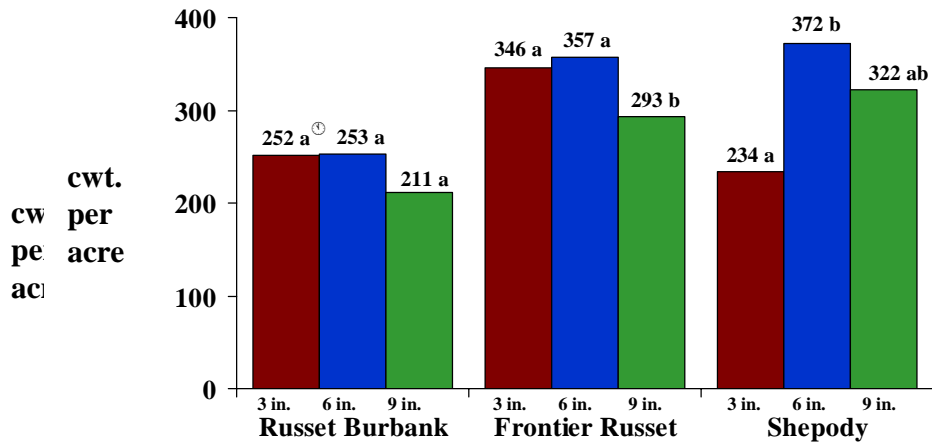


Figure 5. Effect of planting depth on U.S. No. 1 yield averaged over years [⊕]
[⊕] Russet Burbank and Frontier Russet, 1995-1997. Shepody, 1996 and 1997.
[⊙] Numbers followed by the same letter within a variety are not significantly different at P<.05.

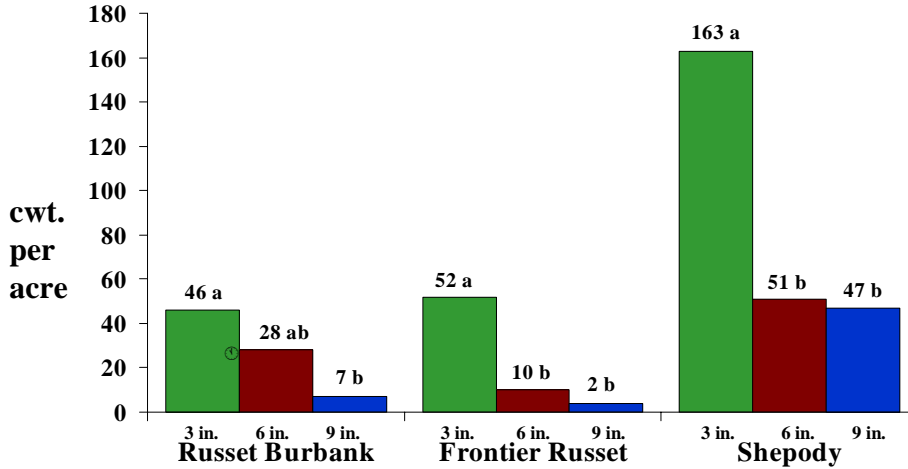


Figure 6. Effect of planting depth on yield of green tubers averaged over years [⊕]
[⊕] Russet Burbank and Frontier Russet, 1995-1997. Shepody, 1996 and 1997.
[⊙] Numbers followed by the same letter within a variety are not significantly different at P<.05.