Proc. Fla. State Hort. Soc. 132:117–119. 2019.

# Seed Piece Spacing for Table Stock Potatoes

Luis E. Gomez-Pesantes[1], Lincoln Zotarelli*[1], Mario H.M.L. Andrade[1], and Gary K. England[2]

[1]Horticultural Sciences Department, University of Florida/IFAS, P.O. Box 110690 Gainesville, FL 32611

[2]Hastings Agricultural Extension Center, University of Florida/IFAS, Hastings, FL 32145

Additional index words. potato cultivar; tuber yield; tuber size distribution

**In Florida potato commercial farm operations, the seed represents 18 to 34% of the total production cost of producing potato (*Solanum tuberosum*). Growers can reduce costs and improve revenues by modifying seed piece spacing without affecting potato marketable yield and tuber quality. The objective of this study was to evaluate the effect of seed piece spacing on total and marketable yield, tuber size distribution of six table stock cultivars (Red LaSoda, Satina, Natascha, Envol, Purple Majesty, and Actrice) at four different seed piece spacing (6, 8, 10, and 12-inches) in a randomized complete–block design. A field experiment was carried out between January and May 2018 in Hasting, FL. Seed piece spacing and cultivars affected total and marketable yields, but there was no interaction between seed piece spacing and cultivar. The 8–inch seed piece spacing resulted in a higher total (289 cwt/acre) and was statistically different than the other seed piece spacing treatments. 'Red LaSoda' had the highest marketable yield (223 cwt/acre), while 'Purple Majesty' had the lowest marketable yield of tubers larger than 1.8-inch diameter but produced higher yield of B and C tuber size (1.9–0.5-inch diameter). Therefore, seed piece spacing for each cultivar can be adjusted by growers to meet market preferences and/or to receive premium prices different tuber size class.**

In 2017, Florida contributed with 7.17 million hundred weight (cwt) of potatoes cultivated in 29,000 acres. Ranking thirteenth in U.S production and valued in $86.6 million (USDA, 2018). A total of 20,000 acres of potato are cultivated in Northeast Florida, representing 68% of Florida total cultivated potato area (USDA, 2018). In Northeast Florida commercial potato operations, seed costs account for 18 to 34% of total production costs. Seed costs are determined by the total amount of seed needed per acre. Therefore, growers can reduce seed costs and improve revenue by adjusting seed piece spacing without affecting potato marketable yield and tuber quality (Krupek et al., 2018). Currently, the standard potato seed piece spacing for farming operations in Florida is between 7–10 inches (Zotarelli et al., 2017) however, this range does not consider the cultivar. Potato cultivars respond differently to seed piece spacing for total and marketable yield, tuber size distribution and quality. Krupek et al. (2016) reported that total and marketable yield increases when reducing seed piece spacing. In contrast, wider seed piece spacing increases total and marketable yield. Potato cultivar performance may vary when combining different within-row spacings and growing area environmental conditions (Magnani et al., 2015). The objective of this study was to evaluate the effect of seed piece spacing on total and marketable yield, tuber size distribution and tuber external and internal quality of six table stock cultivars (Red LaSoda, Satina, Natascha, Envol, Purple Majesty, and Actrice) at four different seed piece spacings (6, 8, 10, and 12 inches within-rows) in northeast Florida.

*Corresponding author. Email: lzota@ufl.edu

## Materials and Methods

A field trial was conducted during the Spring 2018 potato season (January–May) at the University of Florida, Hastings Agricultural Extension Center Research Farm located in Hastings, FL. The experiment was established in a randomized complete block design with two factors, cultivar and seed piece spacing, and replicated four times. The trial was planted on 9 Feb. 2018 and harvested when the plants reached 96 days after planting (DAP) on 16 May 2018. Aboveground biomass samples were collected throughout the season at 40 and 72 DAP. Tubers were mechanically harvested and total and marketable yield, tuber size distribution, specific gravity, and internal and external quality were evaluated. Tubers were graded and classified into categories according to USDA standards (USDA, 1997). The data were analyzed using the PROC MIXED procedures of SAS version 9.4 (SAS Institute, Cary, NC). An analysis of variance (ANOVA) was used to determine seed piece spacing and cultivar main effects and interactions. For means separation, Least Square means (LS-means) comparison was applied with the Holm-Tukey adjusted at a $P$ value of 0.05.

## Results and Discussion

Aboveground biomass accumulation measured at 40 DAP responded to seed piece spacing. There was greater aboveground biomass accumulation with 6-inch seed spacing (915 lb/acre) compared to 12 inches (706 lb/acre). At 72 DAP, the 6 inch seed piece spacing resulted in 37% greater aboveground biomass compared to the 12-inch seed spacing biomass increased by 56%.

Total yield was significantly affected by both seed spacing ($P$ = 0.035) and cultivar ($P$ = 0.045) (Table 1). There were no

Table 1. Effects of seed piece spacing and cultivar on total, marketable yield and tuber size distribution.

| | Tuber yield | | Tuber size distribution[z] | | | | |
|---|---|---|---|---|---|---|---|
| Planting spacing (inches) | Total | Marketable | A1 | A2 | A3 | B | C |
| | cwt/acre | | | | | | |
| 6 | 268.9 AB[y] | 178.7 | 177.5 AB | 6.66 | – | 65.1 A | 18.47 A |
| 8 | 289.4 A | 210.4 | 204.5 A | 10.43 | – | 54.5 B | 15.55AB |
| 10 | 238.9 B | 169.2 | 166.9 B | 8.89 | – | 48.8 B | 12.39 B |
| 12 | 240.2 B | 172.0 | 168.8 B | 8.92 | – | 45.9 B | 11.85 B |
| Cultivars | cwt/acre | | | | | | |
| Actrice | 278.0 AB | 213.0 AB | 221.5 A | 2.7 BC | – | 43.4 C | 10.3 C |
| Envol | 264.7 ABC | 215.7 A | 212.0 AB | 8.4 B | – | 36.0CD | 7.4 C |
| Natascha | 290.7 A | 185.3 B | 182.5 B | 2.4 BC | – | 86.4 B | 18.9 B |
| Purple Majesty | 218.2 C | 75.8 C | 75.8 C | 0.0 C | – | 103.8 A | 38.5 A |
| Red LaSoda | 265.8 ABC | 223.5 A | 202.4 AB | 20.4 A | – | 25.1 D | 6.2 C |
| Satina | 238.8 BC | 193.6 AB | 182.3 B | 18.5 A | – | 27.3 D | 6.1 C |
| Spacing vs. cultivar | NS | NS | NS | NS | *** | NS | NS |

[z]Tuber size distribution: A4 (> 4.0 inches), A3 (3.3–4.0 inches), A2 (2.5–3.3 inches), A1 (1.9–2.5 inches), B (1.5–1.9 inches), C (0.5-1.5 inches)
[y]Mean values within a column followed by same letters are not statistically different at $P < 0.05$ according to the Holm Tukey test. Absence of letter means not significant.
*** = Significant at $P < 0.001$, NS = nonsignificant.

significant differences between 6–8 inch seed piece spacing treatments. However, the average total yield of 6 and 8 inches seed piece spacing was significantly higher (14%) than the average from the 10- and 12-inch spacings for total yield. Marketable yield was significantly affected by cultivar ($P = < 0.001$). 'Red LaSoda' and 'Envol' procuded 223.5 and 215.7 cwt/ac, respectively which was significantly higher than 'Natascha' (185.3 cwt/acre) and 'Purple Majesty' (75.8 cwt/acre) (Table 1). Overall, seed piece spacings of 6 and 8 inches resulted in 23% higher marketable yield than the 10- and 12-inch spacings.

Tuber size distribution was significantly affected by seed piece spacing (Fig. 1). There was an increase of smaller tuber sizes (C and B's) when reducing seed spacing from 10 and 12 inches to 6 inches. The amount (weight) of A1 (1.9- to 2.5-inch) tubers at the 10- and 12-inch seed piece spacings was significantly lower compared to the 6- and 8-inch spacings (Fig. 1). The A2 (2.5–3.3") tuber sizes class did not responded to seed piece spacing treatments, and represented 3% of total yield (Fig 1).

Cultivar affected tuber size distribution (Fig. 2). 'Purple Majesty' had a smaller overall tuber size profile than the other varieties with 65% (142 cwt/ac) of the tubers classified as C (0.5–1.5") and B's (1.5-1.9"); the remaining 45% (75.8 cwt/ac) was classified as A1 (1.9-2.5"). Overall 'Actrice', 'Envol', 'Satina', and 'Red LaSoda' produced larger tuber sizes. For these cultivars, the A1 (1.9–2.5") tuber size represented 76 to 80% of total yield though 'Red LaSoda' and 'Satina' produced significantly higher amount of A2 (2.5–3.3") tubers (Fig. 2) compared to the other cultivars.

For tuber external quality, there was a higher presence of tuber greening (1.1%) at the 12-inch seed piece spacing. The incidence of rotten tubers was greater than 3% for 'Natascha', 'Red LaSoda',

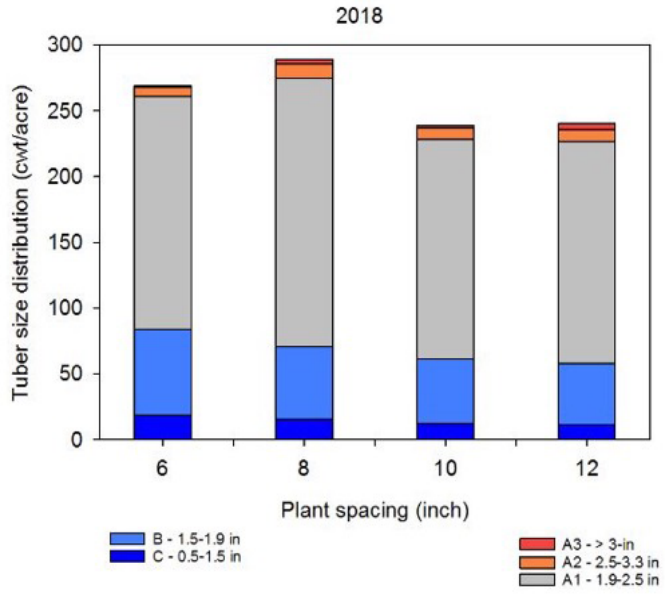


Fig. 1. Main effect of seed piece spacing treatments on tuber size distribution of table stock potato cultivars cultivated in Florida.

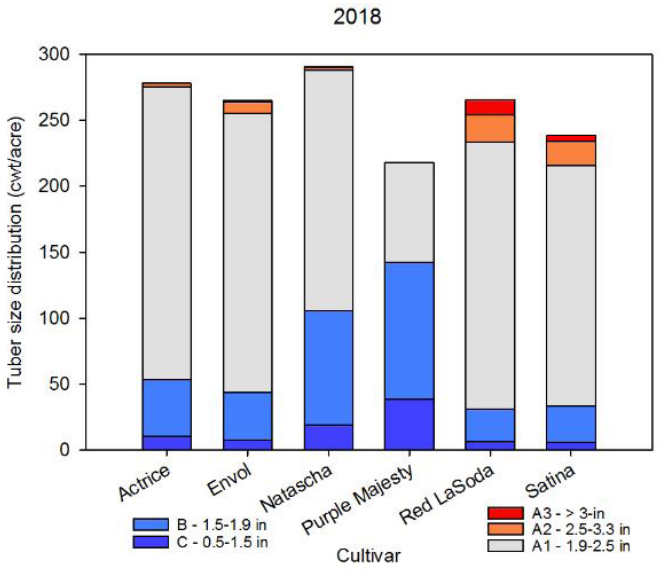


Fig. 2. Main effect of cultivars on total and marketable yield and tuber size distribution of table stock potato cultivars cultivated in Florida.

'Satina' and 'Actrice'. Tuber specific gravity was significantly affected by seed piece spacing and cultivar treatments. The 12-inch spacing treatments resulted in higher tuber specific gravity than 6-inch spacing. 'Purple Majesty' had statistically highest specific gravity compared to other cultivars.

## Conclusion

In conclusion this study demonstrated that potato total and marketable yield, tuber size distribution, specific gravity responded differently to seed piece spacing and cultivars. Potato seeds spaced between 6 and 8 inches resulted in higher total and marketable yields compared to 10 and 12 inches seed pieces spacing. Tuber size distribution can be effectively managed by adjusting seed piece spacing according to growers proffered tuber size according to market preferences and price.

## Literature Cited


Food Science Resource Economics Department. 2018b. Table potatoes: estimated production costs in the Hastings areas, 2008-2009. University of Florida. 25 Sept. 2018. <https://fred.ifas.ufl.edu/pdf/iatpc/files/HastingsTablePotato09.pdf>

Krupek, F.S., C.T. Christensen, C.E. Barrett and L. Zotarelli. 2017. Seed Piece Spacing for Spring Chipping Potato Cultivars in Florida. HortScience 52:230–235. doi:10.21273/hortsci11431-16.

Krupek, F.S., S.A. Sargent, P.J. Dittmar, and L. Zotarelli. 2018. Seed piece adjustment for Florida chipping potato. IFAS HS1317. Gainesville: University of Florida Institute of Food and Agricultural Sciences, 2018. 25 Sept. 2018. <http://edis.ifas.ufl.edu/hs1317>

Magnani, R., U Mazarura, A.M. Tuarira, and A.I. Shayanowako. 2015. Growth, yield, and quality responses to plant spacing in potato (*Solanum tuberosum*) varieties. Afr. J. Agr. Res. 10:571–578. https://doi.org/10.5897/AJAR2014.8665

U.S. Department of Agriculture (USDA). 1983. Soil Survey of St. Johns County, Florida. Natural Resources Conservation Service, U.S. Department of Agriculture. 24 Feb. 2015. <http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPT/florida/FL109/0/StJohns.pdf>

USDA. 1997. United States standards for grades of potatoes for chipping. USDA, Agric. Marketing Serv. <www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5050437 (accessed 10 Jul. 2017).

Zotarelli, L., P.J. Dittmar, P.D. Roberts, and S.E. Webb. 2016. Potato production, p. 233–251. In: J. Dittmar , J.H. Freeman, and G.E. Vallad (eds.). Vegetable production handbook of Florida. Vance Publishing, Lincolnshire, IL.