

# Growth Stages and Tuber Development of FL1867 Potato under Full and Reduced Irrigation Scheduling<sup>1</sup>

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## FL 1867 Overview

The potato cultivar ‘Frito Lay 1867’ (‘FL 1867’) is a popular chipping variety grown across Florida and the southern United States. It is a mid-season maturing variety that was formed by a cross between the popular potato variety ‘Atlantic’ and ‘FL 162’ in 1989 in Wisconsin (Canadian Food Inspection Agency n.d.). When compared to ‘Atlantic,’ ‘FL 1867’ has several unique characteristics: the plant has a white flower rather than a purple flower, it has more of a spreading growth habit, and the tuber has a higher specific gravity than ‘Atlantic’ (Cipar 2004). ‘FL 1867’ has resistance to the golden and cyst nematode (Cipar 2004) as well as tolerance to heat (Oregon State University 2011). The white flesh and high specific gravity make ‘FL 1867’ a desirable variety to be grown for potato chip production.

## Growth and Development in Florida

Knowledge of the timing and duration of the tuber initiation and tuber bulking stages for ‘FL 1867’ is critical to crop management, specifically for timing fertilizer and irrigation applications. To evaluate the start and length of the tuber initiation and tuber bulking stages under Florida growing conditions, ‘FL 1867’ plants were dug up and photographed on a weekly basis from a commercial field near Live Oak, FL in 2012. Beginning at 35 days after planting (DAP), whole plants were sampled from the field with care being

taken to collect only the tubers produced by the plant being sampled.

The crop was in the vegetative growth stage until 35 DAP, as the first evidence of tuber initiation was observed at 41 DAP (Fig. 1A). Primary tuber initiation appeared to continue through the next two weeks (Fig. 1B). It is important to define primary tuber initiation as the period when the majority of tubers that will reach marketable size at harvest are formed. Tubers will continue to be initiated after this period, but most of these will be under-sized at harvest. Tuber bulking appeared to begin 54 DAP (Fig. 1C), as tubers previously initiated increased in size and the number of new tubers formed decreased when compared to the two previous weeks. Tuber bulking continued through the next 5 to 6 weeks (Figs. 1D and E) as fewer newly formed tubers appeared each week. The field was harvested at 97 DAP, after the last sample was collected (Fig. 1F). At this stage the majority of tubers had reached the marketable size between 1 7/8 and 4 inches in diameter.

## Growth and Development Under Reduced Irrigation

A reduced irrigation study took place in this commercial field in 2012. Potato plants from both the full and partial irrigation treatments were sampled and compared to determine if reducing irrigation applications affected tuber development. The full treatment was the typical irrigation

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schedule used by growers in the area, in which an average of 0.4 inches of water was regularly applied through a center pivot beginning when the plants started blooming. The center pivot used in this study was able to apply 0.4 inches of water every 26 hours. For the reduced irrigation schedule treatment, an irrigation skip, or dry pass, was implemented every third irrigation pass. The plants under the reduced irrigation schedule received 3.65 inches less water compared to the full irrigation schedule over the entire growing season. Due to the increased sensitivity of the potato to water stress during tuber initiation (Styen et al. 2007), the irrigation treatment was designed to start after the end of primary tuber initiation. Based on the whole-plant samples collected, the first skip was scheduled at 60 DAP.



Figure 1. Whole plant samples of FL 1867 during the 2012 growing season at 41 DAP (A), 48 DAP (B), 54 DAP (C), 61 DAP (D), 75 DAP (E), and 90 DAP (F).

Credits: S. Byrd

No visual difference was observed throughout the season between plants under the full irrigation schedule and plants under the partial irrigation schedule (Fig. 2). The first skip occurred when the plants reached the tuber bulking stage and is represented by Figure 2A, at which point one skip had taken place, with a difference of 0.42 inches of water applied between the treatments. The skips continued into mid tuber bulking, represented in: 1) Fig. 2B, at which point 4 skips had occurred for a difference in irrigation applied of 1.68 inches; 2) Fig. 2C, when 5 skips had taken place for a difference of 2.14 inches in irrigation; and 3) Fig. 2D, at late tuber bulking one week before harvest, when 7 irrigation skips had occurred for a difference in irrigation of 2.98 inches. Two more skips were made prior to harvest, bringing the total difference in water applied between the two sections to 3.65 inches. Yield checks taken at the end of the year also showed no difference between the two irrigation schedules, with an average yield of 36,279 pounds

per acre. Results of this study are reported fully in Byrd et al. (2014).

From this study we concluded that the typical growing season for the 'FL 1867' cultivar in Florida begins with approximately 35 to 40 days of vegetative growth, followed by approximately 14 days of flowering and primary tuber initiation. Tuber bulking then occurs for a 40- to 60-day period, and harvest maturity is reached approximately 95 to 110 days after planting. It was determined that reducing irrigation by 3.65 inches during tuber bulking, compared to the current grower's irrigation practices, did not affect the growth, development, or yield of the 'FL 1867' cultivar, when the crop-growth stage and performance was monitored closely. This work illustrates the potential for the 'FL 1867' cultivar to be a good candidate for possible reduced irrigation schedules in Florida.



Figure 2. Comparison of tuber growth and development under full and reduced irrigation schedules at 61 DAP (A), 75 DAP (B), 82 DAP (C), and 90 DAP (D). For each sample, F represents plant under full irrigation and R represents plant under reduced irrigation.

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## References

- Byrd, S. A., D. L. Rowland, J. Bennett, L. Zotarelli, D. Wright, A. Alva, and J. Nordgaard. 2014. "Reductions in a Commercial Potato Irrigation Schedule during Tuber Bulking in Florida: Physiological, Yield, and Quality Effects." *Journal of Crop Improvement* 28: 660–679.
- Canadian Food Inspection Agency. 2012. "FL 1867". <http://www.inspection.gc.ca/english/plaveg/pbrpov/cropreport/pot/app00002832e.shtml>. Accessed 12/26/2012.
- Cipar, Martin. Potato Cultivar FL 1867. Patent 6,762,351, filed November 14, 2000, and issued 13 July 2004.

Oregon State University. 2011. "Potato Variety Identification Table". <http://oregonstate.edu/potatoes/Rating%20Key%20-%20Public%2007.pdf>. Accessed 12/26/2012.

Steyn, J. M., D. M. Kagabo, and J. G. Annandale. 2007. "Potato growth and yield responses to irrigation regimes in contrasting seasons of a subtropical region." *African Crop Science Conference Proceedings* 8: 1647–1651.