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End-of-Season Changes in Tuber Size Distribution & Profit Potential of Cultivars for Frozen Processing

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Changes in tuber yields, tuber size distributions, and gross crop values were compared among seven processing cultivars at 130, 148, and 176 days after planting (DAP) in 2006 and 2007 (Fig. 1, 2-yr averages presented). Seed was planted on April 11 in both years at 10-inch in-row spacing (34 inches between rows). Yields increased significantly for all cultivars over the last three harvest dates (vine kill = 156 DAP). The greatest gains in yield occurred from 130 to 148 DAP for most cultivars, emphasizing a need for continued diligence in crop management toward season end for maximum yield and profit. Note that the yield increases over the latter two harvests occurred from 148- to 156-DAP, since vines were mowed 156 DAP. These data characterize the extent of end-of-season yield increases for each cultivar and reveal tendencies to produce oversize tubers; important considerations for tailoring end-of-season management to achieve maximum returns from each cultivar.

Defender, GemStar, Premier, and Ranger had much greater tendency than the other cultivars to produce oversize (>14 oz) tubers from 130 DAP to season end (Fig. 1). Interestingly, the yields of <4-oz to 12-oz tubers remained relatively constant from 130 to 176 DAP while yields of oversize tubers (>14-oz) increased the most for these cultivars. At 176 DAP the average oz/tuber were: Defender = 8.0, GemStar = 9.5, Premier = 8.8, Ranger = 8.7. Despite the increase in oversize and associated contract penalties, process values for these cultivars increased from 148 to 176 DAP, due primarily to the increases in overall yields (Fig. 1 inset tables). An opportunity thus exists to add value to these cultivars by shifting tuber size distribution to favor more moderate size tubers at the expense of >14-oz tubers if the inherent high yield potentials of these cultivars can be maintained. Management techniques to accomplish this include closer (<10-inch) in-row spacing and/or planting seed that produces higher stem numbers. Further work is needed to define the optimal spacing, stem number, and tuber set relationships to maximize returns from these cultivars in the Columbia Basin. In contrast, Alturas, Umatilla, and Russet Burbank averaged 7.1, 7.0, and 7.5 oz/tuber by season end, reflecting more desirable tuber size distributions.

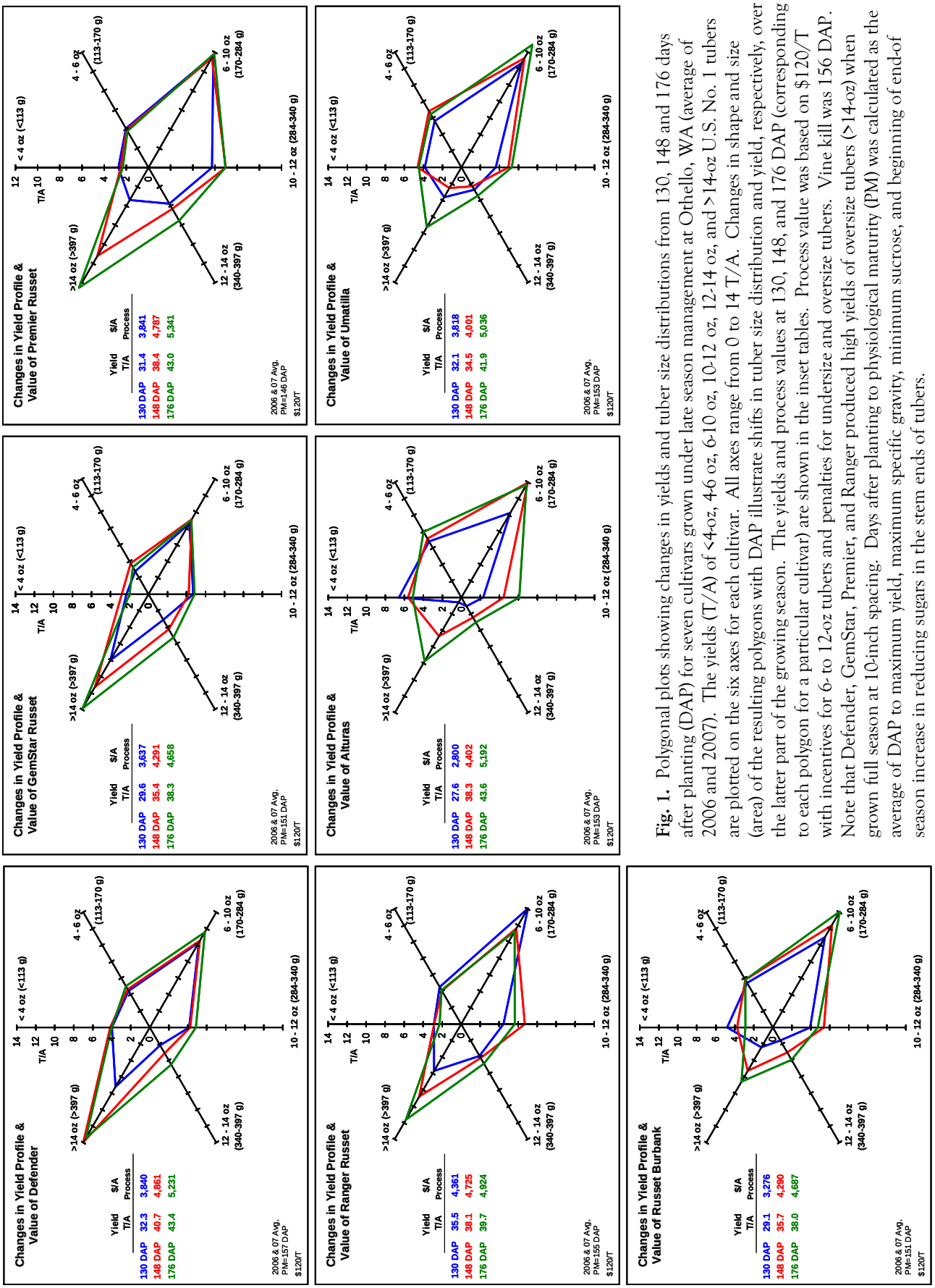

Fig. 1. Polygonal plots showing changes in yields and tuber size distributions from 130, 148 and 176 days after planting (DAP) for seven cultivars grown under late season management at Othello, WA (average of 2006 and 2007). The yields (T/A) of <4-oz, 4-6 oz, 6-10 oz, 10-12 oz, 12-14 oz, and >14-oz U.S. No. 1 tubers are plotted on the six axes for each cultivar. All axes range from 0 to 14 T/A. Changes in shape and size (area) of the resulting polygons with DAP illustrate shifts in tuber size distribution and yield, respectively, over the latter part of the growing season. The yields and process values at 130, 148, and 176 DAP (corresponding to each polygon for a particular cultivar) are shown in the inset tables. Process value was based on $120/T with incentives for 6- to 12-oz tubers and penalties for undersize and oversize tubers. Vine kill was 156 DAP. Note that Defender, GemStar, Premier, and Ranger produced high yields of oversize tubers (>14-oz) when grown full season at 10-inch spacing. Days after planting to physiological maturity (PM) was calculated as the average of DAP to maximum yield, maximum specific gravity, minimum sucrose, and beginning of end-of season increase in reducing sugars in the stem ends of tubers.

Potato Pink Rot

See also: http://www.potatoes.com/research.cfm

***Symptoms often begin at the stolon end of the tuber.**
***Damage is sometimes bordered by a dark line visible on outside of tuber.**
***Recently infected tissue turns pink, and then black, when exposed to air.**
***Infections in storage may cause an ammonia-like smell.**

Management

1. Plant in well-drained fields without a history of the disease.
2. Avoid excessive irrigation late in the growing season, and do not plant in areas of fields expected to become excessively wet.
3. Avoid wounding during harvest and transfer to storage.
4. Harvest storage crops in cool weather and with cooler pulp temperatures.
5. Sort infected tubers at harvest, and process or ship affected lots promptly.
6. Some fungicides are active against pink rot, but take care to avoid encouraging fungicide resistance.

General Information

Causal agent: *Phytophthora erythroseptica*
Biology: Pathogen of potato and many other plants; present in many soils worldwide; tuber infection and decay is worst in warm and excessively wet soils.
Dispersal: Infection can spread from tuber to tuber during harvest and handling. Infected seed can also spread the disease.
Fungicide resistance: *P. erythroseptica* has begun to demonstrate resistance to fungicides. Fungicides should be rotated frequently to prevent resistance. See: http://www.potatoes.com/pdfs/FungicidesPressReduced.pdf

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Pythium Leak

See also: http://www.potatoes.com/research.cfm

*Occurs wherever potatoes are grown.
*This pathogen only enters through wounds.
*There is usually a distinct line between healthy and diseased tissue.
*Infected tissue is a smoky grey color.
*When squeezed, infected tubers produce a dark watery liquid.
*Following exposure to air, infected tissue changes from grey to brown, then black.
*In storage, infected tubers are sometimes reduced to empty shells.

Management

1. Crop rotation and destruction of diseased tubers are important.
2. Some fungicides applied at planting or during the growing season can reduce losses caused by Pythium leak.
3. Harvest with pulp temperatures between 45 and 65 degree F.
4. Minimize mechanical injury to tubers during harvest and handling.
5. In storage, encourage maximum suberization and wound periderm formation; do not allow free water on tubers.

General Information

Causal agent: *Pythium ultimum* and sometimes other *Pythium* species.
Biology: Wide host range including many crops. Infection of tubers occurs at wounds.
Dispersal: Infection can spread from tuber to tuber during harvest and handling. Infected seed can also spread the pathogen.
Fungicide resistance: *Pythium* has begun to demonstrate resistance to fungicides. See: http://www.potatoes.com/pdfs/FungicidesPressReduced.pdf

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