Identifying Economic Gains and Cost Savings with New Varieties


My Background

• PhD Potato Agronomy (WSU)
• MS Plant Protection/Weed Sci (UI)
• BS Ag Econ (UI)
• BS Crop Production (UI)
• Commercial Farming Experience
• International Research Experience (Cambridge, UK)
• Private Company Experience (Monsanto, Syngenta)
• Born and reared in American Falls, ID
Should we even mess with new variety development?

- Our current varieties are making us money
  - Most of us are making money with them
- New varieties impose risk and confusion
  - Learning how to grow them, storage failure
- Too dang many new varieties
  - Which one do we choose?

Do you want China producing the potatoes you eat?

- Global competitiveness
- As an example
  - Is the technology, trim, MPG of the pickup you drive today going to be acceptable in 10 years?
    - Why should we expect the potatoes you grow today to work in 10 years? 20 years?
- If we don’t stay competitive on a global scale, the US potato industry will erode away.
Real Concerns

• Loss of fumigants, tighter regulations
  – Verticillium wilt, nematodes
• New viruses and diseases
  – Zebra chip, BLTV
• New pest threats
  – Tuber moth
• Acrylamide concerns
  – Cancer causing?
• Dry irrigation wells, drought
• Global Population explosion
  – Every day the world gains the same amount of people as the population of Boise (213,000, net), 148/minute

Addressing Real Concerns

• Tri-State Potato Variety Team
  – UI, OSU, WSU, USDA, Commissions, Industry
• Top priorities
  – Disease resistance
  – reduced inputs (water, fert, pesticide, etc)
  – Improved PNW/US competitiveness
  – improved post-harvest
  – reduce production risk
  – high yields and quality
  – human nutrition
The Tri-State Variety Development Team Mission

- Keep the PNW/US industry competitive and profitable
- Provide consumers healthy, high quality inexpensive potatoes
- Contribute to the well being of the environment

History of Common Varieties

- Russet Burbank, 1914, Luther Burbank
  - The original Burbank was a white potato.
  - Russet Burbank (Netted Gem) is a mutation of original Burbank, from Colorado.
- Shepody, 1980, New Brunswick Canada
- Russet Norkotah, 1987, N. Dakota
- Ranger Russet, 1991, Tri-State
- Umatilla Russet, 1998, Tri-State
Key to Success for a Variety

- **Obvious** – having all the right characteristics for the market
  - Internal & external quality, good taste
  - Yield, storability
  - Makes money for everyone in the chain

- **Less Obvious**
  - The growers and industry learn how to grow, manage, handle, and store it.

Case in Point

- **Ranger Russet:**
  - Susceptible to blackspot bruise
  - Used to be a serious issue
  - Industry improved harvest/handling practices

- **Umatilla Russet:**
  - Susceptible to dry rot – especially seed
  - Used to be a serious issue
  - Seed producers changed harvest and handling practices
Russet Norkotah: What makes it work?

- **The Obvious:**
  - Nice shape & appearance, early harvest
  - High % of US 1’s with the right size profile
  - Adequate yield
  - Everyone in the chain making money

- **Less Obvious:**
  - It’s “bullet proof” – low bruising, stores well, low storage rot
  - no major issues post-harvest

Question is

- Is Norkotah the fresh pack variety of the future?
- Are Russet Burbank, Ranger Russet, Umatilla Russet, and Shepody the process varieties of the future?
The Decline of Russet Burbank & Impact of Tri-State Potato Varieties on PNW Production - WA, OR, ID

![Graph showing the decline of Russet Burbank and the increase in planting of other varieties.](image)

New variety economics

- **Potential Gains**
  - Higher payable yield
  - Improved quality, especially out of storage
  - Virus/Disease resistance = less yield drop
  - Able to get your seed certified – less risk
  - Less processing trim loss, higher recovery
  - Remain globally competitive

- **Potential Cost Savings**
  - Reduced inputs – fert, pesticides, water
Obvious Economic Gain with Many New Varieties:

• Higher Payable Yield

Gauging Economic Potential of New Varieties

• Processing contract
  – Base price
  • 4 oz minimum – usable potatoes
  – Premiums and penalties
  • US Grades, SG, > 6oz or > 10oz clause

• Fresh Pack
  – Carton sizes
  – Actual fresh pack prices – USDA Market News
  – Pack shed fee
Process Market Value – Methods

• Early Process Contract
  – Base Price
    • Harvest date, Ranger or Shepody Contract
    • Reject, Specific Gravity Below 1.074
  – Market Yield > 4oz,

• Late Process Contract
  – Base Price
  – Premiums and Penalties
    • % Market yield above 6 oz
    • Specific Gravity – sweet spot
    • Oversize clause

Fresh Market Economic Methods

• Electronic sizer
  – Each potato weighed, US grades

• Industry size classes
  – See chart to right

• 4 year average C. Basin prices
  • Early Harvest
    – July to Mid Aug
  • Late Harvest
    – October

*Prices minus pack shed fee

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<th>Package</th>
<th>US 1 Size (oz)</th>
<th>Price* ($/CWT)</th>
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2005 Early Fresh Market
Early Harvest Regional Trial

2005 Late Process Market
Late Harvest Regional Trial
2006 Organic Late Process Market

Organic Late Harvest Regional Trial

Difference in Return from R. Burbank ($/Acre)

Ranger RB
Norkotah
A90300-6
A90204-6
A90604-3
A90106-6
A90604-3
AC00009-4Ru
AC00008-4Ru
ATX91137-1Ru
ATX92230-1Ru
ATX00039-1Ru
ATX92030-1Ru
ATX92110-1Ru
ATX92220-1Ru
ATX93010-1Ru
ATX92020-1Ru
ATX92035-1Ru
ATX92230-1Ru
ATX00105-1Ru
ATX92005-1Ru
ATX92010-1Ru

2011-13 Early Harvest Fresh Pack Variety Trial – Gross Return Difference from Standard R. Norkotah

Gross Return Difference From R. Norkotah ($/A)

Classic R. A03158-2TE
TX-778
Telon R. A01910-1
TX-298
R. Norkotah
CO-8
R. Burbank
AO96305-3
PA96001-1Ru
AO00057-2
CO-3
2011-13 Late Harvest Fresh Pack Variety Trial – Gross Return Difference from Standard R. Norkotah

Cost Savings with Many New Varieties:

- Improved efficiency with inputs
- Reduced Input use
Higher Yields

- ‘Dirty’ word combination in DC
- Funding grants rarely given to proposals
  - Seeking to only improve yield
- Higher yielding varieties
  - Efficient with inputs, land, water, fert, pesticides

Average U.S. Potato Yields (cwt/A)
Nitrogen Use Efficiency

- 2010-12, Using same agronomic inputs
  - A01010-1 = 814 CWT/A
  - A03158-2TE = 794 CWT/A
  - RB = 714 CWT/A
- On average, these clones were 13% more efficient in their utilization of N than RB.
Nitrogen Use Efficiency (cont.)

• Ranger, R. Burbank, Sage, Teton, Umatilla, Alpine, Classic, and Owyhee
  – 2.4-, 2.3-, 2.4-, 2.1-, 2.6-, 2.7-, 2.3-, and 2.4-CWT/lb N, respectively
• Ranger, Umatilla, Alpine, and Owyhee were 2.6%, 10%, 14%, and 2% more efficient than R. Burbank, respectively
• Alpine Russet was the most N efficient variety using only 250 lbs N/A to produce yields higher than the industry standard, R. Burbank, grown with 450 lbs N/A.
Adjusted Gross Income and Total Yield
Alturas In-Season N Rate Trial

Nitrogen Rate (lbs/A)

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Total Yield
CWT/A

620 640 660 680 700 720 740 760 780

Adjusted Gross Income
Max $ Return = 366 lbs/A of N (HI <50% up to 115 DAP)
Max Yield = 435 lbs/A of N (HI <50% beyond 120 DAP)

% Higher Yield than R. Burbank with Same Agronomic Inputs

AO1010-1 AO3158-2TE
Water Use Efficiency

• Seasonal water use
  – 2.95 inches/100 CWT
    • A01010-1, A03158-2TE
  – 3.35 inches/100 CWT
    • Russet Burbank
• On Average, these varieties are 14% more efficient with water than RB

Phosphorous Efficiency

• Russet Burbank
  – 6.7 CWT/A tuber yield per lb of soil P
• Alturas, Alpine Russet, Chieftain, Ranger R., Sage R., and Umatilla R.
  – all produced 7.2-8.8 CWT/A per lb of soil P
• Alturas was 30% more P efficient than RB
• Alpine, Chieftain, Ranger, Sage, and Umatilla were 19%, 14%, 12%, 8% and 6% more efficient that R. Burbank, respectively
• P efficiency across WA could be improved 6-19% simply by replacing R. Burbank with Alpine, Chieftain, Ranger, Sage, or Umatilla.
Industry Wide Cost Saving and Impact

- Alturas, released by the Tri-State program in 2002
- Yields > than most commonly grown var. Russet Burbank
  - with 50% less nitrogen
- Production of Alturas in ID, OR, and WA was over 18,000 acres in 2010
- Potentially reduced amount of N applied to soil
  - 2.7 million lbs
  - compared with the same acreage planted to the old standard R. Burbank.
- The reduced use of nitrogen = less nitrate-contaminated ground water.
- Potential savings to NW growers was over $1.1 million or $60/acre
- Nearly all potato varieties released by the Tri-State program over the past 8 years require 10-50% less nitrogen fertilizer to produce yields similar to Russet Burbank

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Potato Shape
French Fry Output

[Bar charts showing yield and variability in fry yield across states for Tri-State Clones 2008 (0-16 oz.)]

[Images of potato tubers labeled Tubers, Prior to Storage, 48°F, 44°F, 40°F, Reconditioned, showing differences in fry yield by region: Washington, Idaho, Oregon]
Storability

A
Classic Russet
6 months
Storage @ 44°F

B
R. Norkotah
6 months
Storage @ 44°F

***Based on responses from 300 panelists
Moderate to High Resistance

• PVY: Clearwater R., Palisade R.
• Vert: Alpine R., Alturas, Clearwater, Gemstar, Palisade, Ranger
• Late Blight: A02057-2LB, Palisade, Defender
• Net Necrosis: Palisade, Alturas, GemStar, Teton
• Sugar ends: Alpine R.
• Common Scab: Alpine, Alturas, Blazer, Classic, Teton, GemStar, Owyhee, Clearwater
• ETC

Less Obvious Economic Gain with Many New Varieties:

• The ability to stay in business
  – Global competitiveness
  – Maintain profitability long term by utilizing latest technology, products, varieties
In Summary

• If you want to remain competitive
  – Adopting new varieties is not a choice – it is a necessity
  – You must take a risk, minimize the risk
• New varieties continue to improve
  – Higher payable yields
  – Improve input efficiency
  – Disease and virus resistance
  – Keeping processors and pack-sheds interested
• Stay ahead of the curve
  – Follow variety development, provide input