Maine Potato Breeding Program

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Sebec (AF0338-17) seed plot, 2013

Sebec (AF0338-17) flowers
University of Maine
Potato Breeding Program

Research Effort by Type:

- 60% russets and long-whites, processing and dual-purpose
- 30% round types for chipping and/or fresh use
- 10% reds and specialty types

2013 crosses produced 499,000 true potato seed (TPS) from 669 different families
2013 Seedling Tuber Production

86,649 greenhouse seedling tubers were produced at Aroostook Research Farm

34,551 “A” tubers (ME) from 215 families

29,839 “B” tubers (to ID, WI CO, MI)

22,259 “C” tubers (to CO, WI, ND)
2013 Field Selection in Northern Maine

- 52,197 single-hill plots were evaluated consisting of seedlings from ME, ID, WI, ND, CO, VA
- 1307 (2.5%) were selected for further evaluation in 2014:
  - 760 russets and long-whites (58%)
  - 472 whites, yellows, and chippers (36%)
  - 75 red- and purple-skinned (6%)
GH Crosses produce TPS

Seedling tuber exchange with USDA-ARS Idaho, ND, CO, and WI

GH Seedlings produce seedling tubers

1st Field Season: Single-hill plots ~45,000 clones

2nd Field Season: 8- or 12-hill plots ~1,200 clones

3rd Field Season: New 60-hill plots ~300 clones

4th Field Season: 100-hill plots ~75 clones

5th Field Season: 300-hill plots ~35 clones

6th Field Season: 800-hill plots ~20 clones

7th Field Season: 800-hill plots and AF certified seed

N1 and N2 Production

Small-scale Industry Trials

Commercial Seed Production

Commercial-scale Industry Trials

MSPB or elsewhere

Clean-up & Pre-nuclear

NC, FL, NY early selection

Cooperator Selection

Disease, pest, and quality screening

NCPT, NFPT, NE1031 & Other Multi-site testing

Commercial Release
National Chip Processing Trials (NCPT)

**NCPT Trial**

- 11 National trial sites
- UMaine potato breeding contributes ~20 4th-year and older clones to this national screening trial each year
- Testing over this wide range of environments greatly speeds the selection process
  - Eliminate clones with internal defects or other problems
  - Identify a few clones to advance to larger-scale tests
    - E.g. larger-scale USPB/SFA Chipping trials

Above: Breeding program seed plots provide seed potatoes for national trials. Below: AF4157-6 chipper has shown promise in NCPT and USPB/SFA trials.
Maine USPB/SFA Trial 2012
Top Five in Chip Quality – January 30, 2013, Aroostook Research Farm, data available on our website (http://sbe.umaine.edu/chips/)

From 50F Storage

<table>
<thead>
<tr>
<th>Clone</th>
<th>Glucose (%)</th>
<th>Chip 1 to 5</th>
<th>% Defs</th>
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<tr>
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<tr>
<td>Atlantic</td>
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<td>3.0</td>
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From 42F Storage

<table>
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<th>Clone</th>
<th>Glucose (%)</th>
<th>Chip 1 to 5</th>
<th>% Defs</th>
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<td>ND8305-1</td>
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<td>W6483-5</td>
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<tr>
<td>Atlantic</td>
<td>0.066</td>
<td>4.0</td>
<td>50</td>
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</table>
National Fry Processing Trials (NFPT)

- NFPT Trials
  - WA, ID, ND, WI, ME
  - ME Trial Site
    - Non-irrigated, short-season (115-125 days), relatively cool, loamy soil, relatively low soil pH
  - ME Tested only ~68 of 88 clones during 2012 and 2013 due to seed import restrictions
  - Agronomic performance, fry quality, black spot bruise susceptibility
  - NFPT had 15 AF clones
    - Many were top performers regionally
    - Several were very good performers nationally

University of Maine
Potato Breeding Program

- **Top Priority Disease Resistance Goals**
  - Late blight resistance
  - Scab resistance
  - PVY resistance
  - Pink rot resistance
  - Others: PLRV/NN, EB, VW, GN, Fusarium, etc

Resistance Screening Plots,
Clockwise from top: late blight, PLRV, PVY
Selection of Late Blight Resistant Potato Varieties

- **2013 Aroostook Research Farm:**
  - Non-inoculated
  - 64 test clones, 10 standards
  - 15 were MR to R

- **2013 Penn State:**
  - Inoculated
  - Replicated, 64 test clones, 28 were MR to R
  - Single Replication, 3rd-year material, 65 of 316 were MR to R
Defoliation by Late Blight, Six Representative Potato Clone From 70 Clone Screening trial, Maine 2012

Susceptible Varieties

MR to Resistant Varieties

% Defoliation by Late Blight

Yukon Gold (S) 1877 AUDPC
Defender (R-MR) 430 AUDPC
Missaukee (R-MR) 530 AUDPC
AF3317-15 (R-MR) 331 AUDPC
AF4573-2 (R-MR) 442 AUDPC
Superior (S) 2026 AUDPC
Improving Varietal Resistance  -- University of Maine

- Expanded the use of PVY resistant germplasm in breeding programs
  - Current emphasis is on $R_y_{adg}$-based resistance. Also using germplasm with $R_y_{sto}$ and other sources.

- Field-based screening
  - Confirm resistance and symptom expression using ELISA**
    - Aphid-based inoculation tests: ~100 clones per year.
    - PVY spread studies using two PVY-infected seedpieces at the front of each plot: ~10 clones per year.

- Using marker-assisted selection to speed progress***
  - RYSC3 marker is available and associated with PVY resistance gene $R_y_{adg}$; YES3 is a marker for $R_y_{sto}$

**Collaboration with Andrei Alyokhin and Aaron Buzza;
***Collaboration with Benildo de los Reyes
PVY and GN Resistance
Marker-assisted Selection

- **PVY Resistance Marker** (RYSC3) for *Ry*(adg)
  - Year 1: 155 (+) clones identified

- **GN (H1) resistance**
  - Year 1: 45 (+) of 210 clones, 21%

Example RYSC3-marker profile from the 2102 breeding nursery. The RYSC3 resistance allele (321-bp) appeared in some of the lines included in this PCR run. The sample in the lane labeled ‘4’ was used as a ‘positive control’ in this assay. This sample is from the cultivar ‘Eva’, which is known to be resistant to PVY and also positive for the 321-bp RYSC3 amplicon. The other samples included in this assay were from various resistant (121, 122, 123, 125, 126, 129, 131, 134) and susceptible (120, 124, 127, 128, 130, 132, 133, 135, 137) parents and progeny.
Breeding Program Collaborations

- **Parents for Crossing Program**
  - All U.S. Programs and many others; especially Cornell, USDA-ARS Beltsville, and USDA-ARS Aberdeen

- **Seedling Tuber Exchange and early screening**
  - ME, USDA-ARS Aberdeen, ND, WI, CO
  - NC, FL, and NY

- **Advanced Clone Screening and Development**
  - Eastern Regional Project (NE1231) FL, NC, VA, MD, PA, NY, OH, ME, Canadian Provinces
  - NY, USDA-ARS Beltsville, MI, WI, ND, Tri-state programs and others

- **SolCap Project**

- **USPB National Chip and Fry Processing Trials (NCPT, NFPT)**

- **Grant Proposal Collaborations**
  - USDA-NIFA Special Grant (FL, NC, VA, MD, NY, PA, OH)
  - USDA-SCRI Acrylamide Project (WI lead, many states)
  - USDA-ARS Potato Research Grants (USDA Beltsville & Aberdeen; PA, MI)
Sebec (AF0338-17)

A high yielding white for out-of-field chipping and fresh market

- **Primary Strengths:**
  - High yields
  - Chips from the field
  - Wide adaptation
  - Good size profile
  - Much less internal heat necrosis and hollow heart than Atlantic
  - VW resistance

- **Known Weaknesses**
  - MS to common scab
  - Not a storage chipper

Pedigree: AF303-5 x SA8211-6, Univ. of Maine

Maturity: Mid-season (rtg=5.6). Tubers: Round to Oblong (rtg=3.1), netted skin (rtg=5.5)
Sebec (AF0338-17), Maine Variety Trials
Presque Isle, St. Agatha, Exeter, 21 trials, 2007-2013

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% Atl)</th>
<th>US#1 cwt/A (% Atl)</th>
<th>% B’s</th>
<th>% &gt; 2-1/2”</th>
<th>Spec Grav (vs Atl)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sebec (AF0338-17)</td>
<td>364 (104)</td>
<td>303 (106)</td>
<td>3.3</td>
<td>58.7</td>
<td>1.082 (-0.007)</td>
<td>5.6</td>
<td>11.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Atlantic</td>
<td>354</td>
<td>295</td>
<td>3.0</td>
<td>53.8</td>
<td>1.089</td>
<td>4.9</td>
<td>13.5</td>
<td>16.0</td>
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<tr>
<td>Katahdin</td>
<td>314</td>
<td>249</td>
<td>4.6</td>
<td>47.4</td>
<td>1.076</td>
<td>6.1</td>
<td>16.5</td>
<td>6.6</td>
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<tr>
<td>Snowden</td>
<td>307</td>
<td>263</td>
<td>6.6</td>
<td>35.7</td>
<td>1.089</td>
<td>4.5</td>
<td>8.3</td>
<td>5.5</td>
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<tr>
<td>Superior</td>
<td>308</td>
<td>264</td>
<td>3.0</td>
<td>44.3</td>
<td>1.080</td>
<td>5.1</td>
<td>10.6</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only.
Easton (AF3001-6)

High yields, good processing type, very good fry color

- **Primary Strengths:**
  - High yields
  - Wide adaptation
  - Very good fry color
  - Good internal quality
  - VW resistance
  - Needs less N fertilizer

- **Known Weaknesses**
  - Tuber blight in 2011, rot susceptibility?
  - MS to common scab
  - PVY susceptible
  - Netted to lightly russet skin
  - Herbicide sensitive

**Pedigree:** Silverton R. x AF1668-60, Univ. of Maine.

Maturity: Late (rtg=6.8); Tubers: Long (rtg=6.8) with netted skin (rtg=4.8).
## Easton (AF3001-6), Maine Variety Trials
**Presque Isle and St. Agatha, 17 trials, 2007-2013**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% RB)</th>
<th>US#1 cwt/A (% RB)</th>
<th>% &lt; 4 oz</th>
<th>% &gt; 8 oz</th>
<th>Spec Grav (vs RB)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
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<tbody>
<tr>
<td>Easton (AF3001-6)</td>
<td>372 (113)</td>
<td>327 (131)</td>
<td>14.4</td>
<td>41.2</td>
<td>1.081 (-0.001)</td>
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<tr>
<td>R. Burbank</td>
<td>331</td>
<td>258</td>
<td>18.9</td>
<td>38.7</td>
<td>1.082</td>
<td>3.7</td>
<td>18.5</td>
<td>15.5</td>
<td>39.9</td>
</tr>
<tr>
<td>R. Norkotah</td>
<td>295</td>
<td>267</td>
<td>29.6</td>
<td>22.6</td>
<td>1.075</td>
<td>6.4</td>
<td>7.7</td>
<td>13.7</td>
<td>40.9</td>
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<tr>
<td>Shepody</td>
<td>313</td>
<td>206</td>
<td>15.5</td>
<td>41.8</td>
<td>1.081</td>
<td>3.9</td>
<td>30.7</td>
<td>14.1</td>
<td>46.4</td>
</tr>
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Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only. Chip color is Agtron M35 reflectance form crushed chips, higher number indicates lighter color, ≥ 50 is very good for a fry variety.
AF3317-15

(University of Maine Potato Breeding: AWN86514-2 x R. Kingpin)

- Long Russet w/late blight resistance
- Vine Maturity: late to very late
- Yield:
  - Good when given a long-season
- Spec Grav: Mod
  - 1.085 (vs 1.084 for RB)
- Fry Color: Good
- Boiled: F-G Baked: G
- Tuber Appearance: F-G (> RB)
- Externals: M
  - 8% vs 8% for RB
  - Sunb, mshp

Internals:
- HH: L (0% vs 14% RB)
- IHN: L-M (in SE U.S.)
- Blackspot: MS

Resistances: R (LBL, pink rot, net necrosis, and scab)
AF3362-1
A high yielding, dual-purpose russet

**Primary Strengths:**
- High yields
- Good fry color and cooking quality
- Good tuber type and F-G appearance
- Very little HH to date
- Bruise resistance
- Moderate scab resistance

**Known Weaknesses**
- PVY susceptibility
- Internal heat necrosis in NJ and PA trials
- Short tuber dormancy

**Pedigree:** R. Kingpin x Silverton R., Univ. of Maine.
**Maturity:** Medium-late (rtg=6.0); Tubers: Long (rtg=6.9) with russeted skin (rtg=3.6)
### AF3362-1, Maine Variety Trials
Presque Isle and St. Agatha, 17 trials, 2007-2013

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% RB)</th>
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<th>% &gt; 8 oz</th>
<th>Spec Grav (vs RB)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
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<tbody>
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<td>AF3362-1</td>
<td>355 (107)</td>
<td>328 (132)</td>
<td>14.1</td>
<td>40.8</td>
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<td>4.0</td>
<td>49.9</td>
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<tr>
<td>R. Burbank</td>
<td>331</td>
<td>258</td>
<td>18.9</td>
<td>38.7</td>
<td>1.082</td>
<td>3.7</td>
<td>18.5</td>
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<td>295</td>
<td>267</td>
<td>29.6</td>
<td>22.6</td>
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<td>6.4</td>
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<td>15.5</td>
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<td>46.4</td>
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AF4013-3

Fresh market and specialty processing yellow-fleshed with good yield and fry color

- **Primary Strengths:**
  - High yields
  - Good tuber appearance
  - Bright skin with pink eyes
  - Mid-season maturity
  - Moderate to high gravity
  - Fair to good chip color

- **Known Weaknesses**
  - Scab susceptible
  - Size profile (smallish?)
  - Some misshapes and hollow heart

Pedigree: MonDak Gold x SA9704-1, Univ. of Maine
Maturity: Mid-season. Tubers: Oblong to round (rtg=2.9), smooth to slightly netted skin
AF4124-7

A high yielding, mid-season processing russet

- **Primary Strengths:**
  - High yields and early sizing
  - Good gravity and processing quality
  - Good agronomic performer in National Fry Processing Trials (NFPT)
  - Good tuber for processing
  - Less HH than R. Burbank
  - Blackspot resistance
  - Moderate scab resistance

- **Known Weaknesses**
  - Fair tuber appearance
  - Verticillium susceptible

**Pedigree:** A8469-5 x SC9512-4., Univ. of Maine.
**Maturity:** Medium-late (rtg=5.8); Tubers: Long (rtg=6.8) with russeted skin (rtg=4.2)
AF4124-7, Maine Variety Trials
Presque Isle and St. Agatha, 9 trials, 2009-2013

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<th>Variety</th>
<th>Total Cwt/A (% RB)</th>
<th>US#1 cwt/A (% RB)</th>
<th>% &lt; 4 oz</th>
<th>% &gt; 8 oz</th>
<th>Spec Grav (vs RB)</th>
<th>Tuber App. 1 to 9</th>
<th>% ExtDefs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
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<td>AF4124-7</td>
<td>338 (100)</td>
<td>289 (119)</td>
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<td>48.3</td>
<td>1.085 (+0.005)</td>
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<td>11.0</td>
<td>8.8</td>
<td>46.0</td>
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<tr>
<td>R. Burbank</td>
<td>342</td>
<td>256</td>
<td>13.9</td>
<td>42.2</td>
<td>1.081</td>
<td>3.9</td>
<td>21.6</td>
<td>26.3</td>
<td>38.4</td>
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<tr>
<td>R. Norkotah</td>
<td>320</td>
<td>287</td>
<td>24.7</td>
<td>28.7</td>
<td>1.071</td>
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<td>8.9</td>
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<td>196</td>
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<td>1.078</td>
<td>4.1</td>
<td>31.0</td>
<td>19.9</td>
<td>46.4</td>
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AF4138-8

Fresh market white with good yield and quality

- **Primary Strengths:**
  - High yields
  - Good tuber appearance
  - Good boiled quality
  - Low hollow heart and external defects incidence
  - Early to mid-season maturity
  - Moderate scab resistance
  - Blackspot resistance

- **Known Weaknesses**
  - Internal heat necrosis in SE?
  - Size profile (smallish?)

Pedigree: SA9707-6 x AF1953-4, Univ. of Maine
Maturity: Mid-season (rtg=4.9). Tubers: Round to Oblong (rtg=2.9), slightly netted skin (rtg=6.2)
## AF4138-8, Maine Variety Trials
Presque Isle, St. Agatha, Exeter, 10 trials, 2009-2013

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<th>US#1 cwt/A (% Atl)</th>
<th>% B’s</th>
<th>% &gt; 2-1/2”</th>
<th>Spec Grav (vs Atl)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
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<td>AF4138-8</td>
<td>354 (108)</td>
<td>312 (115)</td>
<td>5.8</td>
<td>41.9</td>
<td>1.069 (-0.022)</td>
<td>6.2</td>
<td>6.6</td>
<td>1.3</td>
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<tr>
<td>Atlantic</td>
<td>345</td>
<td>290</td>
<td>3.1</td>
<td>58.1</td>
<td>1.091</td>
<td>4.6</td>
<td>12.9</td>
<td>21.3</td>
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<td>Katahdin</td>
<td>321</td>
<td>267</td>
<td>3.4</td>
<td>51.4</td>
<td>1.077</td>
<td>6.3</td>
<td>13.4</td>
<td>11.8</td>
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<tr>
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<td>301</td>
<td>258</td>
<td>6.5</td>
<td>40.9</td>
<td>1.088</td>
<td>4.5</td>
<td>8.5</td>
<td>8.4</td>
</tr>
<tr>
<td>Superior</td>
<td>304</td>
<td>273</td>
<td>2.8</td>
<td>46.9</td>
<td>1.081</td>
<td>4.8</td>
<td>8.1</td>
<td>2.1</td>
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AF4157-6

Early-maturing chipper, chips from field and storage

- **Primary Strengths:**
  - Early maturity
  - High yields, especially for an early variety
  - Outstanding chips from the field and storage, incl. cool storage (≤45F)
  - Much less internal heat necrosis and hollow heart than Atlantic
  - Blackspot bruise resistant

- **Known Weaknesses**
  - VS to common scab
  - Small size profile

**Pedigree:** Yankee Chipper x Dakota Pearl, Univ. of Maine

**Maturity:** Early (rtg=4.1). Tubers: Round to Oblong (rtg=3.1), slightly netted skin (rtg=6.0)
# AF4157-6, Maine Variety Trials

Presque Isle, St. Agatha, Exeter, 13 trials, 2009-2013

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% Atl)</th>
<th>US#1 cwt/A (% Atl)</th>
<th>% B’s</th>
<th>% &gt; 2-1/2”</th>
<th>Spec Grav (vs Atl)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF4157-6</td>
<td>325 (98)</td>
<td>264 (101)</td>
<td>5.8</td>
<td>25.2</td>
<td>1.086 (-0.003)</td>
<td>5.4</td>
<td>13.5</td>
<td>3.6</td>
<td>66.9</td>
</tr>
<tr>
<td>Atlantic</td>
<td>343</td>
<td>278</td>
<td>3.2</td>
<td>56.4</td>
<td>1.089</td>
<td>4.8</td>
<td>16.2</td>
<td>17.6</td>
<td>62.4</td>
</tr>
<tr>
<td>Katahdin</td>
<td>301</td>
<td>246</td>
<td>4.2</td>
<td>47.4</td>
<td>1.073</td>
<td>6.2</td>
<td>14.8</td>
<td>10.5</td>
<td>54.9</td>
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<tr>
<td>Snowden</td>
<td>296</td>
<td>244</td>
<td>6.4</td>
<td>39.2</td>
<td>1.087</td>
<td>4.4</td>
<td>11.9</td>
<td>8.2</td>
<td>65.7</td>
</tr>
<tr>
<td>Superior</td>
<td>289</td>
<td>256</td>
<td>2.8</td>
<td>44.7</td>
<td>1.077</td>
<td>4.9</td>
<td>9.3</td>
<td>1.6</td>
<td>61.5</td>
</tr>
</tbody>
</table>

Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only. Chip color is Agtron M35 reflectance form crushed chips, higher number indicates lighter color, ≥ 65 is very good.
AF4172-2

A high yielding, mid-season dual-purpose russet

Primary Strengths:
- High yields
- Mid-season maturity
- Good fry color and cooking quality
- Good tuber type and F-G appearance
- Less HH than R. Burbank
- Bruise resistance

Known Weaknesses
- Small size profile
- Susceptible to scab and verticillium wilt

Pedigree: A95523-12 x A92158-3, Univ. of Maine.
Maturity: Medium (rtg=5.4); Tubers: Long (rtg=6.7) with russeted skin (rtg=3.9)
## AF4172-2, Maine Variety Trials

**Presque Isle and St. Agatha, 10 trials, 2009-2013**

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% RB)</th>
<th>US#1 cwt/A (% RB)</th>
<th>% &lt; 4 oz</th>
<th>% &gt; 8 oz</th>
<th>Spec Grav (vs RB)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>% Chip Col. 50F Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF4172-2</td>
<td>321 (102)</td>
<td>270 (119)</td>
<td>26.4</td>
<td>23.2</td>
<td>1.083 (+0.003)</td>
<td>5.7</td>
<td>11.5</td>
<td>11.3</td>
<td>51.6</td>
</tr>
<tr>
<td>R. Burbank</td>
<td>330</td>
<td>242</td>
<td>15.2</td>
<td>40.6</td>
<td>1.080</td>
<td>3.9</td>
<td>21.1</td>
<td>24.2</td>
<td>39.2</td>
</tr>
<tr>
<td>R. Norkotah</td>
<td>295</td>
<td>266</td>
<td>28.4</td>
<td>25.3</td>
<td>1.071</td>
<td>6.3</td>
<td>8.4</td>
<td>20.7</td>
<td>36.3</td>
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<tr>
<td>Shepody</td>
<td>303</td>
<td>196</td>
<td>14.4</td>
<td>40.7</td>
<td>1.079</td>
<td>4.0</td>
<td>29.8</td>
<td>17.9</td>
<td>45.4</td>
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</tbody>
</table>

Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only. Chip color is Agtron M35 reflectance form crushed chips, higher number indicates lighter color, ≥ 50 is very good for a fry variety.
AF4296-3

A high yielding, processing russet

**Primary Strengths:**
- High yields
- Good fry color and quality
- Good agronomic and fry quality performance in National Fry Processing Trials (NFPT)
- Bruise resistance
- Verticillium resistance

**Known Weaknesses**
- HH like R. Burbank
- MS to scab
- Fair appearance

**Pedigree:** A0508-4 x A99081-8., Univ. of Maine.
**Maturity:** Medium-late (rtg=6.4); Tubers: Long (rtg=7.0) with russeted skin (rtg=3.4)
# AF4296-3, Maine Variety Trials
Presque Isle and St. Agatha, 7 trials, 2010-2013

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% RB)</th>
<th>US#1 cwt/A (% RB)</th>
<th>% &lt; 4 oz</th>
<th>% &gt; 8 oz</th>
<th>Spec Grav (vs RB)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF4296-3</td>
<td>329 (101)</td>
<td>257 (111)</td>
<td>9.7</td>
<td>43.9</td>
<td>1.079 (-0.002)</td>
<td>4.9</td>
<td>17.5</td>
<td>16.1</td>
<td>45.0</td>
</tr>
<tr>
<td>R. Burbank</td>
<td>330</td>
<td>251</td>
<td>14.1</td>
<td>39.6</td>
<td>1.081</td>
<td>3.4</td>
<td>19.0</td>
<td>12.4</td>
<td>37.7</td>
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<tr>
<td>R. Norkotah</td>
<td>333</td>
<td>302</td>
<td>19.4</td>
<td>35.4</td>
<td>1.069</td>
<td>6.2</td>
<td>8.7</td>
<td>32.3</td>
<td>33.0</td>
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<tr>
<td>Shepody</td>
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<td>165</td>
<td>10.0</td>
<td>46.3</td>
<td>1.078</td>
<td>3.7</td>
<td>38.3</td>
<td>22.0</td>
<td>42.3</td>
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</table>

Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only. Chip color is Agtron M35 reflectance form crushed chips, higher number indicates lighter color, ≥ 50 is very good for a fry variety.
AF4648-2

Mid-season storage chipper with scab and PVY resistance

- **Primary Strengths:**
  - High yields of attractive tubers
  - Resistant to common scab, golden nematode, and PVY
  - Good tuber size profile
  - Very good chip color and specific gravity
  - Much less internal heat necrosis and hollow heart than Atlantic
  - Blackspot and shatter bruise tolerance

- **Known Weaknesses**
  - MS to verticillium wilt

**Pedigree:** NY132 x Liberator, Univ. of Maine
**Maturity:** Mid-season (rtg=5.9). Tubers: Round to Oblong (rtg=2.8), smooth skin (rtg=6.8)
# AF4648-2, Maine Variety Trials
Presque Isle and Exeter, 5 trials, 2011-2013

<table>
<thead>
<tr>
<th>Variety</th>
<th>Total Cwt/A (% Atl)</th>
<th>US#1 cwt/A (% Atl)</th>
<th>% B’s</th>
<th>% &gt; 2-1/2”</th>
<th>Spec Grav (vs Atl)</th>
<th>Tuber App. 1 to 9</th>
<th>% Ext Defs</th>
<th>% HH</th>
<th>Chip Col. 50F Dec</th>
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</thead>
<tbody>
<tr>
<td>AF4648-2</td>
<td>303 (90)</td>
<td>263 (93)</td>
<td>4.2</td>
<td>52.8</td>
<td>1.087 (+0.002)</td>
<td>6.4</td>
<td>9.0</td>
<td>5.5</td>
<td>63.7</td>
</tr>
<tr>
<td>Atlantic</td>
<td>345</td>
<td>294</td>
<td>2.6</td>
<td>55.6</td>
<td>1.085</td>
<td>4.8</td>
<td>13.0</td>
<td>22.0</td>
<td>59.4</td>
</tr>
<tr>
<td>Katahdin</td>
<td>270</td>
<td>217</td>
<td>4.2</td>
<td>50.0</td>
<td>1.070</td>
<td>6.0</td>
<td>14.8</td>
<td>12.9</td>
<td>55.0</td>
</tr>
<tr>
<td>Snowden</td>
<td>310</td>
<td>263</td>
<td>7.4</td>
<td>34.2</td>
<td>1.087</td>
<td>4.8</td>
<td>8.4</td>
<td>3.5</td>
<td>64.2</td>
</tr>
<tr>
<td>Superior</td>
<td>276</td>
<td>246</td>
<td>3.6</td>
<td>43.2</td>
<td>1.079</td>
<td>5.0</td>
<td>8.1</td>
<td>1.0</td>
<td>58.2</td>
</tr>
</tbody>
</table>

Tuber appearance: 1 to 9, where 3=poor; 4=fair to poor; 5=fair; 6=fair to good; 7=very good. Hollow incidence determined on large tubers only. Chip color is Agtron M35 reflectance form crushed chips, higher number indicates lighter color, $\geq 65$ is very good.
Reds, Purples, Specialties

- Reds
- Purples
- Fingerlings
- Roasters
- Colored Flesh
  - More to come ......

AF4659-12, small tubers, YF,
AF4985-1
AF4550-2
Acknowledgements

- **University of Maine**
  - Greg Porter, Paul Ocaya
  - Tammy Mills, Bruce MacFarline, Beth Plummer, Darren Knight
  - Dave Lambert, Randy Smith, Aaron Buzza, Elbridge Giggie, J. Jemison, Andrei Alyokhin, Benildo de los Reyes, Mary Ellen Camire, Brian Perkins
  - Maine Seed Potato Board, Porter Farm

- **Funding**
  - USDA-NIFA Special Grant
  - Maine Potato Board
  - University of Maine
  - US Potato Board
  - Maine Dept. of Agriculture
  - Industry Partners and Growers

Seedling Tuber Harvest, 2010: Liza Buck, Megan Ireland, Karlee Bernier, Chandler Guerrette, Samantha Fuller, Carol McKnight

Greg selecting new russets, 2010
Current Advanced Prospects for Commercialization. Seed of these clones is currently available from the Maine Seed Potato Board, Maine seed growers, and/or Aroostook Research Farm. Additional clones in each marketing class will become available over the coming years. For more information on these clones, seed availability, or research results please contact Greg Porter; 5722 Deering Hall, Room 415; University of Maine, Orono, ME 04469-5722; (207)581-2943; porter@maine.edu

- **Sebec, AF0338-17** (AF303-5 x SA8211-6), a widely-adapted, mid-season, high yielding, round white for out-of-field chipping and fresh market. It has performed well in the S.E. and mid-Atlantic states with yields averaging near those of Atlantic. Specific gravity has averaged 4 points lower than Atlantic. AF0338-17 has chipped well from the field and has had much lower incidence of internal defects than Atlantic. It is moderately susceptible to scab, but has moderate verticillium resistance. The Maine Potato Board has licensed this variety and an application for Plant Variety Protection has been submitted. **Seed Availability:** Maine certified seed (see ME seed book); Maine Seed Potato Board seed and disease-free culture tubes or minitubers; University of Maine seed. It is also in US Potato Board Fast-track seed potato production.

- **Easton, AF3001-6** (Silverton Russet x AF1668-60), a widely adapted, late maturing, long-white with netted skin, very good fry color, and high yields. AF3001-6 is very good baked, boiled, and mashed. U.S.#1 yields have averaged ~131% of standard russeted varieties (usually Russet Burbank) in Maine trials. Specific gravity is moderate (average of 1.081 in ME trials) and fry color from storage has been excellent. It has been an outstanding performer in the national fry processing trials (NFPT). It is moderately susceptible to scab, but has good verticillium resistance. Susceptibility to tuber decay (tuber blight in 2011, softrot in several research trials, fusarium in a 2013 commercial trial) has been the most serious concern so far for this variety. The Maine Potato Board has licensed this variety and an application for Plant Variety Protection has been submitted. **Seed Availability:** Maine certified seed (see ME seed book); Maine Seed Potato Board seed, disease-free culture tubes, or minitubers; University of Maine seed.

- **AF3317-15** (AWN86514-2 x Reeves Kingpin), a long russet with late blight resistance and potential for processing and occasional fresh market use. AF3317-15 is very good baked and mashed. AF3317-15 has very late vine maturity and long tubers with russeted skin. It can yield well, but needs a lot of time to develop and mature tubers. Specific gravity is moderate (average of 1.085 in ME trials) and fry color from storage has been fair to good. It has resistance to late blight, common scab, and pink rot. **Seed Availability:** Maine Seed Potato Board disease-free culture tubes; University of Maine seed.

- **AF3362-1** (Reeves Kingpin x Silverton Russet), a mid-season, long russet with good yields, processing potential, and fair to good appearance. AF3362-1 is very good baked and mashed. U.S.#1 yields have averaged ~132% of standard russeted varieties (usually Russet Burbank) in Maine trials. Specific gravity is moderate (average of 1.083 in ME trials) and fry color from storage has been mostly good. It may be a good alternative to Shepody for out-of-field and short-term storage processing use as well as useful for russet fresh market. It has moderate scab resistance and good bruise resistance. AF3362-1 is
susceptible to internal heat necrosis and should not be grown in the S.E. states or other areas where this defect is frequently observed. PVY susceptibility has slowed building of seed stocks for commercial trials. **Seed Availability:** Certified Maine Seed (see ME seed book); Maine Seed Potato Board seed, disease-free culture tubes, or minitubers; University of Maine seed.

**AF4013-3** (MonDak Gold x SA9704-1), a mid-season, oblong to round, yellow with pink eyes and good yields, moderately-high gravity, good chip color, and good appearance where scab is not a problem and tuber size is controlled. It yields better than Yukon Gold, has brighter skin, and a smaller size profile. Specific gravity is moderate to high (average of 1.090 in ME trials) and fry color from storage has been mostly good. It is susceptible to scab. **AF4013-3** has potential for specialty fresh market and processing on fields where scab is not a concern. **Seed Availability:** University of Maine seed plus it is in virus clean up for tissue culture.

**AF4124-7** (A8469-5 x SC9512-4), a medium-late maturing, russet with good fry quality, fair tuber appearance, and high yields. US#1 yields have averaged ~119% of standard russeted varieties (usually Russet Burbank) in Maine trials. Specific gravity is moderate to high (average of 1.085 in ME trials) and fry color from storage has been good. It has been a good performer in the national fry processing trials (NFPT). It is moderately resistant to scab and is blackspot bruise resistant. **Seed Availability:** University of Maine seed plus it is in virus clean up at Porter Farm, ME Seed Potato Board.

**AF4138-8** (SA9707-6 x AF1953-4), a fresh market, early to mid-season, round to oblong white with bright skin. It has good yields, attractive tubers, low specific gravity, blackspot bruise tolerance, low hollow heart incidence, and good boiled quality. It is moderately resistant to scab and has golden nematode resistance. **Seed Availability:** University of Maine seed plus it is in virus clean up at Porter Farm, Maine Seed Potato Board.

**AF4157-6** (Yankee Chipper x Dakota Pearl), an early to mid-season, round to oblong white with good yields, moderately-high gravity, very good chip color, and fair to good appearance. U.S.#1 yields have averaged 95% of Atlantic and 108% of Snowden in Maine trials. Specific gravity is moderate to high (average of 1.086 in ME trials) and chip color from storage has been very good. It has low sugars even from cool temperature storage. It is susceptible to scab, but has resistance to golden nematode, blackspot bruise, and pink rot. **AF4157-6** has potential as a chipper in southern states and in northern states on fields where scab is not a concern. **Seed Availability:** University of Maine seed; Maine Seed Potato Board seed, disease-free culture tubes, or minitubers; US Potato Board Fast-Track program.

**AF4172-2** (A95523-12 x A92158-3), a medium maturing, russet with good fry quality, fair to good tuber appearance, and high yields. US#1 yields have averaged ~119% of standard russeted varieties (usually Russet Burbank) in Maine trials. Specific gravity is moderate (average of 1.083 in ME trials) and fry color from storage has been very good. It has been a good performer in the national fry processing trials (NFPT). It is susceptible to scab, but has good bruise resistance. Tuber size tends toward the smaller
size classes. Baked quality scores have been very good. **Seed Availability:** University of Maine seed plus it is in virus clean up at Porter Farm, ME Seed Potato Board.

- **AF4296-3** (A0508-4 x A99081-8), a widely adapted, late maturing, russet with good fry quality, fair tuber appearance, and high yields. US#1 yields have averaged ~111% of standard russeted varieties (usually Russet Burbank) in Maine trials. Specific gravity is moderate (average of 1.079 in ME trials) and fry color from storage has been good. It has been an outstanding performer in the national fry processing trials (NFPT). It is moderately susceptible to scab, but has moderate verticillium resistance and good bruise resistance. **Seed Availability:** University of Maine seed plus it is in virus free culture at Porter Farm, ME Seed Potato Board and in USPB/NFPT/SCRI Fast-Track seed production.

- **AF4550-2** (W2301-3 x W1101R), an early, purple-skinned, white-fleshed clone with moderate yields and good boiled quality. It has much better purple skin color than Caribe, Purple Viking, and other standard purples, but it is susceptible to scab. **Seed Availability:** University of Maine seed plus it is in virus clean up for tissue culture.

- **AF4648-2** (NY132 x Liberator), a mid-season, round to oblong white with good yields, moderately-high gravity, bruise resistance, very good chip color, and good appearance. It could go for chipping or fresh market. It has good scab resistance and is resistant to golden nematode and PVY. **Seed Availability:** University of Maine seed plus it is in tissue culture at Porter Farm (ME Seed Potato Board) and is in the USPB Fast-Track program.

- **AF4659-12** (A99331-2 x US147-96RY), a yellow-fleshed “pinto-type” specialty variety with a interesting red and yellow skin pattern. It produces small, fingerling-type tubers that are excellent roasted, boiled, or fried. **Seed Availability:** University of Maine seed plus it is in virus clean up at Porter Farm for tissue culture.

**Other 5th-year and older clones:**

- **AF3000-1** (Silverton Russet x A7816-14), fry processing, long-white, netted, mid-season
- **AF4040-2** (LB9704-1 x Reeves Kingpin), fry processing, long-white, netted, mid-season
- **AF4113-2** (Silverton Russet x A75188-3), fry processing, long-white, netted, mid-season
- **AF4198-2** (A8469-5 x Reeves Kingpin), fry processing, russet, medium-late
- **AF4281-3** (A98083-9 x A91814-5), fry processing, long-white, netted, late, PVY res
- **AF4283-1** (A98084-6 x A92030-5), fry processing, long-white, netted, late
- **AF4320-7** (A99081-8 x A97214-4), fry processing, russet, late
- **AF4320-17** (A99081-8 x A97214-4), fry processing, russet, late
- **AF4342-3** (A97214-4 x A98295-3), fry processing, russet, netted, late, PVY res
- **AF4386-16** (NY120 x CF77154-10), chipping, high gravity, field and storage chipping, best potential in south
- **AF4532-8** (ND4093-4 x CO82142-4), russet, fresh market, mid-season
- **AF4532-9** (ND4093-4 x CO82142-4), fry processing, russet, medium-late
**Additional 5\(^{th}\) and 6\(^{th}\) Year Selections:**

- 1 dual-purpose, white
- 3 chippers
- 4 fresh market whites
- 4 dual-purpose, russets
- 5 fry processing
- 9 reds with white flesh
- 1 specialty types (purples, yellows, etc)
- 27 total

**4\(^{th}\) Year Selections (2013):**

- 12 chipping candidates
- 5 dual-purpose candidates
- 9 fresh market whites
- 2 yellow-fleshed, fresh market
- 4 reds with white flesh
- 2 specialties (purples, yellows, etc
- 7 dual-purpose, russets
- 19 fry processing
- 60 total

**3rd Year Selections (2013):**

- 5 chipping candidates
- 15 dual-purpose candidates
- 22 fresh market whites
- 4 yellow-fleshed, fresh market
- 10 reds with white flesh
- 8 specialties (purples, yellows, etc
- 12 dual-purpose or fresh market, russets
- 30 fry processing
- 106 total

**2nd Year Selections (2013):**

- 157 whites and yellows
- 20 reds and specialties
- 157 russet and long-whites
- 334 total

**1st Year Selections (2013):**

- 472 whites and yellows
- 75 reds and specialties
- 760 russet and long-whites
- 1307 total