NC STATE UNIVERSITY

NORTH CAROLINA POTATO VARIETY TRIAL AND BREEDING REPORT

2014



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I. OBJECTIVES AND RESEARCH SPONSORS:

The objective of the NC State University potato breeding and genetics program is to develop new potato varieties that contribute to a more sustainable and economically viable potato production system for North Carolina. To achieve this objective, we collaborate extensively with the eastern US potato breeding and variety development community, and also with programs around the US and internationally. A common goal of all our project collaborations is the development of high yielding, disease and insect resistant, table- and chip-stock potato varieties for potato growers in the eastern US. Because our research sites are primarily located in the hot, humid, lower coastal areas of the mid-Atlantic, we expect that the materials selected and developed in our environment will also perform well in the broader southeastern US geographic region.

Our variety development research efforts are supported by the USDA National Institute of Food and Agriculture (NIFA) 1231 Multistate Potato Variety Development and Evaluation Project, the USDA NIFA Potato Special Research Grants Program, the NC Potato Association, and the US Potato Board and the Snack Food Association, as well as several other industry members.

II. PROJECT SUMMARY

Our program focuses on three areas: the development of new potato germplasm and varieties through our own breeding efforts; collaborative early-generation breeding and selection projects with the USDA-ARS, and the University of Maine; and the evaluation of preliminary and advanced breeding clones for adaptation to NC from a wide range of potato breeding programs in the US and Canada.

Breeding Program

Our in-house efforts to develop varieties begin with crossing in the greenhouses at the NC Department of Agriculture and Consumer Services Tidewater Research Station/NC State University Vernon G. James Research and Extension Center (TRS/VGJREC) in Plymouth, NC. Planting, selection and advance to 6-hill or 12-hill (for clones from the specialty 3-hill trial), 20-hill, and 60-hill plots depend on relative performance at each of these stages over a period of four years. Clones that survive the first four cycles of selection are entered into a 160-hill increase plot to generate enough seed for preliminary yield trials conducted at the TRS/VGJREC the following year. In subsequent years all surviving clones are maintained in 320-hill plots and included in preliminary and advanced yield trials conducted at the TRS/VGJREC and on-farm.

During 2014, we planted 10,619 single-hills and selected 272 clones resulting in a 2.6% selection rate. This is on par with our average selection rate. Out of the 420 clones in our 6-hill and 12-hill plots, 110 (26%) were selected for future evaluation. In the 20-hill plots, 89 clones were planted with 27 (30%) being selected for further evaluation. In our 60-hill plots, 24 clones were planted and 17 (71%) were selected.

In our Colorado potato beetle (CPB) nursery we continued our project to select and screen specific families with potential CPB resistance. We planted 987 2-hill plots for selection purposes and also planted a duplicate set in our CPB nursery for resistance screening. The data collected in the nursery was used as a major but not exclusive selection criteria, resulting in 86 clones which will be advanced for CPB screening as two replicated 3-hill plots (2by3 trial), and for parallel horticultural adaptation selection as non-replicated 6-hill plots in 2015. In this year's

2by3 trial, 47 clones were evaluated for CPB resistance and adaptation in our non-replicated 6hill plots simultaneously. After making our selections in both of these trials, we decided to advance 9 clones to next year's screening trial of three replications with 5-hills each (3by5 trial) and for parallel horticultural adaptation selection as non-replicated 20-hill plots in 2015. In this years 3by5 trial we evaluated 7 clones for CPB resistance and for adaptation in our nonreplicated 20-hill plots simultaneously. We selected 4 clones for advancement to next year's four replications by 10-hills (4by10) and our non-replicated 60-hill trial. In this year's 4by10 we had a total of 16 clones and 12 of those were selected for evaluation next year. The 4by10 trial is our most advanced screening trial and the most advanced clones will remain in this trial until testing is complete, also some of the clones with promise will be placed in yield trials if they have the appropriate agronomic characteristics.

Yield Trials

In our 11 yield trials, we evaluated 295 preliminary and advanced clones. The evaluations were conducted either on-farm, and/or at the TRS/VGJREC. We typically evaluate advanced clones at more than one site in NC. The results of the yield trials are summarized later in this report, and in Tables 1-11. Each table has two parts, the first (a) being devoted to yield information, specific gravity measurements, and chip color scores, and the second (b) providing potato plant and tuber quality characteristics. This report can also be viewed and downloaded at our website http://potatoes.ncsu.edu

III. 2014 PROMISING LINES: Chip-stock clones

Sebec(AF0338-17)

Developed by: Univ. of Maine Released: 2013 # trials evaluated: 20 since (2006) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: medium to late* % *Standard (Atlantic): MKTB YLD 94%* % *Standard (Snowden): MKTB YLD 91% Specific Gravity: 1.075 Chip score: 2.0 (excellent) Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This is a later than mid maturing clone with good yield, gravity and chip scores. Its maturity places it between Atlantic and Snowden and fills the need for an Atlantic like potato that holds up better in a longer season. **This clone is available for testing on a larger scale if growers are interested.**

Chip-stock clones cont.

NC0349-3

Developed by: North Carolina State Univ. Released: N/A # trials evaluated: 16 since (2007) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: medium to late % Standard (Atlantic): MKTB YLD 92% % Standard (Snowden): MKTB YLD 87% Specific Gravity: 1.072 Chip score: 2.0 (excellent) Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This is a promising clone from our program with good performance overall since 2007. This clone has shown susceptibility to IHN but incidence and severity has been low overall. Yields have always been similar to Atlantic and it has consistently chipped well.

Dual-Use (Chip/Table) clones

BNC182-5

Developed by: USDA/ARS-Beltsville Released: N/A # trials evaluated: 11 since (2008) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: late* % *Standard (Atlantic): MKTB YLD 111%* % *Standard (Snowden): MKTB YLD 97% Specific Gravity: 1.071 Chip score: 2 (good) Overall Appearance: 7 (good)*

Other Attributes or Comments: This is a late maturing clone with good yield and overall appearance. Because of its maturity it fits into a later season for table but will also chip at an acceptable level for the chip market.

NC182-5

Developed by: North Carolina State Univ. Released: N/A # trials evaluated: 12 since (2009) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: late* % *Standard (Atlantic): MKTB YLD 101%* % *Standard (Snowden): MKTB YLD 94% Specific Gravity: 1.071 Chip score: 2.0 (good) Overall Appearance: 7 (good)*

Other Attributes or Comments: This is a full-sibling as BNC182-5 and not the same clone. Like its sibling this clone is late maturing, yields have consistently been good and the shapes are very round. Even though the skin nets the conformity of this clone and the gravity suggest it may have a place as a dual-purpose clone.

Table-stock clones

<u>AF4138-3</u> *Developed by:* Univ. of Maine

trials evaluated: 6 since (2010) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: medium maturing % Standard (Atlantic): MKTB YLD 106% % Standard (Superior): MKTB YLD 123% Specific Gravity: 1.059 Skin Texture: Slightly Netted Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This clone has been evaluated in six trials since 2010 and has typically had higher marketable yields than either Atlantic or Superior. The skin texture has averaged out across the years and trials to be slightly netted but we have seen smooth and moderately smooth skins as well. We don't often have recommendations for white table potatoes but given the marketable yield of this clone and clean internals we will be looking at it again in the future for than purpose.

<u>Augusta</u>

Developed by: Europlant

trials evaluated: 10 since (2011) Skin Color: Yellow, Red Blush in eyes Flesh Color: Yellow (YF2) <u>Historical Data;</u> Maturity: medium % Standard (Yukon Gold): MKTB YLD 107% Specific Gravity: 1.069 Skin Texture: Smooth Overall Appearance: 6 (better than fair)

Other Attributes or Comments: This is a mid-season variety with a good resistance package including: late blight, black leg, PVY, PVA, PLRV and potato wart. We have seen some heat sprouts in this variety and the red blush in the eyes can be a bit too prominent but we think the positives certainly outweigh the negatives and that this clone may have a place in NC production.

Dark Red Chieftain

Developed by: Real Potatoes

trials evaluated: 6 since (2012) Skin Color: Dark Red Flesh Color: White *Historical Data; Maturity: medium to late maturing % Standard (Chieftain): MKTB YLD 67% % Standard (Dark Red Norland): MKTB YLD 85% Specific Gravity: 1.056 Skin Texture: Moderately smooth Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This variety is a progeny of Chieftain with a tighter skin and better color. We saw it in one trial in 2012 and it looked promising so we have continued to place it in trials. This is a round clone unlike Chieftain that has a more oblong shape and the color is certainly better than Dark Red Norland. We placed this in the promising clones section because of these positive aspects and look forward to trialing this clone in the future.

Table-stock clones cont.

<u>Soraya</u> *Developed by:* Norika

trials evaluated: 7 since (2012) Skin Color: Yellow Flesh Color: Yellow (YF2) *Historical Data; Maturity: medium to late maturing % Standard (Yukon Gold): MKTB YLD 149% Specific Gravity: 1.052 Skin Texture: Smooth Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This variety, like Dark Red Chieftain, attracted our attention in 2012 and while yields were no where near the phenomenal performance of 2012 in 2013 and 2014 they were still good beating Yukon Gold in all cases for marketable and total yield. Like Augusta this variety brings along a nice resistance package for growers to exploit: PVY, PLRV, GNRo1, Ro4, late blight and common scab. The biggest detraction of this variety is its shape which tends to be oblong to long instead of the more round to oblong shapes that fit into our production system in NC.

Early Generation Watch List

These are clones that are too early in the trialing process to give a strong recommendation for but we believe deserve a little extra attention.

<u>AF4815-1</u>

Developed by: Univ. of Maine

trials evaluated: 4 since (2012) Skin Color: Red Flesh Color: White *Historical Data; Maturity: medium maturing* % *Standard (Chieftain) MKTB YLD 71%* % *Standard (Dark Rd Norland): MKTB YLD 107% Specific Gravity: 1.057 Skin Texture: Moderately Smooth Overall Appearance: 6 (better than fair)*

Other Attributes or Comments: This clone stood out this year in our James Brothers Trial in Weeksville because of it skin color it was a very nice deep red. The size of the clone like many in the trial was larger than we often see as well. We will continue to look at this clone in 2015.

Early Generation Watch List cont.

BNC312-1 Developed by: USDA-ARS/Beltsville Released: N/A # trials evaluated: 2 since (2013) Skin Color: Tan to Light Brown Flesh Color: White

Historical Data; Maturity: late maturing % Standard (Atlantic): MKTB YLD 170% % Standard (Snowden): MKTB YLD 111% Specific Gravity: 1.074 Chip score: 2.0(excellent) Overall Appearance: 5 (fair)

Other Attributes or Comments: This clone has performed well over the last two years and we look forward to trialing it again in 2015. The percent yield of Atlantic seems a bit high and in fact is the result of very low yielding Atlantics in 2013. The 2014 data still places it at 152% of Atlantic but these numbers will likely shift as more testing is done over the next few years.

BNC317-8

Developed by: USDA-ARS/Beltsville Released: N/A # trials evaluated: 2 since (2013) Skin Color: Tan to Light Brown Flesh Color: White *Historical Data; Maturity: medium maturing % Standard (Atlantic): MKTB YLD 114% % Standard (Snowden): MKTB YLD 112% Specific Gravity: 1.071 Chip score: 2.0(excellent) Overall Appearance: 7 (good)*

Other Attributes or Comments: This clone is a full-sib of the next clone but selected by the USDA-ARS. It has performed well in the last two years and we will look at it again in 2015.

NC317-12

Developed by: North Carolina State Univ. Released: N/A # trials evaluated: 1 since (2014) Skin Color: Brown Flesh Color: White *Historical Data; Maturity: late maturing % Standard (Atlantic): MKTB YLD 171% % Standard (Snowden): MKTB YLD 141% Specific Gravity: 1.079 Chip score: 2.0(excellent) Overall Appearance: 7 (good)*

Other Attributes or Comments: This clone was included in the National Chip Processors Trial (NCPT) in 2014. It performed well in our NCPT as well as the one yield trial it was placed in this year. We look forward to finding out how it performed across the US when we receive data from our cooperators this fall.

IV. RESEARCH STATION AND ON-FARM COOPERATOR LOCATIONS:

Tidewater Research Station (NCDA&CS)/Vernon G. James Research and Extension Center, (NCSU), Plymouth, NC (Washington Co.)
Black Gold Farms, Gum Neck, NC (Tyrrell Co.)
James Brothers Farms, Weeksville, NC (Pasquotank Co.)
Sackette Potatoes / International Farming Corporation, Bayboro, NC (Pamlico Co.)

COOPERATING COUNTY EXTENSION AGENTS:

Frank Winslow, Columbia, Tyrrell Co. Tom Campbell, Elizabeth City, Pasquotank Co. Daniel Simpson, Bayboro, Pamlico Co.

V. PROCEDURES:

	Soil	Planting	Harvest	Days to
Site	Туре	Date	Date	Harvest
Black Gold	Hyde loam	Mar 13	Jun 30, Jul 2	109,111
James Brothers	Hyde mucky silt loam	Mar 5	Jun 23	110
Sackette Potatoes	Brookman mucky silt loam	Mar 28	Jul 7	107
TRS/VGJREC	Portsmouth fine sandy	Feb 27 to	Jun 19 to	Variable 100 - 126
	loam	Mar 31	Jul 23	

EXPERIMENTAL DESIGN: All yield trials were planted in a randomized complete block design with 4 replications except the US Potato Board/Snack Food Association (USPB/SFA) Trial that had 5 replications per clone. Forty-six clones in three trials were evaluated on-farm at Black Gold Farms, twenty-eight clones at James Brothers Farm and sixteen at Sackette Potatoes. Plots consisted of one row with 28 hills spaced 9 inches apart. Spacing between rows was 34 inches at Black Gold Farms, and 38 inches for all other trials including the TRS. Weed and pest control practices for on-farm trials were in accordance with those practiced by the cooperators (Appendix 1).

The on-farm trials were dug using a single-row digger and hand harvested. The TRS/VGJREC trials were harvested using a two-row harvester modified to dig one row at a time. James Brothers was graded using a portable Lockwood Grader which sorts to two grades: A+B's ≥ 1 $\frac{7}{8}$ "; and C's < 1 $\frac{7}{8}$ ". Black Gold, Snack Food, Sackette's and the TRS/VGJREC trials were graded to five classes: 1's < 1 $\frac{7}{8}$ "; 2's > 1 $\frac{7}{8}$ to 2 $\frac{1}{2}$ "; 3's > 2 $\frac{1}{2}$ to 3 $\frac{1}{4}$ "; 4's > 3 $\frac{1}{4}$ to 4"; 5's > 4". Culls were removed and weighed separately in all trials. Each clone was evaluated for tuber quality and appearance during grading using standardized NE-1231 rating codes. A description of the rating codes is provided in Appendix 2.

After grading and weighing, 40 marketable tubers (10 tubers/replication) were randomly sampled from each entry, and 50 tubers were sampled from the USPB/SFA trial. The tubers were cut and scored for the presence of hollow heart, IHN and any other internal defects. A second sub-sample of marketable tubers from each replication was taken for specific gravity readings and a third sub-sample was collected and bulked by entry for chipping tests. Specific gravity was determined using the weight-in-air/weight-in-water method. Chip evaluations were

conducted at the TRS/VGJREC for all trials. Chipping at the TRS/VGJREC was done with in 48 hrs of harvest.

VI. RESULTS:

Environmental Summary

Planting occurred across the entire normal timeframe this year. Beginning at the TRS on the 27th of February and ending on the 31st of March. Our on-farm trials were planted in March between TRS planting dates. Moist conditions due to rains at planting caused us to adjust our schedule but the sporadic nature and timing of the rains allowed us to continue planting throughout March. Temperatures at planting were also cold early on and moderated later in the planting window. Following planting rains were adequate throughout the season prior to bulking. Largely rainfall was insufficient during the bulking phase and did not increase until harvest. Throughout harvest rains were insufficient to delay activities and we were able to finish at the TRS before the end of July.

A. Yield Trials

1. On-Farm Trials

Black Gold Tablestock Variety Trial (Tables 1a and 1b)

The marketable yields of the 14 clones in this trial were compared to Chieftain (402 cwt/a). None of the clones had a higher marketable yield, Soraya (397 cwt/A) was the next highest. One clone, NC201-1 had an overall appearance rating of 8 (better than good) all other overall appearance scores were better than fair (6) or lower. Six of the clones in this trial had internal heat necrosis (IHN) at 10% or greater incidence: Chieftain (68% with a heat necrosis severity rating (HNR) of 7.0), Augusta (60% with an HNR of 7.3), BO14AG (43% with an HNR of 8.0), BO15AL (40% with an HNR of 7.0) Gasora (28% with an HNR of 7.0) and Yukon Gold (20% with an HNR of 8.0). No other internal defects were recorded at 10% or greater incidence. External defects observed in the trial were sunscald, misshapes, soft rot, silver scurf, growth cracks, common scab, secondary growth, heat sprouts, potato virus Y and skin blemishes due to Rhizoctonia.

Black Gold Chip Variety Trial (Tables 2a and 2b)

Atlantic, the standard, had a marketable yield of 369 cwt/a, and was also the highest. Gravities were low overall in the trial, Atlantic had a gravity of 1.074 (5 points less than it historically averages), only two clones had equal gravities: B2833-8 and NC268-1, all others were lower. Four clones had a chip score rating of 1 (exceptional): NCH4-3, NCH6-4, NCH6-10 and Snowden. Two clones: B2834-8 and NC0349-3 had overall appearance scores of 7 (good). Only Atlantic (30% with an HNR of 8.0) had 10% or greater symptoms of IHN. No other internal defects were recorded at incidence levels greater than 10%. External defects observed in the trial were sunscald, growth cracks, skin blemishes due to Rhizoctonia, misshapes, common scab, secondary growth, heat sprouts, potato virus Y and soft rot.

US Potato Board/Snack Food Association Trial at Black Gold Farms (Tables 3a and 3b)

Atlantic had a marketable yield of 363 cwt/a. Five clones had greater marketable yields though only two clones: AF4157-6 (416 cwt/a) and Snowden (416 cwt/a) had a significantly greater marketable yield. Atlantic had a gravity of 1.073 and three clones had equal or greater gravities: Snowden (1.076), MSM246-B (1.074) and AF4157-6 (1.073). One clone, AF4157-6 received a chip color rating of 1 (exceptional) in both the 24 to 48 hour and 5 to 7 day chip tests. Five other clones: A01143-3C, Atlantic, C002024-9W, C002321-4W and Snowden received a chip color rating of 1 (exceptional) in the 24 to 48 hour chip test but not in the 5 to 7 day chip test. All other clones in the trial received a chip score rating of 1.5 (excellent to exceptional) in the 24 to 48 hour chip test. Five clones: CO02024-9W, CO03243-3W, Snowden, W5955-1 and W6609-3 received a chip score rating of 1.5 (excellent to exceptional) in the 5 to 7 day chip test. One clone rated an 8 for overall appearance, CO03243-3W. Six clones expressed IHN at 10% or greater incidence: CO03243-3W (24% with an HNR of 7.4), W5955-1 (24% with an HNR of 7.4), Atlantic (24% with an HNR of 7.8), W6609-3 (18% with an HNR of 8.2), A01143-3C (16% with an HNR of 7.8) and CO02321-4W (12% with an HNR of 7.8). Two clones had BC at levels greater than 10% incidence: W6603-3 (48%) and W5955-1 (38%). No other internal defects were observed at levels greater than 10%. Other external defects observed were: sunscald, misshapes, growth cracks, soft rot, secondary growth, common scab and skin blemishes due to Rhizoctonia.

James Brothers Variety Trial (Tables 4a and 4b)

In this trial three yield standards were chosen: Atlantic (round white standard), Chieftain (red standard) and Yukon Gold (yellow flesh standard). Across all clones two had marketable yields greater than Atlantic (307 cwt/a): Chieftain (356 cwt/a) and AF4138-8 (319 cwt/a) neither was significantly greater. Within the class of reds, none of the clones had higher marketable yields than Chieftain. Two yellow flesh clones had significantly higher marketable yields than Yukon Gold (225 cwt/a): Soraya (297 cwt/a) and Alegria (276 cwt/a). Clones with an overall appearance score of 7 were: AF4138-8, NC182-5 and NC201-1. The specific gravity for Atlantic in this trial was 1.074 and the only other clone with an equal specific gravity was 268-1 (1.074) all others were lower. Five clones: AF4138-8, AF4442-4, Atlantic, NC0349-3 and NC268-1 had a chip score rating of 1.5 (excellent to exceptional). Three clones had incidence of IHN at 10% or greater levels: Atlantic (53% with an HNR of 7.3), Chieftain (33% with an HNR of 8.0) and BO14AG (20% with an HNR of 7.8). The variety Granola expressed vascular ring (VR) at 20%, all other clones had less 10% or no VR. No other internal defects of 10% or greater incidence were recorded in this trial. Culls were primarily due to misshapes, common scab, soft rot, sun scald, growth cracks, heat sprouts, secondary growth, Fusarium dry rot, and skin blemishes due to Rhizoctonia.

Sackette-IFC Variety Trial (Tables 5a and 5b)

Atlantic, the standard, had a marketable yield of 309 cwt/a, two other clones had higher marketable yields: NY148 (322 cwt/a) and NC182-5 (312 cwt/a) though neither were significantly greater. Gravities were low overall in the trial, Atlantic had a gravity of 1.066 (13 points less than the historical average), two clones had equal or greater gravities: NC286-1 and Snowden, all others were lower. Six clones had a chip score rating of 1.5 (excellent to exceptional): AF4157-6, Atlantic, Manistee (MSL292-A), Sebec (AF0338-17), Snowden and W5955-1. One clone, NC182-5, had overall appearance score of 7 (good). Two clones had 10% or greater symptoms of IHN: CO3243-3W (23% with an HNR of 7.8) and Atlantic (10%

with an HNR of 8.0). One clone, MSM246-B expressed incidence of brown center (BC) at 13%. No other internal defects were recorded at incidence levels greater than 10%. External defects observed in the trial were sunscald, growth cracks, skin blemishes due to Rhizoctonia, misshapes, common scab, secondary growth, heat sprouts, and soft rot.

2. TRS/VGJREC Yield Trials

Round White Trial One (Tables 6a and 6b)

Atlantic had a marketable yield of 108 cwt/a. Fourteen of the twenty-seven clones in this trial had greater marketable yields and three of these were significantly greater than Atlantic: NC280-89 (197 cwt/a), NC317-12 (187 cwt/a) and AF4640-1 (168 cwt/a). Atlantic had a gravity of 1.078 and nine clones had equal or greater gravities: NC256-15 (1.095), NC256-41 (1.095), NC252-49 (1.085), AF5281-4 (1.083), AF5332-2 (1.081), NC282-45 (1.079), NC317-12 (1.079), Snowden (1.079) and Yukon Gold (1.078). Four clones had a chip scores of 1: NC256-15, NC256-41, NC280-89 and NC282-45. Seven clones had a chip score of 1.5: Atlantic, NC281-114, NC282-8, NC311-9, NCJ106-2, NCJ107-6 and Snowden. Three clones had an overall appearance rating of 7: AF5292-4, B2876-7 and NC317-12. Six clones expressed IHN at 10% or greater incidence: NC282-8 (48% IHN with an HNR of 6.9), AF5081-4 (45% IHN with an HNR of 6.8), NC282-45 (33% IHN with an HNR of 7.1), NC280-89 (25% IHN with an HNR of 7.0), Atlantic (18% IHN with an HNR of 7.8) and AF5281-4 (15% IHN with an HNR of 8.0). Five clones expressed BC at 10% or greater incidence: AF5292-4 (50%), NCJ107-6 (23%), AF5081-4 (20%), NC280-89 (10%) and Superior (10%). No other internal defects of 10% or greater incidence were recorded in this trial. Common external defects were misshapes, sunscald, soft rot, common scab, growth cracks, secondary growth, PVY, and skin blemishes attributed to Rhizoctonia.

Round White Trial Two (Tables 7a and 7b)

Of the sixteen clones in this trial, none had higher average marketable yields higher than Atlantic (186 cwt/A). Atlantic had a specific gravity of (1.079) and two clones had equal or greater specific gravity: B2952-9 (1.082) and B2947-5 (1.079). Five clones received a chip rating of 1.5: B2950-9, BNC318-9, NCB2901-3, NCH4-3 and NCH6-10. Two clones: B2947-5 and BNC317-8 received an overall appearance score of 8 (better than good). Three clones: Atlantic, B2850-9 and B2954-11 received an appearance score of 7. Two clones expressed vascular ring discoloration (VR) at levels equal to or greater than 10% incidence: B2947-5 (13%) and Superior (10%). No other internal defects were expressed at levels of 10% or greater. Common defects were misshapes, soft rot, sunscald, growth cracks, common scab, star cracking, infected lenticels, secondary growth, common scab and skin blemishes attributed to Rhizoctonia.

Round White Trial Three (Tables 8a and 8b)

Of the twelve clones in this trial, ten had higher average marketable yields higher than Atlantic (83 cwt/A) and two were significantly greater: B2967-5 (167 cwt/a) and NC264-7 (149 cwt/a). Atlantic had a specific gravity of (1.078) three clones had a greater gravity: B2954-10 (1.080), BNC312-1 (1.080) and NC268-1 (1.080). Two clones: NC0349-3 and NC182-5 received a chip rating of 1.5. Four clones received overall appearance scores of 7: Atlantic, B2967-5, NC182-5 and NC268-1. One clone, B2954-10 (10%) expressed VR at levels equal to or greater than 10% incidence. No other internal defects were expressed at levels of 10% or

greater. Common defects were misshapes, soft rot, sunscald, growth cracks, common scab, infected lenticels and skin blemishes attributed to Rhizoctonia.

NE-1031 Round White Trial. (Tables 9a and 9b)

Ten of the sixteen clones in this trial had greater marketable yield than Atlantic (53 cwt/A), four were significantly higher: Snowden (117 cwt/a), MSQ086-3 (108 cwt/a), NYH15-17 (108 cwt/a) and BNC182-5 (101 cwt/a). Atlantic had a specific gravity of 1.078 one clone had higher or equal gravity, NY148 (1.082). Three clones: AF4138-8, Atlantic and Snowden received a chip rating of 1.5. One clone, BNC182-5, had overall appearance ratings of 7. Three clones expressed IHN at levels at 10% or greater incidence: MSQ089-3 (35% IHN with an HNR of 6.1), Atlantic (20% with an HNR of 7.2) and NY148 (13% IHN with an HNR of 8.0). One clone expressed VR at 10% or greater incidence: Superior (10%). Four clones expressed BC at 10% or greater incidence: BNC182-5 (23%), Snowden (23%), Katahdin (18%) and MSQ086-3 (13%). No other internal defects were expressed at levels of 10% or greater. The most common culls were misshapes, sunscald, soft rot, PVY and common scab.

NE-1031 Red Trial. (Tables 10a and 10b)

The standard, Chieftain, had a marketable yield of 205 cwt/a and all other clones had lower marketable yields. One clone, NC201-1, received an overall appearance score of 7. Three clones expressed IHN at levels at 10% or greater incidence: Chieftain (50% IHN with an HNR of 6.6), AF4831-2 (30% IHN with an HNR of 7.5) and CO97222-1R/R (20% IHN with an HNR of 7.8). One clone, BNC320-12 expressed soft rot (SR) at 15%. No other internal defects were expressed at levels of 10% or greater. Culls were due mostly to soft rot, misshapes, sunscald, growth cracks, silver scurf, secondary growth, common scab and skin blemishes attributed to Rhizoctonia.

NE-1031 Russet Trial. (Tables 11a and 11b)

The standard, Russet Norkotah, had a marketable yield of 74 cwt/A. Of the eleven clones in the trial nine had higher marketable yields and three of those were significantly greater: Dakota Trailblazer (161 cwt/a), AF4124-7 (134 cwt/a) and AF4320-17 (132 cwt/a). Nine clones had an equal or higher specific gravity than Russet Norkotah 3117 (1.069): AF4172-2 (1.082), AF4788-1 (1.080), AF5072-12 (1.079), Dakota Trailblazer (1.075), AF4320-17 (1.072), Shepody (1.072), AF5060-27 (1.071), AF4127-7 (1.070) and Teton Russet (1.070). Dakota Trailblazer had the highest overall appearance rating in the trial with a 6 (better than fair). Russet Burbank was the only clone to express internal defects of any kind at levels greater than or equal to 10%, IHN (60% with an HNR of 6.2) and BC (33%). No other clones internal defects were expressed at levels of 10% or greater. Culls were mostly soft rot, misshapes, sunscald, growth cracks, secondary growth, common scab, infected lenticels and skin blemishes attributed to Rhizoctonia.

B. Breeding and Early Generation Selection Efforts

NCSU Potato Variety Development Efforts

Our efforts to develop varieties in North Carolina begin with selection as single-hill plots in year one. Because potatoes are clonally propagated via tubers each hill selected has the potential to become a new variety. The single-hill selections are advanced to 6-hill and 20-hill plots with selection in years two and three, respectively. Following this, materials are placed in a 60-hill plot in year four for a final cycle of selection and then increased in a 160-hill plot the next year before entering into yield trials. Our single-hill materials have come from the USDA-ARS and our own crosses made at the TRS. Evaluation of germplasm from different breeding programs allows us to review a wider breadth of materials increasing the likelihood of developing varieties suitable not only for NC and the Southeast, but with broad adaptability overall. Mini-tubers, which are planted in the field as single-hills, are generated in the TRS greenhouses. This year, 10,619 single-hills were planted and 272 clones were selected averaging a 2.6% selection rate.

In our second to fourth year selection plots out of the 420 clones planted in our 6-hill plots (Yr. 2), 110 (26%) were selected for future evaluation. While in the 20-hill plots (Yr. 3), 89 clones were planted with 27 (30%) being selected for further evaluation. In our 60-hill plots (Yr. 4), 24 clones were planted and 17 (71%) were selected.

Specialty Clone Evaluation

Each year our program plants at least one trial with specialty types. These are a loosely defined set of materials that have traits that place them into a niche market, such as tuber flesh color, pigmentation around the eyes, or fingerling shapes. We begin selection at a 3-hill stage each year to give us a better look at these clones and typically only plant out around 50 to 60 tubers per family. After the first year of selection they are incorporated into our normal selection routine at the 6-hill stage though from this year forward they will be advanced from 3 hills to 12 hills for the 2nd year of evaluation. This year we evaluated 1114 clones and selected 51 (4.6%). In addition to this we also conducted a small replicated trial (Table 12, Figures 1 & 2) with 25 clones from Colorado State University and materials of our own, as well as several released varieties. Yield data was taken and since the plots were small it was not partitioned into the various size classes. Figure 2 also shows what some of the clone looked like after chipping.

Germplasm Enhancement for CPB Resistance

Parental material used in crosses to generate the families come from one or more of three species of potato: *Solanum tubersosum, S. chacoense,* and *S. berthaltii.* Unlike our other variety development work, the CPB resistance project requires two identical plots to be planted the first year materials go to the field. To get a better look at the clones, we plant 2-hill plots in both the CPB screen and selection trials. This year we planted roughly 987 clones to evaluate resistance and selected 86 clones for resistance and for agronomic traits. These will be advanced next year in both our CPB nursery and as 6 hill plots for selection purposes. In our 6 hill plots this year, 47 of the 420 clones came from this CPB resistance project. From the 47 CPB clones, 9 were selected for advancement to the 20 hill selection plots and the next cycle of CPB resistance screening. Of the 89 clones in our 20 hill plots 7 clones were part of the CPB resistance screen and 2 of those were selected for advancement to the 60 hills. Of the 24 clones in this year's 60 hill plots 7 was a CPB clone and 4 were selected for further evaluation.

Early Generation Selection Trials

Early generation selection involves selection and evaluation of materials at early stages in the breeding/variety development process. By selecting early generation materials in multiple environments we hope to identify materials that are broadly adapted. Early generation selection efforts also promote collaboration and reduce overall breeding costs, and they are especially important when the success of a variety depends on seed being produced in the north while the crop is produced in the south as is the case with all varieties grown in NC.

University of Maine Trial

In this trial, we evaluate clones from Maine as 8-hill plots in NC and make selections. These clones have already been through two cycles of selection in Maine. After selection in NC, we send a list of selected clones to our cooperators at the University Maine (UME) and they use the information when they select their materials. This year we evaluated 305 ME clones and selected 91. These will be evaluated in 2015 in a non-replicated 28-hill plot in a yield trial.

Observational Trial.

Thirty-eight clones were evaluated in this trial as well as the standards: Atlantic, Chieftain, Dark Red Norland, Snowden, Superior, and Yukon Gold. Each 28-hill plot was non-replicated. This trial is part of an early generation study we are conducting with the UME and is our 2nd opportunity to evaluate them. Last year we selected these clones in an 8-hill non-replicated format. This year we made notes on these clones and indicated which ones we thought had potential as cultivars and made another round of selections. We selected a total of 8 clones. Next year we will see some of the survivors from this trial in replicated yield trials provided they survive selection in ME.

USDA-ARS Trial

This is a multistate selection trial initiated by the USDA-ARS, the institutions/states involved are: The University of Florida (FL), NC State University (NC), USDA-ARS (MD, trial location in ME), The University of Maryland (MD), Pennsylvania State University (PA), Cornell University (NY) and the University of Maine (ME). Each state received 8 hills of the same 262 clones. All were weighed for total yield, rated for the nine standard NE1231 external ratings, and ten tubers from each plot were cut for internal evaluations as well. At our location we selected a total of 77 clones. Next year we will reevaluate these clones in our non-replicated 28-hill yield trial (Unreplicated trial).

Unreplicated Trial.

Thirty-three clones were evaluated in this trial as well as the standards: Atlantic, Chieftain, Dark Red Norland, Snowden, Superior and Yukon Gold. Each 28-hill plot was non-replicated. This trial is part of an early generation study we are conducting with the USDA-ARS and is our 2nd opportunity to evaluate them. Last year we selected these clones in an 8-hill non-replicated format. This year we made notes on these clones and indicated which ones we thought had potential as cultivars and made another round of selections. We selected a total of 3 clones. We will evaluate these clones in a trial with two replications next year (2by20 Trial).

2by20 Trial.

Ten clones were evaluated in this trial along with the standards: Atlantic, Chieftain, Dark Red Norland and Snowden. This is the 3rd cycle of evaluation and selection of these USDA-ARS early generation materials. Out of the 10 in this trial we kept a total of 2 clones. Next year these will be evaluated in one of our standard replicated trials (4 reps, 28 hills, randomized complete block design).

VII. ACKNOWLEDGMENTS

This work could not be conducted without the assistance of the growers, county extension agents and NCDA&CS TRS staff. We are grateful for their continued support and assistance. Seed for the trials was provided by: Dr. Walter De Jong, Cornell University; Dr. Creighton Miller, Texas A&M; Dr. Dave Douches, Michigan State University; Dr. Greg Porter, University of Maine; Dr. Richard Veilleux, Virginia Tech University; and Dr. Kathleen Haynes, USDA/ARS, Beltsville, MD. Also a special thanks goes to Mr. Todd Bradley and the staff at Maine Farmers Exchange, Presque Isle, ME for their efforts to procure small amounts of seed for shipment to NC. Another very special thank you is extended to Dan Corey, Monticello. This project is funded in part by The North Carolina Potato Growers Association, the U.S. Potato Board, the Snack Food Association, the USDA-NIFA Potato Special Research Grants program, UTZ Quality Foods Inc and Real Potatoes Ltd. Their continuing support is very much appreciated.

<u> </u>	· · ·						,	Siz	e Distril	bution by	Class ²			
<u>T</u>	otal Yield	Market	able Yield		(% of	total	yield)	1 7/8	2 1/2	Specific		
Clone	cwt/A	cwt/A	%Chf.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³		
Agila	432	252	63	10	56	2	0	0	32	58	2	1.056		
Augusta	376	273	70	12	41	29	1	0	17	71	30	1.065		
BNC201-1	329	308	78	4	21	67	6	0	3	93	73	1.069		
BO 14 AG	424	316	80	22	67	7	0	0	3	74	7	1.052		
BO15AL	533	352	89	21	39	24	3	0	13	66	27	1.058		
BO15V	389	245	61	13	52	10	0	0	24	63	10	1.051		
Chieftain	461	402	100	6	29	56	1	0	7	87	58	1.055		
Dark Red Chieftair	n 362	283	70	10	41	37	0	0	12	78	37	1.058		
Dark Red Norland	363	315	79	8	41	44	2	0	5	87	46	1.055		
Gasora	386	144	37	60	36	1	0	0	3	37	1	1.067		
NC201-1	364	286	72	17	69	9	0	0	5	78	9	1.056		
Soraya	449	397	100	6	58	30	0	0	6	88	30	1.053		
StrawberryPaw	390	330	85	5	24	54	3	0	14	82	58	1.052		
Yukon Gold	330	277	69	6	21	53	10	1	9	84	63	1.069		
Grand Mean	399	298												
CV(%)	13	19												
LSD (k=100)	74	83												

Table 1a. Black Gold Farms Tablestock Variety Trial. Total and marketable yield, percentage of total yield by size class, specific gravity, and chip scores of potato clones harvested 111 DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

¹ DAP= Day After Planting; DVK= Days of Vine Kill ² Size classes: 1's < 1 7/8"; 2's 1 7/8 to 2 1/2"; 3's 2 1/2 to 3 1/4"; 4's 3 1/4 to 4"; 5's \geq 4"; Culls = all defective potatoes.

³ Determined by weight in air / water method.

		Plant	: Data ²					Tuk	ber Da	ata²					% Inter	nal	Defe	cts³		
Clone	TYPE	DIS	POLL	MAT	CLR	TXT	тсх	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR	ΗH	VR	BC	SR	Comments ⁴
Agila	6	9	8	5	7	7	5	7	7	8	6	8	3	0	9	0	0	0	0	^SG,^HS,SS,MS,GC,RZ,SR,YF1
Augusta	6	9	9	6	7	6	6	7	5	8	5	6	3	60	7.3	0	0	0	0	^SG,SS,MS,^RZ,PVY,YF2 24IHN(13-8,7-7,4-6)
BNC201-1	8	9	9	6	2	7	7	5	2	8	7	7	5	0	9	0	0	0	0	^RZ,SS,MS,GC,YF2
BO 14 AG	9	9	9	9	8	8	4	7	7	8	4	5	1	43	8	0	0	0	0	^^SG,^RZ,SS,MS,GC,CS, 17IHN(11-8,5-7,1-6)
BO15AL	9	9	8	8	7	5	7	7	2	7	6	8	3	40	7	0	0	0	0	^^SG,SS,MS,RZ,16IHN(10-8,2-7,4-6)
BO15V	9	9	8	8	3	7	3	7	7	8	4	7	2	5	9	0	0	0	0	^SG,KNOBS,MS,RZ,SS,GC,CS 2IHN(2-8)
Chieftain	9	9	8	6	3	6	7	5	3	7	5	7	4	68	7	0	0	0	0	SG,RZ,MS,SS,SR, 27IHN(7-8,8-7,12-6)
Dark Red Chieftain	9	9	8	6	2	7	7	6	2	7	5	4	5	0	9	0	0	0	5	^SR,SS,RZ
Dark Red Norland	5	9	9	3	2	6	6	7	4	8	5	8	6	0	9	0	0	0	0	SS,RZ,
Gasora	6	9	9	5	3	5	3	7	5	8	2	6	4	28	7	0	0	0	0	MS,CS,11IHN(3-7,8-6)
NC201-1	5	9	9	2	1	7	6	7	6	8	5	6	8	0	9	0	0	0	0	SR,SS,SISC,MS,YF2
Soraya	6	9	8	8	7	7	5	7	6	8	6	8	5	3	9	0	0	5	0	MS,GC,RZ,SS,SG,1IHN(1-8),YF2
StrawberryPaw	8	9	9	7	2	8	6	4	4	8	7	7	4	0	9	0	0	3	0	MS,^RZ,GC,SS,SG
Yukon Gold	8	9	8	5	7	7	5	7	3	8	7	7	6	20	8	0	0	5	0	SR,SS,^CS,8IHN(2-8,1-7,5-6),YF2

Table 1b. Black Gold Farms Tablestock Variety Trial. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 111 DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

¹ DAP= Day After Planting; DVK= Days of Vine Kill

² See NE1031 Standard Potato Rating System for to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in A and B size classes. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

	<u>Total Yield</u>	<u>Marketabl</u>	e Yield	. <u></u>	(9	6 of t	total	yield	(k	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ^₄	
Accumulator	390	367	93	4	25	63	6	0	2	94	69	1.072	1.5	
AF4386-16	466	380	96	14	50	31	0	0	5	81	31	1.068	1.5	
AF4552-5	375	334	84	5	23	59	7	1	5	89	66	1.066	1.5	
AF5039-15	381	335	85	9	38	50	0	0	3	88	50	1.065	1.5	
Atlantic	446	396	100	7	39	49	1	1	3	89	50	1.074	1.5	
B2814-14	370	339	86	6	21	59	12	0	3	92	70	1.060	1.5	
B2833-16	342	322	81	4	22	66	6	0	2	94	72	1.069	1.5	
B2833-8	384	317	80	16	49	33	0	0	1	82	33	1.074	1.5	
B2834-8	267	254	65	3	26	68	2	0	2	95	69	1.071	2	
Eva	240	197	50	2	12	60	10	0	16	82	70	1.061	2	
Lamoka(NY139)) 417	377	95	6	44	46	0	0	3	90	47	1.066	1.5	
NC0349-3	420	351	89	14	55	28	1	0	3	83	29	1.066	1.5	
NC182-5	477	386	98	17	58	23	0	0	2	81	23	1.068	1.5	
NC264-7	395	310	78	7	31	45	2	0	15	78	48	1.060	2.5	
NC268-1	372	321	82	9	36	50	0	0	5	86	51	1.074	2	
NCB2890-2	304	231	58	18	53	23	0	0	6	76	23	1.068	2	
NCH4-3	369	300	76	16	62	19	0	0	3	81	19	1.071	1	
NCH6-10	317	264	67	14	51	32	0	0	3	83	32	1.068	1	
NCH6-4	317	276	70	11	49	38	1	0	2	87	38	1.069	1	
Sebec(AF0338-17	7) 392	356	90	6	29	59	4	0	2	91	62	1.067	2	
Snowden	411	379	96	7	41	51	0	0	1	92	51	1.069	1	
Grand Mean	371	322												
CV(%)	12	14												
LSD (k=100)	62	60												

<u>Table 2a. Black Gold Farms Chip Variety Trial.</u> Total and marketable yield, percentage of total yield by size class, specific gravity, and chip scores of potato clones harvested 109 DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

¹ DAP= Day After Planting; DVK= Days of Vine Kill

² Size classes: 1's < 17/8"; 2's 17/8 to 21/2"; 3's 21/2 to 31/4"; 4's 31/4 to 4"; $5's \ge 4"$; Culls = all defective potatoes.

³ Determined by weight in air / water method.

⁴ Chip Color Ratings conducted by NCSU Potato Breeding Program at TRS/VGJREC:

1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable

		Plant	Data ²	2				Tuk	ber Da	ata ²				9	% Inte	rnal	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	тсх	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR	ΗH	VR	BC	SR	Comments ^₄
Accumulator	9	9	9	6	6	6	6	5	2	5	8	7	4	0	9	0	0	0	0	CS,MS,LUMPY,DAE,DSE
AF4386-16	7	9	9	5	6	5	6	6	3	7	5	7	5	3	9	0	0	3	0	SS,^SG,RZ,MS,FF
AF4552-5	9	9	8	8	6	6	6	6	2	6	7	7	5	0	9	0	0	0	0	MS,DAE,DSE,RZ,SS,SG,SC
AF5039-15	6	8	9	5	6	7	6	6	2	7	5	6	6	0	9	0	0	0	0	PVY,SR,SS,RZ/CS,SG
Atlantic	6	9	8	5	6	5	6	5	3	7	6	7	5	30	8	0	0	3	0	RZ,CS,MS,SS,12IHN(10-8,2-7)
B2814-14	6	9	9	5	7	5	7	6	2	8	8	8	8	0	9	0	0	0	0	SS,RZ,YF1, CHIP(VR)
B2833-16	9	8	9	7	6	5	5	6	3	7	6	8	6	0	9	0	0	0	0	RZ,MS,SS,GC,SG
B2833-8	6	9	8	5	9	6	7	6	2	7	5	9	8	0	9	0	0	0	0	SS,MS
B2834-8	5	9	9	4	6	6	7	6	2	7	7	8	7	0	9	0	0	0	0	SS,SR,RZ
Eva	7	9	9	6	6	7	6	7	5	8	7	5	4	0	9	0	0	0	0	SS,SR,GC,RZ/CS,MS
Lamoka(NY139)	9	9	8	6	9	6	5	7	4	8	6	7	6	0	9	0	0	0	0	SS,MS,RZ/CS
NC0349-3	6	9	9	5	6	6	7	6	1	7	5	7	7	0	9	0	0	0	0	SR,RZ,SS,PVY
NC182-5	6	9	9	8	6	5	6	6	1	6	4	8	6	0	9	0	0	0	0	MS,RZ,SS
NC264-7	9	5	9	8	9	8	7	7	2	7	7	4	3	0	9	0	0	0	0	MS,^GC,^CS,SS
NC268-1	6	6	9	8	6	5	6	5	2	6	6	7	5	0	9	0	0	0	0	MS,GC,SS,RZ
NCB2890-2	5	6	8	4	6	7	6	7	3	7	4	7	5	0	9	0	0	0	0	RZ,GC,SS,MS,CS
NCH4-3	5	5	9	5	9	6	7	6	2	8	4	8	5	5	9	0	0	3	0	^GC,RZ,SS,MS,2IHN(2-8)
NCH6-10	6	5	9	5	9	7	5	7	3	8	5	8	5	0	9	0	0	0	0	GC,RZ,SS,MS
NCH6-4	6	5	9	5	9	7	5	7	3	8	6	8	6	0	9	0	0	0	0	SS,IL,MS
Sebec(AF0338-17)	9	9	9	7	6	6	5	7	4	7	7	7	6	0	9	0	0	0	0	SS,MS,SR,GC,RZ
Snowden	9	9	8	7	5	5	6	6	2	5	6	8	4	0	9	0	0	0	0	MS,DAE,DSE,LUMPY,SS,RZ

Table 2b. Black Gold Farms Chip Variety Trial. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 109 DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

¹ DAP= Day After Planting; DVK= Days of Vine Kill

² See NE1031 Standard Potato Rating System for to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in A and B size classes. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

Table 3a. US Potato Board/Snack Food Association Trial. Total and marketable yield, percentage of total yield by size class, specific gravity and chip scores of potato clones of potato clones harvested 109DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

				Size	e Dist	ribut	ion b	y Cla	ss ²			_	Chip	Color ⁴
	<u>Total Yield</u>	Marketab	ole Yield		(9	% of	total	yield	l)	1 7/8	2 1/2	Specific	24 to	5 to
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	48 hrs	7 Days
A01143-3C	414	357	98	12	68	18	0	0	2	86	18	1.064	1	2.5
AF4157-6	484	416	116	12	51	35	0	0	2	86	35	1.073	1	1
Atlantic	400	363	100	5	23	59	9	0	4	91	67	1.073	1	2
CO02024-9W	475	402	111	14	60	25	0	0	2	84	25	1.064	1	1.5
CO02321-4W	467	347	95	16	32	44	0	0	8	76	45	1.048	1	2
CO03243-3W	418	387	107	5	33	55	4	0	2	93	59	1.065	1.5	1.5
MSK061-4	421	370	102	8	38	49	1	0	5	88	50	1.076	1.5	2
MSM246-B	352	260	72	5	32	41	1	0	21	74	42	1.074	1.5	2
Snowden	451	416	115	7	46	45	1	0	1	92	46	1.076	1	1.5
W5955-1	326	285	79	5	22	56	10	1	7	88	66	1.070	1.5	1.5
W6609-3	246	209	58	11	35	49	1	0	4	85	50	1.070	1.5	1.5
Grand Mean	405	347												
CV(%)	13	11												

¹ DAP = Days After Planting; DVK = Days to Vine Kill

46

61

² Size classes: 1's < 17/8"; 2's 17/8 to 21/2"; 3's 21/2 to 31/4"; 4's 31/4 to 4"; $5's \ge 4"$; Culls = all defective potatoes.

³ Determined by weight in air/water method.

LSD (k=100)

⁴ Chip Color Ratings conducted by the NCSU potato breeding program at the TRS/VGJREC and by Utz Quality Foods in Hanover PA: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data ²					Tuk	ber Da	ata²				(% Inte	rnal	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	TXT	ТСХ	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR	ΗH	VR	BC	SR	Comments⁴
A01143-3C	9	9	8	9	6	5	4	5	2	7	5	8	5	16	7.8	0	0	0	0	SG,RZ,MS,SS,PVY,8IHN(5-8,3-7)
AF4157-6	6	9	9	4	6	5	5	6	3	8	4	7	6	0	9	0	0	0	0	RZ,SS,SR,MS
Atlantic	7	9	8	5	6	5	6	4	3	7	7	6	5	24	7.8	0	0	0	0	RZ,MS,GC,SS,12IHN(9-8,2-7,1-6)
CO02024-9W	6	9	8	4	9	7	3	6	2	7	5	7	5	2	8.6	0	0	0	0	SS^,MS,SR,1IHN(1-8)
CO02321-4W	6	9	9	4	9	7	5	7	2	8	6	8	6	12	7.8	0	0	0	0	SR,MS,PVY,^SS,6IHN(5-8,1-7)
CO03243-3W	9	9	9	7	6	5	6	6	3	7	6	7	8	24	7.4	0	2	0	0	GC,RZ,CS,SS,MS, 12IHN(4-8,5-7,1-6,1-5,1-4)
MSK061-4	8	9	8	7	9	6	6	6	3	8	5	8	6	0	9	0	0	0	0	RZ,SS,SG,SR,GC
MSM246-B	9	9	8	7	6	5	5	6	2	7	6	5	3	2	8.8	2	0	0	2	^^RZ(CS),MS,SS,1IHN(1-8)
Snowden	9	8	7	7	5	5	5	5	2	5	6	9	4	0	9	0	0	0	0	MS,DSE,DAE,SS,LUMPY
W5955-1	8	9	8	8	6	5	6	7	2	8	8	5	5	24	7.4	0	0	38	0	^^RZ/CS,SS,12IHN(3-8,6-7,3-6)
W6609-3	6	8	8	7	6	5	5	7	3	7	6	7	6	18	8.2	0	0	48	0	RZ,PVY,MS,GC,9IHN(4-8,5-7)

Table 3b. US Potato Board/Snack Food Association Trial. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 109 DAP¹ at Black Gold Farms, Gum Neck, Tyrrell Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (50 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

	T + 12/11					Size Distri	bution by Cla	ass ²	0		
	Total Yield		Marke	table YI	eld	<u>(% of </u>	total yield)		Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	%Chf.	.%Yuk	A's + B':	s C's	Culls	Gravity ³	Color ⁴	
AF4138-8	348	319	105	92	144	8	92	0	1.056	1.5	
AF4442-4	299	273	90	77	123	7	91	2	1.066	1.5	
AF4815-1	336	289	95	82	129	4	86	11	1.057		
AF4831-2	333	277	91	79	124	14	83	3	1.055		
AF4985-1	341	301	100	85	135	3	88	9	1.053		
Alegria	321	276	92	79	125	7	86	7	1.063		
Atlantic	328	307	100	88	137	4	94	2	1.074	1.5	
Augusta	291	192	64	55	87	18	66	17	1.064		
Baltic Cream	222	0	0	0	0	37	0	63	1.062	2	
BO14AG	307	0	0	0	0	28	0	72	1.056	5	
Chieftain	390	356	118	100	159	4	91	5	1.056		
Dark Red Chieftain	270	235	78	67	106	7	87	6	1.061		
Dark Red Norland	305	273	92	77	123	8	89	3	1.058		
Granola	171	0	0	0	0	44	0	56	1.047		
NC0349-3	315	282	93	80	126	9	90	1	1.068	1.5	
NC182-5	345	247	82	70	112	27	72	1	1.073	2	
NC201-1	234	169	57	48	78	24	72	4	1.060		
NC264-7	245	191	62	54	85	7	78	15	1.059	3	
NC268-1	199	170	57	49	78	11	85	3	1.074	1.5	
NC293-7	257	195	65	54	87	20	75	5	1.061		
Red Maria (NY129)	229	192	64	54	86	11	84	5	1.047		
Sebec(AF0338-17)	297	273	90	79	124	7	92	1	1.071	2	
Smiley	258	135	46	38	62	13	52	35	1.068		
Snowden	331	300	99	86	135	4	91	5	1.069	2	
Soraya	406	297	99	84	133	11	73	16	1.059		
StrawberryPaw(NY136)	277	234	78	66	105	6	84	10	1.052		
Superior	292	266	88	76	119	4	91	4	1.069	3	
Yukon Gold	254	225	74	64	100	5	89	6	1.068		
Grand Mean	293	224									
CV(%)	14	15									
LSD (k=100)	55	50									

<u>Table 4a. James Brothers Variety Trial.</u> Total and marketable yield, percentage of total yield by size class, specific gravity and chip scores of potato clones harvested 110 DAP¹ at James Brothers Farm, Weeksville, Pasquotank Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² Size classes: A's + B's > 1 7/8"; C's \leq 1 7/8"; Culls = all defective potatoes

³ Determined by weight in air/water method.

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data ²					Tuk	ber Da	ata ²				(% Inte	ernal	Defe	ects ³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	тсх	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNF	R HH	VR	BC	SR	Comments⁴
AF4138-8	6	9	9	5	6	6	7	6	2	6	6	9	7	0	9.0	0	0	0	0	MS,DAE,Some flats
AF4442-4	9	9	9	6	6	6	4	5	1	8	5	9	5	0	9.0	0	0	0	0	CS,MS,SS
AF4815-1	6	9	9	5	2	7	7	5	5	7	8	8	5	0	9.0	0	0	0	0	CS,RZ,MS,GC
AF4831-2	6	9	8	4	2	8	6	6	4	7	4	8	6	3	8.5	0	0	0	0	MS,SR,VN CLR,1IHN(1-7)
AF4985-1	9	9	9	7	2	8	7	6	3	6	7	8	5	3	8.8	0	0	0	0	MS,GC,RZ1IHN(1-8)
Alegria	8	9	8	7	7	6	3	7	5	7	5	9	4	0	9.0	0	0	0	0	HS,SG,MS
Atlantic	6	8	8	5	6	5	6	6	2	7	6	9	6	53	7.3	0	0	0	0	MS,21IHN(10-8,7-7,2-6,1-5)
Augusta	6	9	9	5	7	7	6	6	5	7	5	9	4	8	8.5	0	0	0	0	^SG,MS,RZ,HSM3IHN(3-8)
Baltic Cream	9	9	9	9	6	7	7	7	1	7	4	9	2	5	8.3	0	0	0	0	ALL CULLED HS,SG,MS,
																				2IHN(1-8,1-7),CHIP(^VR)
BO 14 AG	9	9	9	9	6	7	5	7	4	8	4	5	1	20	7.8	0	0	0	0	ALL CULLED, HS, SG, MS, CS,
																				8IHN(5-8,3-7),CHIP(^VR,BC)
Chieftain	9	9	9	6	3	7	5	5	3	7	5	6	5	33	8.0	0	0	0	0	CS,HS,GC,MS,13IHN(7-8,6-7)
Dark Red Chieftain	9	9	9	6	2	7	7	6	2	7	5	9	6	3	8.8	0	0	0	0	MS,HS,GC,1IHN(1-8)
Dark Red Norland	5	9	9	4	2	7	4	7	5	7	5	9	5	8	8.5	0	0	0	0	MS,GC,3IHN(2-8,1-7)
Granola	9	9	9	9	7	6	4	7	5	7	3	9	1	0	9.0	0	20	0	0	ALL CULLED HS,MS
NC0349-3	6	9	9	5	6	5	7	6	1	7	5	8	6	0	9.0	0	0	0	0	MS,CS,DSE
NC182-5	6	9	9	8	6	6	6	7	1	7	4	9	7	0	9.0	0	0	0	0	MS
NC201-1	5	9	9	3	1	8	7	7	6	8	5	9	7	0	9.0	0	5	0	0	MS,GC
NC264-7	8	5	9	9	6	7	6	6	2	7	7	5	3	0	9.0	0	0	0	0	GC,MS,CS,SR,CHIP(VR)
NC268-1	6	6	9	8	6	5	5	6	2	6	5	9	4	0	9.0	0	0	0	0	MS,GC
NC293-7	6	9	9	5	1	8	4	7	2	8	5	9	6	0	9.0	0	0	0	0	MS
Red Maria (NY129)	8	9	9	7	2	6	7	7	2	8	6	7	5	0	9.0	0	0	3	0	GC,MS,RZ,CS
Sebec(AF0338-17)	9	9	9	7	6	5	6	7	3	7	7	8	6	0	9.0	0	0	0	0	MS,FS,SS
Smiley	6	9	8	5	3	8	4	6	5	8	5	9	3	3	8.8	0	0	0	0	SG,HS,MS,1IHN(1-8)
Snowden	9	9	8	7	1	5	6	6	2	5	7	9	5	0	9.0	0	0	5	0	MS,SS
Soraya	7	9	9	9	7	8	6	6	6	8	5	9	5	0	9.0	0	0	8	0	HS,MS,RZ
StrawberryPaw(NY136)	8	9	9	7	1	8	7	6	3	8	8	8	6	0	9.0	0	0	0	0	MS,AC,GC
Superior	5	9	9	4	1	6	4	7	3	6	7	9	5	3	8.8	0	5	0	0	SS,MS,1IHN(1-8)
Yukon Gold	8	9	9	6	7	7	6	6	5	7	5	9	5	8	6.5	0	0	5	0	HS,SG,MS,RZ,SS,
																				3IHN(1-7,1-6,1-4)

<u>Table 4b. James Brothers Variety Trial.</u> Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 110 DAP¹ at James Brothers Farm, Weeksville, Pasquotank Co., NC – 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in A and B size classes. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

`	•			Size	e Dist	tribut	ion k	by Cl	ass ²					
	<u>Total Yield</u>	Marketab	le Yield		(9	% of t	total	yiel	d)	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ⁴	
AF4157-6	327	266	86	9	40	39	3	0	9	81	42	1.060	1.5	
Atlantic	351	309	100	4	24	60	4	0	8	88	64	1.066	1.5	
CO02321-4W	245	179	59	15	43	28	2	0	12	73	30	1.064	2	
CO03243-3W	325	272	89	6	18	59	6	2	10	83	65	1.056	2	
Lamoka(NY139)	331	246	81	13	21	51	2	0	13	74	53	1.057	2	
Manistee(MSL292-	A) 297	185	59	5	21	38	1	0	34	61	40	1.062	1.5	
MSM246-B	275	215	71	8	26	51	2	0	13	78	52	1.062	2.5	
NC0349-3	326	279	90	9	40	45	1	0	5	86	46	1.060	2	
NC182-5	386	312	102	13	39	41	1	0	6	81	41	1.065	2	
NC264-7	336	221	73	12	30	36	0	0	22	66	36	1.057	3	
NC268-1	203	138	45	13	24	40	4	0	19	68	44	1.067	2	
NY148	372	322	105	10	47	39	0	0	4	86	39	1.064	2	
Sebec(AF0338-17)	342	271	88	7	24	52	5	0	13	80	56	1.063	1.5	
Snowden	302	263	86	8	26	55	5	0	6	86	60	1.067	1.5	
W5955-1	356	290	94	6	23	46	13	1	12	82	59	1.056	1.5	
• • • •	0.45	0.40												
Grand Mean	315	249												
CV(%)	17	20												

Table 5a. Sackette-IFC Variety Trial. Total and marketable yield, percentage of total yield by size class, specific gravity and chip scores of potato clones of potato clones harvested 101 DAP¹ at the Sackette Potatoes Farm, Vandemere, Pamlico Co., NC - 2014

84 ¹ DAP = Days After Planting; DVK = Days to Vine Kill

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² Size classes: 1's < 1 7/8"; 2's 1 7/8 to 2 1/2"; 3's 2 1/2 to 3 1/4"; 4's 3 1/4 to 4"; 5's ≥ 4"; Culls = all defective potatoes.

³ Determined by weight in air/water method.

LSD (k=100)

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data ²					Tub	ber Da	ata²					%	6 Inter	nal I	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	тсх	TSS	SHP	EYE	SIZE	DIS	APP	H	N	HNR	ΗH	VR	BC	SR	Comments ⁴
AF4157-6	6	9	9	5	6	6	7	7	3	6	5	7	5	0		9.0	0	0	0	0	MS,SS,GC,CS,SG
Atlantic	6	8	8	5	5	5	6	6	2	7	8	8	6	10)	8.0	0	0	3	0	SS,MS,GC,CS,RZ,SR,
																					4IHN(3-8,1-7)
CO02321-4W	5	9	9	4	9	8	7	7	3	7	4	8	5	5		8.3	0	0	0	0	SS,CS,RZ,MS,SG,GC,
																					2IHN(1-8,1-4)
CO03243-3W	9	9	9	8	6	6	6	7	2	6	7	7	4	23		7.8	0	0	8	0	^SS,SG,GC,RZ,CS,MS,
																					9IHN(3-8,3-7,2-6,1-5)
Lamoka(NY139)	9	9	8	6	6	6	5	6	4	7	6	6	6	0		9.0	0	0	3	0	SS,CS,RZ,MS,SR
Manistee(MSL292-A)	9	9	9	7	5	5	4	6	2	6	6	4	3	3		8.8	0	0	0	0	^^CS,SS,MS,SR,FLAT,1IHN(1-8)
MSM246-B	9	9	9	7	6	5	6	6	2	5	5	6	5	0		9.0	0	0	13	0	CS,SS,SR,RZ,MS
NC0349-3	6	9	9	5	6	5	5	7	2	5	5	7	6	0		9.0	0	0	0	0	SG,RZ,SS,MS,EL
NC182-5	6	9	9	8	9	6	6	7	3	7	7	7	7	3		8.8	0	0	0	0	SR,SS,MS,CS,RZ,
																					1IHN(1-8),CHIP(VR)
NC264-7	7	8	9	9	8	8	7	7	2	7	7	6	3	0		9.0	0	0	0	0	^GC,^CS,MS,SS
NC268-1	6	7	9	9	6	6	5	7	2	7	6	7	4	3		8.8	0	0	0	0	MS,SS,RZ,GC,CS,1IHN(1-8)
NY148	9	9	9	8	6	6	5	7	3	7	5	8	5	8		8.5	0	0	0	0	SS,SR,RZ,MS,3IHN(1-8,2-7)
Sebec(AF0338-17)	9	9	9	6	6	5	5	7	3	7	7	5	5	0		9.0	0	0	0	0	CS,SR,SS
Snowden	9	9	8	7	5	5	6	7	2	5	7	7	5	0		9.0	0	0	0	0	SS,CS,MS,DSE,DAE
W5955-1	9	9	8	8	5	5	5	7	2	6	8	7	6	3		8.8	0	0	0	0	MS,SS,SR,RZ,CS,1IHN(1-8)

<u>Table 5b. Sackette-IFC Variety Trial.</u> Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 101 DAP¹ at the Sackette Potatoes Farm, Vandemere, Pamlico Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill.

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

				Size	e Dis	tribu	tion	by Cl	ass ²					
	<u>Total Yield</u>	Marketak	ole Yield		(% of	tota	l yiel	d)	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ⁴	
AF4614-2	170	136	138	14	60	21	0	0	6	80	21	1.071		
AF4640-1	208	159	168	16	51	25	0	0	7	77	25	1.065		
AF5081-4	153	105	110	14	60	9	0	0	17	69	9	1.076	2	
AF5142-1	59	28	29	26	45	2	0	0	27	47	2	1.070	2.5	
AF5280-1	151	124	133	12	50	32	0	0	6	82	32	1.067		
AF5281-4	93	51	52	17	49	5	0	0	29	54	5	1.083	2	
AF5292-4	172	141	148	13	51	30	0	0	5	82	30	1.065	2	
AF5332-2	126	93	103	18	57	17	0	0	8	74	17	1.081		
Atlantic	158	108	100	24	59	9	0	0	8	68	9	1.078	1.5	
B2869-20	138	95	106	25	57	11	0	0	6	68	11	1.075	2	
B2869-29	153	97	101	32	54	8	0	0	6	62	8	1.076	2	
B2876-7	158	125	128	17	67	12	0	0	4	79	12	1.075	2.5	
NC252-49	246	138	149	43	55	1	0	0	1	56	1	1.085	2	
NC256-15	153	89	99	36	58	0	0	0	5	58	0	1.095	1	
NC256-41	107	29	30	66	27	0	0	0	6	27	0	1.095	1	
NC280-89	250	193	197	13	45	33	0	0	9	78	33	1.072	1	
NC281-114	119	72	78	29	60	1	0	0	10	61	1	1.072	1.5	
NC282-45	95	59	65	28	56	3	0	0	13	59	3	1.079	1	
NC282-8	126	80	88	28	58	5	1	0	8	64	6	1.074	1.5	
NC302-12	95	76	81	10	44	31	3	0	12	78	34	1.065	2	
NC311-9	162	68	71	35	40	1	0	0	24	41	1	1.071	1.5	
NC317-12	260	185	187	24	59	12	0	0	6	70	12	1.079	2	
NCJ106-2	114	69	75	31	57	3	0	0	9	60	3	1.066	1.5	
NCJ107-6	134	91	94	13	48	19	0	0	19	67	19	1.069	1.5	
Snowden	171	131	148	17	67	9	1	0	7	76	10	1.079	1.5	
Superior	155	117	126	15	63	12	0	0	10	75	12	1.070	2.5	
Yukon Gold	86	59	58	14	45	23	0	0	18	68	23	1.078		
Grand Mean	160	101												
CV(%)	77	26												

<u>Table 6a. Round White Trial One.</u> Total and marketable yield, percentage of total yield by size class, specific gravity and chip scores of potato clones of potato clones harvested 122 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

34

² Size classes: 1's < 1 7/8"; 2's 1 7/8 to 2 1/2"; 3's 2 1/2 to 3 1/4"; 4's 3 1/4 to 4"; 5's ≥ 4"; Culls = all defective potatoes.

³ Determined by weight in air/water method.

190

LSD (k=100)

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data ²					Tul	ber Da	ata²				9	6 Inte	rnal	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	TXT	тсх	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR	ΗH	VR	BC	SR	Comments⁴
AF4614-2	9	9	9	6	9	7	5	7	2	6	5	8	6	3	8.5	0	0	3	0	SR,1IHN(1-7)
AF4640-1	9	9	9	7	6	6	7	7	3	6	6	8	6	0	9.0	0	0	0	0	SS,SR,MS,IL
AF5081-4	8	9	8	7	6	6	6	7	2	7	5	6	4	45	6.8	0	0	20	0	MS,GC,SR,IL,18IHN(4-8,6-7,6-6,2-5)
AF5142-1	5	9	9	6	6	7	5	7	3	7	4	6	4	0	9.0	0	0	0	3	MS,SR,CS,PVY
AF5280-1	7	9	8	7	9	8	6	8	4	7	6	8	6	0	9.0	0	0	0	0	SS,GC,SR,MS,IL,RZ
AF5281-4	8	9	8	7	6	7	6	7	3	7	5	4	2	15	8.0	0	0	8	0	SR,RZ,IL, MS,6IHN(2-8,2-7,1-6,1-5)
AF5292-4	7	9	8	7	6	7	5	7	3	8	6	8	7	0	9.0	0	0	50	0	SR,MS,SS,CS
AF5332-2	8	9	8	7	6	7	4	7	2	7	5	8	3	3	8.8	0	0	0	0	MS,SR,RZ,STST,SG,PVY,1IHN(1-8)
Atlantic	6	9	8	5	5	5	6	6	3	7	5	7	6	18	7.8	0	0	0	0	SR,SS,GC,7IHN(2-8,3-7,1-6,1-4)
B2869-20	7	8	9	5	6	6	6	7	3	7	4	8	6	0	9.0	0	0	0	0	SR,MS
B2869-29	6	9	8	6	6	6	6	7	3	7	4	7	5	5	8.5	0	0	3	0	SS,SR,CS,IL,PVY,MS,2IHN(2-8)
B2876-7	6	9	9	6	6	6	5	7	5	7	5	8	7	0	9.0	0	0	0	0	SS,SR,MS,CS,GC
NC252-49	9	9	9	8	5	6	5	7	2	7	3	8	4	0	9.0	0	0	8	0	SS,SR,MS,STST,SG,CS
NC256-15	6	9	9	6	6	7	5	7	6	6	4	8	4	0	9.0	0	0	0	3	MS,GC,SR
NC256-41	6	7	8	6	6	5	5	7	5	8	2	8	4	8	8.0	0	0	0	0	MS,RZ,SR,SG,3IHN(2-8,1-7)
NC280-89	9	9	8	8	6	5	5	7	3	8	7	7	4	25	7.0	0	0	10	0	MS,SR,SS,RZ,10IHN(4-8,2-7,1-6,3-5)
NC281-114	5	9	8	5	9	7	6	7	2	8	5	7	3	0	9.0	0	0	0	0	CS,SR,SS,MS,GC
NC282-45	6	9	8	6	5	5	6	6	3	7	5	8	5	33	7.1	0	0	3	0	SR,MS,13IHN(6-8,4-7,1-6,1-5,1-4)
NC282-8	6	8	9	7	5	5	6	7	3	7	5	8	6	48	6.9	0	0	3	0	CS,SR,SS,MS,19IHN(6-8,9-7,4-5)
NC302-12	5	8	8	6	6	6	7	7	6	7	7	7	6	0	9.0	0	0	0	0	SR,MS,GC,
NC311-9	8	7	8	7	6	6	7	7	2	7	4	5	4	0	9.0	0	0	0	0	^SR,CS
NC317-12	8	9	9	9	5	5	5	6	2	7	5	8	7	0	9.0	0	0	0	3	SR,SS,RZ,MS
NCJ106-2	5	9	8	5	8	7	5	7	4	8	4	8	6	0	9.0	0	0	0	0	SR,SS
NCJ107-6	6	9	7	5	6	6	5	7	3	7	5	8	6	3	8.8	3	3	23	3	SR,SS,PVY,1IHN(1-8)
Snowden	8	9	8	7	5	5	5	6	3	5	5	7	5	0	9.0	0	0	0	0	SR,SS,CS,DAE,DSE
Superior	5	9	8	4	6	6	5	7	3	6	5	6	4	0	9.0	0	5	10	0	SR,PVY,MS,CS
Yukon Gold	8	9	8	5	7	8	6	7	3	8	7	5	4	5	8.3	0	0	5	0	SR,CS,GC,MS,2IHN(1-8,1-7)

Table 6b. Round White Trial One. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 122 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill.

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

				Size	e Dist	tribut	tion l	by Cl	ass ²					
	<u>Total Yield</u>	Marketab	le Yield		(9	% of	tota	l yiel	d)	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ⁴	
Atlantic	233	186	100	19	65	15	0	0	1	80	15	1.079	2	
Augusta	224	152	84	31	62	6	0	0	1	68	6	1.070		
B2947-5	200	180	99	9	41	47	2	0	1	90	49	1.079	2	
B2950-9	176	114	63	34	57	8	0	0	1	65	8	1.077	1.5	
B2952-7	190	118	63	36	56	5	0	0	2	61	5	1.078	2.5	
B2952-9	173	117	60	29	56	8	0	0	6	64	8	1.082	3.5	
B2954-11	155	114	62	25	61	11	1	0	1	74	12	1.078	2	
B2968-3	161	142	78	9	40	46	2	0	3	88	48	1.063	2.5	
BNC317-8	211	154	84	26	64	8	0	0	1	73	8	1.074	2	
BNC318-9	166	147	79	8	54	33	1	0	3	88	34	1.071	1.5	
NC276-2	177	116	62	34	62	3	0	0	2	65	3	1.064		
NCB2890-2	143	76	41	43	50	2	0	0	5	52	2	1.070		
NCB2901-3	171	120	62	30	66	1	0	0	3	67	1	1.072	1.5	
NCH4-3	154	93	49	39	56	1	0	0	4	57	1	1.077	1.5	
NCH6-10	229	157	87	26	60	9	0	0	5	69	9	1.074	1.5	
Superior	172	139	74	16	57	23	0	0	4	80	24	1.066	2	
Yukon Gold	115	82	43	14	47	20	2	0	18	69	21	1.069		
Grand Mean	179	130												
CV(%)	21	26												
LSD (k=100)	60	51												

Table 7a. Round White Trial Two. Total and marketable yield, percentage of total yield by size class, specific gravity and chip scores of potato clones harvested 104 DAP¹ at the NCSU VGJREC/NCDA TRS. Plymouth. Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² Size classes: 1's < 1 7/8"; 2's 1 7/8 to 2 1/2"; 3's 2 1/2 to 3 1/4"; 4's 3 1/4 to 4"; 5's ≥ 4"; Culls = all defective potatoes.

³ Determined by weight in air/water method.

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data	2				Tub	er Da	ata²					% Inte	erna	l Def	ects ³		
Clone	TYPE	DIS	POLL	MAT	CLR	TXT	ТСХ	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNF	r hf	I VR	BC	SR	Comments ^₄
Atlantic	6	9	8	5	6	5	6	6	2	6	5	8	7	3	8.8	30	0	0	0	SR,SS,1IHN(1-8)
Augusta	5	9	8	5	7	7	5	7	5	8	4	8	5	3	8.8	30	0	0	0	MS,SS,RZ,GC,PTS,YF2,1IHN(1-8)
B2947-5	9	9	9	5	6	5	7	6	1	7	6	8	8	0	9.0) ()	0	13	3	SR,MS,GC
B2950-9	8	9	8	5	6	5	6	6	3	7	4	7	7	0	9.0) ()	0	0	0	SR
B2952-7	6	9	9	5	7	8	7	7	2	7	3	7	6	0	9.0) ()	3	0	5	SR,MS,GC,SS,CHIP(VR)
B2952-9	9	9	8	5	7	5	7	7	2	7	4	5	5	0	9.0) ()	0	0	0	SR,MS,PVY,YF2,CHIP(VR)
B2954-11	6	9	8	5	6	5	6	6	2	7	4	8	7	8	8.3	3 0	0	0	0	SR,MS,3IHN(1-8,2-7)
B2968-3	9	9	8	5	6	6	7	6	2	8	6	7	5	0	9.0) ()	0	0	0	SG,SS,GC,MS,PVY,SR
BNC317-8	6	9	9	5	6	5	7	7	1	8	4	8	8	3	8.8	3 0	0	0	0	SR,SS,1IHN(1-8)
BNC318-9	9	9	9	6	5	5	5	6	4	8	7	8	6	0	9.0) ()	0	0	0	SR,SS,MS,RZ
NC276-2	5	9	9	4	7	8	5	7	2	7	3	8	6	3	8.8	30	0	0	3	MS,SR,GC,RZ,1IHN(1-8),YF2
NCB2890-2	5	7	8	4	6	7	7	7	2	7	3	8	5	0	9.0) ()	0	0	3	MS,CS,GC,RZ
NCB2901-3	6	7	8	4	9	6	7	7	2	8	4	8	6	0	9.0) ()	0	0	0	MS,SR
NCH4-3	5	6	8	4	6	6	7	7	1	7	3	8	3	0	9.0) ()	0	8	3	CS,MS
NCH6-10	6	9	9	4	6	8	5	7	5	8	5	9	4	0	9.0) ()	0	0	0	MS,SS,GC,PTS
Superior	5	9	8	4	6	6	5	6	3	6	7	7	4	3	8.5	50	0	10	0	CS,SR,MS,1IHN(1-7)
Yukon Gold	8	7	8	5	7	7	5	7	4	8	6	5	3	0	9.0) ()	0	0	0	^CS,SR

Table 7b. Round White Trial Two. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 104 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

Table 8a. Round White Trial Three. Total and marketable yield, percentage of total yield by size class, specific gravity	
and chip scores of potato clones harvested 124 DAP1 at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC -	2014

				Size	e Dist	tribut	ion b	y Cla	ass ²					
	Total Yield	Marketak	ole Yield		('	% of	total	yield	d) (k	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ⁴	
Atlantic	113	83	100	20	60	12	0	0	9	72	12	1.078	2	
B2954-10	126	82	126	20	48	15	1	0	16	64	16	1.080	2.5	
B2967-5	207	167	248	15	53	27	0	0	5	80	27	1.062	2	
BNC312-1	131	94	152	22	63	7	0	0	7	71	7	1.080	2	
NC0349-3	132	79	124	25	57	2	0	0	16	59	2	1.074	1.5	
NC182-5	154	102	146	26	63	3	0	0	7	66	3	1.076	1.5	
NC264-7	239	149	198	12	44	17	0	0	27	61	17	1.071	2	
NC268-1	124	94	143	19	64	12	0	0	5	75	12	1.080	2.5	
NCH6-4	123	85	124	25	64	5	0	0	6	69	5	1.071	2	
Snowden	122	91	147	16	58	15	0	0	10	74	15	1.075	2	
Soraya	185	125	173	21	64	2	0	0	13	66	2	1.056		
Yukon Gold	63	42	64	13	49	16	0	0	22	66	16	1.071		
Grand Mean	143	99												
CV(%)	23	32												
LSD (k=100)	44	47												

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² Size classes: 1's < 17/8''; 2's 17/8 to 21/2''; 3's 21/2 to 31/4''; 4's 31/4 to 4''; $5's \ge 4''$; Culls = all defective potatoes.

³ Determined by weight in air/water method.

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	: Data ²					Tub	er Da	ata²				9	% Internal	Defe	ects ³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	ТСХ	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR HH	VR	BC	SR	Comments ⁴
Atlantic	6	9	8	5	6	5	6	6	3	7	5	8	7	5	7.5 0	3	0	0	SS,SR,MS,2IHN(2-6)
B2954-10	8	9	8	7	6	7	5	7	2	7	5	7	6	3	8.8 0	10	0	5	SR,MS,RZ,SS, IL,1IHN(1-8)
B2967-5	9	9	8	9	6	5	7	6	2	7	6	8	7	0	9.0 0	0	0	0	STST,SR,IL,MS,GC,SS
BNC312-1	9	9	8	9	6	7	5	7	3	8	4	7	5	0	9.0 0	0	0	0	SR,IL,
NC0349-3	6	9	8	5	6	6	6	6	2	7	4	6	5	0	9.0 0	0	0	0	SR,IL
NC182-5	6	9	8	7	6	5	7	7	1	8	5	8	7	0	9.0 0	0	0	0	SR,SS,MS
NC264-7	9	6	8	9	9	8	6	7	2	6	6	5	3	0	9.0 0	0	0	0	^CS,SR,SS,MS-DROP,CHIP(VR)
NC268-1	6	7	8	8	6	6	5	6	2	7	5	8	7	0	9.0 0	0	0	0	SR,IL,SS,RZ
NCH6-4	4	9	8	5	8	8	6	7	3	8	5	8	5	0	9.0 0	3	0	0	PTS,SR,GC,MS,SS
Snowden	8	9	8	7	5	5	5	6	3	6	6	7	5	0	9.0 0	0	0	0	SR,MS,CS,DAE,DSE,CHIP(ID)
Soraya	6	9	8	8	9	7	6	7	5	8	4	7	4	0	9.0 0	0	0	0	SR,MS,RZ,SS
Yukon Gold	7	9	7	5	7	8	6	7	3	8	6	6	4	0	9.0 0	0	5	0	SR,CS,MS,SS,GC

Table 8b. Round White Trial Three. Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 124 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

				Size	Dist	ribut	ion ł	ov Cla	$\frac{1}{3}$,	<u> </u>			
<u>1</u>	otal Yield	<u>Marketab</u>	le Yield		(% of	total	yiel	d)	1 7/8	2 1/2	Specific	Chip	
Clone	cwt/A	cwt/A	% Atl.	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	Color ⁴	
AF4138-8	114	68	121	37	56	1	0	0	6	56	1	1.060	1.5	
AF4640-1	114	81	150	20	54	16	0	0	10	69	16	1.067	2	
Atlantic	73	53	100	15	58	15	0	0	12	72	15	1.078	1.5	
B2833-16	117	88	168	21	61	14	0	0	4	75	14	1.077	2	
BNC182-5	132	101	192	18	58	18	0	0	6	76	18	1.072	2	
Katahdin	65	42	78	32	62	2	0	0	4	64	2	1.064	2.5	
Kennebec	55	44	86	10	52	27	0	0	10	79	27	1.062	2	
MSQ086-3	162	108	203	26	57	8	0	0	9	65	8	1.064	2.5	
NY148	97	50	99	36	50	1	0	0	14	51	1	1.082	2	
NY150	55	21	38	53	37	0	0	0	10	37	0	1.075	2.5	
NYH15-17	158	108	208	22	56	13	0	0	9	69	13	1.070	2	
Rochdale Gold-Doree	e 144	83	154	23	53	3	0	0	22	56	3	1.072		
Sebec(AF0338-17)	89	67	130	18	48	27	0	0	6			1.076	2	
Snowden	144	117	221	14	59	23	0	0	5	81	23	1.075	1.5	
Superior	106	80	162	18	72	5	0	0	5	77	5	1.068	2	
Yukon Gold	62	48	92	19	68	8	0	0	6	76	8	1.073	•	
Grand Mean	105	72												
CV(%)	27	36												
LSD (k=100)	40	38												

<u>Table 9a. NE-1031 Round White Trial.</u> Total and marketable yield, percentage of total yield by size class, specific gravity, and chip scores of potato clones harvested 122 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² Size classes: 1's < 1 7/8"; 2's > 1 7/8 to 2 1/2"; 3's > 2 1/2 to 3 1/4"; 4's > 3 1/4 to 4"; 5's > 4" Culls = all defective potatoes.

³ Determined by weight in air/water method.

⁴ Chip Color Ratings conducted by the NCSU Potato Breeding Program at the TRS/VGJREC: 1 = no defects, exceptionally bright; 2 = excellent, bright; 3 = good, light or golden; 4 = dark defects, marginal; 5 = not acceptable.

		Plant	Data ²					Tuk	oer Da	ata²				-	9	% Inte	rnal	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	ТСХ	TSS	SHP	EYE	SIZE	DIS	APP		HN	HNR	ΗH	VR	BC	SR	Comments⁴
AF4138-8	4	6	9	8	6	7	5	7	2	7	3	6	5		0	9.0	0	0	3	0	SR,PVY
AF4640-1	7	9	9	9	6	7	6	7	2	7	4	6	6		0	9.0	0	0	0	3	SR,MS,SS
Atlantic	5	6	9	7	5	5	6	6	3	7	5	6	6		20	7.2	0	0	3	0	SR,SS,8IHN(4-8,1-7,1-6,2-5)
B2833-16	5	7	9	8	5	6	6	7	2	7	6	8	6		0	9.0	0	0	0	0	SR,SS
BNC182-5	7	6	9	8	6	5	5	7	2	7	6	7	7		3	8.8	0	0	23	0	SR,SS,SG,MS,1IHN(1-8)
Katahdin	6	5	9	8	9	8	5	7	4	7	5	8	4		5	6.0	0	0	18	0	SR,MS,2IHN(2-8)
Kennebec	8	9	6	8	8	8	5	7	5	6	6	8	3		3	8.8	0	0	0	0	SR,CS,MS,1IHN(1-8)
MSQ086-3	8	9	8	8	6	6	6	7	2	7	5	7	6		35	6.1	0	0	13	0	SR,CS,MS,SG,PVY,
																					14IHN(1-8,4-7,3-6,6-5)
NY148 (NYE106-4)	8	8	9	8	6	5	6	7	2	6	4	6	5		13	8.0	0	0	3	0	SR,IL,5IHN(4-8,1-6),CHIP(ID)
NY150 (NYF52-1)	6	7	9	8	8	8	7	7	2	7	2	7	4		0	9.0	0	0	3	0	SR,MS
NYH15-17	8	9	9	8	6	5	5	7	3	6	5	7	6		5	8.8	0	0	0	0	SR,2IHN(2-8)
Rochdale Gold-Doree	7	9	9	8	6	7	6	7	3	8	5	5	3		5	8.8	0	5	0	0	SR,SG,SS,2IHN(1-8,1-7)
Sebec(AF0338-17)	6	8	9	8	6	6	5	6	3	7	5	5	5		0	9	0	0	0	0	SR,PVY
Snowden	7	9	9	8	5	5	5	6	3	5	5	7	5		5	7.8	0	0	23	0	SR,MS,DAE,DSE,2IHN(1-7,1-6)
Superior	4	5	9	8	6	7	4	7	3	6	5	8	5		0	9.0	0	10	8	0	SR,PVY
Yukon Gold	5	8	9	8	7	8	6	7	3	7	5	7	5		8	8.3	0	0	5	0	SR,3IHN(2-8,1-6)

<u>Table 9b. NE-1031 Round White Trial.</u> Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 122 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

· ·				S	ize Di	st. by	/ Clas	s (%)2				
	<u>Total Yield</u>	Marke	<u>table Yield</u>		(%	of to	tal yi	eld)		1 7/8	2 1/2	Specific	
Clone	cwt/A	cwt/A	% Chieftain	1's	2's	3's	4's	5's	Cull's	to 4"	to 4"	Gravity ³	
AF4550-2	150	106	52	22	62	8	0	0	7	70	8	1.067	
AF4593-1	115	87	43	13	54	21	0	0	11	76	21	1.057	
AF4815-1	108	70	33	17	50	12	1	0	21	63	12	1.054	
AF4831-2	170	90	45	22	49	3	0	0	26	52	3	1.056	
AF4985-1	138	96	47	4	28	37	3	0	27	69	41	1.063	
AF5275-1	120	81	40	26	65	2	0	0	7	67	2	1.069	
AF5295-1	89	65	33	14	63	9	0	0	14	72	9	1.052	
B2676-2	173	106	52	30	56	5	0	0	9	61	5	1.076	
BNC306-2	108	77	38	18	58	13	0	0	10	72	13	1.074	
BNC320-2	196	119	59	30	59	2	0	0	9	61	2	1.069	
Chieftain	256	205	100	12	47	33	0	0	8	80	33	1.060	
CO098012-5R	103	62	30	31	55	5	0	0	9	60	5	1.067	
CO97222-1R/R	159	89	44	34	54	1	0	0	10	56	1	1.065	
CO97226-2R/R	75	22	11	64	30	0	0	0	6	30	0	1.065	
Dark Red Norland	150	117	58	12	49	29	0	0	10	78	29	1.058	
NC201-1	105	61	30	32	55	2	0	0	11	57	2	1.063	
NC293-7	152	84	41	39	53	1	0	0	7	55	1	1.067	
NC305-2	160	114	55	20	62	9	0	0	9	71	9	1.071	
NC314-6	71	34	16	23	43	3	0	0	31	46	3	1.077	
Strawberry Paw	161	134	65	8	34	48	0	0	9	83	48	1.060	
Grand Mean	138	91											
CV(%)	21	26											
LSD (k=100)	39	32											

<u>Table 10a. NE-1031 Red Trial.</u> Total and marketable yield, percentage of total yield by size class, and specific gravity, of potato clones harvested 111 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC – 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill ² Size classes: 1's < 17/8"; 2's 17/8 to 21/2"; 3's 21/2 to 31/4"; 4's 31/4 to 4"; $5's \ge 4"$; Culls = all defective potatoes. ³ Determined by weight in air/water method.

		Plant	Data ²					Tub	ber Da	ata²				9	% Inte	rnal	Defe	cts ³		
Clone	TYPE	DIS	POLL	MAT	CLR	тхт	тсх	TSS	SHP	EYE	SIZE	DIS	APP	HN	HNR	ΗH	VR	BC	SR	Comments⁴
AF4550-2	5	6	9	8	1	8	6	6	2	7	3	6	6	5	8.5	0	0	0	0	SR,CS,MS,STST,2IHN(2-8)
AF4593-1	5	5	9	8	2	8	7	7	2	5	5	6	5	0	9.0	0	0	0	0	SR,MS,GC,RZ
AF4815-1	4	5	9	8	2	7	6	7	3	7	4	6	5	0	9.0	0	0	0	0	^SR,MS
AF4831-2	6	9	9	8	3	8	5	6	4	8	4	5	3	30	7.5	0	3	0	0	^SR,SS,12IHN(5-8,6-7,1-6)
AF4985-1	6	8	8	9	2	7	7	5	1	7	6	5	3	0	9.0	0	0	3	5	^SR,MS,SS
AF5275-1	5	6	9	9	2	7	7	7	2	7	4	7	4	0	9.0	0	0	0	0	SR,RZ,SS,MS,STST
AF5295-1	5	6	9	8	2	8	6	7	4	7	4	7	5	0	9.0	0	0	0	0	SR,MS
B2676-2	4	6	9	8	3	6	6	7	3	7	4	7	4	0	9.0	0	0	0	3	SR,MS,SS,GC,NET
BNC306-2	4	5	9	9	1	8	6	7	2	6	5	7	5	0	9.0	0	0	0	0	SR,MS,SS,SISC,RZ
BNC320-2	5	7	9	8	1	8	6	7	3	6	4	6	5	0	9.0	0	0	0	15	SR,SG,MS,SS
Chieftain	6	9	9	8	3	6	6	6	3	6	7	7	3	50	6.6	0	0	8	0	SR,SG,MS,RZ,GC, 20IHN(9-8,3-7,3-6,4-5,1-4)
CO098012-5R	7	9	9	9	2	7	6	7	2	6	4	7	6	5	8.5	0	0	0	0	SR,STST,2IHN(2-8)
CO97222-1R/R	5	6	9	8	2	5	7	7	4	7	3	7	4	20	7.8	0	0	8	3	SR,SISC,MS,8IHN(4-8,4-7),RF
CO97226-2R/R	4	5	7	8	2	5	7	7	2	7	2	8	4	0	9.0	0	0	0	0	STST,SR,RZ,MS,RF
Dark Red Norland	4	5	9	8	3	7	6	7	5	7	6	6	4	3	8.8	0	0	0	0	RZ,SISC,SR,SS,1IHN(1-8)
NC201-1	3	5	8	8	1	8	5	7	7	8	6	7	7	0	9.0	0	0	0	0	SR,SS,SISC
NC293-7	5	6	9	8	1	7	5	7	3	7	5	8	6	0	9.0	0	0	0	0	SR,MS,CS
NC305-2	5	9	9	6	2	8	5	7	2	6	4	7	6	0	9.0	0	0	0	0	SR,RZ,MS,CS
NC314-6	5	5	6	8	2	8	7	7	6	7	4	5	3	0	9.0	0	0	0	0	^SR,MS,RZ,GC
Strawberry Paw	8	9	9	8	2	8	7	5	3	7	7	7	5	0	9.0	0	0	0	0	^SR,MS,LUMPY

<u>Table 10b. NE-1031 Red Trial.</u> Plant vine type, disease and air pollution scores, maturity at ca. 3 weeks prior to harvest, and external and internal tuber attributes of potato clones harvested 111 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill

² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

Table 11a. NE-1031 Russet Trial. Total and marketable yield, percentage of total yield by size class, and specific gravity,
of potato clones harvested 124 DAP ¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

				Siz	ze Dist	ribut	ion b	y Cla	ass ²				
	Total Yield	Marketa	able Yield		(% of	[:] tota	l yiel	d)		1 7/8	2 1/2	Specific	
Clone	cwt/A	cwt/A	% R.Nor	1's	2's	3's	4's	5's	Culls	to 4"	to 4"	Gravity ³	
AF4124-7	196	134	231	7	59	9	0	0	25	68	9	1.070	
AF4172-2	121	75	153	35	61	1	0	0	4	61	1	1.082	
AF4320-17	175	132	244	17	75	0	0	0	8	75	0	1.072	
AF4788-1	126	50	87	8	39	0	0	0	53	39	0	1.080	
AF5060-27	74	63	118	7	76	9	0	0	8	85	9	1.071	
AF5072-12	82	61	118	17	69	4	0	0	10	74	4	1.079	
Dakota Trailblazer	179	161	321	8	79	11	0	0	2	90	11	1.075	
Russet Burbank	122	88	146	24	62	7	0	0	7	69	7	1.059	
Russet Norkotah	110	74	100	20	54	7	0	0	19	61	7	1.069	
Shepody	131	96	163	9	68	4	0	0	19	72	4	1.072	
Teton Russet	100	76	145	15	68	7	0	0	9	76	7	1.070	
Grand Mean	129	92											
CV(%)	25	35											
LSD (k=100)	45	48											

45

¹ DAP = Days After Planting; DVK = Days to Vine Kill ² Size classes: 1's < 17/8''; 2's 17/8 to 21/2''; 3's 21/2 to 31/4''; 4's 31/4 to 4''; $5's \ge 4''$; Culls = all defective potatoes. ³ Determined by weight in air/water method.

Table 11b. NE-1031 Russet Trial. Plant vine type,	disease and air pollution scores, maturi	ty at ca. 3 weeks prior to harvest, and external and
internal tuber attributes of potato clones harveste	ed 124 DAP ¹ at the NCSU VGJREC/NCD.	A TRS, Plymouth, Washington Co., NC - 2014

		Plant	Data	2				Tuk	ber Da	ata²					%	Inter	mal	Defe	cts³		
Clone	TYPE	DIS	POLL	MAT	CLR	ТХТ	ТСХ	TSS	SHP	EYE	SIZE	DIS	APP	HN		HNR	ΗH	VR	BC	SR	Comments ⁴
AF4124-7	7	9	9	9	5	4	6	7	7	8	7	8	4	0	ç	9.0	0	0	0	0	^SG,MS,SR,SS
AF4172-2	5	6	9	8	6	1	5	7	6	8	3	7	4	0	ę	9.0	0	0	0	0	SMALL,MS,SR
AF4320-17	6	7	9	9	5	4	6	7	7	8	4	7	5	0	ç	9.0	0	0	0	0	SR,IL,MS,RZ,CS
AF4788-1	7	9	9	9	5	3	6	7	8	8	7	4	3	0	ę	9.0	0	0	0	0	^CS,SR
AF5060-27	7	8	9	9	6	4	6	7	6	8	6	7	5	0	ç	9.0	3	0	0	0	MS,SR,SS,CS
AF5072-12	6	6	9	9	5	3	6	7	6	7	5	7	4	0	ç	9.0	0	0	0	0	SR,GC,MS
Dakota Trailblazer	8	9	9	9	6	4	5	6	6	8	6	8	6	3	8	8.8	0	0	0	0	SR,SS,MS,GC,1IHN(1-8)
Russet Burbank	8	9	9	8	6	1	5	6	5	8	5	7	1	60	6	6.2	0	0	33	0	^SG,SR^,MS,SS, 22IHN(3-8,4-7,11-6,6-5)
Russet Norkotah	6	9	9	9	5	3	6	7	6	8	5	6	4	0	ç	9.0	0	0	5	0	SR,MS,CS
Shepody	6	9	9	8	8	7	5	7	8	7	6	6	4	0	ę	9.0	0	0	8	0	SR,MS,SS,SS
Teton Russet	7	6	9	9	6	4	6	7	6	7	7	7	5	3	8	8.8	0	0	0	0	SR,SG,GC,MS,1IHN(1-8)

¹ DAP = Days After Planting; DVK = Days to Vine Kill
² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.
³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

	Tot	al	Market	table	Specific			Τu	iber D)ata²					9	6 Inte	ernal	Def	ects	3	
Clone	cwt/A	%Atl	cwt/A	%Atl	Gravity	CLR	ТХТ	тсх	TSS	SHP	EYE	SIZE	DIS	APP	ΗN	HNR	HH	VR	BC	SR	Comments ^₄
Adirondack Blue	247	76	247	76	1.063	1	8	6	7	5	7	7	9	4	0	9	0	0	0	0	PF
Adirondack Red	215	66	215	66	1.057	2	8	5	7	6	8	6	9	5	0	9	0	0	0	0	RF
All Blue	195	59	195	59	1.054	1	6	6	6	7	6	6	9	4	0	9	0	0	0	0	MS,SG,PF
Atlantic	328	100	328	100	1.070	6	6	6	7	3	7	6	9	6	60	6	0	0	0	0	6IHN(3-7,1-6,1-5,1-4)
Chieftain	432	132	432	132	1.056	3	7	6	6	4	8	6	9	4	80	6.5	0	0	0	0	HS,SG,MS8IHN(2-8,2-7,2-6,2-5)
CO97222-1R/R	244	75	244	75	1.054	2	6	7	7	3	6	4	9	5	70	5	0	0	0	0	HS,7IHN?(7-5),RF
CO97226-2R/R	147	45	147	45	1.054	2	7	6	7	3	7	4	9	5	0	9	0	0	0	0	GC,SG,RF
Dark Red Norland	197	60	197	60	1.054	3	7	6	7	4	7	5	9	4	0	9	0	0	0	0	CRMFLSH
Inca Gold	45	14	45	14	1.049	7	7	7	7	2	6	2	9	3	0	9	0	0	0	0	HS,SG,YF2
NC201-1	176	53	176	53	1.061	1	8	5	7	6	8	5	9	7	0	9	0	0	0	0	MS,YF1
NC276-2	215	65	215	65	1.066	7	7	7	7	2	6	3	9	6	0	9	0	0	0	0	YF2
NC293-7	240	75	240	75	1.061	1	8	7	7	3	8	5	9	6	0	9	0	0	0	0	FDR,GC,SR,CRM FLSH
NC396-38	134	42	134	42	1.066	1	8	6	8	6	8	4	9	7	0	9	0	0	0	0	SG,DKPF
NC396-63	137	42	137	42	1.064	1	7	6	7	3	8	4	9	7	0	9	0	0	0	0	PF
NC414-1	178	57	178	57	1.070	7	6	6	7	3	6	4	9	6	10	8	0	0	0	0	HS,YF2,1IHN(1-8)
NC414-2	313	98	313	98	1.080	7	7	7	7	2	7	4	9	6	0	9	0	0	0	0	HS, PF/YF, YSPEC/PURPSKN
NCB3069-6	53	16	53	16	1.044	7	8	7	7	3	7	5	6	6	0	9	0	0	0	0	SG,YF1
NCH85-2	253	79	132	41	1.056	1	8	7	7	3	8	3	7	6	0	9	0	0	0	0	YF1
Peter Wilcox	204	62	204	62	1.056	1	7	6	7	5	8	5	9	6	10	7	0	0	0	0	GC,YF2,1IHN(1-7)
Yukon Gold	253	79	121	38	1.069	7	7	6	7	4	7	6	5	4	30	8	0	0	10	0	SR,MS,CS,FDR,YF2,3IHN(2-8,1-7)
Grand Mean	210		198																		
CV(%)	23		24																		
LSD (k=100)	78		74																		
1 DAD = Dave Aft	ar Dlanti	na D	$VK = D_2$	ve to V	/ina Kill																

Table 12. Specialty Trial. Total and marketable yield, specific gravity, external and internal tuber attributes of potato clones harvested 120 DAP¹ at the NCSU VGJREC/NCDA TRS, Plymouth, Washington Co., NC - 2014

¹ DAP = Days After Planting; DVK = Days to Vine Kill
² See NE1031 Standard Potato Rating System for key to scores in Appendix 2.

³ Percentage determined from 10 randomly selected potatoes /rep (40 total) in size classes 3 and 4. HN=heat necrosis; HNR=average heat necrosis rating (Rating Scale: 1= very severe to 9 = absent); HH=hollow heart; VR=vascular ring discoloration; BC=brown center; SR=soft rot

<u>Figure 1. Replicated Specialty Trial Images.</u> One quarter of a tuber sliced while evaluating inte quality of specialty potatoes.



Figure 2. Replicated Specialty Trial Chip Images.

Adirondack Blue



CO97222-1R/R



NC396-68





CO97226-2R/R



NC414-1





NC396-38



NC414-2







Appendix 1: LAND MANAGEMENT CONDITIONS

Location: Black Gold Farms Trial Title: Black Gold Farms Va Trial Design: Randomized com Plot Dimensions: Twenty-two Seed piece Treatment: Weed Control:	b, Gum Neck, Tyrrell Co., NC ariety Chip Trial aplete block, four replications 21' rows at 34' row spacing, 28 hills per row None Metribuzin 1 lbs/A Intensity one 12 fl oz/A Matrix SG 1 oz/A
Fertilizer: Insect Control:	233N, 112P, 200K, 14Mg, 18S, 1.5Zn lbs/A Admire Pro – in furrow
Disease Control:	Quadris in furrow 6.2 oz/A Bravo 8 pt/A (4 applications) Revus Top 6.2 fl oz/A
Vine Kill:	None
Location: Black Gold Farms Trial Title: Black Gold Farms Va Trial Design: Randomized com Plot Dimensions: Fourteen 21 Seed piece Treatment: Weed Control:	a, Gum Neck, Tyrrell Co., NC ariety Table Trial aplete block, four replications ' rows at 34' row spacing, 28 hills per row None Metribuzin 1 lbs/A Intensity one 12 fl oz/A Matrix SG 1 oz/A
Fertilizer: Insect Control:	233N, 112P, 200K, 14Mg, 18S, 1.5Zn lbs/A Admire Pro – in furrow
Disease Control:	Quadris in furrow 6.2 oz/A Bravo 8 pt/A (4 applications) Revus Top 6.2 fl oz/A
Vine Kill:	None
Location: Black Gold Farms Trial Title: Snack Food Assoc Trial Design: Randomized com Plot Dimensions: Eleven 21'r Seed piece Treatment: Weed Control:	e, Gum Neck, Tyrrell Co., NC ciation Trial pplete block, five replications rows at 34' row spacing, 28 hills per row None Metribuzin 1 lbs/A Intensity one 12 fl oz/A Matrix SG 1 oz/A
Fertilizer: Insect Control:	233N, 112P, 200K, 14Mg, 18S, 1.5Zn lbs/A Admire Pro – in furrow
Disease Control:	Quadris in furrow 6.2 oz/A Bravo 8 pt/A (4 applications) Revus Top 6.2 fl oz/A
Vine Kill:	None

Appendix 1: LAND MANAGEMENT CONDITIONS (Cont'd.)

Location: James Brothers F Trial Design: Randomized com	arms, Weeksville, Pasquotank Co., NC plete block, four replications							
Plot Dimensions: Twenty-eigh	it 21' rows at 40' row spacing, 28 hills per row							
Seed piece Treatment:	None							
Weed Control:	metoalochlor 1.5 pt/A							
	Metribuzen 1 lb/A							
Fertilizer:	500lbs, 26-6-16 broadcast							
Insect Control:	Mocap 10G 1 gal/A							
	Leverage 3.5 fl oz/A							
Disease Control:	Quadris 12fl oz/A							
	Headline 6 fl oz/A							
Vine Kill:	None							
Location: Sackette Potatoe Trial Design: Randomized com Plot Dimensions: Sixteen 21' Seed piece Treatment: Weed Control:	es-IFC, Vandemere, Pamlico Co., NC plete block, four replications rows at 38' row spacing, 28 hills per row None Dual Magnum @ 27 oz/acre before potato emergence after last hilling Tricor @ 4oz/A + Matrix @ 1 oz/A + NIS @ 16 oz/A Poast @ 16 oz/A + Crop Oil @ 32 oz/A							
Fertilizer:	100-60-80 Pre-plant 15-23-0 @ 22 gallons/acre At-plant 30% UAN @ 12.4 gallons/acre sidedress							
Insect Control:	Admire Pro @ 7 oz/acre seed treatment							
Disease Control:	Quadris @ 6.2 oz/A Bravo Weatherstik @ 16 oz/A Revuus Top @ 6 oz/A							
Vine Kill:	None							

Appendix 1: LAND MANAGEMENT CONDITIONS (Cont'd.)

Location: Tidewater Research Station, Plymouth, Washington Co., NC Trial Title: Round White Variety Trial One Trial Design: Randomized complete block, four replications Plot Dimensions: Eighteen 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A Fertilizer: 15-15-15, 800 lbs/A 30%N 20 gal/A Insect Control: Mustang 2 oz/A Baythroid 2 oz/A

Leverage 2.8 oz/A

Penncozeb 2 lbs/A

None

Disease Control: Vine Kill:

Location: Tidewater Research Station, Plymouth, Washington Co., NC Trial Title: Round White Variety Trial Two Trial Design: Randomized complete block, four replications Plot Dimensions: Twenty-four 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A 15-15-15, 800 lbs/A Fertilizer: 30%N 20 gal/A **Insect Control:** Mustang 2 oz/A Baythroid 2 oz/A Leverage 2.8 oz/A **Disease Control**: Penncozeb 2 lbs/A

Location: Tidewater Research Station, Plymouth, Washington Co., NC **Trial Title:** Round White Variety Trial Three Trial Design: Randomized complete block, four replications Plot Dimensions: Twenty-four 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A 15-15-15, 800 lbs/A Fertilizer: 30%N 20 gal/A Mustang 2 oz/A Insect Control: Baythroid 2 oz/A Leverage 2.8 oz/A Penncozeb 2 lbs/A **Disease Control**: None Vine Kill:

Location: Tidewater Research Station, Plymouth, Washington Co., NC Trial Title: NE 10-31 White Variety Trial Trial Design: Randomized complete block, four replications Plot Dimensions: Sixteen 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A Fertilizer: 15-15-15, 800 lbs/A 30%N 20 gal/A **Insect Control:** Mustang 2 oz/A Baythroid 2 oz/A Leverage 2.8 oz/A **Disease Control**: Penncozeb 2 lbs/A Vine Kill: None Location: Tidewater Research Station, Plymouth, Washington Co., NC Trial Title: NE 10-14 Red Variety Trial **Trial Design:** Randomized complete block, four replications Plot Dimensions: Fifteen 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A Fertilizer: 15-15-15, 800 lbs/A 30%N 20 gal/A **Insect Control:** Mustang 2 oz/A Baythroid 2 oz/A Leverage 2.8 oz/A **Disease Control:** Penncozeb 2 lbs/A Vine Kill: None Location: Tidewater Research Station, Plymouth, Washington Co., NC Trial Title: NE 10-14 Russet Variety Trial Trial Design: Randomized complete block, four replications Plot Dimensions: Seventeen 21' rows at 38' row spacing, 28 hills per row Seed piece Treatment: None Weed Control: Sencor DF 1 lbs/A Dual Magnum 1.5 pts/A 15-15-15, 800 lbs/A Fertilizer: 30%N 20 gal/A Mustang 2 oz/A **Insect Control:** Baythroid 2 oz/A Leverage 2.8 oz/A Penncozeb 2 lbs/A **Disease Control**: None Vine Kill:

Appendix 2: STANDARDIZED NE1031 RATING CODES FOR PLANT AND TUBER CHARACTERISTICS

Tuber Color

- 1. purple
- 2. red
- 3. pink
- 4. dark brown
- 5. brown
- 6. tan/light brown
- 7. buff
- 8. white
- 9. cream

Tuber Skin Set

1. very poor 2 --3. poor 4 --5. fair 6 --7. good 8 --9. excellent

Tuber Size <u>(GCY Scale)</u>

- 1. small 2. --3. small-medium 4. --5. medium 6. --7. medium-large 8. --
- 9. large

<u>Plant Type</u>

decumbent-poor canopy
 decumbent-fair canopy
 decumbent-good canopy
 spreading-poor canopy
 spreading-fair canopy
 spreading-good canopy
 upright-poor canopy
 upright-fair canopy
 upright-fair canopy
 upright-good canopy

<u>Tuber Texture</u>

- partial russet
 heavy russet
 moderate russet
 light russet
 netted
 slight net
 moderately smooth
 smooth
- 9. very smooth

<u>Tuber Shape</u>

very round
 mostly round
 round to oblong
 mostly oblong
 oblong
 oblong to long
 nostly long
 long
 cylindrical

Tuber Appearance

1. very poor 2. --3. poor 4. --5. fair 6. --7. good 8. --9. excellent

Plant Disease and Pollution Reaction

1.	Dead
2.	-
3.	severe
4.	+
5.	moderate
6.	-
7.	+
8.	slight
9.	none

Tuber Cross-section

- 1. very flat
- 2. --
- 3. flat
- 4. --
- 5. intermediate/oval
- 6. --
- 7. mostly round
- 8. --
- 9. very round

Tuber Eye Depth

1. -2. deep 3. + 4. -5. medium 6. + 7. -8. shallow 9. +

Tuber Disease Rating

- 1. very severe
- 2. --
- 3. severe
- 4. --
- 5. moderate
- 6. borderline
- 7. slight
- 8. very slight
- 9. none

<u>Maturity</u>

1. -2. early 3. + 4. -5. medium 6. + 7. -8. late 9. +

Appendix 3: COMMENT CODES FOR TABLE B

AC=air cracks	RZ=Rhizoctonia
BR=bruise	SEB=stem end browning
CPB=Colorado potato beetle	SC = star cracking
CS=common scab	SG=secondary growth
CT=chain tubers	SIS=silver scurf
DAE=deep apical eyes	SKN=skins
DSE=deep stolen end	SS=sun scald
EB=early blight	SR=soft rot
ECB= European corn borer	STST=sticky stolons, tight stolon attachment
EL= enlarged lenticels	TSWV=Tomato Spotted Wilt Virus
FS=fusarium wilt	VW=Verticillium wilt
GC=growth cracks	WSTD=weak stand
HI= herbicide injury	WW=wire worm
HN = Heat Necrosis (see below)	YF=yellow flesh (YF scale: 1=light yellow to 3=dark
HS=heat sprouts	yellow)
IL=infected lenticels	RF=red flesh (RF scale: 1 =light red or pink to 3 =
LB=late blight	dark red)
LHD=leaf hopper damage	
MS=misshaped tubers	
PE=pink eye	
PR=pink rot	
PLRV=potato leaf roll virus	
PTS=very pointed tubers	
PS=powdery scab	
PVA, PVX, PVY=potato viruses A, X, Y	

Note: ^ before code = high levels; ^^ = very high; ~ = moderate or some

Heat Necrosis

10 tubers/replication are sampled, typically there are 4 replications in each trial (40 tubers total), USPB/SFA trial has 5 reps (50 tubers) and the observational and unreplicated trials have 1 rep (10 tubers), rating is on a 1 to 9 scale, a rating of 9 indicates no incidence a rating of 1 indicates severe incidence

Reading the HN notation: e.g. 12IHN(2-6,5-7,5-8) - The '12' in this case, is the total number of tubers expressing incidence. The number after the dashes (6,7,and 8) are severity ratings. The sum of the numbers before each dash equals the number before the 'IHN', these are the number of tubers with a particular severity rating. So there were 2 tubers with a severity of 6, 5 with a severity of 7, and 5 with a severity of 8.