2004 SFA/USPB Chip Variety Trials

Sponsored by
The Snack Food Association
U.S. Potato Board

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TABLE OF CONTENTS

2004 SFA/USPB Potato Chip Variety Trials

Dr. Donald E. Halseth, Coordinator
Cornell University

INTRODUCTION

The search for new and improved potato varieties is an ongoing and challenging task. During 2002, the U. S. Potato Board joined with the Snack Food Association in the sponsorship of these trials, which were initiated by the SFA in 1985. The six trial locations in 2004 were Florida, Idaho, Maine, Michigan, Pennsylvania and the Red River Valley.

This report is divided into two sections. The first section presents the variety data for the 2004 growing and harvest season at each of the six trial locations. The second section consists of the data obtained from storage samples collected during the harvest of the 2003 trial and were held in storage into 2004 for out-of-storage information. The SFA Potato Technology Committee has thoroughly discussed the need and value of storage data and this report represents the second annual report to include this data.

TRENDS IN THE SEED ACREAGE OF CURRENT CHIPPING VARIETIES

Table 1 summarizes the seven-year trends of the seed acreage of chipping potato varieties from 1998-2004. Dakota Pearl has shown a steady acreage increase for six years while NorValley and Norchip have recent acreage declines.

Table 1. 2004 Approved Seed Acreage for Current Chipping Varieties

		Approved Seed Acres*						
Variety	**Year Released**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
1. Atlantic	1976	6,621	6,245	5,481	5,075	4,645	4,351	3,635
2. Dakota Pearl	1999	n/a	8	67	88	248	1,749	1,868
3. Snowden	1990	7,783	5.942	3,149	2,485	2,758	2,597	1,627
4. Reba	1992	n/a	522	828	755	908	981	898
5. Pike	1995	1,137	1,778	1,433	1,455	1,304	1,291	883
6. Monona	1964	686	652	607	307	509	495	586
7. NorValley	1996	2,271	2,137	1,597	2,244	1,946	1,344	475
8. Andover	1995	397	369	474	419	418	392	393
9. Chipeta	1993	858	938	721	742	401	550	356
10. Ivory Crisp	2001	n/a	n/a	n/a	92	208	214	187
11. Marcy	2003	n/a	n/a	n/a	n/a	n/a	94	187
12. Kanona	1988	446	414	450	180	232	219	160
13. Norchip	1968	278	182	251	206	116	73	52
*Data obtained from PAA certification section								

2004 SFA/USPB CHIP TRIALS

PROCEDURE

Trial entries are selected from candidates suggested by the various University and USDA potato breeders who have been very cooperative in this project. The advanced breeding lines evaluated in 2004 were A91790-13, AF2211-9, B1240-1, MSF099-3, MSJ461-1, ND2470-27, ND5822C-7, NY132, W1201 and W1773-7 (see Table 2 for descriptions), and were compared with the chip industry standards Atlantic and Snowden. Trial coordinators established trials in six states with grower or research farm plots where entries were grown using standard cultural practices. Observations on emergence, growth characteristics and maturity are made during the growing season. Yield, tuber size distribution, external and internal defects, and specific gravity were evaluated at harvest. Storage samples were held in grower storages and university facilities and chip processors participated in chipping evaluations from various temperature and storage durations.

OVERVIEW

It is important to look at the performance of the individual entries at each location because of the variations in soil types, weather, growing conditions and crop management. Pages 5-25 show the yield, percent size distribution, and specific gravity data obtained at each of the six regional locations. Table 3 (page 26) summarizes the overall average yield, percent size distribution and specific gravity for each of the 10 clones averaged over the six regional trial sites. There were two advanced breeding lines (A91790-13 and MSF099-3) which completed three years of trialing from 2002 through 2004. These data are presented in Tables 4a and 4b (page 27). A third entry, ND2470-27, was in trials for 1999, 2003-2004 and has data presented in Table 4c. The data provides the three-year average for each regional location and reflects the variable performance among seven locations.

A91790-13 is an entry from the USDA-Aberdeen, ID potato breeding program from a cross between Chipeta and Ivory Crisp. It had its highest average yield in California and Idaho, and when averaged over all locations had a No.1 yield of 101% of Atlantic and 106% that of Snowden. Yield was relatively higher at irrigated locations. Specific gravity averaged 4 points below Snowden and 6 points below Atlantic. Best chip color in California and Maine while some hollow heart was reported in California and the Red River Valley.

MSF099-3 was selected by the Michigan State University potato breeding program in 1994 from a cross between Prestile x MSC127-3. Tubers are oblong, shallow eyes and a netted skin. Some hollow heart in oversize tubers. Highest average total and No.1 yields were obtained in Michigan with California being a close second. Average No.1 yield was 94% of Snowden and 89% of Atlantic. Specific gravity averaged 1 unit below Snowden and 3 points below Atlantic. Best chip color in California and Maine trials. Moderate levels of hollow heart in a few trials while culls averaged 2% less than Atlantic or Snowden.

ND2470-27 was developed from a cross between Yankee Chipper and Norchip made at North Dakota State University. Highest average total and No.1 yields were obtained in the Idaho and Washington trials. Averaged over all seven trial sites, ND2470-27 had No. 1 yields of 103% of Snowden and 88% of Atlantic. Specific gravity was 9 points below Snowden and 12 points below Atlantic. While Maine had the best chip color, California and the Red River Valley trials averaged only a few Agtron units lower.

Two entries were dropped from further testing after one year of SFA/USPB trials in 2004. **B1240-1** was dropped from USDA-Beltsville program due to inconsistent chipping and it developed severely indented apical ends in several locations. Scab and black spot susceptibility were noted in some SFA trials. **W1773-7** was discontinued from SFA trials by the University of Wisconsin program as it did not represent a significant improvement over Snowden in sand/irrigated conditions.

Table 2. Characteristics of the 2004 SFA/USPB Chip Trials Entries
Data Provided by Potato Breeders

Advanced Seedlings	Characteristics	Seed Provided By
A91790-13	A selection from a cross between Chipeta x Ivory Crisp in 1991. It has mid-season maturity, med-high specific gravity, high yield potential and ability to chip from 40-42F storage. Susceptible to net necrosis.	Dr. Rich Novy USDA - Aberdeen Aberdeen, ID
AF2211-9	A selection from a cross between Atlantic x Maine Chip in 1996. It has mid-season maturity, high specific gravity, medium yield potential and chips across a range of temperatures. Moderately resistant to scab and net necrosis, but susceptible to verticillium wilt.	Dr. Zenaida Ganga University of Maine Presque Isle, ME
B1240-1	A selection from a 1991 cross between B0172-22 x B0186-3. It has late maturity, medium specific gravity, and a high yield potential. Tolerant to early blight and internal heat necrosis, resistant to CPB, but scab susceptible.	Dr. Kathleen Haynes USDA – Beltsville Beltsville, MD
MSF099-3	A selection made from a cross between Snowden x Chaleur in 1993. It has mid-season maturity, oblong shape, medium specific gravity. It is intermediate in scab susceptibility and has chipped from 42F storage.	Dr. Dave Douches Michigan State Univ. East Lansing, MI

Continued - Table 2. Characteristics of the 2004 SFA/USPB Chip Trials Entries Data Provided by Potato Breeders		
MSJ461-1	A selection from a 1997 cross between Tollocan x NY88. It has late maturity, med-low specific gravity, and a high yield potential. Excellent chip color, tubers attractive enough for tablestock, foliar late blight resistance but scab susceptible.	Dr. Dave Douches Michigan State Univ. East Lansing, MI
ND2470-27	A selection from a 1984 cross between Yankee Chipper x Norchip. Late maturity, medium-to-high specific gravity and a high yield potential. It has low sugar accumulation and chips from 42F storage. Susceptible to silver scurf and chain setting and heavy stolons noted with heat stress.	Dr. Susie Thompson North Dakota State Univ. Fargo, ND
ND5822C-7	A selection from a 1994 cross between ND4103-2 x Dakota Pearl. Maturity is late to very late. Specific gravity is medium to high and a very high yield potential. Bright skin, uniform size and shape, and chips from 42F storage. Susceptibility to hollow heart, particularly in large potatoes.	Dr. Susie Thompson North Dakota State Univ. Fargo, ND
NY132	A selection from a 1995 cross between Eva x Pike. Maturity is late, medium-high specific gravity, and medium yield potential. Attractive tubers, bright skin, very good scab resistance and good chip color. Occasional levels of internal necrosis and hollow heart, but less than Atlantic.	Dr. Walter De Jong Cornell University Ithaca, NY
W1201	A selection from a cross in 1985 between Wischip x FYF85. It has late maturity, medium specific gravity and a medium-to-high yield. High, early tuber bulking rate of well-sized tubers. Good resistance to early blight and chips from 45F storage. Some scab resistance but may have some pressure bruise susceptibility.	Dr. Horia Groza and Bryan Bowen University of Wisconsin Rhinelander, WI
W1773-7	A selection from a 1991 cross between Steuben x RHL 167. Maturity is mid-season, medium-low specific gravity, high yield potential and good chip color from three months at 48F. Excellent internal quality, round, smooth tubers and fair scab resistance.	Dr. Horia Groza and Bryan Bowen University of Wisconsin Rhinelander, WI

Florida Regional Trial

Local Coordinators:	Cooperating Grower:	Cooperating Chip Processor:
Dr. Chad Hutchinson University of Florida Horticultural Sciences Dept PO Box 110690 Gainesville, FL 32611-0690 Dr. Marion White University of Florida Mid-Florida REC 2725 Binion Road Apopka, FL 32703-8504	University of Florida Plant Science Research and Education Unit at Hastings, FL	Utz Quality Foods Hanover, PA

Trial Data:

Planting Site:	University of Florida, PSREU Hastings Farm
Planting Date:	February 4, 2004
Harvest Date:	May 17, 2004 (103 days)
Growing Conditions:	Weather conditions were less than ideal during the 2004 potato season. February and March were wetter than normal in Northeast Florida. The amount of rainfall early in the season qualified the research farm to apply 30 lb nitrogen/Acre above the 200 lb nitrogen/Acre BMP (Best Management Practices) rate. May and June were hot. Early season stress from heavy rain and no nitrogen (leaching) combined with the high temperatures late in the season impaired crop quality in the region. Overall, weather conditions were poor, fertilization practices were good, irrigation practices were good and pest incidence was light. Therefore, overall growing conditions for the trial were good.
Experimental Design:	Each variety/clone was planted in a single 200 ft row as directed by the SFA protocol. Four 20 ft sections of each row were harvested and graded. This was not a replicated experiment. Only means were calculated.
Row Spacing:	8 inches in-row, 40 inches between-row
Fertilizer:	preplant 100-43-86/A; sidedress 50-0-42/A (2 app) and 30-0-25/A (lb N-P-K/A)
Pest Control:	Telone II, 6 gpa, pre-plant Temik 15G, 20 lb/A, at planting Sencor DF,16 oz/A and Dual II Magnum,16 fl oz/A at hilling Fungicides and Insecticides as needed. IPM program.

Table 1. FLORIDA: Production statistics for SFA clones.

Clone	Tuber Yield			% Culls	Size Class Distribution[3, 4] (%)					Size Class Range (%)		Specific Gravity
	No.1[1] cwt/A	Total cwt/A	% No.1[2]		1	2	3	4	5	2 to 4	3 to 4	
Atlantic	**275**	**344**	**80**	**2**	**8**	**69**	**13**	**0**	**0**	**81**	**13**	**1.091**
Snowden	**306**	**396**	**77**	**0**	**11**	**74**	**4**	**0**	**0**	**78**	**4**	**1.086**
A91790-13	250	314	80	3	7	59	23	0	0	83	24	1.083
AF2211-9	248	301	82	2	7	71	12	1	0	84	13	1.088
B1240-1	275	343	80	2	9	74	9	0	0	82	9	1.083
MSF099-3	154	248	62	2	18	61	3	0	0	64	3	1.086
MSJ461-1	155	299	52	2	17	51	2	0	0	54	2	1.077
ND2470-27	157	231	70	4	12	63	8	0	0	70	8	1.082
ND5822C-7	257	401	64	2	15	62	3	0	0	65	3	1.085
NY132	285	385	74	2	10	66	9	1	0	76	10	1.086
W1201	314	367	82	2	6	56	30	1	0	87	31	1.091
W1773-7	318	371	86	1	6	65	20	2	0	85	22	1.087
Average	247	333										1.085

[1]**No.1 Yield**: marketable yield, size classes 2 to 4

[2]**Percent No. 1**: calculated based on weight using the formula, No. 1 Wt / Total Yield Wt

[3]**Size Class Distribution**: calculated based on weight using the formula, Class Wt / (Total Yield Wt – Cull Wt).

[4]**Size Classes**: 1 = 1.5 to 1 7/8", 2 = 1 7/8 to 2.5", 3 = 2.5 to 3.25", 4 = 3.25 to 4", 5 = > 4"; Class size C was recorded and is included in Total Yield but is not shown as a separate size category.

Table 2. FLORIDA: Plant growth and tuber characteristics for SFA clones.

	Plant Growth Characteristics[1]				Tuber Characteristics[2]						
Clone	Percent Stand	Early Vigor	Vine Type	Vine Maturity	IFC	SC	ST	TS	ED	APP	Chip Rating
Atlantic	**90**	**na**	**9-6**	**4**	**2.0**	**6.0**	**5.3**	**2.3**	**6.0**	**5.7**	**61.9**
Snowden	**96**	**na**	**9**	**3**	**2.0**	**6.0**	**5.3**	**2.0**	**5.7**	**6.7**	**62.6**
A91790-13	66	na	9-6	3	1.5	6.7	6.3	2.7	6.3	5.3	63.4
AF2211-9	87	na	8	5	1.0	6.3	5.7	2.3	6.7	5.7	66.3
B1240-1	84	na	8	5	2.0	7.3	5.7	3.0	6.7	6.3	65.4
MSF099-3	93	na	8	1	2.0	6.3	5.3	3.7	6.7	5.7	60.6
MSJ461-1	78	na	9-6	2	2.0	6.3	5.7	3.3	6.0	4.7	63.6
ND2470-27	67	na	8	2	1.0	6.7	6.0	2.3	6.3	5.7	65.2
ND5822C-7	92	na	9	4	1.0	7.7	6.7	2.7	6.0	6.7	63.7
NY132	82	na	9-6	6	2.0	6.7	6.3	3.3	6.7	6.7	67.4
W1201	83	na	9	5	1.0	6.0	5.3	3.3	5.3	5.7	61.0
W1773-7	78	na	9-6	3	1.0	6.0	5.0	2.7	6.0	5.3	60.9

[1]Plant Growth Characteristics.

Percent Stand: based on 8 inch in-row spacing, 20 ft plot.

Early Vigor: na; not available due to computer error

Vine Type: 1 = decumbent - poor canopy, 2 = decumbent - fair canopy, 3 = decumbent - good canopy, 4 = spreading - poor canopy, 5 = spreading - fair canopy, 6 = spreading – good canopy, 7 = upright - poor canopy, 8 = upright - fair canopy, 9 = upright - good canopy.

Vine Maturity: 1 = completely dead.

[2]Tuber Characteristics.

Internal Flesh Color (IFC): 1 = white, 2 = cream, 3 = light yellow, 4 = medium yellow, 5 = dark yellow, 6 = pink, 7 = red, 8 =blue, 9 = purple.

Skin Color (SC): 1 = purple, 2 = red, 3 = pink, 4 = dark brown, 5 = brown, 6 = tan, 7 =buff, 8 = white, 9 = cream.

Skin Texture (ST): 1 = partially russet, 2 = heavy russet, 3 = moderate russet, 4 = light russet, 5 = netted, 6 = slightly netted, 7 = moderately smooth, 8 = smooth, 9 = very smooth.

Eye Depth (ED): 1 = very deep, 3 = deep, 5 = intermediate,7 = shallow, 9 = very shallow

Overall Appearance (APP): 1 = very poor, 3 = poor, 5 = fair, 7 = good, 9 = excellent.

Table 3. FLORIDA: External and internal defects for SFA clones.

Clone	% External Tuber Defects [1]					% Internal Tuber Defects[2]			
	Growth Cracks	Mis-shapen	Sun-burned	Rotten & misc.	Total Culls	HH	BR	CRS	IHN
Atlantic	**0**	**1**	**0**	**0**	**2**	**1**	**0**	**0**	**0**
Snowden	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
A91790-13	0	2	0	1	3	0	0	0	0
AF2211-9	0	1	0	0	2	0	0	0	1
B1240-1	0	1	1	1	2	1	0	0	0
MSF099-3	0	2	0	0	2	4	0	0	0
MSJ461-1	0	1	1	0	2	0	0	0	0
ND2470-27	1	3	1	0	4	0	0	0	0
ND5822C-7	0	1	0	0	2	0	0	0	0
NY132	1	1	1	0	2	4	0	0	0
W1201	0	1	1	0	2	0	0	0	0
W1773-7	0	0	0	0	1	0	0	0	0

[1]**External Tuber Defects**: Total Culls is sum of growth cracks, misshapen, sunburned and rotten/misc.

[2]**Percent Internal Tuber Defects**: percent of tubers showing defects; HH = hollow heart, BR = brown rot, CRS = corky ringspot, IHN = internal heat necrosis.

Idaho Regional Trial

Local Coordinator:	Cooperating Grower:	Cooperating Chip Processor:
Stephen L Love		
Tam Salaiz	Aberdeen R&E Center	R&G Potatoes
Peggy Bain	Aberdeen, Idaho	American Falls, Idaho
University of Idaho		

Trial Data

PLANTED	26-Apr-04		
VINE KILLED	4-Sep-04		(Reglone @ 2 pts/A)
HARVESTED	20-Sep-04		
PLOT LENGTH	20’	**HARVEST LENGTH**	20'
HILL SPACING	10”	**ROW SPACING**	36”
HILLS PER PLOT	24	**ROWS/ PLOT**	1
REPS	4		

METHOD OF HARVEST Grimme Machine **IRRIGATION** Sprinkler

FERTILIZER

100 N - 50 P - 40 K– pre-plant (20 April, 2004)
100 N injected (40-June 28, 40-July 15, 20-July 26)

INSECTICIDES APPLIED/HILLING

Admire 2F (17 oz/A) - Shanked 18 May

FUNGICIDES APPLIED

Chlorothalonil (Bravo Weather Stik, 1.5 pts/a) injected 1 July
Chlorothalonil (Bravo Weather Stik, 1.5 pts/a) injected 26 July
Chlorothalonil (Equus - 1.5 pts/a) + Curzate (3.3 oz/a), aerial, 29 July
Dithane DF Rainshield (2 lbs/a) injected, 9 August
Chlorothalonil (Equus - 1.5 pts/a) + Curzate (3.3 oz/a), aerial, 21 August

HERBICIDES APPLIED

Sencor DF 75% (0.33 lb/A) + Spartan (2.0 oz/A) - Spray Coupe- 19 May
Encorporated with 0.5" water Six consecutive days >90^{o}F July10-15.

ENVIRONMENTAL FACTORS

Very mild growing conditions throughout the growing season.
Cool spring, only 4 days over 80 F, temperature below freezing on May 25.
Wetter than normal summer with relatively high humidity.
3.6 inches of rain fell between April 15 through September 4 (vine kill date).
Daily average humidity over 50% on 85 days from May 15 through Sept 4.
High humidity resulted in high potential for late blight and frequent fungicide applications.
The summer was relatively cool with only 10 days over 90 F and zero days over 100 F.

Table 1. IDAHO TRIAL 2004, Yield, Size Distribution, Specific Gravity.

	Yield (cwt/A)		Percent Size Distribution				%	Specific
Clone	US No1	Total	<1 7/8 "	1 7/8-2.5"	2.5-4"	>4"	Unusable	Gravity
ND5822C-7	543	683	18	27	40	13	2	1.091
A91790-13	517	604	12	21	54	11	2	1.091
B1240-1	507	555	5	6	65	20	3	1.090
MSJ461-1	442	578	19	21	48	7	5	1.092
W1201	419	493	9	18	53	14	6	1.096
ATLANTIC	**405**	**466**	**10**	**18**	**54**	**15**	**3**	**1.093**
ND2470-27	400	481	13	18	58	7	4	1.075
NY132	325	409	20	26	50	3	1	1.101
AF2211-9	282	346	16	27	51	4	3	1.091
W1773-7	276	394	29	34	35	1	1	1.090
MSF099-3	248	311	18	26	47	7	2	1.087
SNOWDEN	**119**	**215**	**44**	**25**	**27**	**3**	**0**	**1.088**
Mean	**374**	**461**	**18**	**22**	**49**	**9**	**3**	**1.09**
LSD (.05)	81	76						0.004
LSD (.01)	109	102						0.006

Table 2. IDAHO TRIAL 2004, Vine and tuber charteristics.

Clone	Vine Size [1]	Vine Maturity[2]	Stems/ Plant	Fresh Merit Score [3]	Tuber Color[4]	Tuber Shape[5]
ND5822C-7	4.3	4.5	2.8	1.6	1.0	1.0
A91790-13	4.0	4.8	3.4	1.3	1.0	1.5
B1240-1	3.3	5.0	2.2	2.5	1.8	1.3
MSJ461-1	3.5	4.0	3.3	1.7	2.0	1.3
W1201	2.5	3.0	2.5	1.8	2.0	1.3
ATLANTIC	**2.3**	**3.3**	**2.2**	**2.0**	**2.3**	**1.5**
ND2470-27	2.3	3.0	2.6	1.5	1.0	1.5
NY132	2.3	3.5	2.2	1.1	1.0	1.0
AF2211-9	1.0	2.5	2.3	1.4	1.5	1.0
W1773-7	1.8	3.0	2.7	2.3	3.0	1.0
MSF099-3	1.3	2.3	2.9	1.7	2.8	3.0
SNOWDEN	**1.3**	**2.0**	**3.8**	**1.4**	**2.8**	**1.3**
Mean	**2.5**	**3.4**	**2.7**	**1.7**	**1.9**	**1.4**

[1] (1-5) 5=Large

[2] (1-5) 5=Late

[3] (1-5) 5=Best Preference Score

[4] (1-5) 1=White

[5] (1-5) 1=Round

Table 3. IDAHO TRIAL 2004, External and Internal Defects.

	External defects[4]				Internal Defects[6]			
	Growth				%	%	%	%
Clone	Scab	Cracks	Knobs	Blackspot [5]	HH	BC	IBS	VD
ND5822C-7	3.5	4.8	5.0	3.5	28	13	0	0
A91790-13	2.5	5.0	5.0	2.9	0	0	0	0
B1240-1	3.0	5.0	5.0	3.7	3	0	0	0
MSJ461-1	3.0	5.0	5.0	3.5	0	0	0	0
W1201	3.8	4.5	4.8	3.1	0	0	0	0
ATLANTIC	**2.5**	**5.0**	**5.0**	**2.8**	**15**	**5**	**0**	**0**
ND2470-27	3.5	5.0	5.0	2.7	0	0	0	3
NY132	3.5	5.0	5.0	3.7	15	0	0	0
AF2211-9	2.3	5.0	5.0	3.1	3	5	0	0
W1773-7	1.8	5.0	5.0	3.3	0	0	0	0
MSF099-3	4.0	5.0	5.0	3.2	0	0	0	0
SNOWDEN	**3.3**	**5.0**	**5.0**	**3.9**	**0**	**0**	**0**	**0**
Mean	**3.7**	**4.8**	**4.9**	**3.3**	**2.0**	**1.0**	**2.0**	**3.0**

[4] (1-5) 5=None

[5] (1-5) 5=severe. Tubers peeled in abrasive peeler.

[6] Percent of defects on 10 large tubers

HH=hollow heart, BC=brown center, IBS=internal brown spot, VD=vascular discoloration

Table 4. IDAHO TRIAL 2004, After Harvest Quality Report.

		R&G Potato Company Ratings[8]					
	Chip[7]		Undesirable	Internal		Exterior	Total
Clone	40	Blackspot	color	defects	Green	defects	defects
ND5822C-7	1.6	3	3	0	0	28	**34**
A91790-13	1.3	0	0	0	0	11	**11**
B1240-1	2.5	8	7	0	0	7	**22**
MSJ461-1	1.7	2	0	0	0	32	**34**
W1201	1.8	0	0	0	0	29	**29**
ATLANTIC	**2.0**	**14**	**9**	**0**	**0**	**9**	**32**
ND2470-27	1.5	5	0	0	0	56	**61**
NY132	1.1	12	2	0	0	26	**40**
AF2211-9	1.4	9	0	0	0	21	**30**
W1773-7	2.3	0	42	0	0	11	**53**
MSF099-3	1.7	0	0	0	0	69	**69**
SNOWDEN	**1.4**	**3**	**2**	**0**	**0**	**13**	**18**

[7] SFA Color (1-5) 1=lightest

[8] (0-15) 15=Frito Lay rejection std. Samples rated at harvest

Maine Regional Trial

Participants:

Local Coordinator:
Ed Plissey, Res. Director
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207-255-6166
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Cooperating Grower:
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Exeter, ME 04435-3228
207-379-2081

Cooperating Chip Processor:
Dennis Deary, Process Manager
Frito-Lay, Inc.
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Trial Data:

Previous Crop:	Barley
Location:	Exeter, Maine
Soil :	Bangor Silty Loam Series
Planting Date:	May 15, 2004
Fertilization:	1,200 lbs. 14-14-20
Plots:	1-36" row X 260 ft.
Tillage and Pest Mgt.:	Traditional commercial chip culture
Planter and Spacing:	Harriston, 6 row, pick type at 9 inches.
Date Vine Kill:	September 7, 2004 – Reglone @ 1 pint/Ac.
Date Harvest:	Friday, September 17, 2004
Processing Date:	Monday, September 20, 2004

Variety Entries:

1. Atlantic (field Std.)	S & R Corp., Island Falls, ME
2. Snowden (Storage Std.)	S & R Corp., Island Falls, ME
3. AF2211-9	Dr. Zenida Ganga, University of Maine, Presque Isle
4. MSF0993	Dr. David Douches, Michigan State, E. Lansing, MI
5. MSJ461-1	Dr. David Douches, Michigan State, E. Lansing, MI
6. NY132	Dr. Walter DeJong, Cornell University, Ithaca, NY
7. W1773-7	Dr. Horia Groza, Ag Research Sta., Rhinelander, WI
8. W1201	Dr. Horia Groza, Ag Research Sta., Rhinelander, WI
9. B1240-1	Dr. Kathleen Haynes, USDA-ARS, Beltsville, MD
10. A91790-13	Dr. Rich Novy, USDA-ARS, Aberdeen, ID
11. ND5822C-7	Dr. Susie Thompson, NDSU, Fargo, ND
12. ND2470-27	Dr. Susie Thompson, NDSU, Fargo, ND

Procedure:

Seed sample shipments were received by Crane Brothers Farm in Exeter, Maine and held in seed storage until all samples arrived and were conditioned for cutting. Seed lots were hand cut and transported to Dorman Farms for planting. The seed lots were planted with a six-row Harriston pick-type planter on Bell Farm off the Stetson Road in Exeter, Maine. The trial site was planted under normal soil moisture conditions and received fairly uniform rainfall throughout the growing season. The trial site received standard cultural and pest management applications throughout the growing season. No significant foliar insect, disease or weed pressure was encountered in the trial area during the growing season.

The trial was harvested on September 17, 2004. A 50-pound tuber sample was delivered to the Frito-Lay Potato Chip Plant at Dayville, CT for commercial fry processing. Replicated yield samples were gathered and transported to the Bio-Ag Research facility for grading, sizing and specific gravity evaluation. Winter processing samples were transferred to Dr. Zenida Ganga at the Aroostook Research Farm potato-breeding project for winter storage and chip-fry color evaluation.

RESULTS

All cultivars except NY132, AF2211-9 and MSF099-3 were found to be infected with deep-pitted scab at harvest. AF2211-9 and MSF099-3 were lightly infected with a common scab. Snowden, A91790-13 and ND5822C-7 were so severely infected that a suitable yield sample could not be selected for commercial frying at the Frito-Lay plant. All cultivars had good size distribution for commercial chip production with the exception of the pitted scab problem. The pitted scab may have been a factor in the lower specific gravity readings found in several varieties in the tests. Cultivars with high scab defect levels produced high defect level scores following commercial chip processing at the Frito-Lay plant. The Snowden variety produced an unacceptable high percentage of fewer than 2 inch sized tubers. Because of the problem with deep-pitted scab, no commercial storage samples were placed in storage from the 2004 trial. The cause of the deep-pitted scab problem has not been determined. The soil pH was not abnormally high, however the site may have been used for manure storage or industrial waste storage at some time prior to planting the 2004 trial.

The Maine trial coordinator lauds the continued cooperation of John Dorman at Dorman Farms in Exeter, Maine for hosting the SFA/NPPB Chip Trial for 20 consecutive years and Dennis Deary at the Frito-Lay Inc. processing plant in Dayville, CT for continued cooperation and support of the regional project. Thank also to Jim and Steve Crane at Crane Brothers Farm in Exeter, Maine for receiving and storing seed samples prior to planting. Thanks are also extended to Dr. Zenida Ganga and technicians Garland Rounds and Tina Houston for their continued support of the winter storage and fry testing.

Table 1. Total and Marketable Yield, size and quality of USPB/SFA Potato Chip Cultivars Grown in Central Maine – 2004.

	Yield: Cwt./Ac.			Percent (%) Size Distribution					Frito-Lay Plant Data: Dayville, CT		
Cultivar	Marketable Yield	Total Yield	Percent US No. 1	Culls[3]	Small 0 – 2"	Medium 2 – 3.5"	Large Over 3.5	Specific[1] Gravity	Agtron Color	Total Solids	Total[2] Defects
AF2211-9	348.7	384.0	91	2.3	6.8	87.9	3.0	1.086	70	17.2	0
ND5822C-7	293.8	462.5	64	15.4	3.2	45.7	17.7	1.080	69	16.2	22
W1773-7	281.3	403.0	70	21.7	8.5	65.4	4.4	1.081	69	18.0	4
ND2470-27	273.0	455.0	60	35.4	4.6	47.6	12.4	1.070	NA	NA	NA
ATLANTIC	**259.0**	**357.8**	**72**	**17.8**	**9.8**	**52.4**	**20.0**	**1.087**	**68**	**18.0**	**10**
NY132	252.3	267.3	94	0	5.6	85.5	8.0	1.089	70	17.9	0
MSF099-3	231.3	258.8	89	0.5	10.2	74.9	14.4	1.081	69	16.7	3
W1201	210.0	326.3	64	31.0	4.6	57.1	7.3	1.083	67	14.0	31
MSJ461-1	203.8	307.5	66	22.4	11.4	62.2	4.0	1.073	69	15.5	0
B1240-1	141.3	322.0	44	51.6	4.5	32.2	11.7	1.083	67	14.0	31
SNOWDEN	**94.5**	**265.3**	**36**	**42.9**	**21.5**	**35.6**	**0**	**1.075**	**NA**	**NA**	**NA**
A91790-13	45.0	293.8	15	84.7	0	15.3	0	1.070	NA	NA	NA

1 = Gravity measured by SFA Hydrometer. 2 = Defects: Primarily external black spots due to pitted scab. 3 = Culls: Primarily deep pitted scab.

Michigan Regional Trial

Local Coordinators:

Chris Long
Dave Douches
Michigan State University
East Lansing, MI

Cooperating Grower:

Greg Perkins
V & G Farms
Stanton, MI

Cooperating Chip Processor:

Herr Foods, Inc.
Nottingham, PA

Trial Data:

Planting Date:	April 30, 2004
Vine Kill Dates:	None applied
Harvest Date:	October 4, 2004 (154 DAP)
Row & Plant Spacing:	34″ x 9″; irrigated
Plots:	Single rows for each entry approximately 300′ long

Trial Procedure:

Seed was mechanically cut on April 21, 2004 and delivered to the grower's storage the following day. No specific seed issues were noted at the time of seed cutting. No seed treatments were applied at the time of seed cutting.

At harvest, three plot areas of 23 feet were harvested from each entry and were used to determine yields, size distribution, specific gravity and internal defects. A 40 lb. storage sample was collected from each entry and was placed in the grower's commercial storage for evaluation in spring 2005. Twenty-five tuber samples were also collected at harvest and stored at Michigan State University at 45ºF and 50ºF for both a February and May evaluation. An out of the field chip sample was taken for each variety at harvest and sent to Herr Foods for processing.

A plant growth and vigor observation was made on June 17th.

Growing Season Weather:

Weather conditions were generally cool with heavy rainfall in May. May was the wettest month, receiving just under 8.2" of rainfall. Total rainfall, April through October, was 20.12" averaging 2.87" per month over this same period. Rainfall for 2004 was slightly under the 15 year average of 21.32. Daytime temperatures were moderate throughout the growing season following the 15 year average. There was no recorded temperature over 89ºF in this region in 2004. In addition, nighttime temperatures remained cool throughout the region. One day in June the nighttime temperature reached 68ºF. The average nighttime lows for July, August and September were 57ºF, 53ºF and 49ºF, respectively.

Results:

Table 1 summarizes the yield, size distribution, and specific gravity data. Overall, US#1 yields were good with ND5822C-7 having an exceptional yield for the second year in a row. ND2470-27 and MSJ461-1 exhibited a marginal specific gravity for processing.

Table 1. Yield ,Size Distribution*, Specific Gravity

	Yield (cwt/A)		Percent Size Distribution					
Entry	US#1	TOTAL	US#1	Small	Mid-Size	Large	Culls	Specific Gravity
ND5822C-7	673	705	95	3	70	25	2	1.085
A91790-13	490	543	90	9	85	5	1	1.090
W1201	488	504	97	3	80	17	0	1.091
B1240-1	487	526	93	3	64	28	5	1.084
MSJ461-1	441	484	91	8	84	7	1	1.079
SNOWDEN	**416**	**438**	**95**	**4**	**80**	**15**	**1**	**1.087**
ATLANTIC	**415**	**431**	**96**	**3**	**88**	**8**	**0**	**1.093**
ND2470-27	408	426	96	3	61	35	1	1.078
MSF099-3	391	431	91	3	82	9	6	1.083
W1773-7	384	421	91	9	82	9	0	1.087
NY132	353	361	98	2	75	23	0	1.089
AF2211-9	324	360	90	9	89	1	1	1.085
Average	439	469	94					1.086

*small <1 7/8"; mid-size 1 7/8"-3 1/4"; large >3 1/4"

Table 2 summarizes the at-harvest tuber quality. ND5822C-7 had an elevated incidence of hollow heart with 14 out of 30 cut showing the defect. In addition, this variety had 12 brown centers indicating the total incidence of hollow heart could have been even higher. The following comments regarding scab susceptibility are observations from the field trial during grading. The entries showing the greatest susceptibility to scab were A91790-13, B1240-1 and MSF099-3. These varieties contained moderate surface and slight pitted scab. In most other entries, the incidence of scab was minimal to none.

Table 2. At Harvest Tuber Quality. V & G Farm, Michigan.

	Internal Defects[1]					
Entry	HH	VD	IBS	BC	Total Cut	Scab[2] Rating
ND5822C-7	14	1	0	12	30	nd
A91790-13	0	3	1	0	30	nd
W1201	0	7	0	0	30	nd
B1240-1	2	3	0	1	30	nd
MSJ461-1	2	1	2	0	30	1.8
SNOWDEN	**2**	**11**	**0**	**0**	**30**	**1.9**
ATLANTIC	**2**	**3**	**0**	**0**	**30**	**2.1**
ND2470-27	3	12	1	1	30	nd
MSF099-3	8	1	0	1	30	2.5
W1773-7	6	0	0	0	30	1.8
NY132	4	1	0	0	30	1.5
AF2211-9	0	8	0	0	30	2.3

[1] Internal Defects. HH = hollow heart, VD = vascular discoloration, IBS = internal brown spot, BC = brown center.

[2]Scab tolerance data from MSU scab trial. 0 = no infection, 1 = low infection < 5%, 3 = intermediate, 5 = highly susceptible, nd = no data

Table 3 shows the post harvest chip quality based on samples collected at harvest on October 4 and processed at Herr Foods Inc. on October 14th, 11 days after harvest. Chip colors were all good, with A91790-13 having exceptionally nice color. Some varieties had a significant amount of total chip defects primarily W1773-7, ND2470-27, B1240-1 and MSF099-3.

Table 3. 2004 Post-Harvest Chip Quality[1].

	Agtron	SFA[2]	Specific	Percent Chip Defects[3]		
Entry	Color	Color	Gravity	Internal	External	Total
ND5822C-7	65.4	1.0	1.082	5	4	9
ATLANTIC	**61.8**	**1.5**	**1.085**	**9**	**2**	**11**
MSJ461-1	66.1	1.5	1.073	5	7	12
A91790-13	63.8	1.0	1.085	7	5	12
SNOWDEN	**62.6**	**1.0**	**1.082**	**3**	**12**	**15**
W1201	61.7	1.0	1.089	11	8	19
NY132	67.7	1.0	1.088	9	15	24
AF2211-9	68.3	1.0	1.083	10	15	25
MSF099-3	62.0	1.5	1.079	26	0	26
B1240-1	62.2	1.5	1.080	19	9	28
ND2470-27	63.0	1.0	1.077	23	10	33
W1773-7	62.1	1.5	1.082	33	3	36

[1]Samples collected at harvest October 4 and processed by Herr Foods Inc., Nottingham, PA on October 14, 2004 (11 days).

[2]SFA Color: 1 = lightest, 5 = darkest

[3]Percent Chip Defects: are a percentage, by weight, of the total sample comprised of undesirable color, greening, internal defects and external defects.

Table 4 summarizes the results of the samples collected for black spot bruise. Two-25 tuber samples were collected at harvest. One sample served as a check and the second sample was stored for at least 12 hours at 50ºF, then placed in a 6 sided plywood drum and rotated 10 times to produce a simulated bruise. Later, all samples were abrasively peeled and scored for black spot bruise. All entries had a high percentage of bruise free potatoes among the check samples except Atlantic and ND5822C-7.

Among the "Simulated Bruise" samples, the best entries were MSJ461-1, MSF099-3 and A91790-13. ND2470-27 and B1240-1 showed the lowest percent bruise free.

Table 4. Black Spot Bruise Test

	A. Check Samples[1]									B. Simulated Bruise Samples[2]								
Entry	0	1	2	3	4	5+	Total Tubers	Percent Bruise Free	Average Bruises Per Tuber	0	1	2	3	4	5+	Total Tubers	Percent Bruise Free	Average Bruises Per Tuber
A91790-13	24	1					25	96	0.0	16	7	1		1		25	64	0.5
MSJ461-1	25						25	100	0.0	17	5	2	1			25	68	0.5
MSF099-3	24	1					25	96	0.0	13	8	4				25	52	0.6
ND5822C-7	19	6					25	76	0.2	8	15	1	1			25	32	0.8
ATLANTIC	**18**	**6**	**1**				**25**	**72**	**0.3**	**10**	**11**	**3**	**1**			**25**	**40**	**0.8**
W1773-7	23	2					25	92	0.1	9	12	4				25	36	0.8
SNOWDEN	**24**	**1**					**25**	**96**	**0.0**	**10**	**5**	**9**	**1**			**25**	**40**	**1.0**
AF2211-9	21	4					25	84	0.2	6	9	8	2			25	24	1.2
W1201	23	2					25	92	0.1	7	7	7	4			25	28	1.3
NY132	21	4					25	84	0.2	15	1		2	5	2	25	60	1.5
ND2470-27	21	4					25	84	0.2	4	6	10	2	3		25	16	1.8
B1240-1	22	3					25	88	0.1	3	8	4	7			22	14	2.0

[1]Tuber samples collected at harvest and held at room temperature for later abrasive peeling and scoring.

[2]Tuber samples collected at harvest, held at 50F for at least 12 hours, then placed in a 6 sided plywood drum and rotated 10 times to produce simulated bruising. They were then held at room temperature for later abrasive peeling and scoring.

Variety Comments:

ND5822C-7: This clone continues to have tremendous plant vigor with very large vines. Tuber type was nice, but hollow heart and brown center continue to be found in over 20% of cut oversize tubers. Scab tolerance seems to be good. Chip color was nice with an Agtron score of 65.4. Concerns still remain in regard to elevated total glycoalkaloides in this variety. This variety exhibited a slight susceptibility to black spot bruise.

A91790-13: Emergence and plant vigor were noted as above average. Yields were very nice as US#1's reached 490 cwt/A. Specific gravity was the third highest at 1.090. Scab levels for this variety were lower than last year, but still present in moderate amounts. Chip color was excellent, with lower total defects overall. Susceptibility to black spot was slight.

W1201: This variety was seen to have good plant vigor on June 17th and produced a good yield. A consistently strong specific gravity continues to be noted in this variety around 1.090. No hollow heart was noted in the oversize with 7 of 30 tubers having vascular discoloration. W1201 seems to be a later maturing variety that bulks early. Chip quality was good, but susceptible to black spot bruise at 1.3 bruises per tuber.

B1240-1: A poor stand was noted on June 17th mostly due to seed piece decay. In spite of the poor stand, this variety had an above average US#1 yield at 487 cwt/A. It had the second largest number of culls in the trial at 5%. Specific gravity was acceptable, but below average for the trial. Internal defects were moderate with only 2 hollow heart in 30 cut tubers. Scab susceptibility was noted in the plot at harvest with moderate surface and slight pit scab present. The Agtron score was good, but the total chip defects were high, mostly due to pitted scab and stem end color. Black spot bruise susceptibility was the highest in the trial at 2.0 bruises per tuber.

MSJ461-1: This variety exhibited an average yield of uniform round tubers. Internal defects in the tubers were low. The number of "B" sized tubers was higher than average at 8%. The Agtron score was excellent at 66.1 with below average chip defects. The recorded specific gravities at harvest and at Herr Foods, Inc. were below the minimum processing stand of 1.080. This variety was one of the least susceptible to black spot bruise in this trial.

SNOWDEN: Average yield and an average specific gravity of 1.087.

ATLANTIC: Average yield with the highest specific gravity in the trial at 1.093.

ND2470-27: This variety yielded below average, but produced the largest amount of recorded oversize tubers for this trial at 35%. It also produced the lowest specific gravity of the trial. A large amount of vascular discoloration was noted. Chip color was good, but a large amount of vascular and stem end discoloration was present. Black spot bruise susceptibility was the second highest for the trial at 1.8 bruises per tuber.

MSF099-3: It had a below average yield with the largest number of culls in the trial at 6%. Specific gravity was below average at 1.083. Hollow heart was recorded at 8 tubers in 30 cut, which was the second highest recorded entry in the trial. Chip quality was poor with 26% internal color, mostly due to stem end discoloration. The specific gravity was marginal at 1.079. Black spot bruise susceptibility was low at 0.6 bruises per tuber.

W1773-7: Emergence and plant vigor were average. US#1 yield was below average at 384 cwt/A. Specific gravity was good at 1.087. This variety had the third largest amount of hollow heart in the trial at 6 per 30 cut tubers. Chip color was poor with 33% of the chips exhibiting some discoloration. Black spot bruise susceptibility was slight to moderate.

NY132: On June 17th, NY132 was reported to have an uneven stand due to variability in plant height and growth rate. This variety had a strong marketable profile with 98% of the tubers in the US#1 category. 23% of the US#1 yield was oversize. Four out of 30 cut tubers were hollow. The Agtron score on the chips was 67.7, the second highest in the trial with a 1.088 specific gravity. Nine percent internal defects were recorded due to stem end discoloration in the chips. Overall, this variety was very susceptible to black spot bruise at 1.5 bruises per tuber. It appeared to have a lower number of tubers that were bruised, but those that were bruised were severe.

AF2211-9: This variety recorded the lowest yield in this year's trial with a large percent of "B" size tubers. The specific gravity was acceptable at 1.085. Eight vascular discolorations were noted at harvest which was higher than average. The chips recorded a 68.3 Agtron score, the highest in the trial. Black spot bruise susceptibility was quite high at 1.2 bruises per tuber.

Pennsylvania Regional Trial

Local Coordinator:
Dr. Bill Lamont
Penn State Univ.
Department of Horticulture
University Park, PA 16802

Cooperative Grower:
James Hite
Patton, PA 16668

Cooperating Chip Processor:
Snyder of Berlin
Dan Sharretts
Berlin, PA 15530

Trial Data:

Planting Date:	11-May-00		Soil Temperature: 64ºF
Vine Kill Date:	2-Sep-00	(Reglone)	
Harvest Date:	22-Sep-00	(134 days)	Soil Temperature: 60ºF

Row and plant spacing: 34 inches between rows, 10.5 inches between plants;
Plot length 25 feet; 4 replications.

Growing Season Weather: The growing season was cool, cloudy and damp with 25.2 inches of rain from May 19 to September 23, 2004. The plot was not irrigated.

	*Avg. High ºF	*Avg. Low ºF	Rain (inches)
May	74	60	4.8 (5/19)
June	80	72	4.1
July	84	78	6.7
August	82	77	3.6
September	77	65	6.0 (9/23)
*Pennsylvania State Climatologist			25.2
As reported at Altoona, PA			

Trial Procedure:

Previous crop:	Oats
Fertilizer:	13-13-13 1,350 pounds
Irrigation:	Rainfall 25.2 inches
Herbicides:	Roundup followed by Sencor/Dual according to label
Insecticides:	16 oz. / A Admire at planting
	1.3 pints ACA+/Acre
Fungicides:	Manzate®, Bravo® according to label
Vine Kill:	Reglone according to label
Soil Type:	shaley loam

General Notes: All the potato lines exhibited varying degrees of silver scurf.
Evidence of Pinkeye was noted at harvest on ND5822C-7.

Pennsylvania Regional Trial

Table 1. Yield, Size Distribution, Specfic Gravity of 2004 Snack Food varieties at Patton, PA.

	Yield (cwt/A)		Percent Size Distribution					
Entry	**No. 1**	**Total**	**No. 1**	**Small**	**Mid-Size**	**Large**	**Culls**	**S. G.**
NY132	322	369	87	5	87	3	5	1.080
ND5822C-7	320	454	70	5	70	2	22	1.084
MSJ-461-1	304	455	67	4	67	7	22	1.085
MSF099-3	302	361	83	4	83	2	11	1.087
W1773-7	293	373	78	9	78	1	12	1.071
SNOWDEN	**287**	**376**	**76**	**3**	**76**	**8**	**13**	**1.091**
ATLANTIC	**240**	**312**	**77**	**3**	**77**	**8**	**12**	**1.091**
W1201	227	307	74	2	74	6	18	1.098
B1240-1	224	357	63	2	63	19	16	1.074
A91790-13	193	325	59	6	59	0	35	1.087
AF2211-9	189	286	66	4	66	6	24	1.073
ND2470-27	187	317	59	3	59	6	32	1.080
Average	257	358	72					1.083

* small <2"; midsize 2 to 3-1/4"; large >3".

Pennsylvania Regional Trial

Table 2. PA - 2004 Snack Food Trial Out of Field Chipping Data			
Cultivar	**Specific Gravity**	**16-Aug Agtron**	**Defect Description**
ATLANTIC	**1.093**	**67**	
SNOWDEN	**1.090**	**67**	
ND2470-27	1.073	62	light browning, some vascular
ND5822C-7	1.091	67	
MSF099-3	1.090	67	
MSJ461-1	1.085	65	
B1240-1	1.078	65	light blistering
W1201	1.092	65	some tem end browning
W1773-7	1.080	67	
NY132	1.096	67	
A91790-13	1.083	63	light vascular
AF2211-9	1.094	68	

Camvbria County potato field day at SFA trial - James and Lori Hite

1 Samples dug: 8/14/04 Samples chipped: 8/17/04

Red River Valley Regional Trial

LOCAL COOPERATOR: Duane Preston, UMN/NDSU

Cooperator: Oberg Farms, Hoople, North Dakota

Chip Cooperator: Barrel O Fun, Perham, Minnesota

Seed: Hand cut and Douglas Fir Bark applied on May 12, 2004

Planted: with 2 row plot planter on May 17, 2004

Chemicals:

Admire in row at planting with plot planter.

Quadris and Ultra Flourish applied by Obergs in furrows on May 17, 2004

Fertilizer: 110-80-60-3 Zinc

Herbicide: **M**atrix 1 Oz./Ac. – one application

Fungicides: Echo Zn 1.5 pints/Ac applied 5 times
Echo Df 0.83 lbs/Ac applied 1 time Storage Samples:

Insecticides: Leverage 3.5 Oz/Ac applied 1 time

Plot: Non-Irrigated

Harvested: September 16, 2004

Graded: September 30, 2004

Chipped: Barrel O Fun, Perham, MN. September 20, 2004

Storage Samples: Placed in storage (USDA Potato Processing Lab, East Grand Forks, MN) September 30, 2004

OBERG FARMS-RED RIVER VALLEY-NORTH DAKOTA

Table 1. RRV SFA Trial - 2004 - yield, size distribution, hollow heart, and specific gravity.

	Yield (cwt/acre)		Percent Size Distribution					Hollow	Specific
CULTIVAR	US #1	Total	US #1	< 2 in	2-3 1/2 in	> 3 1/2 in	Culls	Heart	Gravity
NY132	**144**	**156**	**92**	3	92	2	2	2 of 4	1.101
MSF099-3	**159**	**191**	**83**	4	83	9	4	3 of 10	1.099
A91790-13	**197**	**262**	**75**	3	75	18	3	5 of 10	1.093
B1240-1	**196**	**267**	**73**	1	73	21	5	3 0f 10	1.091
SNOWDEN	**239**	**280**	**85**	6	85	4	5		1.100
AF2211-9	**253**	**292**	**86**	4	86	5	5	6 of 10	1.105
MSJ461-1	**263**	**316**	**83**	10	83	1	5		1.095
W1201	**271**	**323**	**84**	3	84	9	5		1.099
ND2470-27	**285**	**334**	**85**	3	85	10	2		1.090
ATLANTIC	**263**	**336**	**78**	3	78	14	5	7 of 10	1.107
W1773-7	**303**	**337**	**90**	4	90	3	3		1.096
ND5822C-7	**374**	**416**	**90**	4	90	3	3		1.091

2004-2005 SFA Trial-Red River Valley

Table 2. Agtron chip values and specific gravity from two chip dates.

Variety	Sep 21 Agtron	Specific Gravity	Dec 29 Agtron	Specific Gravity
A91790-13	65	1.093	68	1.090
AF2211-9	59	1.105	64	1.106
ATLANTIC	**41**	**1.107**	**36**	**1.104**
B1240-1	57	1.091	37	1.093
MSF099-3	59	1.099	58	1.103
MSJ461-1	65	1.095	55	1.096
ND2470-27	67	1.100	59	1.092
ND5822C-7	62	1.097	50	1.104
NY132	58	1.101	59	1.105
SNOWDEN	**63**	**1.100**	**63**	**1.105**
W1201	61	1.099	52	1.107
W1773-7	60	1.096	56	1.104

SFA samples Chipped at Barrel O Fun, Perham, Minnesota
Chipped at BOF 9/21/2004 and 12/29/2004

Table 3. Overall average yield, percent size distribution and culls, specific gravity and out of field chip color for ten lines and two standards grown in FL, ID, ME, MI, PA and the RRV in 2004.

	Yield (cwt/acre)		Percent Size Distribution					Specific		
Entry	**No.1**	**Total**	**No.1**	**Small**	**Mid-Size**	**Large**	**Culls**	**Gravity**	**Agtron**	**SFA**
ND5822C-7	410	520	77	8	68	10	9	1.086	66.4	1.3
W1201	322	387	81	5	75	9	11	1.093	63.1	1.4
ATLANTIC	**309**	**374**	**82**	**6**	**75**	**11**	**7**	**1.094**	**64.9**	**1.8**
W1773-7	309	383	81	11	78	3	8	1.085	63.8	1.9
B1240-1	305	395	74	4	64	17	16	1.084	63.3	2.0
MSJ461-1	302	407	73	12	70	4	10	1.084	65.9	1.6
ND2470-27	285	374	76	6	67	12	15	1.079	64.3	1.3
A91790-13	282	390	67	6	65	6	25	1.086	63.8	1.2
NY132	280	325	87	8	82	7	2	1.091	66.0	1.1
AF2211-9	274	328	83	8	82	3	7	1.088	66.3	1.2
MSF099-3	248	300	81	10	77	7	5	1.087	63.5	1.6
SNOWDEN	**244**	**328**	**71**	**15**	**68**	**5**	**12**	**1.088**	**63.8**	**1.2**
average:	297	376	78	8	72	8	11	1.087	64.6	1.5

Agtron readings for samples from field for FL, ME, MI, PA and RRV
SFA chip scores for samples from field for ID and MI

Three Year Averages for Breeding Lines
Completing Three Years of Testing in the SFA/USPB Chip Trials

A91790-13

Table 4a. Three year average over seven regional trial sites for A91790-13 from 2002 to 2004.

	Yield (cwt/acre)		Percent Class Distribution					Specific
Regional Locations	No.1	Total	No.1	Small	Mid-Size	Large	Culls	Gravity
California *	542	579	94	9	79	8	4	83
Florida	276	328	84	8	83	4	3	76
Idaho	491	537	92	6	86	5	2	88
Maine	211	309	67	3	58	9	30	81
Michigan	374	422	88	9	78	11	3	84
Pennsylvania	146	256	58	13	58	3	27	88
Red River Valley	193	237	81	5	80	11	5	89
average	319	381	81	7	75	7	10	84

* California had trials in 2002 and 2003

MSF099-3

Table 4b. Three year average over seven regional trial sites for MSF099-3 from 2002 to 2004.

	Yield (cwt/acre)		Percent Class Distribution					Specific
Regional Locations	No.1	Total	No.1	Small	Mid-Size	Large	Culls	Gravity
California *	364	388	94	13	77	5	4	87
Florida	210	272	77	12	78	2	3	77
Idaho	275	309	89	9	87	3	2	89
Maine	272	297	91	6	78	14	3	90
Michigan	428	464	92	5	85	8	3	80
Pennsylvania	220	267	81	7	81	1	10	89
Red River Valley	206	234	88	5	88	4	3	94
average	282	319	87	8	82	5	4	87

* California had trials in 2002 and 2003

ND2470-27

Table 4c. Three year average over seven regional trial sites for ND2470-27 for 1999, 2003 and 2004.

	Yield (cwt/acre)		Percent Class Distribution					Specific
Regional Locations	No.1	Total	No.1	Small	Mid-Size	Large	Culls	Gravity
California *	376	413	90	18	65	10	7	75
Florida	188	250	75	10	75	2	7	72
Idaho-Washington **	464	525	90	8	86	4	4	72
Maine	269	366	76	6	70	7	17	81
Michigan	324	374	86	10	72	17	4	72
Pennsylvania	198	285	69	9	68	4	18	82
Red River Valley ***	300	340	88	4	86	8	3	90
average	303	365	82	9	75	8	9	78

* California had trials in 1999 and 2003. *** RRV plots flooded out in 1999.

** Washington had a trial in 1999, Idaho had trials in 2003 and 2004.

2003-2004 OUT-OF-STORAGE EVALUATION

2003 Snack Food Association Trial Grown at Aberdeen, Idaho.

Out of Storage Quality Report

	6 week cool down 6 weeks storage		R&G Potato Company Ratings (0-15 15=Frito Lay rejection std)					
CLONE	Chip 40 F	Chip 50 F	Undesirable color	Blackspot	Green	Internal defects	Exterior defects	Total defects
ND5822C-7	3.0	1.3	0	0	0	21	24	45
W1201	3.4	1.5	0	10	2	0	26	38
A91790-13	1.1	1.0	0	0	0	2	27	29
NDTX4930-5W	2.1	1.1	0	0	0	4	13	17
W1355-1	2.5	1.3	0	0	0	6	15	21
SNOWDEN	**3.4**	**1.3**	**0**	**0**	**0**	**7**	**21**	**28**
ATLANTIC	**3.3**	**2.2**	**11**	**0**	**1**	**11**	**41**	**64**
ND2470-27	3.4	1.8	0	4	0	5	30	39
MSH095-4	2.2	1.4	8	0	0	3	25	36
AF1424-7	2.1	1.3	0	0	0	0	11	11
MSF099-3	3.1	1.5	3	0	0	0	17	20
MSG227-2	2.7	1.2	6	0	0	0	23	29

Samples harvested September 25 and gradually cooled to 50^{o}.

Samples stored at 40 and 50^{o} for 6 weeks.

Samples rated on Feburary 5, 2004.

2003 MAINE SFA TRIAL

	USDA Chip Color Rating (55°F) *	
Entry	Dec 03	Feb 04
ATLANTIC	**3.4**	**3.4**
SNOWDEN	**3**	**4**
AF1424-7	3	3.2
MSF099-3	3.2	3.2
MSG227-2	3	3.6
MSH095-4	3	3
W1355-1	3	3
WI201	4	4
NDTX4930-5W	3	3
A910790-13	3	3
ND5822C-7	3.2	3
ND247D-27	3	4

2004 MAINE SFA TRIAL

	SFA Chip Color Rating (55°F) **	
Entry	Nov 04	Jan 05
A91790-13	3	3
AF2211-9	2	3
ATLANTIC	**3**	**3**
B1240-1	3	2
MSF099-3	2	3
MSJ461-1	3	3
ND2470-27	3	3
ND5822C-7	3	3
NY132	2	3
SNOWDEN	**1**	**1**
W1201	3	3
W1773-7	2	3

* Storage chip fry color rated using 1 to 10 scale from USDA Handbook No. 267.

** Storage chip color rated using SFA Chart Rating 1 to 3 scale.

OUT-OF-STORAGE CHIP QUALITY
2003-2004 MICHIGAN REGIONAL REPORT

Chris Long and Dick Chase, Michigan State University

Procedure:

At the harvest of the 2003 USPB / SFA Chip Trial on September 17, 2003 at V & G Farms in Stanton, MI, several storage samples were collected. A 40 pound sample was collected from each entry and placed in the cooperating grower's commercial storage for later evaluation. Three 25 tuber samples were also collected from each entry at harvest and stored in cold storages at MSU. Two samples were stored at 50ºF for a February and April evaluation. The third 25 tuber sample was stored at 45ºF for a February evaluation.

Results:

The 40 pound tuber samples placed in the growers' commercial storage were removed on March 9, 2004. The storage temperature was maintained at 48 ºF. For sprout control, MH30 was applied pre-harvest and CIPC was applied in the storage in late November 2003. The tuber samples were evaluated before the samples were shipped to Jays LLC in Chicago. This data is shown in Table 1.

Table 2 summarizes the chip quality of the 25 tuber samples collected at harvest from each entry and stored at MSU. They were stored at 50ºF and chipped on February 5, 2004, stored at 50ºF and chipped on April 21, 2004 and stored at 45ºF and chipped on February 5, 2004. All samples were treated with CIPC.

On February 5, 2004 at 45ºF, chip colors for all entries were marginal. ND5822C-7 and Atlantic were performing below the average under these conditions.

On February 5, 2004 at 50ºF, chip colors for all entries were acceptable. ND5822C-7 chip color was marginal. Defects were the greatest in NDTX4930-5W do in large part to pitted scab and internal color. Snowden, W1201, MSG227-2, W1355-1 and MSF099-3 had excellent color.

On April 21, 2004, from 50ºF storage, MSG227-2 had excellent color and very few defects. ND5822C-7, NDTX4930-5W, MSH095-4 and ND2470-27 all exhibited marginal color.

TABLE 1.

V & G FARMS STORAGE SAMPLES[1]

			CHIP QUALITY - JAYS LLC				
	TUBER[2]		AGTRON	SFA*	PERCENT DEFECTS		
ENTRY	CONDITION	SG	COLOR	COLOR	INT.	EXT.	TOTAL
ATLANTIC	**soft, tr.PB, 3-4" sprouts, scab**	**1.088**	**51.6**	**1.5**	**9.4**	**47.8**	**57.2**
SNOWDEN	**firm, PB, 2-3" sprouts, scab**	**1.080**	**51.2**	**1.0**	**0.0**	**20.9**	**20.9**
AF1424-7	soft, severe scab, small, tr. PB	1.091	58.2	1.5	3.7	11.1	14.8
A91790-13	firm, severe scab, 1-2" sprouts	1.080	55.3	1.0	0.0	35.1	35.1
MSF099-3	soft, 4-5" sprouts, PB, scab	1.092	49.9	2.0	10.1	45.0	55.1
MSG227-2	no sprouts, firm, tr. scab, PB	1.087	59.8	1.0	1.7	8.2	9.9
MSH095-4	firm, 4-6" sprouts, sl. scab, sl. PB	1.088	52.4	1.0	0.0	6.0	6.0
NDTX4930-5W	firm, scab, 0-1" sprouts, PB	1.070	52.2	1.5	6.1	32.2	38.3
ND2470-27	firm, 2-3" sprouts, scab, sl. PB	1.076	56.6	1.5	7.1	13.6	20.7
ND5822C-7	firm, tr. sprouts, sl PB, tr. scab	1.085	56.8	2.0	17.7	12.4	30.0
W1201	firm, scab, 1-2" sprouts, sl. PB	1.093	55.4	1.5	3.2	37.8	41.0
W1355-1	firm, scab, PB	1.083	53.8	1.0	2.3	9.0	11.3

1. Samples removed from V & G storage March 9, 2004 and processed and scored by JAYS March 16, 2004.

2. Storage samples evaluated for tuber condition. PB = pressure bruise. Black flesh recorded when a shallow slice below a pressure bruise shows dark flesh color.

* SFA Color Score 1 = lighest, 5 = darkest Scores determined at MSU on returned chip samples.

TABLE 2.

M.S.U. STORAGE SAMPLES

	45ºF February 5, 2004		**50ºF February 5, 2004**		**50ºF April 21, 2004**	
	SFA*	PERCENT **	SFA*	PERCENT **	SFA*	PERCENT **
ENTRY	COLOR	DEFECTS	COLOR	DEFECTS	COLOR	DEFECTS
ATLANTIC	**2.5**	**85% color**	**1.5**	**14% pitted scab**	**1.5**	**-**
SNOWDEN	**2.0**	**25% color, VD**	**1.0**	**8% pitted scab**	**1.5**	**-**
AF1424-7	1.5	45% color, SED	1.5	30% pitted scab	1.5	-
A91790-13	1.5	10% SED, scab	1.5	22% scab, color	1.5	-
MSF099-3	2.0	40% scab	1.0	16% VD, scab	1.5	-
MSG227-2	2.0	20% color	1.0	Trace VD	1.0	-
MSH095-4	2.0	25% color	1.5	24% color, VD	2.0	-
NDTX4930-5W	2.0	50% color, scab	1.5	60% pitted scab	2.0	-
ND2470-27	1.5	45% color, scab	1.5	36% scab	2.0	-
ND5822C-7	3.0	85% color	2.0	22% color, scab	2.0	-
W1201	1.5	25% color	1.0	Trace scab	1.5	-
W1355-1	1.5	20% pitted scab	1.0	10% scab	1.5	-

* SFA 1-5 Color Score; 1 = lighest, 5 = darkest 3.5 and higher unacceptable.

** HH = hollow heart; VD = vascular discoloration; SED = stem end discoloration; IBS = internal brown spot.

Pennsylvania Regional Trial

Table 1. PA - 2003 Snack Food Trial Out of Storage Chipping Data

Cultivar	Specific Gravity	23-Oct Agtron	Percent Defects	Defect Description	17-Dec Agtron	Percent Defects	Defect Description
ATLANTIC	**1.095**	**53**	**0**	**vascular brn severe 10%+**	**50**	**30**	**internal discoloration**
SNOWDEN	**1.084**	**63**	**4**	**vascular**	**61**	**0**	
NDTX4930-5W	1.079	63	1	lt. browning, some vascular	68	1	lt. browning, some vascular
MSF099-3	1.088	60	2	slight stem end browning	62	1	
MSG227-2	1.083	65	1		65	1	
W1207	1.090	65	0		65	0	
W1355-1	1.080	62	4	minor vascular, slt stem end	65	1	
MSH095-4	1.088	63	0		65	0	
ND2470-2F	1.078	65	2	moderate vascular	65	1	no vascular discoloration
ND5822C-7	1.084	58			58		
A9179-13	1.083	67	0		67	0	
AF1424-7	1.077	65	0		65	0	

Harvested: 10/24/03 Out of field chipping: 10/27/03 Out of 54F storage chipping: 12/18/03

Pennsylvania Regional Trial

Table 2. PA - 2003 Snack Food Trial varieties storage sprout information

Entry	Average sprout length in inches.							
	30-Jan-04		27-Feb-04		31-Mar-04		30-Apr-04	
	45ºF	notes	45ºF	notes	45ºF	notes	45ºF	notes
ATLANTIC	**0**		**0.5**		**1.1**		**2.2**	
SNOWDEN	**0**		**0.5**		**0.9**		**2.3**	
NDTX4930-5W	0		0.0		0.5		1.2	
MSF099-3	0		0.5		1.3		2.5	
MSG227-2	0		0.3		0.5		0.7	
MSH095-4	0		0.3		0.8		2.5	
W1201	0		1.3		1.3		1.7	
W1355-1	0		0.5		0.5		1.3	
ND5822C-7	0		0.0	b	0.5		1.0	
ND247D-27	0		0.7		1.0		1.8	
A91790-13	0		0.2		0.5		1.0	
AF1424-7	0		0.5		1.4		2.7	

a = samples less than 0.5" were reported as 0.5"
b = Soft Rot present

RRV STORAGE CHIP DATA FROM 2003 SFA TRIAL

Table 1. Storage samples from 2003 SFA trials-Sproule Storage-Grand Forks, ND

Line			Percent Shrink	Apr 8 Agtron	Percent Defects			Specific Gravity	Comments
					Internal	External	Total		
A91790-13	32.3	27.3	15.5	66		21	21	1.104	rotted
AF1424-7	27.6	21.6	21.7	66	3	14	17	1.099	rotted
ATLANTIC	**28.7**	**26.5**	**7.7**	**64**	**17**	**20**	**37**	**1.100**	
MSF099-3	50.6	45.6	9.9	66		21	21	1.108	lots of rot and soft
MSG227-2	0	0	NA	NA				NA	
MSH095 -4	30.4	27.5	9.5	68	6	23	29	1.103	lots of soft rot
ND2470-27	46.7	43.9	6.0	65		30	30	1.100	rot
ND5822C-7	42.3	39.7	6.1	64	10	18	28	1.103	
NDTX4930-5W	54.7	52.1	4.8	68		9	9	1.014	very nice tubers
SNOWDEN	**41.5**	**39**	**6.0**	**66**		**20**	**20**	**1.103**	
W1201	43	40.1	6.7	66	12	26	38	1.102	
W1355-1	26.1	24.8	5.0	68	9	23	32	NA	bruises and green

Samples placed in storage on Sept 30, 2003

Sproule samples weighed at storage on April 2, 2004

Samples taken out of storage and chipped at SpucCheck Lab on April 8, 2004

Table 2. Storage samples from 2003 SFA trials - Windsor Farms - East Grand Forks, MN

Line			Percent Shrink	Feb 17 Agtron	Percent Defects		
					Internal	External	Total
A91790-13	33.8	29.7	12.1	69	0	22	22
AF1424-7	36.2	30.2	16.6	68	6	3	9
ATLANTIC	**39.8**	**37.8**	**5.0**	**66**	**6**	**39**	45
MSF099-3	49.1	35.3	28.1	69	0	15	15
MSG227-2	25.9	24.8	4.2	66	20	25	45
MSH095 -4	40.3	37.8	6.2	68	5	12	17
ND2470-27	0	0	NA	69	2	8	10
ND5822C-7	46.8	45.1	3.6	67	10	8	18
NDTX4930-5W	46.9	44.6	4.9	69	6	21	27
SNOWDEN	**38.1**	**36.7**	**3.7**	**68**	**6**	**18**	24
W1201	48.8	46.4	4.9	67	0	24	24
W1355-1	39.9	37.3	6.5	69	5	18	23

Samples placed in storage on Sept 30, 2003

Windsor storage samples removed and weighed on Feb14, 2004

Samples chipped on Feb 17, 2004