

RESEARCH PROGRESS REPORT FOR 1987

"Physiological and Cultural Studies"

Submitted to the

SLV Research Center Committee

and the

Area II Potato Administrative Committee

by

David G. Holm

San Luis Valley Research Center

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Research was conducted in the following areas in 1987:

- a) Postharvest Evaluations of Advanced Selections
 - Blackspot Reaction
 - Storage Weight Loss and Dormancy
 - Specific Gravity, Fry Color, and Fry Texture
- b) Physiological Age of Seed
- c) Streptomycin-Oxytetracycline Seedpiece Treatment (in cooperation with Rob Davidson)

POSTHARVEST EVALUATIONS

Blackspot. Ten randomly selected tubers from each of 55 clones were bruised on the stem and bud ends with a 150 g weight dropped from a height of 68 cm. Tubers were stored at room temperature for three days prior to evaluation on October 8, 1987. Blackspot susceptibility was evaluated by cutting the tubers in half longitudinally and rating the extent of damage.

Blackspot indices ranged from 2.6 to 5.0 (Table 1). Two clones, CO8190-1 and W842, were more susceptible to blackspot than Lemhi Russet, which is very susceptible to blackspot bruising. Several clones were less susceptible to blackspot bruising than Russet Burbank. Clones that did not show any blackspot bruising were: A76147-2, AC75430-1, AC8184-2, CO8118-2, CO8182-1, and TC582-1.

Storage Weight Loss and Dormancy. Ten randomly selected tubers were weighed into storage on October 1, 1987 and held at 45°F for a four month period under low relative humidity conditions. On February 1, 1988 weight of the tubers was determined. Dormancy evaluations were made at the same time based on degree of sprouting. Results are summarized in Table 1.

Percent weight loss ranged from 3.4 to 8.0. Clones with less than 4% weight loss were: A79141-3, AC75430-1, AC77101-1, AC7869-17, AC8184-2, BC0038-1, and C07918-11.

Dormancy indices ranged from 1.0 to 5.0. Only three clones were as dormant as Russet Burbank. Clones with no evident sprout growth were: AC75430-1, AC77226-13, Nooksack, and Russet Burbank.

Specific Gravity, Fry Color, and Fry Texture. Thirty-nine clones were evaluated for specific gravity, fry color, and fry texture. Samples were held for two weeks at 50°F after harvest until October 2 when specific gravity, fry color, and texture were determined. The remaining portion of the sample was stored at 45°F until December 16, when fry color and texture were evaluated again. This data is presented in Table 2.

Specific gravities were generally lower in 1987 than in 1985 and 1986. Some clones such as TC582-1 and Nooksack generally have gravities in the range of 1.100. This year specific gravities for TC582-1 and Nooksack were 1.089 and 1.088 respectively. Specific gravity ranged from 1.099 for A79141-3 and AC80369-1 to 1.066 for AC77226-10.

Clones producing acceptable french fries (ratings \geq 3) prior to and after storage were: A79141-3, A7961-1, AC77226-13, AC80369-1, BC0038-1, C07918-11, C08195-4, C08204-3, C008014-1, TC582-1, Lemhi Russet, and Russet Burbank.

Clones with excellent texture (ratings \geq 4) both evaluation periods were: A7816-14, AC7869-17, AC80369-1, BC0038-1, C08195-4, MN10874, TC582-1, Lemhi Russet, and Russet Burbank.

PHYSIOLOGICAL AGE OF SEED

The effects of preplant storage temperature on single drop seed of Centennial Russet, Russet Burbank, and Sangre seed were evaluated for a third year. The storage temperature treatments in 1987 were: (1) continuous storage at 40-45°F; (2) warmed 13 days at 50-55°F; and (3) warmed 29 days at 50-55°F.

The clones responded similarly to preplant warming of seed (Table 3). This year, in contrast to previous results, total and US #1 yield decreased when seed was warmed 29 days prior to planting. In 1985 and 1986 there was no yield decrease observed when seed was warmed up to 42 and 23 days, respectively, before planting. This difference is the result of lower number of stems per plant and lack of an associated increase in average tuber weight when seed was warmed for a longer period compared to previous years.

The general trend during the three years of this study has been for greater average tuber weights and fewer stems per plant with increasing length of warming period prior to planting. Number of tubers per stem was not affected by warming seed.

Based on results from a three-year period, if seed is stored at 40°F and warmed for not more than two weeks prior to planting, optimum total and US #1 yields should be obtained in most years.

STREPTOMYCIN-OXYTETRACYCLINE SEEDPIECE TREATMENT

Previous studies have shown that a 250 ppm seedpiece treatment of streptomycin-oxytetracycline can reduce the rot potential of WNC521-12 daughter tubers based on mist chamber assays. Beneficial effects on cut seed stands were also observed in a year conducive to seedpiece decay.

Studies in 1987 were expanded to evaluate the effectiveness of the same treatment on the Sangre cultivar. Results are summarized in Table 4.

There were no treatment effects on total yield or stand indicating no phytotoxicity. Mist chamber assays are currently in progress to determine the rot potential of daughter tubers.

Table 1. Blackspot, weight loss, and dormancy evaluations for intermediate and advanced potato clones - 1987.

Clone	Blackspot Index ¹	% Weight Loss ²	Dormancy Index ³	Clone	Blackspot Index ¹	% Weight Loss ²	Dormancy Index ³
A74212-1	4.7	4.3	3	C08011-5	4.7	5.5	3
A76147-2	5.0	5.8	1	C081103-1	4.4	7.0	2
A7816-14	4.5	4.4	3	C08118-2	5.0	6.8	2
A79141-3	4.3	3.8	3	C08138-6	4.6	4.3	3
A7961-1	4.5	4.5	3	C08182-1	5.0	4.5	4
AC75430-1	5.0	3.5	5	C08190-1	2.7	5.8	2
AC77101-1	4.7	3.5	4	C08195-4	4.5	5.1	3
AC77226-10	4.9	6.2	4	C08204-3	4.0	4.4	3
AC77226-13	4.8	5.4	5	C082134-1	4.5	4.0	2
AC77513-1	4.8	8.0	4	C082142-4	4.8	4.8	2
AC77652-1	4.2	5.2	4	C008014-1	4.5	5.2	3
AC7869-17	4.8	3.4	4	MN10874	4.2	4.7	4
AC79100-1	4.5	5.2	2	ND A1725-1	3.7	4.9	3
AC8024-5	3.9	5.5	3	ND TX9-1068-11R	4.1	6.8	4
AC80369-1	3.9	5.4	2	TC582-1	5.0	4.5	3
AC80545-1	4.1	4.5	4	W842	2.7	6.9	3
AC81138-1	4.7	5.9	3	WNC567-1	4.6	6.6	4
AC81198-11	3.6	4.2	4	Atlantic	3.0	7.0	3
AC8184-2	5.0	3.8	3	Centennial Russet	4.8	6.3	4
AC82263-1	4.9	5.2	4	Lemhi Russet	2.9	4.5	4
AC82693-4	3.6	4.5	3	Nooksack	4.8	4.5	5
AC82706-2	4.1	4.4	3	Norchip	4.6	5.2	3
BC0038-1	4.0	3.7	3	Norgold Russet	4.7	5.1	2
BC0169-12	4.6	5.1	4	Red LaSoda	4.4	5.5	3
BC0224-3	4.3	4.9	3	Russet Burbank	3.8	4.3	5
BR7093-24	3.9	6.0	4	Sangre	4.3	4.4	3
C07918-11	4.9	3.7	3	White Rose	4.8	5.3	3
C07918-15	4.4	5.2	3				

¹Blackspot was rated on a 1 to 5 scale, with 5 indicating no discoloration.

²Tubers were stored at 45°F for a four month period.

³Dormancy was rated on the basis of sprout length as follows: 1 = >2"; 2 = 1-2"; 3 = 1/4-1"; 4 = <1/4"; and 5 = no visible growth. Tubers were stored at 45°F for four months.

Table 2. Specific gravity, fry color, and fry texture evaluations for intermediate and advanced potato clones - 1987.

Clone	Specific Gravity	Fry Color ¹		Fry Texture ²	
		At Harvest	2 wks 50° F+ 10 wks 45° F	At Harvest	2 wks 50° F+ 10 wks 45° F
A74212-1	1.076	2	1	2	2
A76147-2	1.092	1	2	3	5
A7816-14	1.091	3	2	4	5
A79141-3	1.099	4	3	4	3
A7961-1	1.091	3	3	3	2
AC75430-1	1.085	2	2	2	3
AC77101-1	1.080	1	2	2	1
AC77226-10	1.066	4	2	1	3
AC77226-13	1.069	4	3	3	3
AC7869-17	1.076	4	2	4	4
AC79100-1	1.092	2	2	2	3
AC8024-5	1.082	3	2	3	2
AC80369-1	1.099	4	4	4	4
AC81138-1	1.080	2	2	3	2
AC81198-11	1.070	1	1	2	2
AC8184-2	1.075	1	1	3	2
AC82263-1	1.089	2	2	2	3
AC82693-4	1.068	2	2	2	3
AC82706-2	1.074	1	1	4	3
BC0038-1	1.086	3	4	4	4
BC0169-12	1.074	1	1	1	1
BC0224-3	1.087	3	2	4	3
CO7918-11	1.075	3	3	3	2
CO8011-5	1.070	2	2	4	3
CO8118-2	1.080	2	2	3	3
CO8138-6	1.078	4	2	3	4
CO8182-1	1.079	1	1	4	3
CO8190-1	1.078	1	1	3	3
CO8195-4	1.091	4	5	4	4
CO8204-3	1.087	3	3	3	3
CO82134-1	1.077	1	1	4	2
CO82142-4	1.085	2	1	3	3
CO08014-1	1.091	4	4	3	4
MN10874	1.089	2	2	4	4
TC582-1	1.089	4	3	5	4
Lemhi Russet	1.094	3	3	5	5
Nooksack	1.088	4	2	4	3
Norgold Russet	1.079	2	2	3	2
Russet Burbank	1.089	4	3	4	4

¹Fry color was rated on a 1 to 5 scale, with 5 being the lightest or best color.

²Fry texture was rated on a 1 to 5 scale, with 5 indicating the cooked flesh is dry, with 1 representing a soggy, wet texture.

Table 3. Influence of seed storage temperature prior to planting on yield, grade, average tuber weight, stems per plant, and tuber number per plant for Centennial Russet, Russet Burbank, and Sangre - 1987.

Treatment	Yield (Cwt/A)		%	Avg. Tuber Weight (oz)	Stems/Plant	Tubers/Stem
	Total	US #1	US #1			
Centennial Russet						
Control (40-45° F)	308	255	82.9	5.1	2.7	2.4
13 days (50-55° F)	282	234	82.8	5.5	2.7	2.1
29 days (50-55° F)	295	245	82.8	5.4	2.7	2.3
Russet Burbank						
Control (40-45° F)	356	268	75.4	4.4	3.0	2.9
13 days (50-55° F)	372	290	77.9	5.5	2.8	2.6
29 days (50-55° F)	337	261	77.4	5.7	2.6	2.6
Sangre						
Control (40-45° F)	388	349	89.5	6.5	2.8	2.3
13 days (50-55° F)	410	376	91.8	7.2	2.7	2.3
29 days (50-55° F)	321	297	92.1	7.3	2.4	2.1
Interaction¹						
Cultivar x Storage						
LSD	39*	NS	NS	NS	NS	NS
Main Effects and Significance¹						
Cultivar						
Centennial Russet	295	244	82.8	5.3	2.7	2.2
Russet Burbank	355	273	76.9	5.2	2.8	2.7
Sangre	373	341	91.1	7.0	2.6	2.2
LSD	27*	30*	3.7*	0.4*	NS	0.3*
Storage Regime						
Control (40-45° F)	351	291	82.6	5.3	2.8	2.6
13 days (50-55° F)	355	300	84.2	6.1	2.7	2.3
29 days (50-55° F)	318	268	84.1	6.1	2.5	2.3
LSD	27*	25*	NS	0.4*	NS	NS

¹NS = Not significant, *P = 0.10, **P = 0.05.

Table 4. Yield, stand, and daughter tuber rot potential for Sangre receiving a seedpiece treatment of streptomycin-oxytetracycline - 1987.

Treatment	Total Yield (Cwt/A)	% Stand	% Infection Sites ¹
Control	424	97	—
Treated	418	99	—

¹Mist chamber evaluation.