

## RESEARCH PROGRESS REPORT FOR 1985

Submitted by  
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Research conducted in 1985 included the following:

- a) Potato Breeding
- b) Seedling Selection and Clonal Development
- c) Sangre Selection Studies
- d) Centennial Russet Mutation Studies
- e) Use of Micropropagation to Select Potato Clones (in cooperation with Mike Thornton)
- f) Streptomycin-Oxytetracycline Seedpiece Treatment (in cooperation with Rob Davidson)
- g) Physiological Age of Seed
- h) Clonal Nitrogen-Use Efficiency

### POTATO BREEDING

The major objectives of the Colorado potato breeding and selection project are three-fold:

1. To develop new potato cultivars with increased yield, improved quality, resistance to pests, and tolerance to environmental stresses.
2. To provide a basic foundation seed source of selections to certified seed growers for increase and commercial testing.
3. To evaluate promising selections for possible seed export.

Each of these objectives is aimed at maintaining or increasing the competitive position of our industry in Colorado.

Characteristics being emphasized in our program are yield, specific gravity, russeting, and fresh market/processing qualities. Thirty-one parental clones were intercrossed in 1985. Seeds from 258 combinations were obtained. Sixty seedling families were grown in the greenhouse, producing 11,795 tubers for initial selection in 1986.

Seedling tubers were obtained from Dr. R. E. Webb, Beltsville, Maryland; Dr. J. J. Pavsek, Aberdeen, Idaho; Dr. R. E. Voss, Davis, California; and Dr. J. Creighton Miller, Lubbock, Texas. The California seedlings were produced from true seed obtained from Colorado.

Sangre Selection Studies. Seventeen line selections of Sangre were made from our tuber-unit seed lot in 1982. Seven selections were made for typical vine and 10 for larger vines. Progeny rows of each selection were grown for observational purposes in 1983. In 1984 and 1985 comparative performance trials were conducted. Data were collected on yield, grade, stand, plant height, and vine maturity. Results of the 1985 study are presented in Table 7.

Clones 10, 11, and 14 have had greater total and U. S. No. 1 yields than the standard clone for two years. These clones are slightly less vigorous early in the season, have taller vines, and are later maturing than the standard. A seed increase has been initiated on each of these selections and will be tested in other areas of the Western United States.

Out-of-State Tests. Several clones are tested in other states each year. Presently, the primary out-of-state testing occurs in California. Selections are evaluated in both observational and yield trials. In 1985, the California yield trials were conducted by the University of California on the W. B. Camp & Son farm near Arvin. Observational trials were located on Johnston Farms. Ten clones were included in the observational trials. Three of these selections were also included in the yield trials (Table 8). AC77513-1, AC77652-1, and TC582-1 yielded better than Centennial Russet in this test.

Grower Tests. Two russet selections, TC582-1 and WNC567-1, were released for grower testing in 1985. Both selections will be retested in 1986. Each selection was compared to Centennial Russet and Russet Burbank for seven characteristics by the growers. These characteristics were: stand, emergence uniformity, vine vigor, tuber type, tuber size, uniformity of tuber size, grade defects, and skin set at harvest. Both selections received good to excellent ratings for most characteristics (Tables 9 and 10).

Two additional clones, AC77513-1 and AC77652-1, will be available for grower evaluation in 1986. Performance data for these clones, in addition to TC582-1 and WNC567-1, is summarized in Table 11.

New Potato Cultivar. The naming and release notice for WNC285-18 was submitted in January of 1986. The name selected for WNC285-18 is Ute Russet, subject to approval. A copy of this document is attached as Appendix 1.

Clone Bank. Table 12 lists the accessions currently in the Clone Bank at the Research Center.

## CLONAL NITROGEN-USE EFFICIENCY

The yield response of four potato clones (WNC567-1, WNC618-9, Nooksack and Russet Burbank) to nitrogen applications were evaluated by yield component analysis for the second year. This information is useful as we try to develop potato clones which utilize nitrogen efficiently.

Nitrogen was applied at rates of 0, 70, and 140 pounds per acre. Data were collected on total yield, tuber number, stem number and vine maturity. For this data, average tuber weight and tuber number per stem were calculated.

All clones responded similarly to nitrogen application (Table 15). Increasing the amount of nitrogen resulted in increased yield, increased tuber weight and delayed maturity.

Table 2. Grade defects for advanced yield trial clones.

Clone	% External Defects <sup>1</sup>	External Defects Observed <sup>2</sup>	% Hollow Heart <sup>3</sup>
A70369-2	4.2	GC, SG, MS*, GR	—
AC77149-2	2.2	MS*	—
AC79100-1	5.0	GC, SG, MS*	0.5
AC79128-1	7.3	MS*	—
BC9668-1	1.9	GC*, MS*	—
BR7093-24	3.0	GC, MS*, GR	—
CO7913-1	13.7	GC, SG, MS*	1.4
CO7916-1	4.1	GC, MS*	—
CO7920-3	2.1	MS*	—
CO7922-1	5.9	GC, MS*	—
TXA17-1	4.7	GC*, MS, GR	—
WNC285-18	5.1	MS*, AH	—
WNC567-1	4.2	GC, MS*	—
Centennial Russet	1.1	MS*	—
Nemarus	5.0	GC, MS*	—
Nooksack	5.5	GC, MS*	—
Norchip	4.7	GC, MS*, GR	—
Russet Burbank	3.4	GC, SG*, MS*	—

<sup>1</sup>Percent external defects based on the proportion of the total sample weight with significant defects.

<sup>2</sup>GC = Growth Crack; SG = Second Growth; MS = Misshapen; GR = Green; AH = Alligator Hide. Most prevalent defects for each clone are asterisked.

<sup>3</sup>Percent hollow heart calculated as follows: (Weight of tubers > 10 ounces with defect/total sample weight) x 100.

Table 4. Chip color evaluations - Clover Club Foods Company<sup>1</sup>

Clone	Tuber Type	Specific Gravity	Chip Color <sup>2</sup>		
			Oct 1 <sup>3</sup>	Jan 15 <sup>4</sup>	Recond 4 wks <sup>5</sup>
Atlantic	White	1.107	1.0	4.5	4.5
TXA17-1	White	1.093	1.0	6.5	4.0
AC80545-1	White	1.098	1.0	4.0	3.5
BR7093-24	White	1.100	1.0	5.0	4.5
A70369-2	White	1.095	1.5	6.0	5.0
Norchip	White	1.085	1.5	5.0	4.5
AC80369-1	Russ	1.097	1.5	6.0	4.5
C08014-1	Russ	1.109	2.0	7.0	-
C07918-15	White	1.084	2.0	4.5	6.0
C081103-1	White	1.105	2.0	4.0	5.0
C081103-2	White	1.118	2.5	3.0	4.0
AC77226-10	Russ	1.086	3.0	9.0	7.0
C07917-16	White	1.104	3.0	9.5	8.0
AC77101-1	Russ	1.089	3.0	9.0	6.5
AC77226-13	Russ	1.086	3.5	10.0	9.0
AC79100-1	Russ	1.093	4.0	6.0	6.5
AC8024-5	Russ	1.084	4.0	10.0	9.0
C08128-1	Russ	1.097	4.0	8.0	7.0
AC80363-1	Russ	1.098	4.5	10.0	6.0
BC0038-1	White	1.096	5.0	-	6.0
AC77669-1	Russ	1.077	6.0	-	9.0

<sup>1</sup>Data collected by Larry Anderson.

<sup>2</sup>Color was rated using the PCII 1-10 scale. Ratings of 1-4 acceptable, 5 marginal.

<sup>3</sup>Potatoes were harvest September 2-4 and held at room temperature until October 1,

<sup>4</sup>Stored at 50°F and then cooled to 37°F when the main body of the potatoes were removed from the storage 3-1/2 weeks before frying.

<sup>5</sup>Reconditioned at 62-64°F.

Table 6. Grade defects for Western Regional Trial entries.

Clone	% External Defects <sup>1</sup>	External Defects Observed <sup>2</sup>	% Hollow Heart <sup>3</sup>
A72685-2	4.3	GC, MS*, GR	-
A7411-2	0.5	MS*	-
A74114-4	4.6	GC, MS*	-
A74133-1	4.0	GC, SG*, MS	-
A74212-1	1.3	GC, MS*	-
A76147-2	6.4	GC, MS*	-
AC77513-1	9.9	GC*, MS*	0.5
AC77652-1	4.2	GC, MS*	-
AD74135-1	6.7	SG, MS*	-
ND388-1	3.1	GC, MS*	-
ND534-4	5.3	SG, MS*	1.4
TC582-1	3.6	GC, SG, MS*	-
78-LC1	1.3	MS*	-
Centennial Russet	1.2	MS*	-
Lemhi Russet	5.6	GC, MS*	-
Norgold	-	-	0.6
Russet Burbank	2.8	GC, SG*	-
Russette	0.9	GC*	-

<sup>1</sup>Percent external defects based on the proportion of the total sample weight with significant defects.

<sup>2</sup>GC = Growth Crack; SG = Second Growth; MS = Misshapen; GR = Green; AH = Alligator Hide. Most prevalent defects for each clone are asterisked.

<sup>3</sup>Percent hollow heart calculated as follows: (Weight of tubers > 10 ounces with defect/total sample weight) x 100.

Table 8. Yield (total and U. S. No. 1), percent U. S. No. 1, and specific gravity for Colorado selections and Centennial Russet grown in California - 1985.

Clone	Yield (Cwt/A)		% US #1	Specific Gravity
	Total	US #1		
AC77513-1	550	475	86	1.080
AC77652-1	510	485	95	1.069
TC582-1	570	555	97	1.090
Centennial Russet	460	445	97	1.072

Table 11. Comparison of advanced numbered selections with Centennial Russet and Russet Burbank for yield and grade.

Clone	No. of Tests	Yield (Cwt/A)		% US #1	%	%
		Total	US #1		External Defects <sup>1</sup>	Hollow Heart <sup>2</sup>
AC77513-1	3	347	265	76.0	6.9	3.0
AC77652-1	3	266	210	78.8	4.3	1.7
TC582-1	3	373	275	73.8	2.9	0.5
WNC567-1	4	321	250	77.4	4.2	0.1
Centennial Russet	6	298	228	74.9	1.7	1.1
Russet Burbank	7	360	238	65.2	7.7	0.7

<sup>1</sup> Includes such defects as growth cracks, second growth, misshapen, and alligator hide.

<sup>2</sup> Based on tubers greater than 10 ounces.



Table 13. Yield, stand, and percent blackleg infections for WNC521-12 receiving a seed treatment of streptomycin-oxytetracycline.

Treatment	Total Yield (Cwt/A)	% Stand	% Infection Sites <sup>1</sup>
Uncut Seed			
Control	368	94	40.4
Treated	369	95	25.0
Cut Seed			
Control	358	98	41.3
Treated	354	98	35.8
<u>Interaction</u>			
Seed Type x Treatment			
LSD (0.05)	NS <sup>2</sup>	NS	6.1
<u>Main Effects and Significance<sup>2</sup></u>			
Seed Type			
Uncut	368 <sup>NS</sup>	94 <sup>+</sup>	32.7**
Cut	356	98	38.6
Seed Treatment			
Control	363 <sup>NS</sup>	96 <sup>NS</sup>	40.9**
Treated	362	96	30.4

<sup>1</sup>Mist chamber evaluation.

<sup>2</sup>NS = not significant, +P = 0.10, \*\*P = 0.01.

Table 15. Influence of nitrogen application on yield, average tuber weight, stem number per plant, and tuber number per plant for four potato clones.

Clone	N Rate (lbs/A)	Yield (Cwt/A)	Avg. Tuber Weight (oz)	Stems/ Plant	Tubers/ Stem	Vine Maturity <sup>1</sup>
WNC567-1	0	171	3.3	3.1	1.8	1.5
	70	254	4.2	3.2	2.1	2.0
	140	262	5.1	3.0	1.8	3.0
WNC618-9	0	232	4.1	3.2	2.0	2.5
	70	272	4.9	3.4	1.8	3.0
	140	290	5.1	3.4	1.8	3.0
Nooksack	0	168	4.8	2.6	1.5	3.0
	70	228	6.4	2.4	1.7	3.5
	140	248	6.8	3.0	1.4	4.0
Russet Burbank	0	177	2.8	3.3	2.1	1.8
	70	256	3.6	3.2	2.4	1.8
	140	267	3.9	2.9	2.8	2.8
<u>Interaction</u> Clone x N Rate						
LSD (0.05)		NS <sup>2</sup>	NS	NS	NS	NS
<u>Main Effects</u> <u>and Significance</u>						
<u>Clone</u>						
	WNC567-1	229	4.2	3.1	1.9	2.2
	WNC618-9	265	4.7	3.3	1.8	2.8
	Nooksack	215	6.0	2.6	1.5	3.5
	Russet Burbank	233	3.4	3.1	2.4	2.1
	LSD (0.05)	35	0.4	0.4	0.3	0.3
<u>N Rate</u>						
	0	187	3.7	3.0	1.8	2.2
	70	253	4.8	3.0	2.0	2.6
	140	267	5.2	3.0	1.9	3.2
	LSD (0.05)	30	0.3	NS	NS	0.3

<sup>1</sup>Vine maturity is based on the amount of dead foliage on August 31: 1 = Very Early; 2 = Early; 3 = Medium; 4 = Late; 5 = Very Late.

<sup>2</sup>NS = Not significant.

COLORADO AGRICULTURAL EXPERIMENT STATION  
COLORADO STATE UNIVERSITY  
FORT COLLINS, COLORADO

and

CALIFORNIA AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF CALIFORNIA  
BERKELEY, CALIFORNIA

and

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
WASHINGTON, D.C.

#### NOTICE TO GROWERS OF THE RELEASE OF THE POTATO CULTIVAR UTE RUSSET

The Colorado and California Agricultural Experiment Stations and the Agricultural Research Service, United States Department of Agriculture announce the joint release of the potato cultivar Ute Russet. Ute Russet is an oblong, smooth, fresh market potato with a dark, coarse net.

Ute Russet, tested under pedigree number WNC285-18, was selected in the San Luis Valley of Colorado from a cross of W12-3 and Nooksack made at Prosser, Washington. Ute Russet is a sibling of Centennial Russet.

Ute Russet emerges slowly, produces an erect, medium sized vine, and is late maturing. No sensitivity to metribuzin has been observed. Tubers have a long dormancy and are moderately resistant to blackspot, shatter bruise, and hollow heart, and resistant to second growth. Tubers are susceptible to alligator hide and it is advisable to plant it on lighter, sandy soils for this reason. Total glycoalkaloid content is 9 mg/100 mg fresh weight.

Trials have shown Ute Russet to be resistant to Sclerotium rolfsii and leafroll net necrosis, and moderately resistant to Verticillium wilt and scab. Field tests have shown that ring rot and leafroll expression is milder and later than in Russet Burbank. Ring rot expression is approximately one week later under San Luis Valley conditions.

Processing characteristics are generally inferior to Russet Burbank and thus only fresh market usage is recommended.

Tests conducted to date indicate the primary areas of adaptability to be the San Luis Valley of Colorado and Kern County in California.