

1996 Progress Report
1996 California Statewide Dry Bean Testing
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The 1996 dry bean work group research supported by our statewide activities covered a wide range of production concerns recommended by growers and bean industry representatives. Many of those results are detailed in other sections of the 1996 U.C. Dry Bean Research Progress Report and authored by researchers from county and campus programs. This report attempts to complement those contributions, especially for evaluations of common sets of genotypes that were conducted in more than one county or location, and by researchers from different disciplines.

Uniform tests of advanced lines and parental (source) materials were conducted for blackeye, lima, and common beans and strip tests were completed for blackeyes and pintos. Logistical support, in the form of assistance in planting, managing and/or harvesting, was provided for more than 50 research trials throughout bean growing regions of the state in 1996.

We had excellent cooperation and expert field assistance from Dick Jacobs (Superintendent) at the CA State University Farm at Chico, Gene Caffese (Grower) at Stockton, David Muller (Grower) at Denair, John Garcia (Grower) at Firebaugh, Keith and Hale Robertson (Growers) at Tracy, Scott Park and David Naal (Growers) at Meridian, and from many UC personnel at the Kearney Agricultural Center, West Side Research & Extension Center, UCD Agronomy Farm, and UCCE Farm Advisors.

Blackeye Cowpeas

1996 Blackeye Uniform Yield Trial

The 1996 Blackeye Uniform Yield Trial was carried out in seven locations and consisted of three advanced lines each from the UC Davis and the UC Riverside breeding programs, as well as BE 46 and BE 88 as checks (Table 1). Entries were included mainly for their seed size, their performance in the 1994 and 1995 uniform yield trials and their resistance to nematodes, *Fusarium*, and (to a lesser degree) *Lygus*. The following is a brief discussion of the results for the UCD lines. More thorough discussions on these results are presented in the breeding sections of the Davis and Riverside reports.

Overall yield results were typical for all locations except for Tulare where yields higher than the relatively poor 1994 and 1995 seasons. All three UCD lines continued to show strong genotype x environment interaction for yield and this result was consistent with earlier years. UCD 9259 yields were quite variable among locations and its canning quality was not as good as expected (Table 2), reaching undesirable levels of splitting and cracking. For this reason the line will be discontinued from further testing. UCD-9345 joins UCD-9337 (see breeding report) as the best variety candidates at this point, whereas UCD-9260 will undergo further testing.

Table 1. 1996 Blackeye Yield Trials
*Yield and seed size ranking** for selected locations*

Lines	Kern/ Shafter		Fresno/ KAC (M.J. Site)	Riverside/ UCR/Single Flush	Fresno/ KAC/Single Flush	Fresno/ KAC/ D. flush*		Tulare/ Hildebrand		Fresno/ WSR&EC	
CB 46	4	6**	5	1	2	1	6	1	5	3	6
CB-88	5	4	2	5	6	6	5	7	3	8	2
H8-8-27	1	7	6	8	1	4	7	6	7	4	7
H8-8-15	6	8	7	6	5	8	8	8	8	5	8
P-43	7	1	1	3	3	5	2	2	2	7	3
UCD-9345	3	3	3	7	7	2	1	3	4	2	4
UCD-9259	8	2	8	4	4	7	3	5	1	1	1
UCD-9260	2	5	4	2	8	3	4	4	6	6	5
Highest Yield	53.1		23.6	24.7	25.5	40.9		24.7		25.9	
Lowest Yield	40.9		19.4	20.8	21.9	33.3		10.2		20.9	
Site Mean	46.8		21.6	23.0	24.1	37.8		44.4		23.7	

* Yield differences were not significant at this location @ p = .05

** Clipper bottom screen was 14/64" round hole, yield and seed size ranking order were 1=highest/largest
Harvest plot size 5' x 25'

Table 2. S&W/UCD Canning Tests for Blackeyes
28-Oct-96

Can ID	Line ID and Location	color	cracks splits	starch	score* 1-2-3
12	9241-UCD	Light			1
13	9259-WSFS	Darker			1
14	9345-WSFS	Darker			1
15	BE-46-WSFS	Darker			1
16	9260-WSFS	Darker	x		2
17	9345-TUL	Light			1
18	9259-TUL	Light	x	x	3
19	9260-TUL	Light			2 *
20	BE-46-TUL	Darker			1
21	9337-MUL	Light			1
22	90222-MUL	Light			1
23	9259-MUL	Light	x		2
24	BE-46-MUL	Light	x		2
25	9337-M, FIELD	Light			1
26	9259-M, FIELD	Light	x		2

* Rating based on canning attributes, scale 1 = S & W Label, 2 = Generic/Private Label, 3 = Reject

Support for other blackeye research included equipment and/or help for planting, harvesting and data gathering for the following activities (responsible researchers in parentheses):

- Greenhouse *Fusarium* Screening at Davis (S. Smith, D. Helms).
- Effect of Cultural and Genetic Controls of Lygus in Dry Beans (T. Bensen, S Temple)
- Variety Observation Trial at Stockton (M. Canevari).
- Evaluation of Lygus Families at KAC (S. Temple).
- Miscellaneous Lygus Studies at KAC (P. Goodell, C. Summer).
- Advanced Lines Yield Trials at KAC (J. Ehlers, A. Hall).
- Heat Tolerant Yield Trial at Shafter (A. Hall).
- Nematode Field Screening (P. Roberts, B. Mathews, J. Ehlers).

Limás

Two root knot nematode species attack limas in the San Joaquin Valley: *Meloidogyne incognita* races 1 and 3, and *M. javanica*. The UCD breeding program has been testing a number of vine baby lima lines identified for resistance to both nematode species, which would provide growers with an alternative baby lima variety for soils with high root knot nematode populations. Nematodes can reproduce on the roots of susceptible varieties, resulting in highly reproductive colonies, causing root galling, yield reduction, and increased nematode soil populations for future crops. Resistant varieties will prevent nematodes from building up in the soil.

1996 Baby Lima Uniform Yield Trials

In 1996 five vine baby lima selections with nematode resistance were yield tested at Meridian, UC Davis, Tracy, and Denair. The highest yields (up to 47.8 cwt/A) were obtained at Tracy, which also was the only location with significant differences among yields.

Based on yield, seed size and canning performance, three lines were chosen for further testing during 1997. They will be grown as strips in commercial fields infested with nematodes. More detailed information and yield data are reported in the UC Davis Breeding Report.

Supplemental support was also given to other lima research activities:

- WSR&EC Field Increase and Observation of 289 Introduced *Phaseolus lunatus* accessions from CIAT.
- Observation Planting of Large and Baby Bush Limas at Stockton.
- Effect of Cultural and Genetic Controls of Lygus in Dry Beans (T. Bensen, S Temple)

Garbanzo

The identification of *Ascochyta* blight three years ago in the Central Valley affected the goals for garbanzo breeding and testing in California. Previously, breeding efforts had focused on increased seed size and quality as well as resistance to soilborne and virus diseases. To provide California garbanzo growers with materials economically successful under this broader set of conditions, the UC Dry Bean Work Group has initiated 1) testing of introduced *Ascochyta*-resistant varieties under varied conditions as short term alternatives, 2) modification of existing cultural practices, and implementation of new ones to allow the use of our susceptible commercial materials, 3) recombination *Ascochyta* resistance into commercial California genetic backgrounds as long term solution, and 4) monitoring the spread and dynamics of the disease in the garbanzo growing areas of the state.

The UC Davis State Testing component of our Dry Bean Research and Extension Program supported work on all these activities with personnel and equipment. Two *Ascochyta* resistant varieties from Washington, Dwelley and Sanford, were evaluated under *Fusarium* pressure in San Luis Obispo. As expected, they did not perform as well as any UCD *Fusarium* lines, however seed was harvested from the surviving plants. We will increase this seed under *Ascochyta*-free conditions (summer 1997, UC Davis field) hoping to rescue some *Fusarium* tolerance in that germplasm as they are screened again in the greenhouse (1997) or the field (1998, Central Coast). The results from the 1996 San Luis Obispo Yield Trial are presented and discussed in the UC Davis Breeding section of this report. Two other (herbicide) trials in which Dwelley and Sanford successfully resisted *Ascochyta* conditions are discussed in separate contributions in this report. As this two varieties seem to perform well under *Ascochyta* pressure, further testing will allow us to find their most optimal growing areas, their seed and canning quality attributes, and market acceptability.

Following the increase of *Ascochyta* garbanzo lines from USDA, Washington at UC Davis last summer, during 1997 we will conduct a series of yield tests with these and other germplasm groups. These range from introduced germplasm to hybrid progenies of California x Washington varieties.

Monitoring the 1997 commercial growing areas of the state will allow us to better understand the behavior of *Ascochyta* and other diseases. During 1996 we found *Ascochyta* in Solano and Yolo counties for the first time. So far only one mating type of the fungus is reported for the state. Details of this activity are contained in the section titled "1996 Garbanzo Disease Survey" of this report.

During 1997 we will also cooperate in the conduct of fungicide, planting date, irrigation and herbicide trials, which hopefully should identify new ways to manage *Ascochyta* and other garbanzo diseases.

Infestations of white mold, caused by *Sclerotinia sclerotiorum*, were important early in the 1996 season when weather conditions were most conducive to the disease.

However, once temperatures increased *Ascochyta* blight became the main limiting disease for garbanzo production. In 1997 we will again monitor for the disease and will consider establishing study areas if disease pressure is high enough to make sampling and culturing feasible. We would still like to know more about *Sclerotinia* epidemiology in the different ecological niches of the San Joaquin Valley.

Additional support with equipment and labor was provided to the following garbanzo research activities:

- Herbicide Study at UC Davis (M. Canevari, E. Roncorroni)
- Increase of *Ascochyta* resistant lines UC Davis (D. Helms)

Common Beans

Yield Trials, UCD lines

Following eight years of selection, BCMV screening and selective canning tests, during 1996 we yield tested a large group of breeding lines representing most of the commercial common bean classes grown in California. These lines originated from crosses made between California commercial types and introduced lines with very diverse genetic backgrounds. Breeding lines having at least one previous yield test were grouped and tested as Advanced Yield Trials (AYT) and those with no yield history were tested as Preliminary Yield Trials (PYT). Both dark and light red kidneys were tested at Chico and Stockton, while pinks, small reds, blacks and small whites were only tested at Chico. Only the Advanced Yield Trials are covered in this section of the 1996 Report. Observation nurseries, progeny tests, Preliminary Yield Trial results and early generation breeding activities are discussed in the UCD Grain Legume Improvement Program section of this volume.

Table 3 summarizes the different yield trials and their overall results. In general, yields were slightly lower than those of 1995 due to the severity and timing of several heat waves during the growing season. We were nevertheless able to grow very uniform and clean stands at both Chico and Stockton and obtained good statistical separation among yields on all trials. It is remarkable that despite the adverse weather conditions, the four top yielding lines in all classes, reached average yields above 24 cwt/A. These outstanding lines also show relatively broad maturity ranges, from which the most desirable ones can be targeted for specific growing conditions and market needs.

In response to industry needs, great effort and consideration was given to the selection, planting and evaluation of our 1996 elite kidney lines. Some of those lines had undergone two consecutive yield tests and others had already passed one canning test. All lines are BCMV resistant. Tables 4 and 5 show the yield and maturity ratings of the UCD dark and light red kidney lines tested at Stockton and Chico. Yields of the CDRK and CELRK checks were median in all cases except for CELRK at Stockton, which ranked first. This commercial variety is early maturing, and was closely followed in yield by lines with more extended seasons which are

Table 3
Summary of 1996 Advanced Common Bean Yield Trials*

Types	Number of Lines	Yields (cwt/A)			Maturity*
		Best	Check	Top 4 Mean	
DRK/Stockton	25	28.8	22.1	27.9	ML-ME-ML-ME
			CDRK		ML
DRK/Chico	25	26.3	21.3	25.9	L-ML-ML-L
			CDRK		ME
LRK/Stockton	14	30.5	30.5	29.4	E-M-ML-M
			CELRK		E
LRK/Chico	14	27.9	22.9	27.2	L-M-L-ML
			CELRK		VE
Pinks	6	29.7	21.9	25.4	L-L-M-ML
			Yolano		ML
Small Reds	10	28.1	19.5	27.4	ME-L-VL-M
			Ruffus		VL
Blacks	14	26.2	22.6	24.8	L-VL-L-ML
			BTS 39		L
Small White	12	31.6	13.9	27.9	L-L-M-ME
			Aurora		VL

* For top 4 and checks: E=Early, M=Medium, L=Late, V=Very,

Table 4. 1996 Advanced Dark Red Kidney* Yield Trials

Line Code	Pedigree	F	Stockton		Chico		Means	1995 ranking	1994 ranking
			cwt/A	Mat*	cwt/A	Mat*	cwt/A		
9653	CDRK'82 X ABA 56	7	28 3 ab	ME	n/a	n/a	28.3	13/27	
9659	ABA 52 X CDRK'82	7	26 9 abcd	M	25 1 abc	ML	26.0	1/27	
9649	CDRK'82 X BAN 29	7	25 9 abcd	MS	25 9 ab	ML	25.9	19/27	
9615	CDRK'82 X BAN 21	7	27.4 abc	MLS	24 2 abcd	ML	25.8	2/6	12/30
9638	CDRK'82 X PAD 46	7	28 8 a	ML	22.7 abcde	ML	25.8	20/27	
9658	ABA 52 X CDRK'82	7	25 2 abcd	M	26 3 a	L	25.7	5/27	
9648	CDRK'82 X BAN 29	7	24 9 abcd	MLS	26 0 ab	ML	25.5	6/27	
9657	ABA 52 X CDRK'82	7	26 9 abcd	ML	23.1 abcde	M	25.0	18/27	
9652	CDRK'82 X BAN 29	7	24.8 abcde	ML	n/a	n/a	24.8	12/27	
9603	WAF 133 x CDRK '82	7	26 0 abcd	M	22.3 abcde	ME	24.1		
9656	CDRK'82 X BAN 29	7	27 4 abc	ME	20 5 defgh	ML	23.9	11/27	
9654	CDRK'82 X BAN 29	7	22 9 abcde	MLS	24.1 abcd	L	23.5	15/27	
9650	CDRK'82 X BAN 29	7	20 7 abcde	ML	25.3 abc	L	23.0	7/27	
9604	CDRK '82 x BAN 28	7	24 7 abcde	M	20 2 defgh	M	22.5		
CDRK			22 1 abcde	MLS	21 4 cdef	ME	21.7	3/27	
9606	CDRK '82 x Montcalm	6	24 0 abde	M	19 4 efgh	ME	21.7	2/7	
9605	CDRK '82 x BAN 29	7	22 3 abcde	ME	20 9 cdefg	M	21.6		
9607	CDRK '82 x Montcalm	6	24 1 abcde	ME	17 8 fgh	ME	20.9	2/7	
9610	CDRK'82 X BAN 21	7	18 5 bcde	MLS	21 6 bcdef	L	20.0	4/6	16/30
9601	WAF 133 x CDRK '82	7	17 7 cde	MS	22 3 abcde	ML	20.0		
9611	PAD 41 x Linden	8	19.8 abcde	MLS	19.4 efgh	E	19.6	6/6	
9640	CDRK'82 X PAD 1618	7	18 5 bcde	M	20 3 defgh	ML	19.4	26/27	
9655	CDRK'82 X BAN 29	7	21.3 abcde	M	16 3 h	L	18.8	10/27	
9602	WAF 133 x CDRK '82	7	18 3 bcde	MES	17 5 fgh	ME	17.9		
9609	Linden x BAN 31	8	17 2 ed	MLS	16 9 gh	M	17.1	4/7	
9608	CDRK '82 x Montcalm	6	22 2 abcde	M	11 6 i	ME	16.9		
WI-80			23 2 abcde	L	9 3 i	VL	16.3	n/a	
9651	CDRK'82 X BAN 29	7	14 8 e	L	n/a	n/a	14.8	22/27	
Site Yield Means			23.0		20.8				

*All lines resistant to Bean Common Mosaic Virus

** Mat = maturity relative to commercial checks Days from planting to cutting VE=100 E=105

ME=115 M=120 ML=125 L= >125 VL= >>125 S=Early/Late split pod set

Lines in italics tested good canners in 1995

CV's Stockton (24 8) Chico (12 53)

Table 5. 1996 Advanced Light Red Kidney* Yield Trials

Line Code	Pedigree	F	Stockton		Chico		Means	1995 ranking	1994 ranking
			cwt/A	Mat**	cwt/A	Mat**	cwt/A		
9675	LINDEN X BAN 31	8	28.8 abc	M	27.6 ab	M	28.2	8/25	
9676	LINDEN X BAN 31	8	29.2 ab	MS	26.1 abc	ML	27.6	9/25	
9686	LINDEN X BAN 21	7	25.9 abcde	ML	27.9 a	L	26.9	11/25	
CELRK			30.6 a	E	22.9 abcde	VE	26.7		
9669	WAF 133 X CDRK'82	7	27.1 abcd	ML	25.3 abcd	ML	26.2	16/25	
9680	LINDEN X G6615	7	29.0 ab	ML	22.4 bcde	ML	25.7	5/25	
9613	WAF 133 X CDRK'82	7	27.7 abc	ML	21.8 cde	M	24.8	7/8	22/30
9679	LINDEN X BAN 21	7	24.2 bcdef	L	24.7 abcd	L	24.5	23/25	
9677	LINDEN X BAN 21	7	21.4 defg	ML	27.2 ab	L	24.3	12/25	
9678	LINDEN X BAN 21	7	22.9 cdefg	L	23.2 abcde	L	23.0	22/25	
9683	LINDEN X BAT 1558	7	24.2 bcdef	L	21.3 cde	VL	22.7	20/25	
9673	LINDEN X PAD 44	7	24.4 bcdef	LS	20.6 de	L	22.5	1/25	
9674	LRK 20 X CDRK'82	7	21.0 efg	LS	24.0 abcde	VL	22.5	3/25	
9681	LINDEN X BAT 1558	7	19.9 fg	VL	23.8 abcde	VL	21.9	25/25	
9682	LINDEN X BAT 1558	7	17.6 g	VL	19.4 e	VL	18.5	24/25	
Site Yield Means			24.9		23.9				

*All lines resistant to Bean Common Mosaic Virus

** Mat = maturity relative to commercial checks Days from planting to cutting : VE=100 E=105 ME=115
M=120 ML=125 L= >125 VL= >>125
CV's Stockton (14.5) Chico (12.8)

desired by the industry. Commercial-scale evaluations will be needed in the future in order to make broad and definite recommendations for specific combinations of genotype, environment, and market criteria. Some preliminary visual quality observations have already been made on the kidney seed harvested in 1996. These will be followed by canning tests at S&W in Modesto. Selected lines will be more extensively tested at several locations, including Stockton and Chico.

Most of the California pink bean acreage is dominated by the UCD variety Yolano. Although Yolano is a high yielding variety, it has a relatively narrow adaptive range and mediocre root system. With the goal of overcoming this shortfalls, a series of hybrid lines with diverse genetic backgrounds have been selected and tested for several seasons. Our objective is to release a variety that can be grown in the Northern Sacramento Valley or San Joaquin County , and with yields and quality equal to or better than to those of Yolano. As Table 6 shows, three out of five lines yielded higher than Yolano at Chico in 1996. Also, a larger group of preliminary lines showed better yields than Yolano at Chico (See 1996 UCD Breeding report). Similar results were observed at Chico and Stockton in 1995. This trend in our results suggests we are headed in the right direction. In addition most of these lines carry resistance to more BCMV strains than Yolano. However, further yield testing and commercial seed quality evaluations are needed before releasing any of these lines as varieties.

The U.S. and California Hispanic markets comprise a large proportion of the domestic common bean trade, especially for pintos, small reds and blacks. Although California bean growers have grown pintos and black beans with mixed results they lack information on locally adapted varieties of small red and other Central American types. A group of such types, mostly hybrids of Central American lines with California commercial types, has been assembled by the UC Davis breeding project during the last eight years. Most of these lines carry complete BCMV resistance. Table 7 reports the yields and maturity of the advanced Central American types tested at Chico in 1996. Almost all lines yielded above the very late Ruffus small red check, and showed a range of maturities. From the ten lines tested, two are small red, one is a mottled red on pink and seven are Flor de Mayo types. Since the very delicate flavored Flor de Mayos are highly demanded in some regions of Mexico and other Central American countries, it is very likely that a niche could be developed in the domestic U.S. market. Lines 9623, 9696, and 9699 are Flor de Mayos with excellent visual seed quality, and yielded more than 26 cwt/A. Line 9623 yielded 32.5 cwt/A at Stockton in 1995, and ranked first also at Chico and Davis that year. We will continue field testing these lines in 1997 and recommend one or two lines for release by the end of the season.

Tables 8 and 9 show the yields and maturities for the advanced black and small white yield trials at Chico in 1996. In both cases a considerable number of lines outyielded the commercial checks. Small white line 9625 has had consistent high yield rankings since 1994, as well as lines 9627 and 9628. In 1996 the black bean lines showed undesirable pod splitting at the end of the season at Chico, and we think that opportune cutting and harvesting could reduce the amount of seed. Many UCD advanced lines were superior to the BTS 39 commercial check. Following one more

Table 6. 1996 Chico Advanced Pink* Yield Trial

Line Code	Pedigree	F	cwt/A	Mat**	1995 Ranking	1994 Ranking
9688	YOLANO X BAT 1763	8	29.8 a	L	1/9	
9634	YOLANO X BAT 1763	8	25.2 b	L	4/7	16/27
9689	YOLANO X BAT 1763	8	24.7 bc	M	5/9	
Yolano			21.9 c	ML	1/7 & 3/9	
9631	YOLANO X RAB 206	7	18.2 d	L	6/7	14/27
9633	PAI 9 X YOLANO	8	18.0 d	VL	5/7	3/27

* All lines are resistant to Bean Common Mosaic Virus

** Mat = maturity relative to commercial checks. Days from planting to cutting :
VE=100 E=105 ME=115 M=120 ML=125 L= >125 VL= >>125

CV = 7.9

Table 7. 1996 Chico Advanced Small Red* Yield Trial

Line Code	Pedigree	Type	F	cwt/A	Mat**	1995 Ranking	1994 Ranking
9623	YOLANO X BAT 1763	FM	8	28.1 a	ME	1/4	13/16
9698	YOLANO X RAB 463	RM	7	27.7 ab	L	3/10	
9697	YOLANO X BAT 1763	FM	8	27.1 ab	VL	1/10	
9696	YOLANO X BAT 1763	FM	8	26.8 ab	M	6/10	
9699	YOLANO X BAT 1763	FM	8	26.2 ab	ME	4/10	
96103	YOLANO X SUG 53	FM	7	24.5 ab	L	2/10	
9624	YOLANO X BAT 1763	FM	8	23.7 bc	M	3/4	15/16
96100	CDRK'82 X G6616	FM	7	23.7 bc	ME	5/10	
96101	YOLANO X RAB 477	RM	7	19.9 c	L	7/10	
Ruffus		RM		19.5 d	VL		
9622	CDRK'82 X PAD 44	M	7	18.3 d	L	2/4	6/16

* All lines are resistant to Bean Common Mosaic Virus

TYPES : FM=Flor de Mayo, RM=Red Mexican/small red, M=mottled red on pink

** Mat = maturity relative to commercial checks. Days from planting to cutting : VE=100
E=105 ME=115 M=120 ML=125 L= >125 VL= >>125

CV = 10.7

season of testing, we expect to recommend black and small white lines as variety candidates.

Yield Trials, Pintos

To conclude our three-year evaluation of US Pinto varieties for California, during 1996 we tested the four varieties with the best overall performance in 1994 and 1995 (Table 10). The yields showed the same rank order as those of 1994 and 1995, and are thus very conclusive. Although overall experimental yields were low in 1995 and 1996 due to excessive heat, the 1994 yields indicate the production potential for more typical conditions. Top yielding NW 590 scored the lowest average quality during 1994 and 1995, whereas Othello, the second in yield ranked first in quality. In areas such as Chico with very hot summers, pintos have a tendency to develop darker seed tones and Othello should be the best choice. In cooler regions like the Sacramento/San Joaquin Delta, NW 590 should not develop dark color, and would be a good choice for high yields. The yield potential of these varieties is really very high.

Table 8. 1996 Chico Advanced Black* Yield Trial

Line Code	Pedigree	F	cwt/A	Mat**	1995 Ranking	1994 Ranking
96114	MEX E-51 X MIDNIGHT	7	26.2 a	L	11/15	
96131	BTS 39 X DOR 42	8	24.6 ab	VL	1/15	
96130	BTS 39 X NAG 236	8	24.3 ab	L	12/15	
96113	MEX E-51 X MIDNIGHT	7	24.1 b	ML	5/15	
96109	MIDNIGHT X NAG 91	7	23.8 abc	L	9/15	
96116	MEX E-51 X MIDNIGHT	7	23.6 abc	L	6/15	
96111	MIDNIGHT X NAG 91	7	23.5 abc	L	7/15	
BTS 39			22.6 abcd	L	4/15	
96112	MEX E-51 X MIDNIGHT	7	21.1 abcde	ML	10/15	
96105	MIDNIGHT X NAG 91	7	19.6 bcde	L	2/15	
96115	MEX E-51 X MIDNIGHT	7	18.8 cde	L	3/15	
96108	MIDNIGHT X NAG 91	7	18.0 de	L	15/15	
9630	BTS 39 X NAG 91	7	17.9 de	L	3/3	20/24
96107	MIDNIGHT X NAG 91	7	17.9 de	VL	13/15	
96106	MIDNIGHT X NAG 91	7	16.4 e	ML	8/15	

* All lines are resistant to Bean Common Mosaic Virus

** Mat = maturity relative to commercial checks. Days from planting to cutting:

VE=100 E=105 ME=115 M=120 ML=125 L=>125 VL=>>125

CV = 14.9

Table 9. 1996 Chico Advanced Small White Yield Trial

Line Code	Pedigree	F	cwt/A	Mat**	1995 Ranking	1994 Ranking
9625	PAN 17 X SAL	8	31.6 a	L	1/4	7/24
96127	YOLANO X BAT 1763	8	28.2 ab	L	8/14	
96129	SAL X PAN 68	8	25.9 cb	M	7/14	
9627	PAN 21 X SAL	8	25.9 cb	ME	3/4	9/24
96118	UC 114-231-85 X CAN 21	7	25.7 cb	L	10/14	
9628	PAN 21 X SAL	8	25.5 cb	ML	2/4	10/24
96132	SAL X PAN 68	8	25.3 cb	ME	6/14	
96126	YOLANO X BAT 1763	8	24.4 bcd	L	3/14	
96133	UC 114(231)85 X CAN 21	7	21.9 cd	ML	5/14	
96125	YOLANO X BAT 1763	8	20.4 de	L	9/14	
96123	YOLANO X BAT 1763	8	16.7 fe	L	12/14	
96128	PAN 68		16.1 f	L	1/14	
Aurora			13.9 f	VL		

** Mat = maturity relative to commercial checks. Days from planting to cutting :
VE=100 E=105 ME=115 M=120 ML=125 L=>125 VL=>>125

CV = 11.5

Table 10. 1996 Chico Pinto Yield Trial

Variety	cwt/A**	1994 Yields*	1995 Yields*	94-95 max. yield cwt/A	1995 Quality*
NW 590	23.2 a	1/9	1/9	40.9 (Chico/94)	7/9
Othello	18.2 b	2/9	2/9	35.9 (Chico/94)	1/9
RNK 101	14.6 c	3/9	3/9	32.1 (Stockton/94)	3/9
UI 196	13.7 c	5/9	8/9	39.6 (Chico/94)	5/9

*Average yield and quality ranking among five locations

**CV = 10.7