

**Report to the Oregon Processed Vegetable Commission  
1995-1996**

1. Title: Green Bean Breeding
2. Project Leaders: J. R. Baggett, Horticulture  
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Cooperator: D. Mok
3. Project Status: Terminating June 30, 1996
4. Project Funding: \$64,000 breeding  
\$10,560 processing

Breeding funds were used for a major portion of the support of two vegetable breeding technicians, student labor, supplies, and research farm expenses. Processing funds were used for processing samples of experimental beans, laboratory analysis, and panel evaluations.

5. Objectives: Breed bush green beans for the western Oregon processing industry with:
  - A. Improved potential for high yields at favorable sieve sizes and dependability
  - B. Improved straightness, texture, and other quality factors
  - C. Develop easy picking and small pod strains of Blue Lake type
  - D. Resistance to white mold and root rot
6. Report of Progress:

Bean breeding lines and commercial introductions were tested in replicated yield trials planted April 26, May 16, May 30, June 22, and June 30. The April 26 and May 30 plantings included eight advanced lines or varieties; the May 16 and June 22 plantings included 22 lines and varieties; and the June 30 planting included seven OSU lines and 'Minnette' (Harris-Moran) at 36- and 18-inch row spacings. Plots were either one or two rows 20' long, replicated four times. Several 5-foot sections were harvested from each plot, usually at two-day intervals. Samples were canned and frozen at Food Science and Technology. They will be evaluated in February by industry representatives. Processed quality data will be published in a separate report.

Commercial varieties tested in 1995 included the small-sieve (baby bean) variety 'Minnette' (Harris-Moran), and medium-pod-size ('Slenderette'-type) varieties 'Maxima' (Rogers), 'Matador' (Asgrow), 'Banquet' (Asgrow), and HMS 2974 (Harris-Moran).

Data obtained from the replicated trials are summarized in Tables 1-10 and Figures 1-9. Of the normal sieve size OSU lines included, 'Oregon 54' and OSU 5416 produced the highest dollar return, clearly leading 'Oregon 91G' in the overall season averages presented in the table below:

Variety	Season Average \$/A Based on		
	Trial Averages*	Selected Harvest**	Highest Harvest
Oregon 91G	1562	1566	1636
Oregon 54	1713	1685	1794
OSU 5416	1741	1769	1811
OSU 5520	1583	1525	1664
OSU 5558	1471	1480	1563
OSU 5563	1468	1490	1508
LSD @ 5%	138	186	146

\*Average of 1-3 harvests from five trials.

\*\*The harvest closest to 50% 1-4 sieve, usually (65% for 5558 and 5563).

The differences between 'Oregon 54' and OSU 5416 depend on the method of comparison, with 'Oregon 54' slightly higher if trial average of harvests or highest harvest are used, and OSU 5416 higher if selected harvests from the four trials are used (Figure 3). Further comparisons of 'Oregon 54' and OSU 5416 will be made in a later section. Of the advanced easy-pick lines included in the four trials, OSU 5520 was generally the best in 1995. Because of its earliness and immature green seed, 5520 will be continued in 1996, but OSU 5558 and OSU 5563 will be shelved. Newer easy-pick lines 5566 and 5575 will be tested in 1996 because they appear to be high-yielding for the easy-pick type.

Three new standard bush Blue Lake lines, OSU 5630, OSU 5635, and OSU 5651, included in the trials for the first time, looked promising and will be tested more thoroughly in 1996. These lines generally exceeded 'Oregon 54' in \$ return in both the May 16 and June 22 trials, except that OSU 5651 was missed in harvesting the June 22 trial (Table 4, Figure 2). These lines appear to be earlier and more concentrated than 'Oregon 54' and less early and concentrated than 'Oregon 91G'. The parentage of these lines is: OSU 5630 (Oregon 91G x Oregon 54), OSU 5635 (Oregon 54 x OSU 5163), and OSU 5651 (Oregon 54 x OSU 5256). They have many sister lines, some of which will be tested in 1996.

Medium-sieve beans/'Slenderette' types. Four commercial varieties tested in 1995 have been grouped for comparison in Table 5. These yields and sieve sizes are presented with no adjustment of yields feasible. Comparison of yields and \$ value is difficult because we did not know the optimum harvest maturity of each variety. Unless the pods appeared to be overmature, the last harvest was selected for statistical analysis. For 'Maxima', we cannot be sure that the yield of 9.0 tons and the \$ return of \$1,980 in the June 22 trial are realistic. Of the four varieties included, quality may be more of a problem with HMX 2974 than with the other three varieties.

Small-sieve beans. OSU 5446 and 'Minuette' were included in four trials. Although OSU 5446 is not likely to be grown commercially, it sets a high standard for yield and quality of small-sieve pods and has been used in many crosses. 'Minuette' is being grown commercially in Oregon. Though not Blue Lake in character, color and pod refinement are good and the growth habit is excellent. Depending on the relative importance placed on 3-sieve versus 4-sieve pods, and thus the harvest used for comparison, the \$ return of 5446 was much higher in trial 1, and higher in trial 3. In trials 2 and 4, return for the two varieties was similar (Tables 6 and 7, Figures 6 and 7).

In trials 2 and 4, we included three new OSU lines, OSU 5600, OSU 5603, and OSU 5613, which came from the cross OSU 5163 x Rapier. Pods of these lines are very small and refined, with good Blue Lake color (not as good as OSU 5446) and some tendency for bumpiness. Of the three, OSU 5603 is the least promising and may be discontinued. OSU 5600, which was in trials in 1994, is the best in appearance. The growth habit of these lines is medium upright and somewhat leafy compared to OSU 5446. Only a small percentage of the pods reach 4-sieve, and they eventually reached a yield which compared favorably with 'Minuette' at a similar ratio of 3-sieve:4-sieve pods. However, they become seedy without developing many 4-sieve pods and evaluation of processed pods will be necessary to estimate their yield potential. Dollar return estimates compared with 'Minuette' were sometimes reduced because there was a higher percentage of 1-sieve pods, which were not included. A summary of \$ value for the small-sieve varieties is given in the following tables.

Variety	<u>Season Average \$ Value From Four Trials</u>	
	<u>Based on Harvest With:</u>	
	Highest \$ Value	Highest T/A 3-sieve
5446	1559	1451
Minuette	1460	1376

Variety	<u>Season Average \$ Value From Two Trials</u>	
	<u>Based on Harvest With:</u>	
	Highest \$ Value	Highest T/A 3-sieve
5446	1504	1419
Minuette	1485	1485
5600	1463	1463
5603	1275	1275
5613	1621	1621

**Row spacing trial.** Selected varieties and lines were grown at 36- and 18-inch row spacing to determine if there was an interaction between the varieties and row spacing. Different responses to row spacing could relate to differences in vigor and degree of uprightness in habit. As in 1993 and 1994, there was a marked increase in yield and \$ return when 18" rows were compared with 36" rows (Tables 8 and 9, Figures 8 and 9). Average adjusted tons/acre from 18" rows was 120% of that from 36" rows. However, this value was 138% for 'Oregon 91G', 124% for OSU 5416, and 127% for 'Oregon 54' (data from only one harvest date). Values for the easy-pick lines were 113% (OSU 5520), 116% (OSU 5558), and 135% (OSU 5563). For OSU 5446, the yield for 18" rows was only 105% of that for 36" rows, and 112% for 'Minuette'.

Thus, the results contradicted our expectations that OSU 5446 with a small plant, 'Minuette' with a medium-sized upright plant, and the easy-pick lines with distinct upright habits would gain more from closer rows than the standard bush Blue Lake varieties such as 'Oregon 91G'. This trial was under heat and drought stress for a time before flowering, which was especially noticeable in the 18" row plots, but later became quite vigorous with an indeterminate crop and high yields. The more vigorous varieties may have been able to outgrow the early stresses better than OSU 5446 or 'Minuette'. Statistically, the interaction between spacing and varieties was barely significant at 5% ( $F = 2.46$ ).

Because of the rank growth and late season with much rain, white mold was a serious problem in the spacing trial. 'Oregon 54' was especially damaged because it was several days later than the other standard varieties and mold was increasing rapidly as it matured so that only one harvest date was possible for this variety. The plots were scored for mold damage near the end of the harvest period. As shown in Table 13, mold was considerably worse at 18" in 'Oregon 91G', 'Oregon 54', and OSU 5416, but not in the less susceptible varieties. Note that 'Oregon 91G' had a higher score than 'Oregon 54' at 18", but it was possible to harvest on three dates as planned because 'Oregon 91G' matured several days earlier, before the mold reached its peak. It should be noted that no chemical control for mold was applied to any of our trials.

**Root rot and white mold trials.** All of the lines included in yield trials were planted in the root rot test plots along with a limited number of lines derived from crosses with specific resistant accessions. Root rot scores are shown in Table 11. There is a tendency for lines with higher white mold susceptibility to have lower root rot scores, since plant vigor tends to increase white mold, while early, concentrated, and less vigorous varieties often get higher root rot scores. Root rot scores in 1995 were not high enough to show great differences.

All trial lines were also included in the white mold plots along with all OSU breeding lines with sufficient seed and lines from specific white mold crosses. Infection scores shown in Table 12 were high and reasonably consistent across replications. Since our readings are taken at the end of the season, some differences that exist at harvest time may not be apparent in the data. For example, the high readings of OSU 5446 and the easy-pick lines may not indicate the degree of the problem at harvest maturity.

Comparison of OSU 5416 with 'Oregon 54'. Of the many lines similar to and having parentage similar to that of 'Oregon 54' (OSU 5402), only OSU 5416 was included in 1995 yield trials. Several others, such as OSU 5421, have been carried in recent years but were shelved in 1995. OSU 5416 is probably the best of these related lines for pod quality, but the pods are not quite as smooth or straight as 'Oregon 54' pods. However, in many trials, OSU 5416 seems to be less affected by conditions that appear to result in a delayed set in 'Oregon 54' and a delay of harvest maturity by a day or two. OSU 5416 is often harvested a day or two earlier than 'Oregon 54' in our trials, or the percentage of 1-4 sieve pods indicates that OSU 5416 matures about a day earlier. Since yields of OSU 5416 are sometimes better, data from 37 separate replicated, hand-picked trials was analyzed, using \$ return/acre from both averages of harvests in each trial, or selected harvests based on sieve-size percentage. Paired \$ values of selected harvests from the 37 trials are shown in Figure 10. OSU 5416 values were higher in 24 of the 37 trials. Summary data are shown in the following table for the 37 trials from 1989-1995.

Variety	Average of Harvests \$/acre	Selected Harvest \$/acre
Oregon 54	1617	1648
OSU 5416	1635	1660
Difference (non-significant)	18	12

Though the difference is small, and is non-significant statistically because of the variation among trials, continuation of OSU 5416 and possibly retesting it in commercial trials may be advisable. OSU records indicate that there was a reserve of 57 lbs. held by Rogers and 56 held by Ferry Morse after 700 lbs. were shipped to Norpac and 450 lbs. were shipped to Agripac for trial in 1992. These reserves should be available for additional seed increase if that is desired.

Commercial performance of 'Oregon 91G' and 'Oregon 54' in 1995. Substantial acres of 'Oregon 54' were grown along with 'Oregon 91G' in western Oregon in 1995. Data provided by two processing companies are summarized in the following table.

Variety	Company A				Company B				Overall AV	
	Acres Grown	Gross T/A	Net T/A	\$/A	Acres Grown	Gross T/A	Net T/A	\$/A	Net T/A	\$/A
Oregon 91G	6129	7.0	6.2	1093	680	7.5	6.5	1053	6.4	1073
Oregon 54	1592	6.2	6.5	1172	1274	7.6	6.7	1143	6.6	1158

<sup>a</sup>Last two weekly periods omitted because very few acres of Oregon 54 included.

7. Summary:

Three standard Blue Lake, three easy-pick, and two small-sieve varieties were grown in five replicated hand-picked trials, one of which included planting at both 36- and 18-inch row spacings. Four 'Slenderette'-type commercial varieties and nine newer OSU lines of easy-pick, standard, or small-sieve types were included in two of the trials. OSU 5416 produced more \$/A than 'Oregon 54', with 'Oregon 91G' producing less than 'Oregon 54'. Several new standard bush Blue Lake varieties, OSU 5630, OSU 5635, and OSU 5651 look promising. Small-sieve OSU 5446 usually exceeded 'Minuette' in \$/A, but these two varieties were sometimes close in production. Three new OSU small-sieve lines, OSU 5600, OSU 5603, and OSU 5613 are very refined and may yield well enough for commercial production. Development of new materials and testing of breeding lines for resistance to white mold and root rot continued.

8. Signatures:

Redacted for Privacy

Project Leader:

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Table 1. Yields of standard green bean varieties, May 16 planting, Corvallis, 1995.<sup>2</sup>

Line	Av. Stand	Harvest 1				Harvest 2				Harvest 3				Av. Adj. T/A
		Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A	
91G	150	69	69	8.0	9.5	71	58	7.8	8.4*	72	37	8.7	7.5	8.5
Oregon 54	150	72	66	8.8	10.2	73	54	9.2	9.6*					9.9
5416	150	72	60	9.6	10.5	73	50	9.5	9.5*					10.0
5520	150	69	82	8.6	11.4	71	65	9.2	10.6	72	44	10.3	9.6*	10.5
5558	150	71	88	7.4	8.7	73	65	8.2	8.2*					8.4
5563	150	71	92	7.5	9.1	73	78	8.0	8.9*					9.0
5566	150	71	74	8.8	9.5	72	74	8.8	9.4	73	64	9.9	9.9*	9.6
5568	150	71	84	7.5	8.6	73	71	7.8	8.1*					8.4
5575	150	69	82	8.2	10.8	71	63	9.3	10.5*					10.6
5630	150	69	84	7.3	9.8	71	64	8.9	10.1	72	61	9.4	10.5*	10.1
5635	150	71	81	8.4	11.0	73	64	8.8	10.0*					10.5
5651	150	69	97	7.3	10.7	71	89	8.4	11.6	73	73	9.5	11.7*	11.3

<sup>2</sup>Mean of 4 replications; subplots of 5' were harvested from 20' plots on each harvest date; rows 36" apart; days = days from planting; % = percent 1-4 sieve grades; adj. T/A = tons per acre adjusted to 50% 1-4 sieve (except 5558, 5563, 5566, and 5568, which were adjusted to 65% 1-4 sieve). Analysis of variance calculated using the harvest closest to 50% 1-4 sieve (65% 1-4 sieve for 5558, 5563, 5566, and 5568) for each line marked with \*. LSD for comparing \* means (unadjusted) was 1.1 T/A at 5% significance; for comparing adjusted \* means LSD was 1.2 T/A at 5% significance.

Table 2. Yields of standard green bean varieties, June 22 planting, Corvallis, 1995.<sup>2</sup>

Line	Av. Stand	Harvest 1				Harvest 2				Harvest 3				Av. Adj. T/A
		Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A	
91G	150	60	65	9.9	11.4	62	50	10.9	10.9*	64	39	11.4	10.1	10.8
Oregon 54	150	63	69	10.6	12.6	65	49	11.1	11.0*	67	30	12.5	10.0	11.2
5416	149	62	69	9.4	11.2	64	60	10.3	11.4*	67	40	11.7	10.5	11.0
5520	150	60	83	8.2	10.8	62	59	9.7	10.6	64	49	10.3	10.2*	10.5
5558	148	62	93	7.3	8.8	64	85	7.7	8.9*					8.8
5563	149	62	91	7.4	8.8	64	86	7.5	8.7*					8.8
5566	148	62	79	8.4	9.3	64	73	9.4	10.0*	67	46	11.3	9.7	9.7
5568	149	62	92	7.8	9.4	64	84	7.5	8.6*					9.0
5575	148	61	53	9.4	9.7*	63	40	10.8	9.7					9.7
5630	150	61	79	9.8	12.6	63	65	10.2	11.8	65	49	10.2	10.1*	11.5
5635	150	62	88	9.2	12.8	64	75	9.9	12.3	67	37	12.9	11.2*	12.1

<sup>2</sup>Mean of 4 replications; subplots of 5' were harvested from 20' plots on each harvest date; rows 36" apart; days = days from planting; % = percent 1-4 sieve grades; adj. T/A = tons per acre adjusted to 50% 1-4 sieve (except 5558, 5563, 5566, and 5568, which were adjusted to 65% 1-4 sieve). Analysis of variance calculated using the harvest closest to 50% 1-4 sieve (65% 1-4 sieve for 5558, 5563, 5566, and 5568) for each line marked with \*. LSD for comparing \* means (unadjusted) was 2.1 T/A at 5% significance; adjusted \* means were not significantly different at 5% significance.



Table 3. Yields of selected OSU green bean lines on two planting dates, Corvallis, 1995.\*

Line	Av. Stand	Harvest 1				Harvest 2				Harvest 3				Av. Adj. T/A	LSD <sup>†</sup> T/A	LSD <sup>†</sup> Adj. T/A
		Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A	Days	% 1-4	T/A	Adj. T/A			
91G	150	77	83	5.9	7.9	79	65	6.7	7.8	82	43	8.5	7.9*	7.9	1.5	1.5
Oregon 54	150	82	53	9.0	9.2	83	47	8.8	8.5*	84	32	8.6	7.1	8.3		
5416	148	82	59	9.1	9.9	83	50	8.8	8.8*	84	36	8.6	7.4	8.7		
5520	150	77	91	5.4	7.7	79	71	6.2	7.5	82	41	8.5	7.8*	7.7		
5558	148	79	93	4.9	5.9	82	69	6.7	6.9*	83	53	5.8	5.2	6.0		
5563	150	79	93	5.0	6.0	82	66	6.2	6.2*	83	51	6.9	6.1	6.1		
91G	150	63	76	9.3	11.7	64	61	9.5	10.5	65	44	10.4	9.8*	10.7	1.0	1.0
Oregon 54	149	65	69	10.4	12.4	66	66	8.9	10.3*	69	35	10.8	9.2	10.6		
5416	149	65	58	9.4	10.1	66	55	10.1	10.6*	69	33	11.3	9.4	10.0		
5520	150	63	81	7.5	9.8	64	68	8.5	10.0	65	53	9.2	9.5*	9.8		
5558	150	65	92	8.0	9.7	66	83	7.3	8.3*	69	47	8.7	7.5	8.5		
5563	150	65	88	7.6	8.9	66	78	8.0	8.9*	69	54	8.3	8.1	8.6		

\*Means of 4 replicates; subplots of 5' were harvested from double 20' plots on each harvest date; rows 36" apart; days = days from planting; % = percent 1-4 sieve grades; adj. T/A = tons/acre adjusted to 50% 1-4 (except 5558 and 5563, which were adjusted to 65% 1-4).

<sup>†</sup>Analysis of variance calculated using the harvest marked \*; LSD was calculated at 0.05 significance to compare values marked \*.

Table 4. Dollar return/acre for standard OSU lines, four trials, 1995.<sup>2</sup>

Trial	Line	Harvest 1			Harvest 2			Harvest 3			Avg. \$/A <sup>y</sup>	Selected \$/A <sup>z</sup>
		Days	%	\$	Days	%	\$	Days	%	\$		
1 April 26	91G	77	83	1193	79	65	1190	82	43	1312	1232	1312
	Ore. 54	82	53	1476	83	47	1403	84	32	1315	1398	1403
	5416	82	59	1519	83	50	1441	84	36	1270	1410	1441
	5520	77	91	1081	79	71	1054	82	41	1301	1145	1145
	5558	79	93	991	82	69	1236	83	53	950	1059	1236
	5563	79	93	1035	82	66	1101	83	51	1090	1075	1101
2 May 16	91G	69	69	1412	71	58	1280	72	37	1223	1305	1280
	Ore. 54	72	66	1594	73	54	1548				1571	1548
	5416	72	60	1663	73	50	1547				1605	1547
	5520	69	82	1652	71	65	1635	72	44	1553	1613	1553
	5558	71	88	1423	73	65	1468				1446	1468
	5563	71	92	1493	73	78	1575				1534	1575
	5566	71	74	1660	72	74	1590	73	64	1802	1684	1802
	5568	71	84	1481	73	71	1407				1444	1407
	5575	69	82	1552	71	63	1646				1599	1646
	5630	69	84	1580	71	64	1617	72	61	1588	1595	1588
	5635	71	81	1603	73	64	1557				1580	1557
	5651	69	97	1396	71	89	1703	73	73	1832	1644	1832
3 May 30	91G	63	76	1696	64	61	1595	65	44	1573	1621	1573
	Ore. 54	65	69	1863	66	66	1590	69	35	1566	1673	1590
	5416	65	58	1702	66	55	1686	69	33	1599	1662	1686
	5520	63	81	1461	64	68	1554	65	53	1526	1514	1514
	5558	65	92	1589	66	83	1472	69	47	1398	1486	1472
	5563	65	88	1515	66	78	1593	69	54	1408	1505	1593
4 June 22	91G	60	65	1768	62	50	1770	64	39	1663	1734	1770
	Ore. 54	63	69	1907	65	49	1755	67	30	1708	1790	1755
	5416	62	69	1714	64	60	1800	67	40	1663	1726	1800
	5520	60	83	1601	62	59	1652	64	49	1662	1638	1638
	5558	62	93	1467	64	85	1582				1525	1582
	5563	62	91	1523	64	86	1492				1508	1492
	5566	62	79	1623	64	73	1745	67	46	1619	1662	1745
	5568	62	92	1637	64	84	1503				1570	1503
	5575	61	53	1520	63	40	1630				1575	1520
	5630	61	79	1917	63	65	1850	65	49	1637	1801	1637
	5635	62	88	1908	64	75	1899	67	37	1873	1893	1873

<sup>2</sup>Based on a value of \$242 for 2-4 sieve pods; \$108 for 5 and 6 sieve pods. Yield of 2-sieve pods was obtained by taking one-half of the combined graded 1-2 sieve pods.

<sup>y</sup>Average \$/acre is a rough estimate because of non-uniform number of trials and maturities included.

<sup>z</sup>Selected best values for comparison. Usually the same value used for analysis of variance in Tables 1, 2, and 3.

**Table 5. Performance of Slenderette-type green bean varieties on two planting dates, Corvallis, 1995.<sup>2</sup>**

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre
			2 <sup>y</sup>	3	4	5	2	3	4	5	Total <sup>x</sup>	
2 May 16	Banquet	69	13	71	16	0	0.7	3.7	0.8	0	6.1	1247
		71	9	71	20	1	0.5	4.0	1.1	0.1	6.5	1379
		72	5	58	35	2	0.3	3.6	2.1	0.1	6.7*	1456
	Matador	71	11	64	23	2	0.7	3.9	1.4	0.1	7.1	1461
		73	8	60	28	5	0.5	3.9	1.8	0.3	7.4*	1551
	HMX 2974	69	12	67	19	1	0.6	3.2	0.9	0.4	5.5	1128
		71	8	60	31	1	0.4	3.2	1.7	0.1	6.3*	1299
		72	4	55	37	4	0.2	2.9	2.0	0.2	6.2	1245
	Maxima	69	16	73	12	0	0.8	3.6	0.6	0	6.1	1212
		71	9	66	25	1	0.6	4.6	1.7	0.1	7.9*	1677
		72	7	64	28	1	0.4	4.0	1.8	0.1	7.1	1515
4 June 22	Banquet	63	15	77	8	0	0.7	3.3	0.4	0	5.1	1045
		65	7	68	25	1	0.4	4.2	1.6	0.1	7.0	1510
		67	5	66	27	2	0.3	4.4	1.8	0.1	7.4*	1589
	Matador	61	17	61	20	2	0.7	2.7	0.9	0.1	5.5	1049
		63	11	61	26	2	0.6	3.6	1.6	0.1	7.0	1422
		65	7	45	44	4	0.5	3.1	3.0	0.3	7.9*	1638
	HMX 2974	61	18	63	17	2	0.7	2.8	0.8	0.1	3.8	1058
		63	10	68	21	1	0.5	3.8	1.2	0.1	6.4*	1330
		65	4	42	48	6	0.3	3.2	3.7	0.5	8.3	1790
	Maxima	61	11	74	15	0	0.7	4.5	0.9	0	7.0	1485
		63	7	76	16	1	0.5	5.0	1.1	0.1	7.5	1593
		65	5	60	34	1	0.4	4.9	2.8	0.1	9.0*	1980

<sup>2</sup>Means of 4 replicates; subplots of 5' were harvested from 20' plots on each harvest date; rows 36" apart; days = days from planting; % = percent 1-4 sieve grades. \$/acre based on \$275/ton for 2-4 sieve; \$120/ton for 5 sieve.

<sup>y</sup>2 sieve values calculated as 50% of the combined 1 + 2 sieve weights from grader.

<sup>x</sup>Total weight of harvested beans, including sieve sizes 1-5. Analysis of variance calculated using the harvest market \*, usually the harvest with the highest yield unless sieve size distribution or notes indicated the variety was overmature; LSD at 5% significance to compare values marked \* was 1.0 T/A for trial 2 and 1.6 T/A for trial 4.

Table 6. Performance of small sieve green bean varieties, Corvallis, 1995.

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre <sup>x</sup>
			2 <sup>z</sup>	3	4	5	2	3	4	5	Total <sup>y</sup>	
1 April 26	5446	85	15	71	4	0	0.71	3.44	0.22	0.00	5.40	1057
		86	12	69	6	0	0.71	3.95	0.36	0.00	5.66	1215
		87	11	69	9	1	0.67	4.42	0.58	0.04	6.38	1377
		88	7	70	14	1	0.47	4.46	0.91	0.07	6.42	1420
		89	6	69	19	1	0.36	4.42	1.23	0.04	6.74	1460
	Minuette	86	22	52	4	0	0.52	1.23	0.11	0.00	6.65	452
		88	11	64	14	0	0.40	2.32	0.51	0.00	6.70	781
		89	8	63	19	1	0.31	2.28	0.69	0.04	3.95	798
		92	3	45	40	8	0.16	2.32	2.07	0.44	5.47	1148
2 May 16	5446	66	18	51	13	1	0.85	2.46	0.65	0.04	5.00	965
		68	6	38	38	12	0.38	2.54	2.54	0.80	7.10	1406
		70	4	31	41	20	0.27	2.36	3.08	1.52	7.83	1546
	5600	69	24	52	0	0	1.30	2.86	0.00	0.00	5.73	1009
		71	24	52	0	0	1.54	3.37	0.04	0.00	6.78	1197
		72	14	60	11	1	0.92	3.84	0.72	0.04	6.89	1333
	5603	67	32	37	0	0	1.41	1.67	0.00	0.00	4.64	746
		69	25	50	0	0	1.25	2.54	0.00	0.00	4.86	917
		71	15	69	1	0	0.87	3.92	0.04	0.00	5.94	1167
	5613	67	36	28	0	0	1.52	1.20	0.00	0.00	4.53	658
		69	23	55	0	0	1.18	2.86	0.00	0.00	5.69	978
		71	17	67	0	0	1.07	4.28	0.00	0.00	6.71	1294
	Minuette	69	6	71	16	1	0.33	3.77	0.83	0.04	5.51	1197
		71	5	65	24	1	0.34	4.57	1.70	0.07	7.32	1609
3 May 30	5446	59	24	49	2	0	1.45	2.90	0.11	0.00	6.16	1079
		62	7	51	9	0	0.65	4.89	0.83	0.00	7.32	1544
		64	4	59	32	1	0.29	4.50	2.46	0.11	7.83	1766
	Minuette	62	25	50	0	0	1.16	2.36	0.00	0.00	4.89	851
		64	7	71	14	1	0.45	4.39	0.87	0.04	6.49	1386
		66	3	44	47	3	0.24	3.26	3.52	0.22	7.83	1721

**Table 6. Performance of small sieve green bean varieties, Corvallis, 1995 (cont.).**

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre <sup>x</sup>
			2 <sup>z</sup>	3	4	5	2	3	4	5	Total <sup>y</sup>	
4 June 22	5446	57	14	64	8	0	0.76	3.52	0.44	0.00	5.80	1140
		60	7	58	26	2	0.45	3.73	1.67	0.14	6.82	1432
		62	6	54	31	3	0.36	3.55	2.03	0.22	7.94	1462
	5600	62	26	46	1	0	1.38	2.39	0.07	0.00	5.58	930
		64	27	46	1	0	1.61	2.76	0.07	0.00	6.42	1075
		67	13	66	8	0	0.96	5.00	0.62	0.00	7.98	1592
	5603	60	26	47	2	0	1.12	2.03	0.07	0.00	4.60	781
		62	18	62	1	0	0.92	3.08	0.07	0.00	5.29	987
		64	14	70	3	0	0.89	4.60	0.22	0.00	7.00	1382
	5613	62	25	50	1	0	1.21	2.46	0.04	0.00	5.18	899
		64	16	64	3	0	1.05	4.10	0.22	0.00	6.74	1298
		67	7	76	10	0	0.58	6.60	0.87	0.00	9.17	1947
	Minuette	60	22	51	6	0	0.94	2.25	0.25	0.00	4.64	833
		62	15	63	7	0	0.78	3.26	0.36	0.00	5.51	1066
		64	8	73	11	0	0.51	4.46	0.65	0.00	6.42	1360

<sup>z</sup>2 sieve values calculated as 50% of the combined 1 + 2 sieve weights from grader.

<sup>y</sup>Total weight of harvested beans, including sieve sizes 1-5.

<sup>x</sup>\$/acre based on \$242/ton for 2-4 sieve; \$108/ton for 5 sieve.

**Table 7. Statistical comparison of yields and dollar return of small sieve green bean lines, Corvallis, 1995.<sup>2</sup>**

	Variety	Trial 1	Trial 2	Trial 3	Trial 4	AV
T/A	5446	6.3	5.8	7.4	6.2	6.5
	Minuette	4.8	6.9	7.4	5.9	6.2
	LSD @ 5%	2.1 (NS)	1.2 (NS)	NS	0.4 (NS)	NS
\$/A	5446	1743	1602	2046	1705	1774
	Minuette	1325	1893	2024	1623	1716
	LSD @ 5%	578 (NS)	341 (NS)	NS	114 (NS)	NS
T/A	5446		5.8		6.2	6.0
	Minuette		6.9		5.9	6.4
	5600		5.9		6.9	6.4
	5603		5.1		6.1	5.6
	5613		5.6		8.5	7.1
	LSD @ 5%		0.7		1.3	0.8
\$/A	5446		1602		1705	1654
	Minuette		1893		1623	1758
	5600		1610		1908	1759
	5603		1390		1674	1532
	5613		1549		2346	1947
	LSD @ 5%		195		351	218

<sup>2</sup>Based on one selected harvest for each variety in each trial, which was the last harvest (highest \$/A) unless sieve size distribution or notes indicated the variety was overmature.

Table 8. Yield of selected bean lines at 36- and 18-inch row spacing, June 30 planting, Corvallis, 1995.\*

Variety	Harvest 1						Harvest 2						Harvest 3						Av. T/A		AV Adj. T/A	
	% 1-4 Sieve		Tons/Acre		Adj. T/A		% 1-4 Sieve		Tons/Acre		Adj. T/A		% 1-4 Sieve		Tons/Acre		Adj. T/A		Av. T/A		AV Adj. T/A	
	36	18	36	18	36	18	36	18	36	18	36	18	36	18	36	18	36	18	36	18	36	18
91G	73	65	12.1	17.3	14.9	19.8	61	59	11.7	16.5	13.0	18.0	38	45	13.7	17.8	12.1	16.9	12.5	17.2	13.3	18.3
Oregon 54	41	50	14.4	16.7	13.1	16.7	—	39	—	16.8	—	15.0	—	—	—	—	—	—	—	—	—	—
5416	83	85	12.4	14.6	16.5	19.8	51	67	15.1	15.9	15.2	18.6	35	55	15.2	16.2	12.9	17.1	14.2	15.6	14.9	18.5
5520	58	63	13.1	15.0	14.1	17.0	55	52	11.1	14.3	11.6	14.6	35	33	15.1	15.0	12.8	12.5	13.1	14.8	12.9	14.7
5558	69	64	11.4	15.1	11.7	15.0	70	54	11.0	14.3	11.4	13.1	58	53	11.5	13.0	10.9	11.8	11.3	14.1	11.4	13.3
5563	53	69	11.3	14.7	10.3	15.2	59	56	10.0	13.7	9.5	12.7	55	58	10.4	12.8	9.6	12.1	10.6	13.7	9.8	13.3
5446	99	100	9.7	10.4	9.7	10.4	93	99	10.0	11.4	10.0	11.4	91	93	11.6	11.0	11.6	11.0	10.4	10.9	10.4	10.9
Minuette	99	100	7.8	9.1	7.8	9.1	99	99	8.6	9.4	8.6	9.4	90	97	10.6	11.7	10.6	11.7	9.0	10.1	9.0	10.1
LSD @ 5% <sup>y</sup>			1.8	1.8	2.0	2.0			2.2	2.2	2.3	2.3			3.0	3.0	2.8	2.8	2.0	2.0	2.0	2.0
Spacing means			11.5	14.1	12.3	15.4			11.1	13.6	11.3	14.0			12.6	13.9	11.5	13.3	11.6	13.8	11.7	14.1
LSD @ 5% <sup>z</sup>			0.6		0.7				0.8		0.9				1.1		1.1		0.7		0.8	

\*Means of 4 replications; 5 feet of row in each harvest. The 18" row plots consisted of three rows; only the center row was harvested. Adj. T/A = tons per acre adjusted to 50% 1-4 sieve for 91G, Oregon 54, 5416, and 5520; to 65% 1-4 sieve for 5558 and 5563; 5446 and Minuette were not adjusted. Oregon 54 was omitted from harvest average calculations, spacing means, and analysis of variance except for harvest 1.

<sup>y</sup>LSD values on this line apply to numbers within columns (comparing variety means) and between columns (comparing spacing within varieties).

<sup>z</sup>LSD values on this line for comparing spacing means.

**Table 9. Dollar return of selected bean lines grown at 36- and 18-inch row spacing, June 30 planting, 1995.<sup>2</sup>**

Variety	Harvest (days)	Total (2-6 sieve)		2-4 sieve		5-6 sieve	
		36	18	36	18	36	18
91G	62	1872	2839	1570	2228	301	611
	63	1897	2696	1439	1991	458	705
	65	1988	2600	1083	1605	904	994
	AV	1919	2712	1364	1942	555	770
Oregon 54	67	2131	2487	1263	1649	877	838
5416	63	2364	2823	2145	2588	219	235
	66	2372	2673	1601	2140	771	532
	68	2170	2618	1136	1851	1034	767
	AV	2301	2705	1627	2193	675	512
5520	62	2151	2553	1583	1974	568	579
	63	1776	2282	1263	1562	513	720
	66	2091	2083	1092	1026	998	1057
	AV	2006	2306	1313	1521	693	786
5558	67	1644	2532	1347	1991	297	540
	69	1936	2304	1592	1622	345	681
	70	1940	2090	1443	1456	497	634
	AV	1840	2309	1461	1690	380	619
5563	67	1747	2656	1211	2202	536	454
	69	1690	2189	1268	1570	423	619
	70	1718	2083	1237	1535	482	548
	AV	1719	2309	1238	1769	480	540
5446	59	1924	1921	1912	1921	12	0
	61	2012	2235	1961	2219	51	16
	63	2358	2235	2272	2149	86	86
	AV	2098	2131	2048	2097	50	34
Minuette	62	1547	1719	1540	1719	8	0
	63	1732	1762	1724	1754	8	8
	66	1382	2416	1316	2377	67	39
	AV	1554	1966	1526	1950	27	16

<sup>2</sup>Dollars/acre based on \$242/ton for sieves 2-4 and \$108/ton for sieves 5 and 6. Yield of 2-sieve pods was obtained by taking one-half of the combined graded 1-2 sieve pods.



**Table 10. Summary of average yields of selected OSU lines, 1991-1995.<sup>z</sup>**

Line	AV Adj. T/A						AV \$/A					
	1991	1992	1993	1994	1995	Overall AV <sup>y</sup>	1991	1992	1993	1994	1995	Overall AV <sup>y</sup>
91G	8.0	8.8	7.7	10.6	9.5	8.9	1511	1376	1390	1555	1473	1461
Oregon 54	9.0	9.3	8.1	10.6	10.0	9.4	1720	1531	1460	1648	1608	1593
5416	9.1	9.2	8.4	11.0	9.9	9.5	1735	1560	1550	1674	1601	1624
5520	7.4 <sup>x</sup>	8.5		8.6	9.6		1375 <sup>x</sup>	1154		1715	1478	
5558		9.1 <sup>x</sup>	7.6	8.4	7.9			1390 <sup>x</sup>	1322	1406	1379	
5446							1469 <sup>x</sup>	1505	1173	1385	1355	1377

<sup>z</sup>All averages are estimates because of non-uniform number of trials and maturities included; most are averages of 4-7 trials.

<sup>y</sup>Averages from 27 trials were used to calculate the overall averages for 91G, Oregon 54, and 5416; for 5446, averages from 25 trials were used.

<sup>x</sup>Average of two trials only.

Table 11. Fusarium root rot infection, Corvallis, 1995.

Line	Score <sup>z</sup>		
	Rep 1	Rep 2	Avg.
91G <sup>y</sup>	3.5	3.5	3.5
Oregon 54	3.5	3	3.25
5416	2	3	2.5
5446	3	3.5	3.25
5520	2	2	2.0
5558	3.5	3	3.25
5563	3	3	3.0
5566	3	3	3.0
5568	2.5	3.5	3.0
5575	3	2.5	2.75
5600	2	4	3.0
5603	3	3.5	3.25
5604	3	2.5	2.75
5613	2.5	3.5	3.0
5630	1.5	2.5	2.0
5635	2.5	3	2.75
5651	2	3	2.5
B7471-5-3B	2	2.5	2.25
B7126-33-1-2	1.5	3	2.25
B7126-33-2-1	2	3	2.5
B7126-54-2-1	3	2.5	2.75
B7237-13	1.5	3	2.25
B7239-5-1	4	1.5	2.75
B7239-11-1	3	3	3.0
B7239-11-2	4	3.5	3.75
B7240-2	2.5	2	2.25

**Table 11. Fusarium root rot infection, Corvallis, 1995 (cont.).**

Line	Score <sup>z</sup>		
	Rep 1	Rep 2	Avg.
DM6NY1	2	2.5	2.25
DM4NY6	1	2	1.5
DM3NY1	0.5	0.5	0.5
Maxima	1.5	1.5	1.5
HMX 2974	1.5	2.5	2.0
Matador	2	2.5	2.25
Banquet	3	3	3.0
Minuette	3	3.5	3.25
Wis 46 RR	1	0.5	0.75
Wis 83 RR	1	1.5	1.25
RR4270	1	1.5	1.25
RR6950 <sup>y</sup>	0.75	0.75	0.75

<sup>z</sup>Scores: 1-5 scale, 1 = no or very slight surface infection, 5 = roots mostly dead, plants severely stunted.

<sup>y</sup>Each value is an average of 2 plots.

Table 12. White mold infection, Corvallis, 1995.<sup>2</sup>

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
*91G	7	6	6	6	6.25
*Oregon 54	8	8	8	8	8.0
5403	7	5	8	7	6.75
*5416	6	7	8	7	7.0
5421	7	8	8	7	7.5
5426	5	6	7	6	6.0
5445	7	8	8	8	7.75
*5446	6	10	7	8	7.75
5453	7	8	7	6	7.0
5513	5	5	5	5	5.0
*5520	7	6	5	6	6.0
5556	6	7	6	6	6.25
*5558	8	8	7	7	7.5
*5563	8	8	6	7	7.25
*5566	9	7	7	6	7.25
*5568	8	8	5	6	6.75
5573	5	7	7	7	6.5
*5575	6	7	5	7	6.25
5582	5	7	6	5	5.75
5590	4	5	6	5	5.0
5592	5	3	5	4	4.25
5597	6	4	7	4	5.25
*5600	5	6	6	6	5.75
5602	6	5	6	6	5.75
*5603	8	7	6	6	6.75
5604	7	6	5	8	6.5
5607	7	7	7	7	7.0
5609	6	7	8	7	7.0
5611	4	5	7	5	5.25
*5613	6	8	7	8	7.25
5615	6	4	6	5	5.25
5616	6	5	7	5	5.75
5618	6	6	5	6	5.75
5620	7	7	5	6	6.25

Table 12. White mold infection, Corvallis, 1995 (cont.).<sup>2</sup>

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
5629	8	6	6	8	7.0
*5630	8	7	7	7	7.25
5632	6	5	6	6	5.75
5633	7	7	8	7	7.25
*5635	9	8	7	7	7.75
5640	6	7	7	7	6.75
5641	7	6	7	7	6.75
5643	5	7	6	6	6.0
5644	5	6	6	6	5.75
5647	7	6	5	6	6.0
*5651	9	8	8	8	8.25
5656	4	5	5	6	5.0
5659	5	5	6	6	5.5
5664	6	5	6	6	5.75
5665	4	5	4	5	4.5
5669	7	7	7	8	7.75
5671	5	6	6	6	5.75
5673	6	7	7	7	6.75
5675	5	7	6	7	6.25
5679	6	8	5	7	6.5
5680	7	5	6	6	6.0
5681	6	5	7	7	6.25
5682	6	4	6	7	5.75
5692	8	7	8	7	7.5
5697	7	7	7	7	7.0
5699	7	5	6	4	5.25
5701	6	6	6	7	6.75
5702	5	6	6	5	5.5
5705	5	6	5	5	5.75
5706	6	7	7	6	6.5
B7471-5-3B	7	9	5	7	7.0
B7030-24	5	6	6	5	5.5
B7126-1-1-1	5	5	6	4	5.0
B7126-33-1-2	5	6	6	6	5.75

Table 12. White mold infection, Corvallis, 1995 (cont.).<sup>2</sup>

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
B7126-33-2-1	6	5	5	5	5.75
B7126-54-2-1	5	6	3	7	5.25
B7237-1-3	7	7	9	5	7.0
B7237-11-3	6	5	5	5	5.25
B7237-13	10	9	8	6	8.25
B7237-14-3	9	8	7	7	7.75
B7237-14-4	8	9	7	6	7.5
B7238-15	2	8	6	7	5.75
B7238-22	4	6	5	6	5.25
B7239-4	4	7	6	7	6.0
B7239-5-1	5	8	8	6	6.75
B7239-5-2	6	6	5	7	6.0
B7239-5-4	7	7	4	7	6.25
B7239-11-1	4	4	2	4	3.5
B7239-11-2	6	6	3	7	5.5
B7239-11-3	5	7	4	6	5.5
B7240-2	6	7	7	7	6.75
DM3NY1	8	7	7	6	7.0
DM4NY6	3	6	5	7	5.25
DM6NY1	4	6	7	6	5.75
169787	2	5	6	3	4.0
180753	4	5	6	6	5.25
204717	5	4	5	5	4.75
225846	5	2	2	4	3.25
226865	2	4	3	1	2.5
824775	4	4	4	2	3.5
MO 162	1	0.5	1	4	1.6
Black Valentine	8	9	7	7	7.75
3525	8	7	8	8	7.75
L192	3	3	2	2	2.5
Gabriella	9	6	6	6	6.75
Black Turtle	6	7	7	7	6.75
Aurora	6	6	8	7	6.75
Exrico	5	5	6	6	5.5

**Table 12. White mold infection, Corvallis, 1995 (cont.).<sup>z</sup>**

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
2235	7	7	7	5	6.5
Tendercrop	5	5	6	6	5.5
Easy Pick	8	7	8	7	7.5
Maxima	6	6	7	7	6.5
Minuette	6	7	6	5	6.0
Matador	4	6	4	6	5.0
HMX 2974	7	5	5	6	5.75
Banquet	5	6	6	5	5.5

<sup>z</sup>White mold scores: 1-10 scale, 1 = low incidence, sometimes slight symptoms, 10 = high incidence, usually severe symptoms.

\*Lines are advanced breeding lines which were included in the yield trials. Others are breeding lines being screened, or controls.

Table 13. White mold infection at 36" and 18" row spacing, Corvallis, 1995.<sup>z</sup>

Line	36" Reps						18" Reps					
	1	2	3	4	5	AV	1	2	3	4	5	AV
91G	3	4	7	4	5	4.6	8	10	6	5	8	7.4
Oregon 54	4	4	7	6	8	5.8	6	6	5	7	7	6.2
5416	2	2	4	4	4	3.2	3	10	10	6	8	7.4
5520	8	6	4	4	3	5.0	7	4	9	4	5	5.8
5558	1	5	3	4	3	3.2	2	2	5	3	4	3.2
5563	5	3	3	2	2	3.0	2	4	3	3	3	3.0
5446	6	5	4	4	5	4.8	2	5	4	4	8	4.6
Minuette	3	2	2	5	2	2.8	3	2	1	3	2	2.2
LSD @ 5% for varieties within spacing or for individual varieties between spacing	2.1						2.1					
Spacing means	4.1						5.0					
LSD @ 5% for spacing means <sup>y</sup>	0.7											

<sup>z</sup>White mold scores: 1-10 scale, 1 - low incidence, sometimes slight symptoms; 10 = high incidence, usually severe symptoms.

<sup>y</sup>The interaction variety x spacing ( $F$  2.6) was significant at the 5% but not at the 1% level.



FIGURE 1

# **STANDARD BEAN YIELD 1995** **MAY 16 & JUNE 22 SELECTED HARV.**

■ MAY 16      ▨ JUNE 22

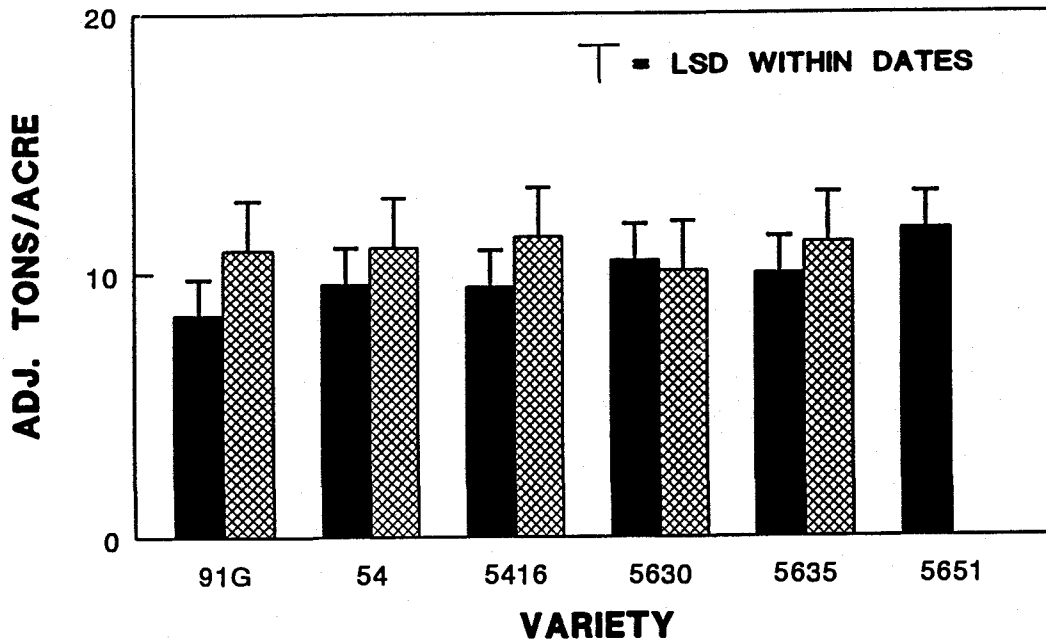


FIGURE 2

# **STANDARD BEAN \$/A 1995** **MAY 16 & JUNE 22 SELECTED HARV.**

■ MAY 16      ▨ JUNE 22

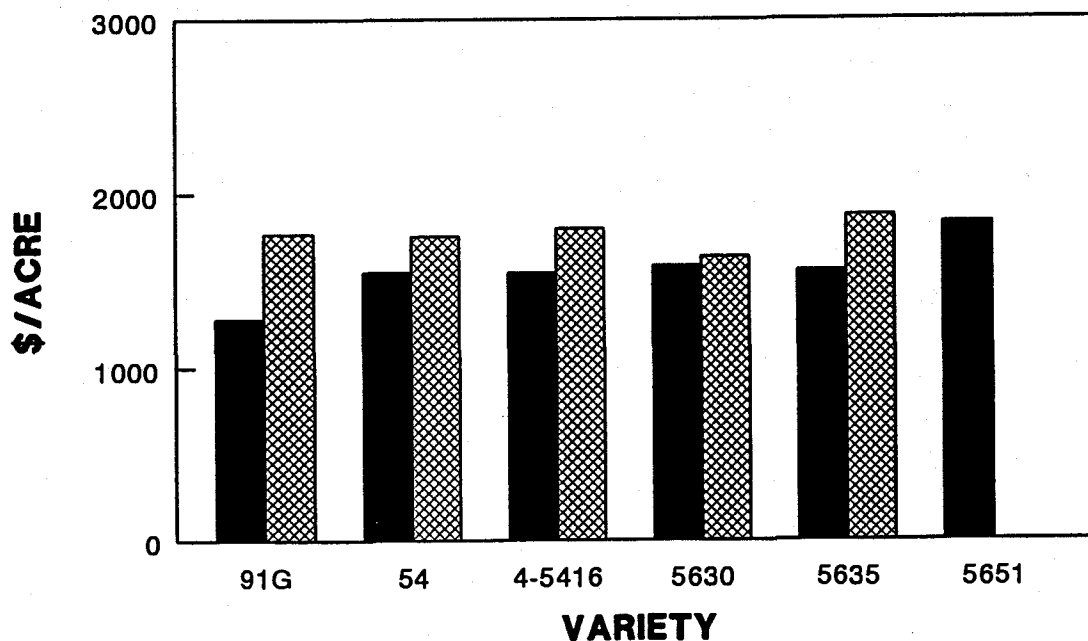


FIGURE 3

**OR 91G, OR 54, OSU 5416 \$/A 1995**  
**FIVE DATES SELECTED HARV.**

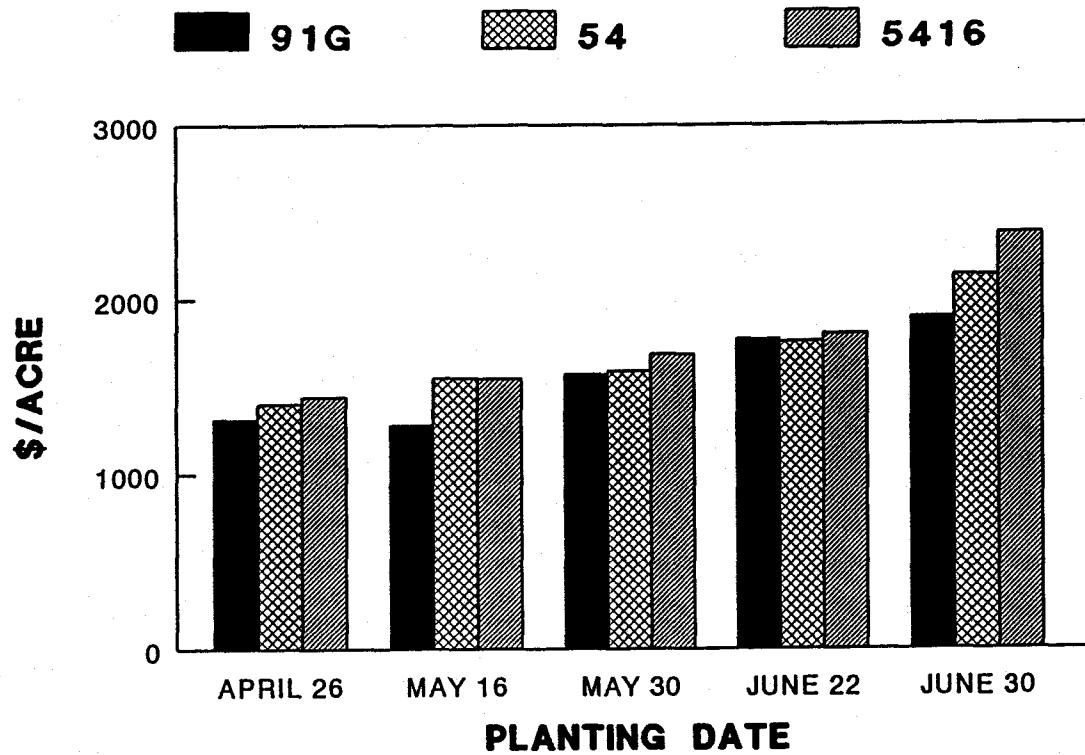


FIGURE 4

# **EASY PICK BEAN YIELD 1995** **MAY 16 & JUNE 22 SELECTED HARV.**

■ MAY 16      ▨ JUNE 22

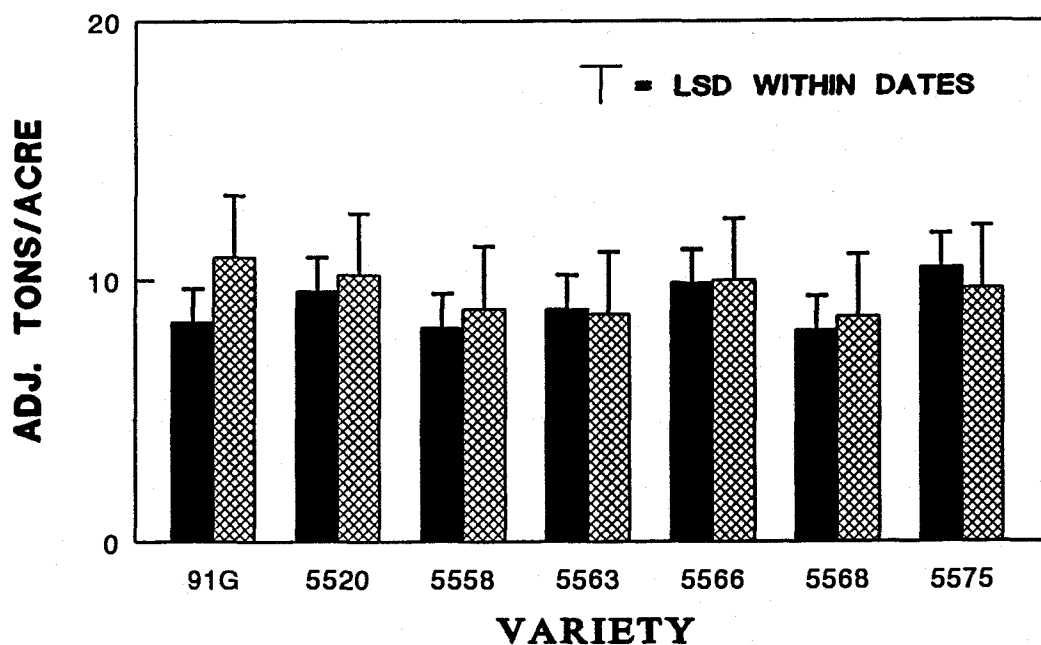


FIGURE 5

# **EASY PICK BEAN \$/A 1995** **MAY 16 \$ JUNE 22**

■ MAY 16      ▨ JUNE 22

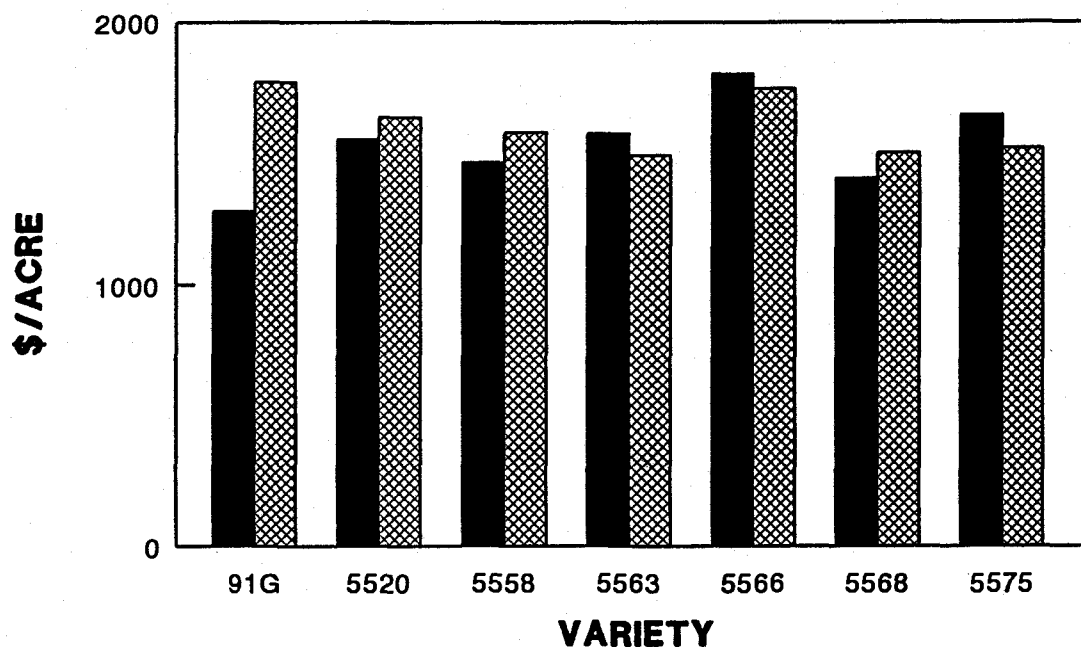


FIGURE 6

# **SMALL SIEVE BEAN \$/A 1995** **FIVE DATES, SELECTED HARVESTS**

■ 5446      ▨ MINUETTE

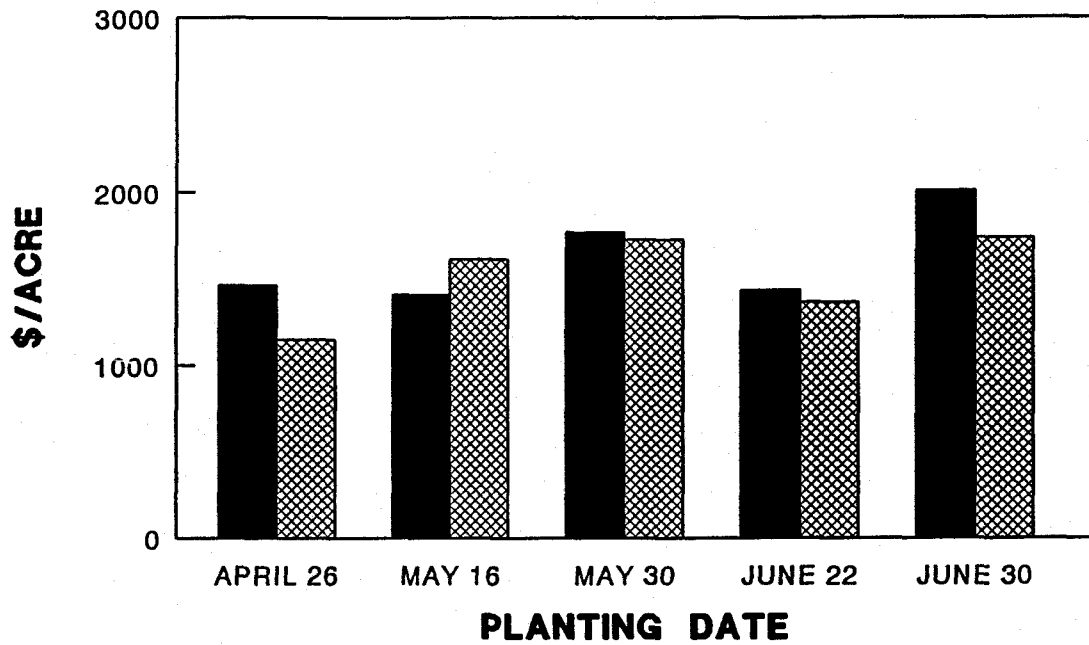


FIGURE 7

# **SMALL SIEVE BEAN \$/ACRE 1995** **MAY 16 & JUNE 22 SELECTED HARVESTS**

■ MAY 16      ▨ JUNE 22

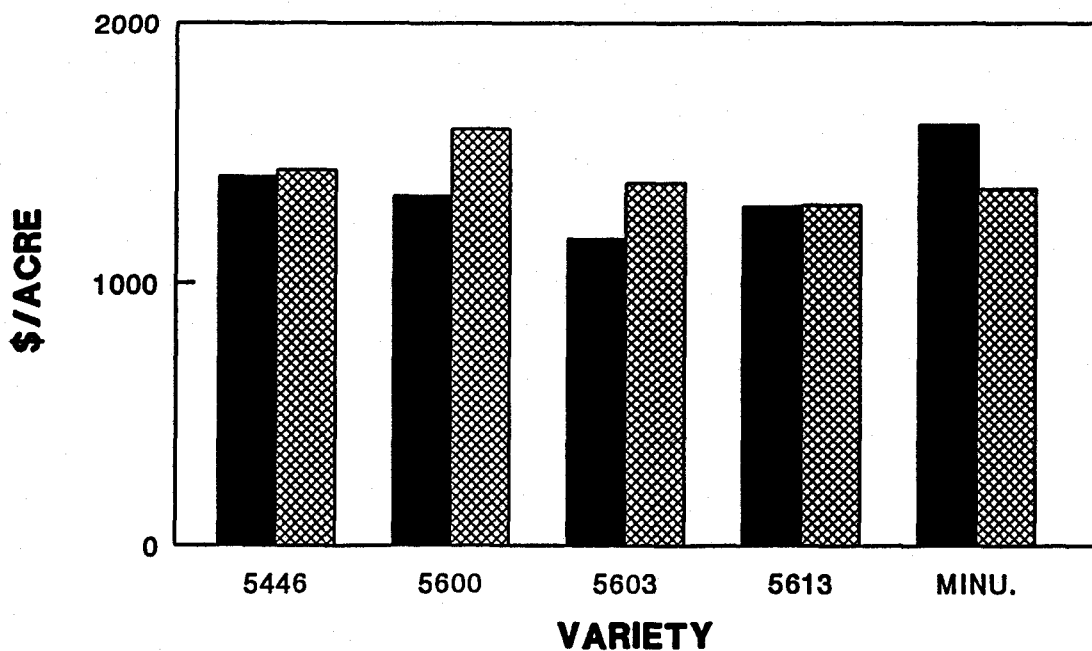


FIGURE 8

# **BEAN YIELD IN 36" & 18" ROWS** **JUNE 30 1995 AV. OF 3 HARVESTS**

**36 INCH**
 **18 INCH**

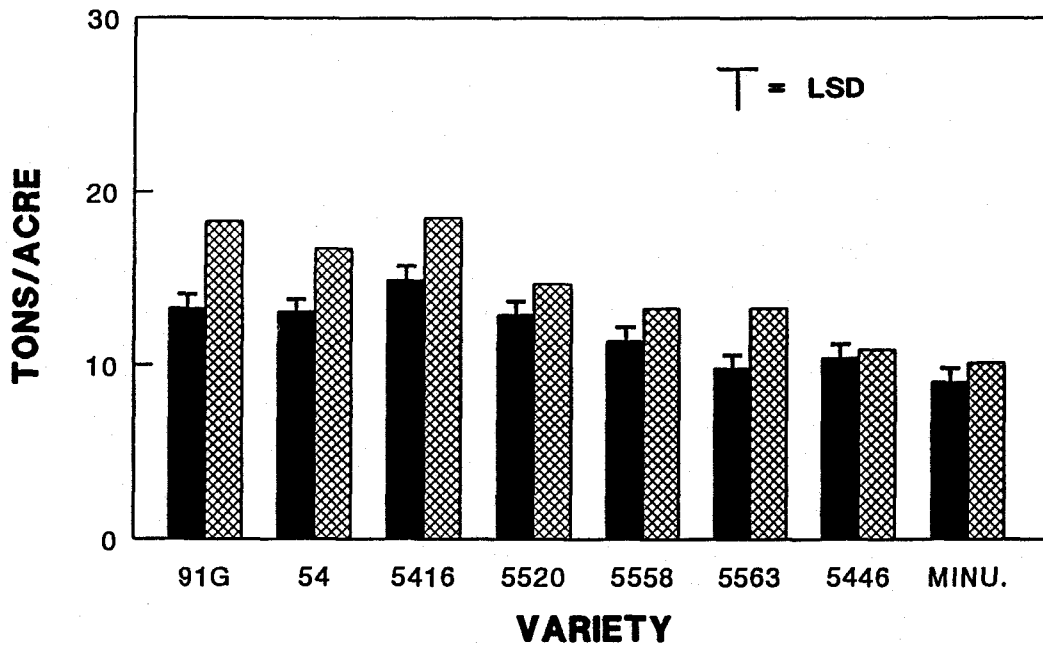


FIGURE 9

# **BEAN VALUE IN 36" & 18" ROWS** **JUNE 30 1995 AV. OF 3 HARVESTS**

**36 INCH**
 **18 INCH**

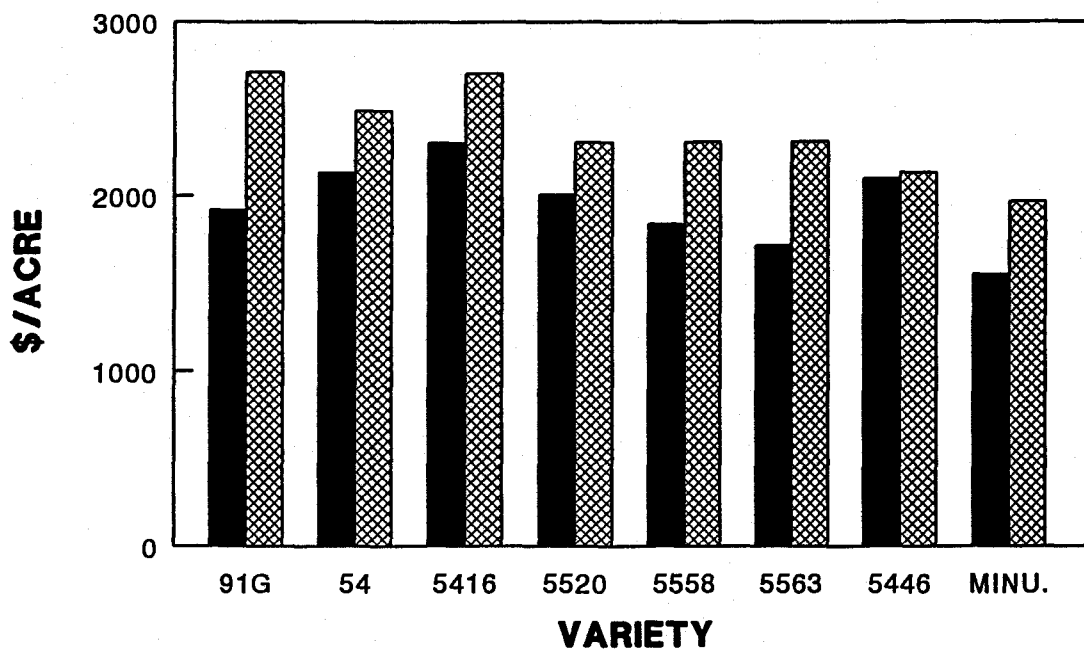
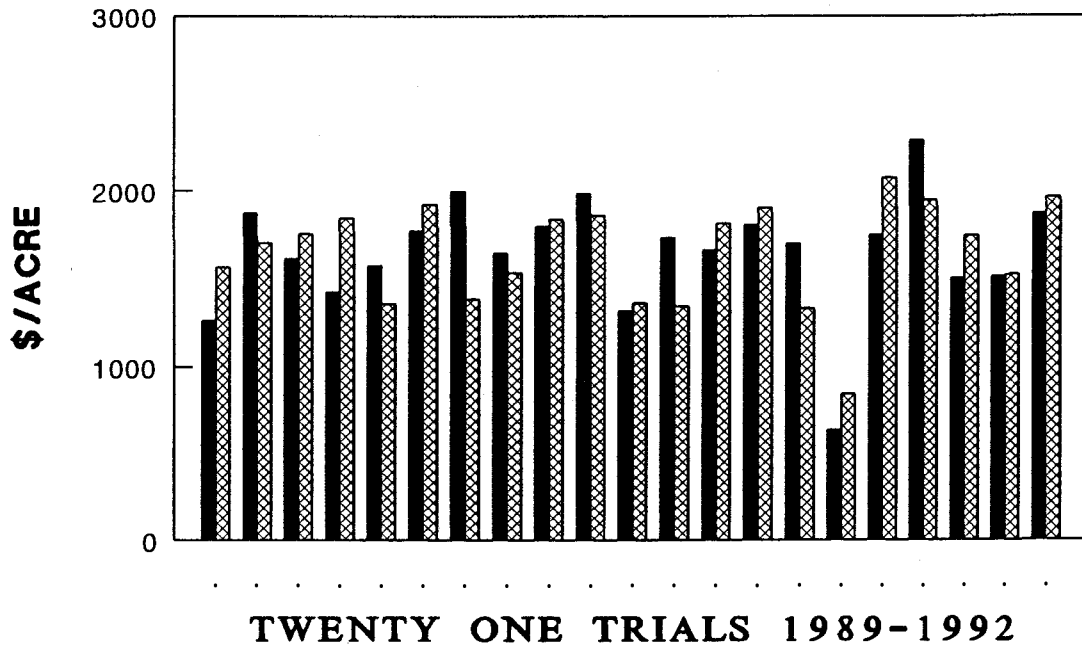


FIGURE 10

# **SUMMARY 5402 & 5416 \$/ACRE 1989-1992 SELECTED HARV.**

■ 5402      ▨ 5416



# **SUMMARY 5402 & 5416 \$/ACRE 1993-1995 SELECTED HARV.**

■ 5402      ▨ 5416

