

**Report to the Oregon Processed Vegetable Commission
1993-1994**

1. **Title:** Green Bean Breeding
2. **Project Leaders:** J. R. Baggett, Horticulture
Brian Yorgey, Food Science and Technology

Cooperator: D. Mok
3. **Project Status:** Terminating June 30, 1994
4. **Project Funding:** \$39,000 breeding
\$25,000 breeding supplementary technical support
\$13,847 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:**
 - A. Performance and quality of advanced breeding lines were tested in seven replicated yield trials, planted about every 10 days from May 11 to July 9. Trials 2, 4, 5, 6, and 7 included six OSU varieties and lines along with three commercial varieties of the small sieve or "baby bean" type for comparison with OSU baby bean line 5446. Trials 1 and 3 included five additional new OSU lines, two of which were omitted from harvest. Since several OSU lines were of the easy picking type, the variety Easy Pick was included in all of the seven trials, and Hypak, a commercial variety of non-Blue Lake type was included in trials 1 and 3. The plots were one or two rows 20' long, replicated four times. Five five-foot harvests were made from each plot, usually at two-day intervals. Trial 1, which was planted May 11 and subjected to a very serious standing water and compaction problem, was not harvested except for the baby beans. Samples were taken to Food Science and Technology for canning and freezing. Processed quality data will be presented in a supplemental report.

When the detailed data on yield of standard size beans (Tables 1 and 2) were used to calculate \$/acre (Table 3), it was not possible to make totally valid comparisons between variety means because they were not derived from a uniform number of harvests or uniform maturity at harvest. Using individual harvests, at specified % 1-4 sieve, it should be possible to compare lines reasonably well. A seasonal average for value/acre is shown in the following summary table.

Variety	Season Average \$/A Based on		
	Trial Averages*	Selected Harvest	Highest Harvest
Oregon 91G	1390	1440	1485
OSU 5402	1460	1541	1581
OSU 5416	1550	1604	1669
OSU 5421	1527	1524	1626
OSU 5558	1322	1391	1461

*Average of 1-3 harvests from six trials.

**The harvest closest to 50% 1-4 sieve, usually.

The above table shows that Oregon 54, OSU 5416, and OSU 5421 exceeded Oregon 91G in dollar value either way it is presented. Figure 2 compares 91G and Oregon 54 in \$ value. Oregon 54 was exceeded by OSU 5416 and OSU 5421 in season trial average and average of highest harvests, but not for selected harvests. These results are similar to those obtained in 1992. However, a summary of yields of these lines for 1989 through 1993 (Table 9) does not suggest that OSU 5416 and OSU 5421 have the potential to yield more T/A or \$/A than Oregon 54. While the five-year average of OSU 5421 does exceed that of Oregon 54, the difference is probably not great enough to justify increasing more seed of OSU 5421. This will be considered, however. Note that OSU 5416 and OSU 5421 have higher white mold and root rot severity scores than OSU 5402.

A comparison of the 1993 performance of Oregon 91G and Oregon 54 in commercial plantings is shown in Table 10 and Figures 3 and 4.

Because standard size lines were not harvested in trial 1, only one trial was available to evaluate several of the new lines. Easy picking line OSU 5558 was harvested in six trials and was close to Oregon 91G in yield. Easy picking line OSU 5520 was about equal to Oregon 91G in its only trial, trial 3. The third easy picking line, OSU 5563, did not produce as much as Oregon 91G. These three lines are being continued for the present.

Yields and dollar value of small sieve varieties are compared in Table 4. OSU 5446 compared well with the three commercial varieties. Dollar values based on \$300/ton for 2-4 sieve are summarized in the table below.

Variety	Season Average \$/A Based on	
	Highest \$ Value ²	Highest T/A 3 Sieve
5446	1545	1416
Minuette	1353	1307
Rogers 324	1306	1306
76-110	1247	1210

²Average of the highest \$ value of the 3-5 harvests in each of seven trials.

The season average for OSU 5446 is distinctly higher than the other three varieties in either comparison used. In Table 8 and Figure 1, the dollar returns/acre of OSU 5446 and Oregon 91G are compared using the same value of \$275 for 2-4 sieve pods and \$127 for 5 and 6 sieve pods. Returns for OSU 5446 are comparable to Oregon 91G in this case also, although selection of a comparable harvest for comparison is arbitrary.

Table 7 and Figures 5 and 6 show that Oregon 91G, OSU 5446, and 76-110 all yielded significantly higher in 18" rows than in 36" rows. Although, statistically, the interaction between varieties and spacings was not significant, the proportional increase of 18" rows over 36" rows was slightly greater in OSU 5446 (1.66) than for 91G (1.44) and 76-110 (1.40). Figures 7 and 8 show that yields of 3 and 4 sieve pods, and especially yields of 3 sieve pods alone, are considerably higher with 5446 and 76-110. The total yield of 91G (Figure 9) was distinctly higher than that of 5446 and 76-110.

- B. Tables 5 and 6 show root rot and white mold scores for the lines included in our yield trials. Root rot infection was unusually severe and affected the yields in trial 3, which was planted in the root rot area (Tables 1 and 4). Some early varieties were badly damaged, i.e. Hypak and Minuette. Note root rot scores for these varieties (5.0 and 4.3). Although Oregon 91G also was rated 4.3 for root rot, the effect on yield was not so great. As usual, Oregon 91G received lower white mold and higher root rot scores than Oregon 54. A related line, OSU 5418, had the highest infection score for white mold.

Of the small beans, OSU 5446 received the maximum score for root rot infection, 5.0, which was higher than that received by Rogers 324, Minuette, and 76-110. However, OSU 5446 still outyielded these other varieties in the root rot trial (trial 3, Table 4). In the white mold area, 76-110 and Rogers 324 had less infection than

OSU 5446 (which was the same as 91G), but Minnette was higher in white mold infection.

- C. New materials being evaluated and brought through generations in 1993 included a diverse population of standard size lines, small sieve lines, and lines which might be intermediate. Although small sieve (baby beans) are not considered feasible alternatives by most Oregon processors, high yielding lines of small or intermediate pod size might be practical in the future.

7. Summary:

In replicated trials, as in 1992 trials, Oregon 54, OSU 5416, and OSU 5421 produced higher \$/acre values than Oregon 91G. Small sieve line OSU 5446 compared well in \$/acre with Rogers 324, 76-110, and Minnette. OSU 5446 returns/acre compared well with returns from Oregon 91G when the same price/ton was used. Breeding of normal size, small sieve, and intermediate types of Blue Lake bush beans continued.

8. Signatures:

Redacted for Privacy

Project Leader:

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Table 1. Green bean yields, June 10 planting (root rot area), Corvallis, 1993.^z

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	63	83	3.2	4.2	64	70	2.5	3.0	67	56	4.1	4.4*	3.9
5402	150	63	93	3.5	5.0	64	89	4.1	5.7	67	72	4.9	6.0*	5.6
5416	150	64	96	3.6	5.3	67	79	4.5	5.9*					5.6
5418	150	64	97	4.2	6.1	67	92	5.3	7.5*					6.8
5421	150	64	87	4.2	5.8	67	74	5.2	6.5*					6.2
5520	150	63	88	2.6	3.6	64	80	3.4	4.4	67	56	4.1	4.3*	4.1
5558	150	64	100	2.2	3.3	67	93	2.8	3.9*					3.6
5563	150	64	97	2.0	2.9	67	95	2.9	4.2*					3.6
Hypak	142	63	94	1.0	1.4	64	90	1.8	2.6	67	81	2.2	2.9*	2.3
EZ Pick ^y	149	67	97	2.4	3.5	69	98	2.7	4.0					3.8

^zMean of 6 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. Analysis of variance calculated using the harvest closest to 50% 1-4 sieve for each line marked with *. LSD for comparing * means was 0.9 T/A at 5% significance. Very low yields of some varieties were due to severe root rot susceptibility.

^yEZ Pick was not included in analysis of variance because only 4 replications were harvested.

Table 2. Yields of selected OSU bean lines on five planting dates, Corvallis, 1993.*

Line	Av. Stand	Harvest 1				Harvest 2				Harvest 3				Harvest 4				Av. Adj. T/A	LSD ^y T/A	LSD ^y 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	Days	% 1-4	T/A	Adj. T/A			
May 20 Planting																				
91G	150	67	83	6.9	9.2	69*	58	7.7	8.3	71	44	8.7	8.1					8.5	1.2	NS
5402	150	69	87	6.6	9.0	70	78	7.0	8.9	72	67	7.2	8.4	74*	53	8.4	8.7	8.8		
5416	150	69	86	7.2	9.8	70	74	7.9	9.8	72*	63	7.1	8.0					9.2		
5421	150	69	79	8.1	10.4	70	64	8.6	9.8	72*	55	7.9	8.3					9.5		
5558	150	70	97	6.7	9.9	72	92	6.3	9.0	74	83	7.4	9.9	76*	74	6.6	8.2	9.3		
EZ Pick	148	70	95	5.0	7.2	72	96	5.4	7.9	74	88	6.8	9.4	76*	82	6.5	8.6	8.3		
June 17 Planting																				
91G	150	63	79	6.5	8.3	68	46*	9.4	9.0	70	45	9.1	8.6					8.6	2.0	NS
5402	150	62	91	6.2	8.7	64	84	6.3	8.4	67	60	8.6	9.4	69*	54	9.2	9.5	9.0		
5416	150	62	82	5.3	7.0	64	77	6.6	8.3	67	59	9.0	9.8	69*	53	9.3	9.6	8.7		
5421	150	62	74	6.6	8.2	64	66	7.3	8.5	67*	46	9.0	8.6					8.4		
5558	150	64	89	5.0	7.0	67	90	6.7	9.3	69*	83	7.0	9.3					8.5		
EZ Pick	150	64	96	4.6	6.7	67	95	5.6	8.1	68	93	5.8	8.5	69*	90	6.9	9.7	8.3		
June 24 Planting																				
91G	150	61	66	8.0	9.3	62	60	8.4	9.2	64*	49	8.4	8.3	65	29	9.1	7.2	8.5	NS	NS
5402	150	60	88	6.4	8.8	62	79	7.1	9.1	64*	63	7.6	8.6	67	26	10.2	7.8	8.6		
5416	149	60	91	6.6	9.3	62	84	7.5	10.1	64*	69	7.7	9.2	67	35	10.3	8.8	9.4		
5421	150	60	85	6.9	9.2	62	74	8.0	9.9	64*	55	8.4	8.7	65	26	11.2	8.5	9.1		
5558	149	62	97	5.4	8.0	64	95	6.0	8.7	67*	57	7.6	8.1	69	36	8.1	7.0	8.0		
EZ Pick	147	62	100	5.2	7.8	64	100	5.9	8.9	67	63	7.8	8.8	69*	46	8.0	7.7	8.3		

Table 2. Yields of selected OSU bean lines on five planting dates, Corvallis, 1993 (cont).²

Line	Av. Stand	Harvest 1			Harvest 2			Harvest 3			Harvest 4			Av. Adj. T/A	LSD ³ T/A	LSD ³ 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				Days	% 1-4	T/A	Adj. T/A
July 1 Planting	91G	150	62	70	6.3	7.6	64*	49	7.0	6.9	67	21	9.8	9.7				8.1	NS	NS
	5402	149	64*	68	6.7	7.9	67	29	9.5	7.5								7.7		
	5416	150	64*	73	8.0	9.8	67	29	9.7	7.6								8.7		
	5421	149	64*	66	8.0	9.3	67	30	9.8	7.8								8.6		
	5558	149	64	98	6.5	9.5	67*	55	7.8	8.2	69	32	9.1	7.4				8.4		
	EZ Pick	149	64	100	5.6	8.4	67	72	7.8	9.6	69*	52	7.9	8.1				8.7		
July 9 Planting	91G	150	61	85	6.2	8.4	63	76	7.0	8.8	66*	40	9.3	8.4				8.5	0.9	0.9
	5402	150	63	95	6.3	9.2	66	65	8.0	9.2	68*	46	8.8	8.5				9.0		
	5416	150	63	92	6.4	9.1	66	70	8.8	10.6	68*	44	7.8	7.4				9.0		
	5421	150	63	78	7.6	9.7	66*	51	9.2	9.3	68	39	9.3	8.3				9.1		
	5558	150	63	92	5.5	7.8	66	71	7.4	7.4	68*	52	7.4	7.5				7.6		
	EZ Pick	150	63	98	5.1	7.6	66	73	7.3	9.0	68*	49	7.9	7.9				8.2		

²Means 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.

³Analysis of variance calculated using the harvest marked *; LSD was calculated at 0.05 significance to compare values marked *.

Table 3. Dollar return/acre for standard OSU lines, six trials, 1993.^z

Trial	Variety	Harvest 1			Harvest 2			Harvest 3			Avg. \$/A ^y	Selected \$/A ^x
		Days	%	\$	Days	%	\$	Days	%	\$		
2 May 20	91G	67	83	1488	69	58	1477	71	44	1419	1462	1477
	5402	70	78	1410	72	67	1457	74	53	1585	1473	1585
	5416	69	86	1550	70	74	1659	72	63	1355	1522	1355
	5421	69	79	1693	70	64	1575	72	55	1439	1569	1439
	5558	72	92	1520	74	83	1712	76	74	1490	1566	1490
	EZ Pick	72	96	1259	74	88	1587	76	82	1538	1378	1538
3 June 10	91G	63	83	959	64	70	987	67	56	1145	1030	1145
	5402	63	93	1093	64	89	1374	67	72	1530	1332	1530
	5416	64	96	1199	67	79	1516				1357	1516
	5418	64	97	1319	67	92	1733				1526	1733
	5421	64	87	1318	67	74	1620				1469	1620
	5520	63	88	788	64	80	1037	67	56	1130	985	1130
	5558	64	100	618	67	93	919				769	919
	5563	64	97	577	67	95	965				771	965
	Hypak	63	94	373	64	90	581	67	81	687	547	687
4 June 17	91G	63	79	1357	68	46	1699	70	45	1640	1565	1699
	5402	64	84	1395	67	60	1696	69	54	1713	1504	1713
	5416	64	77	1426	67	59	1768	69	53	1771	1528	1771
	5421	62	79	1407	64	66	1656	67	46	1641	1568	1641
	5558	64	89	1031	67	90	1458	69	83	1593	1361	1593
	EZ Pick	67	95	747	68	93	1322	69	90	1538	1156	1538
5 June 24	91G	61	66	1653	62	60	1572	64	49	1463	1522	1463
	5402	62	79	1535	64	63	1512	67	26	1569	1496	1512
	5416	62	84	1647	64	69	1567	67	35	1707	1596	1567
	5421	62	74	1585	64	55	1548	65	26	1623	1542	1548
	5558	64	95	1422	67	57	1462	69	36	1329	1364	1462
	EZ Pick	64	100	1385	67	63	1575	69	46	1756	1463	1756
6 July 1	91G	62	70	1272	64	49	1250	67	21	1319	1281	1250
	5402	64	68	1380	67	29	1459				1419	1380
	5416	64	73	1742	67	29	1502				1622	1742
	5421	64	66	1543	67	30	1447				1495	1543
	5558	64	98	1504	67	55	1496	69	32	1454	1484	1496
	EZ Pick	64	100	1112	67	72	1638	69	52	1526	1425	1526
7 July 9	91G	61	76	1503	63	80	1447	66	40	1604	1480	1604
	5402	63	95	1462	66	65	1627	68	46	1524	1538	1524
	5416	63	92	1495	66	70	1857	68	44	1672	1675	1672
	5421	63	78	1588	66	51	1618	68	39	1352	1519	1352
	5558	63	92	1247	66	71	1578	68	52	1341	1389	1341
	EZ Pick	63	73	1535	66	73	1511	68	49	1315	1376	1315

^zBased on a value of \$275 for 3 and 4 sieve pods; \$127 for 5 and 6 sieve pods. 1 and 2 sieve pods excluded.

^yAverage \$/acre is a rough estimate because of non-uniform number of trials and maturities included.

^xSelected best values for comparison. Usually the same value used for analysis of variance in Tables 1 and 2.

Table 4. Performance of small sieve green bean varieties, Corvallis, 1993.

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre ^x
			2 ^z	3	4	5	2	3	4	5	Total ^y	
1 May 11	5446	68	16	55	12	0	0.60	2.03	0.44	0.00	3.7	842
		71	14	52	18	2	0.69	2.54	0.87	0.07	4.9	1135
		73	7	39	38	10	0.45	2.61	2.54	0.65	6.7	1618
	Minuette	68	28	41	2	0	0.89	1.27	0.73	0.00	3.1	613
		71	16	66	3	0	0.69	2.90	0.14	0.00	4.4	1027
		73	7	68	16	1	0.47	4.39	1.05	0.04	6.4	1629
	Rogers 324	68	28	44	0	0	1.05	1.67	0.00	0.00	3.8	748
		71	20	60	2	0	0.98	2.94	0.07	0.00	4.9	1097
		73	11	73	4	1	0.69	4.39	0.22	0.04	6.0	1460
	76-110	68	27	46	0	0	0.98	1.67	0.00	0.00	3.6	728
		71	14	68	3	0	0.65	3.15	0.14	0.00	4.6	1087
		73	10	68	10	1	0.56	3.77	0.58	0.04	5.5	1355
2 May 20	5446	63	34	29	3	0	1.32	1.10	0.11	0.00	3.9	703
		65	26	43	6	0	1.20	1.99	0.29	0.00	4.7	957
		67	14	53	18	1	0.78	2.83	0.94	0.04	5.4	1255
		68	12	52	22	1	0.76	3.50	1.34	0.07	6.1	1454
		69	8	49	32	3	0.49	3.15	2.03	0.22	6.4	1586
	Minuette	65	35	29	0	0	1.02	0.83	0.00	0.00	2.9	508
		67	24	50	2	0	0.87	1.85	0.07	0.00	3.7	768
		69	12	69	6	0	0.65	3.62	0.29	0.00	5.2	1256
	Rogers 324	65	30	41	0	0	0.21	1.67	0.00	0.00	4.1	793
		67	22	54	1	0	0.12	2.76	0.04	0.04	5.1	1081
		69	17	64	2	0	0.02	3.77	0.11	0.00	5.9	1346
	76-110	65	22	55	1	0	0.92	2.32	0.04	0.00	4.2	902
67		14	65	7	0	0.72	3.33	0.36	0.00	5.1	1216	
69		10	63	17	0	0.60	3.73	0.98	0.00	5.9	1460	
3 June 10	5446	61	22	44	9	3	0.56	1.09	0.22	0.07	1.7	522
		63	17	44	16	5	0.60	1.56	0.58	0.18	2.3	774
		64	12	37	13	4	0.62	1.99	0.69	0.22	3.6	933
	Minuette	63	39	22	0	0	0.38	0.22	0.00	0.00	0.7	164
		64	30	40	0	0	0.42	0.54	0.00	0.00	0.9	264
		67	12	68	7	0	0.33	1.81	0.18	0.00	1.8	638
	Rogers 324	61	42	16	0	0	1.02	0.40	0.00	0.00	1.6	389
		63	34	32	0	0	1.21	1.16	0.00	0.00	2.4	653
		64	26	47	0	0	1.12	1.99	0.00	0.00	2.8	857
	76-110	64	37	26	0	0	0.98	0.69	0.00	0.00	1.8	459
		67	26	48	0	0	0.82	1.49	0.00	0.00	2.1	633

Table 4. Performance of small sieve green bean varieties, Corvallis, 1993 (cont.).

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre ^x	
			2 ^z	3	4	5	2	3	4	5	Total ^y		
4 June 17	5446	60	10	63	16	1	0.51	3.23	0.83	0.04	5.1	1260	
		62	4	56	32	4	0.20	2.79	1.60	0.18	5.0	1283	
		64	4	45	40	8	0.20	2.54	2.25	0.47	5.7	1427	
	Minuette	62	32	36	0	0	0.85	0.98	0.00	0.00	2.7	503	
		64	13	70	3	0	0.60	3.19	0.14	0.00	4.5	1082	
		67	3	82	11	1	0.16	3.92	0.51	0.04	4.8	1265	
		69	2	70	24	2	0.14	4.06	1.38	0.11	5.8	1548	
	Rogers 324	61	27	46	1	0	1.02	1.74	0.04	0.00	3.8	768	
		64	21	57	1	0	1.12	3.01	0.04	0.00	5.3	1146	
		67	16	66	2	1	1.00	4.06	0.11	0.04	6.2	1425	
	76-110	62	24	51	1	0	0.85	1.78	0.04	0.00	3.5	733	
		64	15	67	4	0	0.60	2.68	0.14	0.00	4.0	942	
		67	5	67	23	1	0.25	3.66	1.23	0.04	5.4	1420	
	5 June 24	5446	57	20	50	9	0	0.92	2.28	0.40	0.00	4.5	992
			60	9	60	21	1	0.49	3.37	1.20	0.07	5.6	1399
62			6	40	43	5	0.36	2.46	2.61	0.29	6.1	1530	
64			2	29	48	18	0.14	2.14	3.55	1.30	7.4	1762	
Minuette		60	18	62	2	0	0.69	2.39	0.07	0.00	3.8	867	
		62	9	77	5	0	0.44	3.55	0.22	0.00	4.6	1156	
		64	6	71	17	0	0.27	3.41	0.83	0.00	4.8	1241	
Rogers 324		60	24	52	0	0	1.05	2.32	0.00	0.00	4.4	927	
		62	19	62	0	0	0.96	3.19	0.00	0.00	5.1	1141	
		64	13	75	0	0	0.65	3.84	0.00	0.00	5.2	1236	
76-110		60	14	66	5	0	0.63	2.90	0.22	0.00	4.4	1032	
		62	9	68	14	0	0.45	3.34	0.69	0.00	4.9	1231	
		64	6	53	34	2	0.33	3.04	1.99	0.11	5.8	1488	
6 July 1		5446	60	20	48	13	0	0.78	1.88	0.51	0.00	4.0	872
			62	15	47	19	5	0.76	2.46	0.98	0.25	5.2	1187
	64		4	40	32	19	0.25	2.46	1.96	1.16	6.1	1425	
	Minuette	62	21	50	8	0	0.83	1.99	0.33	0.00	4.0	867	
		64	8	48	18	1	0.51	3.01	1.09	0.07	6.2	1275	
		67	2	27	48	22	0.11	1.74	3.04	1.38	6.4	1511	
	Rogers 324	60	35	31	0	0	1.36	1.20	0.00	0.00	3.9	703	
		62	20	59	1	0	0.89	2.57	0.04	0.00	4.4	962	
		64	11	73	4	0	0.58	3.77	0.22	0.00	5.1	1256	
	76-110	60	19	57	3	1	0.63	1.88	0.11	0.04	3.3	727	
		62	12	61	15	1	0.49	2.39	0.58	0.04	3.9	956	
		64	9	53	28	2	0.40	2.43	1.27	0.07	4.6	1135	

Table 4. Performance of small sieve green bean varieties, Corvallis, 1993 (cont.).

Trial	Variety	Days	Percent Sieve Size				Tons/Acre Sieve Size					\$/Acre ^x
			2 ^z	3	4	5	2	3	4	5	Total ^y	
7 July 9	5446	59	15	51	16	4	0.91	3.08	0.98	0.22	6.1	1392
		61	7	52	24	10	0.47	3.34	1.52	0.65	6.4	1544
		63	7	44	30	13	0.54	3.37	2.28	0.98	7.7	1822
		66	3	32	37	24	0.29	2.94	3.34	2.14	9.1	2061
	Minuette	61	12	54	19	34	0.51	2.32	0.80	0.14	4.3	1014
		63	10	52	25	30	0.49	2.54	1.20	0.14	4.8	1179
		66	5	40	40	10	0.33	2.72	2.65	0.69	6.7	1648
	Rogers 324	61	26	48	0	0	0.96	1.81	0.00	0.00	3.7	763
		63	20	59	1	0	0.94	2.76	0.04	0.00	4.7	1027
		66	13	72	3	0	0.82	4.64	0.22	0.00	6.5	1560
	76-110	61	25	48	2	0	0.83	1.60	0.07	0.00	3.3	688
		63	18	59	5	0	0.69	2.25	0.18	0.00	3.8	857
66		9	62	17	1	0.47	3.12	0.87	0.07	5.0	1235	

^z2 sieve values calculated as 50% of the combined 1 + 2 sieve weights from grader.

^yTotal weight of graded beans, including sieve sizes 1-5.

^x\$/acre based on \$275/ton for 2-4 sieve; \$120/ton for 5 sieve.

Table 5. Fusarium root rot infection, Corvallis, 1993.

Line	Score ^z			Notes
	Rep 1	Rep 2	Avg.	
91G ^y	3.8	4.5	4.3	
5402	3.5	3.5	3.5	
5416	4	4	4.0	
5418	4	5	4.5	
5421	4	4	4.0	
5440	4.5	3.5	4.0	
5446	5	5	5.0	
5520	3.5	3	3.3	
5558	3.5	5	4.3	
5563	4	4	4.0	
B7030-24	3.5	2.5	3.0	
B7126-33-2-1	4	4	4.0	
B7237-13	4	4	4.0	
B7238-15	4.5	4.5	4.5	black-seeded
B7238-15	4.5	4.5	4.5	white-seeded
B7238-22	4	4	4.0	
B7239-5-1	5	3.5	4.3	
B7239-5-2	4	4	4.0	
B7239-5-4	4	4	4.0	
B7239-10	5	4	4.5	
B7239-11-2	5	5	5.0	
B7239-13	4	3.5	3.8	
B7240-2	3.5	3.5	3.5	
B7243-8	2	5	3.5	
EZ Pick	3	4	3.5	
Rogers 324	4.5	4.5	4.5	

Table 5. Fusarium root rot infection, Corvallis, 1993 (cont.).

Line	Score ²			Notes
	Rep 1	Rep 2	Avg.	
Minuette	4	4.5	4.3	
76-110	4	4	4.0	
Hypak	5	5	5.0	
WIS 46RR	3	3	3.0	
WIS 83RR	3	4	3.5	
RR6950 ^y	1.5	2.5	2.0	
RR4270	2	3	2.5	
DM3NY1	3	3	3.0	
DM4NY6	1.5	3.5	2.5	
DM6NY1	2	3.5	2.8	

²Scores: 1-5 scale, 1 = none or very slight, 5 = roots mostly dead, plants severely stunted.

^yEach value is an average of 2 plots.

Table 6. White mold infection, Corvallis, 1993.²

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
91G	7.7	5.6	4.4	3.6	5.3
5402	7	5	4	4	5.0
5416	7	6	5	8	6.5
5418	9	6	8	5	7.0
5421	7	5	6	5	5.8
5440	2	5	4	5	4.0
5446	7	7	4	3	5.3
5516	6	8	9	7	7.5
5520	4	5	5	3	4.3
5558	7	5	5	5	5.5
5563	5	3	3	6	4.3
B7126-1-1-1	1	1	1	1	1.0
B7126-33-1-2	5	4	1	1	2.8
B7126-33-2-1	2	5	1	6	3.5
B7126-54-2-1	3	4	2	1	2.5
B7237-1-1	5	6	3	3	4.3
B7237-1-3	2	2	1	1	1.5
B7237-13	1	2	1	1	1.3
B7237-14-2	1	3	1	1	1.5
B7237-14-3	4	3	2	1	2.5
B7237-14-4	2	1	1	1	1.3
B7238-15 white	3	4	1	1	2.3
B7238-22	5	3	2	3	3.3
B7239-1	6	4	5	5	5.0
B7239-4	4	4	4	2	3.5
B7239-5-1	5	5	1	6	4.3
B7239-5-2	3	3	3	5	3.5
B7239-5-4	4	3	4	2	3.3
B7239-11	4	2	2	4	3.0
B7239-11-1	2	1	1	1	1.3
B7239-11-2	3	2	2	2	2.3
B7239-11-3	2	1	1	1	1.3
B7239-12	5	4	3	4	4.0
B7239-13	4	4	4	5	4.3

Table 6. White mold infection, Corvallis, 1993 (cont.).^z

Line	Rep 1	Rep 2	Rep 3	Rep 4	Avg.
B7240-2	4	3	4	3	3.5
B7243-8	4	5	5	5	4.8
DM3NY1	2	4	4	4	4.5
DM4NY6	2	5	2	2	2.8
DM6NY1	4	3	4	3	3.5
Black Turtle	4	3	2	4	3.3
Black Valentine	5	5	3	2	3.8
MO162	0	0	1	0	0.3
Tendercrop	5	4	3	4	4.0
Ex Rico	3	4	2	1	2.5
Aurora	6	7	4	4	5.3
Gabriella	3	4	2	1	2.5
L192	0	0	1	0	0.3
2235	2	3	1	5	2.8
3525	4	5	6	1	4.0
169787	1	0	1	0	0.5
180753	0	0	0	2	0.5
204717	1	1	0	0	0.5
824775	0	1	0	0	0.3
226865	5	0	1	2	2.0
225846	1	0	0	0	0.3
EZ Pick	8	1	1	1	2.8
Minuette	6	4	5	7	5.5
Hypak	8	7	5	4	6.0
76-110	7	2	3	2	3.5
Rogers 324	4	2	4	5	3.8

^zWhite mold scores, 1-10 scale, 1 = low incidence, sometimes slight symptoms, 10 = high incidence, usually severe symptoms.

Table 7. Yield of Oregon 91G, OSU 5446, and 76-110 at 36- and 18-inch row spacing, 1993.^z

Variety	Harvest 1				Harvest 2				Harvest 3				AV T/A	
	% 1-4 Sieve		Tons/Acre		% 1-4 Sieve		Tons/Acre		% 1-4 Sieve		Tons/Acre		36	18
	36	18	36	18	36	18	36	18	36	18	36	18	36	18
91G	64	84	7.7	11.1	62	56	9.6	12.9	34	44	12.4	13.4	9.9	12.5
5446	98	100	5.4	9.3	99	100	6.7	10.6	94	99	11.5	7.1	6.7	10.4
76-110	100	100	4.8	7.0	100	100	5.3	8.0	97	98	7.1	9.3	5.7	8.1
LSD at .05 ^y			1.6	1.6			1.3	1.3			1.5	1.5	0.6	0.6
spacing means			6.0	9.1			7.2	10.5			9.1	11.4	7.4	10.3
LSD at .05			0.9				0.7				0.8		0.3	

^zTrial planted June 17; 4 replications; 5 feet of row in each harvest. The 18" row plots consisted of three rows; only the center row was harvested.

^yLSD values on this line apply to numbers within columns (comparing variety means) and between columns (comparing spacing within varieties).

Table 8. Dollar return/acre² of Oregon 91G, OSU 5446, and 76-110 grown at 36- and 18-inch row spacing, 1993.

Variety	Harvest (days)	Total (2-6 sieve)		3 sieve only		4 sieve only		3 + 4 sieve	
		36	18	36	18	36	18	36	18
91G	62	1562	2466	478	877	658	1116	1136	1994
	64	1572	2406	259	558	518	1057	778	1615
	67	1921	2250	289	458	558	817	847	1276
	AV	1685	2374	342	631	578	997	920	1628
5446	61	1300	2043	837	1515	319	140	1156	1655
	62	1639	2795	1037	1834	478	120	1515	1954
	64	1954	2750	847	1914	977	558	1824	2472
	AV	1631	2529	907	1754	591	272	1499	2027
76-110	62	1007	1296	728	798	50	20	778	817
	64	1246	1814	877	1455	239	120	1116	1575
	67	1753	2251	1057	1695	558	399	1615	2093
	AV	1335	1787	887	1315	282	179	1170	1495

²Acre values based on \$275/ton for sieves 2-4 and \$127/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 9. Summary of average yields of selected OSU lines, 1989-1993.

Line	AV Adj. T/A						AV \$/A				
	1989	1990	1991	1992	1993	Overall AV	1990	1991	1992	1993	Overall AV
91G	7.2	8.1	8.0	8.8	7.7	8.0	1555	1511	1376	1390	1458
5402	8.4	9.2	9.0	7.5	8.1	8.4	1736	1720	1531	1460	1612
5416	8.6	8.9	9.1	7.5	8.4	8.5	1626	1735	1560	1550	1618
5421	8.5	8.8	9.0	8.7	8.5	8.7	1650	1714	1697	1527	1647

Table 10. Yields of Oregon 91G and Oregon 54 in commercial production, 1993.

Variety	All Growers ^z		Type 1 Growers ^y		Type 2 Growers ^x	
	Net Tons/A	\$/A	Net Tons/A	\$/A	Net Tons/A	\$/A
Oregon 91G	5.55	1175	5.63	1195	5.50	1163
Oregon 54	5.84	1225	6.21	1294	5.63	1184

^zData obtained from 49 growers or planting periods involving groups of growers.

^yIncludes only the 18 individual growers who planted Oregon 91G and Oregon 54 on the same day or within a three day period.

^xIncludes the 31 planting periods and individual growers who did not plant the two varieties within a 3 day period.

AVERAGE \$/ACRE, SIX TRIALS 1993

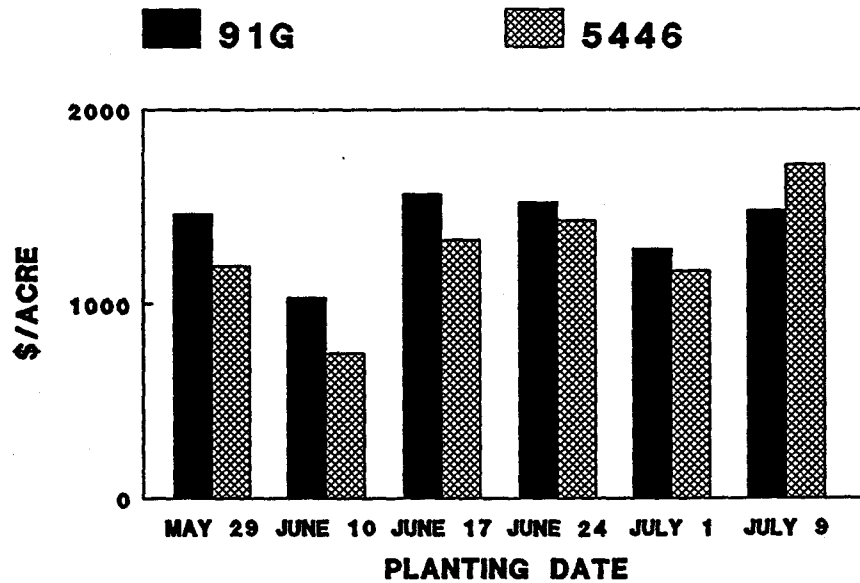


Figure 1. Average \$/A of 91G and 5446 from all harvest dates in each of six regular trials, 1993.

AVERAGE \$/ACRE, SIX TRIALS 1993

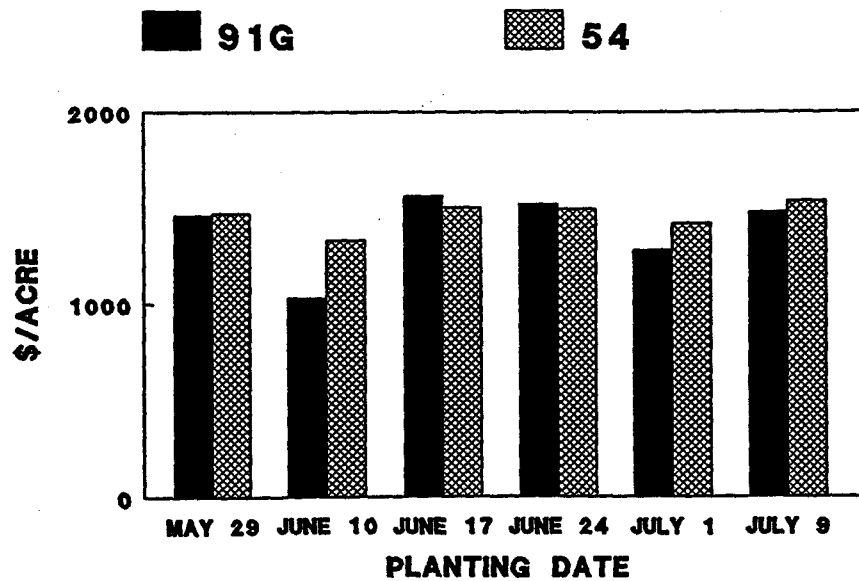


Figure 2. Average \$/A of 91G and Oregon 54 from all harvest dates in each of six regular trials, 1993.

1993 PRODUCTION-ORE 91G AND 54

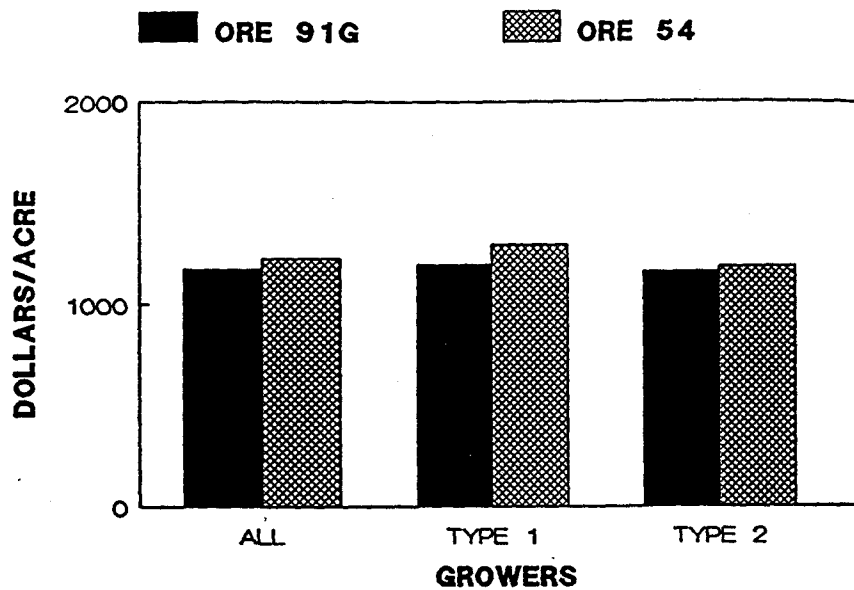


Figure 3. 1993 commercial yields of Oregon 91G and Oregon 54. Type 1 growers are those planting the two varieties on the same day or within a 3-day period. Type 2 growers planted them more than three days apart.

1993 PRODUCTION-ORE 91G AND ORE 54

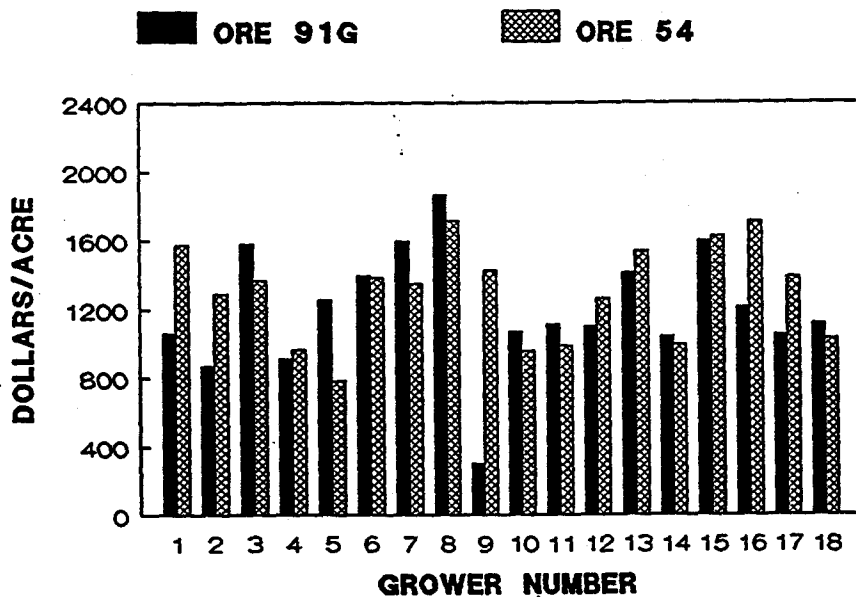
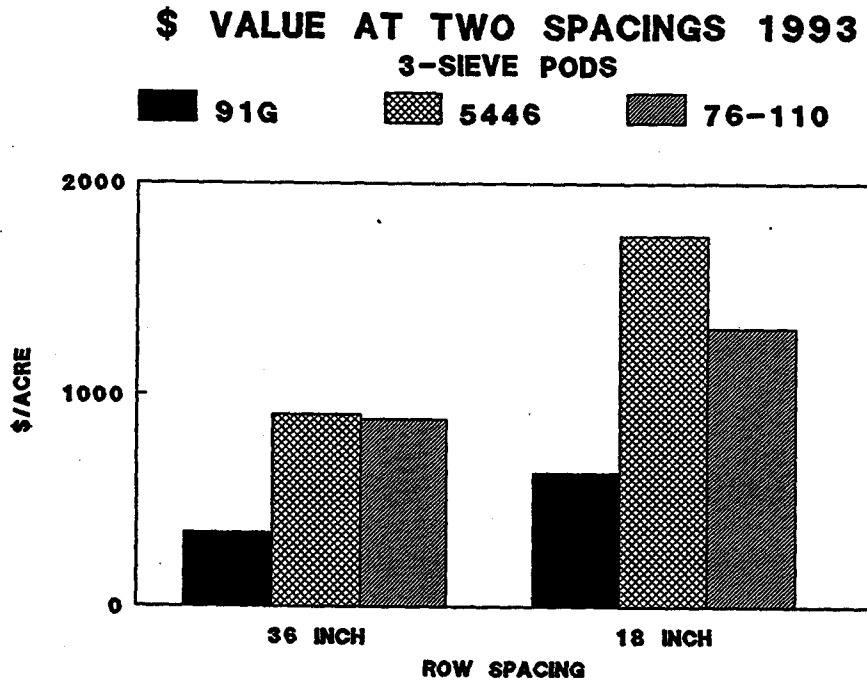
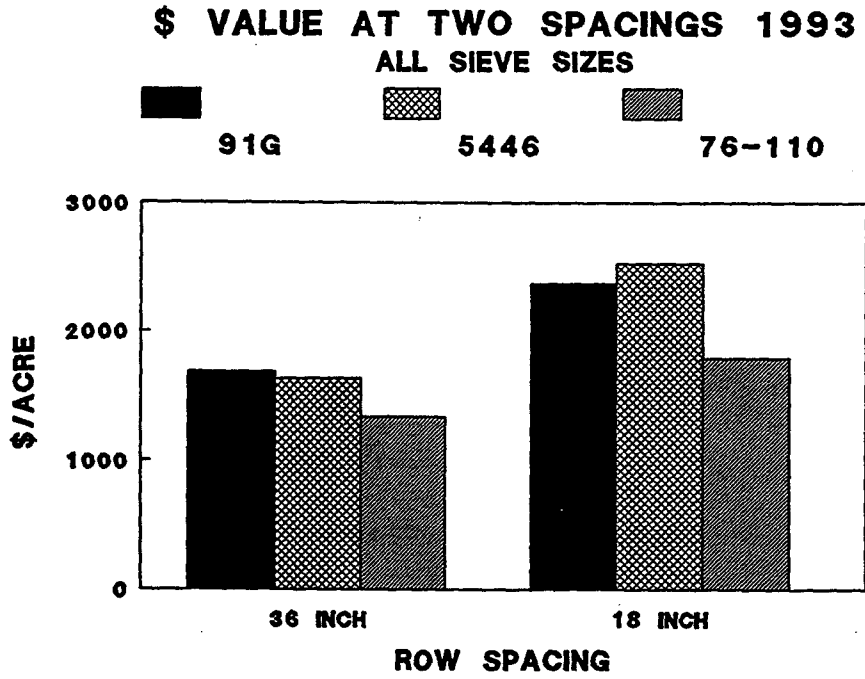


Figure 4. Yields of Oregon 91G and Oregon 54 in commercial production by 18 type 1 growers (those planting the varieties within a 3-day period).



Figures 5 and 6. Value of 91G compared to 5446 and 76-110 at 36" and 18" row spacings, all sieve sizes (Figure 5) and 3-sieve pods only (Figure 6), 1993

TONS/A AT TWO ROW SPACINGS

ALL SIEVE SIZES

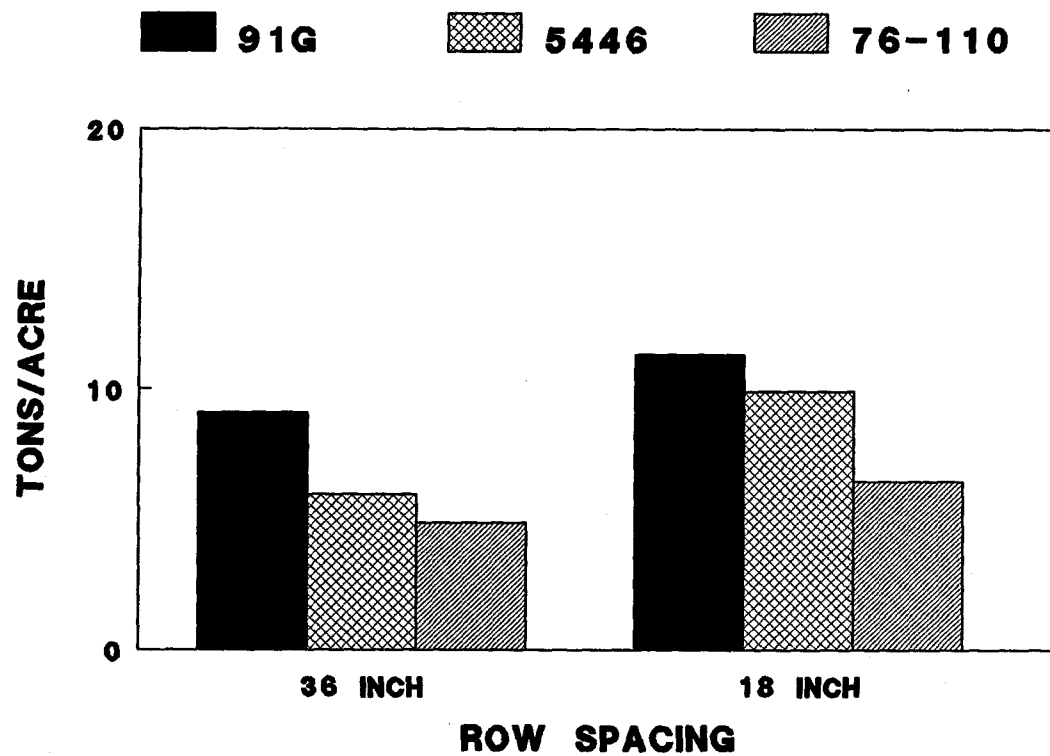
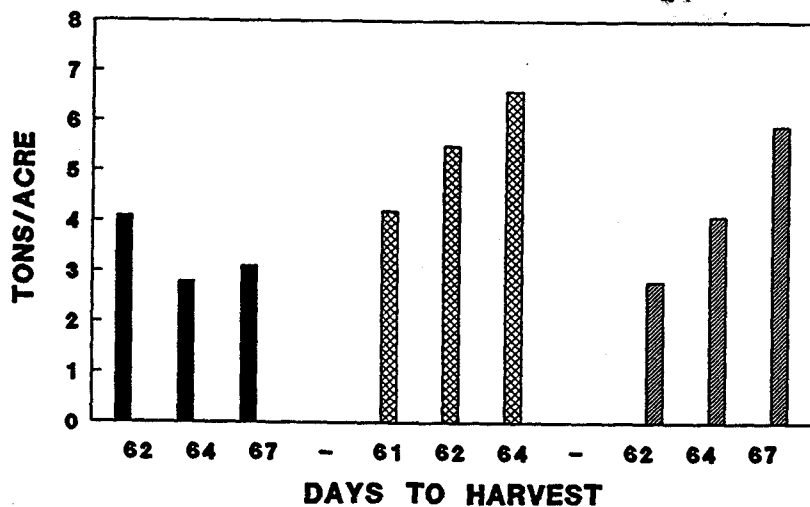


Figure 7. Yield of all sieve sizes of 91G, 5446, and 76-110 at 36" and 18" row spacing, 1993.

TONS/A OF 3+4 SIEVE PODS

36 INCH ROWS

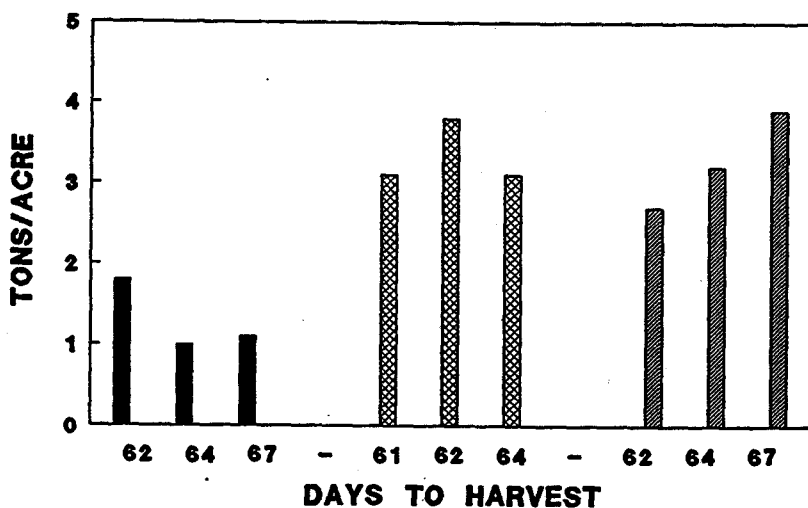
91G 5446 76-110



TONS/A OF 3-SIEVE PODS

36 INCH ROWS

91G 5446 76-110



Figures 8 and 9. Tons/A of 3 and 4 sieve pods (Figure 8) and 3 sieve pods only (Figure 9) of 91G, 5446, and 76-110 at 36" spacing, 1993.