

Report to the Oregon Processed Vegetable Commission
1987

1. Title: Green bean breeding and evaluation
2. Project Leaders: J. R. Baggett, Horticulture
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3. Project Status: Continuing, indefinite
4. Project Funding for Reporting Period:

Breeding: \$37,000
Processing Evaluation: \$8,000

Funds allotted to breeding were used for research farm assessments, supplies and labor for planting, plot maintenance, harvest, crosses, seed production and cleaning. Funds allotted to evaluation were used for processing labor and packaging, analytical work, conducting panel evaluations, and analysis of results.

5. Objectives: Breed bush green beans for the western Oregon processing industry with:
 - a) Improved yield potential 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. Major activities of the bean breeding program in 1987 were:

- 1) Selection continued in lines derived from crosses between 5076, 5078, and 5079 x Oregon 91G and four additional OSU lines and another group of crosses of Slenderette x 5 OSU lines and a third group of crosses involving intercrosses between OSU 5061 and several other OSU lines. Crosses involving 5076, 5078, and 5079 tended to produce lines with fibrous pods, but an apparent high yield of medium sieve pods. Lines from OSU 5061 crosses tended to have short pods but some were retained. Most of the lines from Slenderette crosses were discarded because of light color and no apparent improvement over Slenderette, but a few of these lines were saved also.
- 2) Single plant selections were made for the first time in segregating populations from crosses for the easy picking characteristic. These crosses included Easy Harvest and Easy Pick each crossed with Oregon 91G, 5022, 5061, 5073, 5090, and 5339. Generally, it was very difficult to recognize easy picking plants in these populations, but many selections were made in hopes of being able to more easily classify the resulting F₃ families in 1988. Selections were also made in two series of crosses for small sieve (whole pak) pods (Smilo, Gitano, and Dandy x OSU lines). Many plants were selected for small, smooth

Pods and will also be reevaluated in 1988 as F₃ families. The objective for these crosses is to develop a range of pod sizes with high yield and Blue Lake color and quality. It is recognized that there are likely unfavorable genetic associations which will make this difficult.

Additional crosses will be made in 1988 between OSU lines and additional small sieve varieties. F₂ plants were selected from crosses between Dave Mok's interspecific hybrids and Oregon 91G. These selections will be evaluated for root rot and white mold resistance.

- 3) Yield trials of advanced lines were planted on seven dates as shown in the tables. Plantings 2 and 4 were comprised of 24 entries, including Oregon 91G as control, 17 OSU breeding lines, two commercial varieties of the small sieve type (Cometa and 76-110), two bush Romano types (Roma and R0168) and Easy Pick. Plantings 1, 3, 5, 6, and 7 included 11 of the OSU lines which were used in plantings 2 and 4, along with Oregon 91G.

Field results of these trials are shown in Tables 1-3. Yield patterns over days and change in % 1-4 sieve are shown on the graphs for the trials of 12 entries. Results of processing and sensory panel evaluations are summarized separately.

- 4) Root rot and white mold test plots were grown as usual, including the entries in the yield trial and other lines which have been selected for root rot and white mold resistance.
- 5) Observations of the occurrence of basal, semi sterile flat pod mutants. Certain OSU lines were continued. This work will be continued in the future with the help of a graduate student who will study the stability of the mutant, its relation to the usual flat pod rogues of beans, and the effect of season and possibly seed growing area.
- 6) Comments on the most promising advanced OSU bean lines are as follows:

OSU 5024-1-9, 5024-1-10, and 5024-1-15. These sister lines were all included in an attempt to determine which is better in general since they are very similar. At the present the most questionable characteristic is seed quality because stands have been poor for 2 years. The pods of the OSU 5024 lines are very smooth and attractive, yields are good except for the possible effect of stand. Seeds may be too long. Seed increases of 5024-1 lines started in Idaho may be continued for one more year while making additional trials, possibly using Idaho grown seed. Increases in 1987 resulted in 71 lbs of 5024-1-9 and 51 lbs of 5024-1-10.

OSU 5073 - a high yielding line, sometimes out yielding Oregon 91G by as much as a ton/acre in adjusted yield or actual yield in the range of 50-60% 1-4 sieve. Color is bright and satisfactory. There is a possibility of fiber in overmature crops, but panel scores are normally good for texture. Percent fiber is higher than Oregon 91G when the % 1-4 sieve drops to 30 or 40. This line has been on

increase in Idaho for 2 years with an inventory of about 1000 lbs after 1987.

OSU 5090 - pods of this line become quite large after the normal harvest stages but are smooth and firm when processed at the proper time. Pods have excellent color. Yields are about the same as Oregon 91G, probably higher. Increases of 5090 were started in 1987 in Idaho, resulting in 64 lbs of stock seed.

OSU 5097. While the pods of OSU 5097 are slightly short and sometimes slab sided, they are fleshy, have superior color, and get good texture and flavor ratings. Increases should be started in 1988 if the line is continued.

OSU 5163 - this is perhaps the most promising line on trial. It would be best harvested at 60% 1-4 sieve or above to maximize its qualities, which include good color and smoothness most of the time. It should be recognized as a small sieve line. Yields at 60% 1-4 sieve have often exceeded Oregon 91G and adjusted yields were high in 1986 and 1987. Yields at higher % 1-4 sieve (around 60-70%) when directly compared to Oregon 91G, indicate that 5163 will make better yields of small size pods. Panel scores have been high for color, flavor, and texture. If harvested at under 50% 1-4 sieve pods may be seedy in the 4 and 5 sieve sizes. Increases were started in 1987, resulting in 70 lbs of stock seed.

OSU 5256. This line has been carried because of small sieve size. It yields about the same as Oregon 91G, but in some trials yields more than Oregon 91G at high % 1-4 sieve, such as 60-70%. It generally must be harvested at 50% 1-4 sieve or higher to avoid seedy pods, especially during stress conditions. Quality has been good. Seed increases were started in 1987, resulting in 56 lbs of stock seed.

B. Processing quality evaluation of green bean selections:

1. Newer selections: Hand harvested field samples representing 17 round pod and 2 flat Italian pod selections or cultivars from the May 15 planting at the OSU Vegetable Crops Farm were processed by standard canning and air-blast package freezing procedures. A quality evaluation of the processed product was made by a 10 member panel of OSU staff or students in multiple sessions. Panelists at each session evaluated 8-10 selections based on sieve sizes 3 (whole), 5 (cut) and 6 (cut) in canned bean pack. Five individual quality factors as well as overall quality of the samples were scored by the panel on the beans presented direct from the can, or after a 10 minute cook of the frozen product.

A condensation of the processed quality results for lines top-rated by the panel are given in Tables 5 (canned) and 6 (frozen). Quality data for all lines, including industry evaluations yet to be scheduled, will be available at a later date. Sensory results from the OSU panel indicate that overall quality scores for the 17 round pod lines ranged from 6.2 to 4.8 when canned in 5 sieve cuts, and from 6.6 to 5.0 when frozen as 5 and 5 sieve blended cuts.

Canned Pack: Round pod selections ranked in the top 7 of the 17 selections evaluated by the OSU panel are listed below with overall quality scores in brackets (see Table 5):

Easy Pick (6.2), 5090 (6.1), 5256 (6.1), 5078 (5.8), 5076 (5.7), 5265 (5.7), 91G (5.5)

The flat Italian selection Ro-168 was judged superior (score 6.6) to the commercial reference cultivar Roma (score 5.0) due to improved color and appearance quality when canned.

Frozen Pack: The 9 selections top-rated among the 17 round pod lines by the OSU panel are listed below followed by the panel overall score in brackets (see Table 6):

5256 (6.6), 5073 (6.5), 5090 (6.1), 5257 (6.9), 5097 (5.9), 5276 (5.9), 91G (5.9), 5061 (5.7), Easy Pick (5.7)

The flat Italian selection Ro-168 scored substantially higher on color but was otherwise judged similar to Roma cultivar in quality by the OSU panel.

2. Advance lines/varieties in multi-harvest maturity study:

Eleven selected advance lines were included together with reference variety 91G in this study to determine the effects of planting date and crop maturity at harvest on the processing quality. Reported in Table 7 are results for 12 lines canned at 1 planting date and 2 or 3 harvest dates. Crop maturity is measured as the % 1 to 4 sieve pods by weight in the size-graded sample. Processed quality has been assessed both by a 10-member sensory panel of OSU staff/students and by seed and fiber analyses.

Results shown in Table 7 indicate that the effect of harvest maturity from approximately 60% to 30% 1 to 4 sieve pods varied with the selection. Since the majority of lines showed only a minor reduction in overall quality with increasing maturity, the lines showing least quality stability based on the one planting were 5024-1-9 and 5097. Seed content increased to 9% or above as maturity approached the 30% 1 to 4 sieve level in selections 5097, 5163, 5256 and 5265. Fiber content did not increase significantly during maturation of the 12 lines in this planting.

Sensory and analytical results for the maturation response of selections in a second and third planting will be available at a later date.

7. Summary:

Field selection work in 1987 included crosses between typical OSU lines such as Oregon 91G, OSU 5061, 5076, and 5079; Slenderette crosses; Easy Pick and Easy Harvest crosses; and small sieve (whole pack) crosses. A group of 24 lines and cultivars were included in root rot and white mold tests, and two replicated yield trials. Twelve of these entries were included in five additional replicated yield trials. The most promising OSU lines in the field were 5024-1-9 and two sister lines, OSU 5073, OSU 5079, OSU 5163, and OSU 5256. Of these, OSU 5163 has been especially interesting for the past several years because it can yield very well at over 60% sieve grades 1-4.

In processing tests, the top 7 of 17 lines evaluated as canned pods by an OSU panel were Easy Pick, 5090, 5256, 5078, 5076, 5265, and Oregon 91G. The top 8 of 17 scored as frozen pods were 5256, 5073, 5090, 5257, 5097, 5276, Oregon 91G, and Easy Pick. Flat Italian lines Ro-168 was preferred over Roma in overall score for canned pods, but in frozen pods exceeded Roma only in color. In a separate study of samples taken at several maturity stages, OSU 5024-1-9 and 5097 showed the least quality stability. In this trial seed content increased measurable with maturity but fiber content of the 12 lines did not increase significantly.

8. Signatures:

Submitted by:

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~~Project Leader~~ _____

Date

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Project Leader _____

Date

Approved by:

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Date

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Date

TABLE 1

Yields of selected OSU bean lines on five planting dates, Corvallis, Oregon, 1987¹

Line	Av. Stand	Harvest 1		Harvest 2		Harvest 3		Harvest 4		Harvest 5		Avg. ² Adj. T/A	LSD ³ Adj. T/A						
		Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.								
91G	140	76	88	7.4	10.1	78	73	7.2	8.8	81	62	8.7	9.7	83	42	9.8	9.0*	9.5	1.4
5024-1-9	129	81	57	9.6	10.2*	83	40	10.8	9.7									10.0	
5024-1-10	138	81	62	9.7	10.9*	83	35	12.3	10.5									10.7	
5024-1-15	138	81	58	9.6	10.4*	83	38	10.5	9.3									9.9	
5061	140	81	68	10.0	11.8	83	55	11.1	11.6*									11.7	
5073	139	81	66	9.7	11.3	83	41	9.2	8.4*									9.8	
5076	138	81	89	9.1	12.6	83	63	10.2	11.5*									12.1	
5090	139	81	65	9.7	11.2	83	38	10.0	8.8*									10.0	
5097	139	81	60	9.9	10.9*	83	34	10.3	8.6									9.8	
5163	139	81	83	9.8	12.3	83	71	10.3	11.8*									12.1	
5256	140	76	90	6.3	8.3	78	79	7.7	9.4	81	74	9.5	11.1	83	49	9.8	9.3*	8.8	
5265	140	81	81	8.7	10.8	83	50	10.4	10.0*									10.4	
91G	150	68	58	9.9	10.6	70	44	11.3	10.6*	72	32	12.3	10.1					10.4	1.5
5024-1-9	140	68	64	8.3	9.5	70	43	9.2	8.5*	72	31	11.6	9.4					9.1	
5024-1-10	148	68	71	8.4	10.1	69	59	7.6	8.3*	72	32	11.0	9.0					9.1	
5024-1-15	143	68	73	9.0	11.0	69	57	8.2	8.7*	72	30	12.1	9.7					9.8	
5061	150	69	56	10.9	11.5*	72	35	11.5	9.7									10.6	
5073	150	69	52	11.1	11.3*	72	33	11.6	9.7									10.5	
5076	150	72	51	10.2	10.3*	74	40	11.9	10.7	76	21	13.3	9.4					10.1	
5090	146	70	59	9.2	10.0*	72	37	10.7	9.3	74	30	11.3	9.0					9.4	
5097	150	68	64	8.2	9.3*	70	36	10.8	9.3	72	26	11.7	8.9					9.2	
5163	145	70	66	10.3	11.3	72	47	11.8	11.0*	74	46	11.6	10.8	76	33	12.4	9.9	11.0	
5256	150	68	84	7.5	9.5	70	64	8.8	9.5*	72	44	9.7	8.7	74	37	10.1	8.4	9.2	
5265	150	69	78	6.7	8.1	72	44	9.5	8.5*	74	39	9.6	8.2					8.3	
91G	150	65	65	8.0	8.5	68	54	9.0	9.4*	70	41	9.1	8.2	72	30	10.4	8.3	8.6	1.5
5024-1-9	141	68	57	9.2	9.9	70	51	9.9	10.0*	72	31	10.5	8.5					9.5	
5024-1-10	149	68	53	9.8	10.0*	70	39	10.3	9.1	72	27	12.4	9.5					9.5	
5024-1-15	148	65	81	8.3	10.9	68	58	9.6	10.4	70	45	10.2	9.6*	72	32	11.7	9.6	10.1	
5061	150	65	78	7.6	9.7	68	61	8.9	9.9	70	58	10.4	11.2*	72	32	11.3	9.3	10.0	
5073	150	65	53	9.1	9.3*	68	43	9.5	8.8	70	39	10.7	9.5	72	30	10.3	8.2	9.0	
5076	150	68	76	8.3	10.5	70	66	7.9	9.2	72	48	11.3	11.1*	75	32	11.9	9.7	10.1	
5090	150	66	65	8.1	9.3	68	51	8.7	8.8*	70	43	9.3	8.7	72	29	10.0	7.9	8.7	
5097	150	66	81	8.0	10.5	68	62	9.0	10.1	70	44	9.8	9.2*	72	31	10.4	8.4	9.6	
5163	149	65	79	7.8	9.0	66	80	8.6	9.9	68	68	9.4	9.9	70	64	8.9	9.3	9.5	
5256	150	65	84	7.2	8.5	68	70	7.8	8.3	70	69	8.2	8.6	72	53	8.9	8.8*	8.6	
5265	150	68	80	6.9	8.0	70	75	7.9	8.8	72	59	9.3	9.7*	75	42	10.3	9.1	8.9	

Planting dates: April 23, April 23, May 15, May 15, June 9

TABLE 1 (cont.)

Yields of selected OSU bean lines on five planting dates, Corvallis, Oregon, 1987¹ (cont.)

Line	AV. Stand	Harvest 1		Harvest 2		Harvest 3		Harvest 4		Harvest 5		Avg. ² Adj. T/A	LSD ³ Adj. T/A		
		Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.	Days	% Tons Adj.				
91G	150	65	55	13.8	14.5	67	49	14.7	14.6*	69	39	14.3	14.1	14.4	1.9
5024-1-9	150	65	50	12.7	12.7*	67	44	13.7	12.9	69	30	15.0	12.0	12.5	
5024-1-10	150	65	52	13.2	13.5*	67	46	12.4	11.9	69	33	15.3	12.7	12.7	
5024-1-15	150	65	53	13.3	13.7*	67	43	13.1	12.1	69	40	14.2	12.8	12.9	
5061	150	65	62	10.4	11.7	67	54	12.8	13.3*	69	40	13.2	11.9	12.3	
5073	150	65	63	12.4	14.1	67	55	14.0	14.7	69	47	13.7	13.3*	14.0	
5076	148	67	61	13.9	15.5	69	56	13.0	13.8*	72	31	16.3	13.2	14.2	
5090	150	67	48	14.0	13.7*	69	42	13.6	12.5	72	25	15.2	11.4	12.5	
5097	150	65	57	12.6	13.5*	67	42	12.8	11.8	69	36	13.6	11.7	12.3	
5163	150	65	64	11.6	12.1	67	54	13.1	13.0*	69	51	13.1	12.6	12.6	
5256	150	65	79	11.3	12.9	67	64	13.0	13.6	69	58	13.7	14.0*	13.5	
5265	150	65	73	11.0	12.0	67	61	12.1	12.8*	69	48	12.2	11.4	12.1	
91G	150	65	41	12.2	11.1*	67	37	11.2	9.7					10.4	NS
5024-1-9	129	65	53	10.7	11.0*	67	45	10.2	9.7					10.4	
5024-1-10	148	65	43	10.3	9.6*	67	31	12.2	9.9					9.8	
5024-1-15	140	65	44	9.9	9.3*	67	37	10.8	9.4					9.4	
5061	150	66	41	11.4	10.4*	67	38	12.5	11.0					10.7	
5073	150	63	75	9.5	11.9	65	48	11.1	10.8*	67	39	11.4	10.2	11.1	
5076	148	66	49	10.6	10.5*	67	41	11.8	10.8					10.6	
5090	150	65	39	10.9	9.7*	67	28	11.7	9.2					9.4	
5097	150	65	48	10.4	10.2*	67	40	11.5	10.3					10.2	
5163	150	65	58	10.2	10.5*	67	47	11.6	10.8					10.6	
5256	150	63	95	7.8	10.1	65	64	9.6	10.0	67	50	11.6	11.0*	10.0	
5265	150	66	49	9.5	9.0*	67	43	10.0	9.0					9.0	

¹ Means of 4 replications; 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; tons = tons/acre; adj. = tons/acre adjusted to 50% 1-4 sieve, except 5163, 5256, and 5265, which were adjusted to 55% 1-4 sieve.

² Average adjusted yield based on the first 2 harvests in the April 23 and June 24 plantings, the first 3 harvests in the May 15 and June 19 plantings, and the first 4 harvests in the June 9 planting.

³ Analysis of variance calculated using the harvest closest to 50% 1-4 sieve (55% for 5163, 5256, and 5265), marked *. Adjusted yields were non-significant at 5% for the June 29 planting.

TABLE 2

Green bean yields, May 4 and May 28 plantings, Corvallis, Oregon, 1987¹

Line	May 4 Planting												May 28 Planting											
	Av. Stand	Harvest 1				Harvest 2				Harvest 3				Avg. Adj. T/A	Av. Stand	Harvest 1				Harvest 2				Avg. Adj. T/A
		Days	%	Tons	Adj.	Days	%	Tons	Adj.	Days	%	Tons	Adj.			Days	%	Tons	Adj.	Days	%	Tons	Adj.	
91G	140	72	64	8.7	9.9*	74	29	9.7	7.7				8.8	148	67	75	5.6	7.0	70	66	7.3	8.4*	7.7	
5022-1	140	72	47	9.1	8.8*	74	22	10.1	7.3				8.1	150	67	72	6.5	7.9	70	38	9.3	8.2*	8.0	
5024-1-9	119	73	40	8.6	7.7*								7.7	143	67	65	6.3	7.3	70	45	8.5	8.1*	7.7	
5024-1-10	135	73	38	9.5	8.3*								8.3	144	67	62	6.7	7.5	70	38	9.8	8.6*	8.0	
5024-1-15	135	73	42	9.4	8.7*								8.7	150	67	77	5.7	7.3	70	54	8.4	8.8*	8.0	
5061	140	72	57	8.2	8.8*	74	28	9.1	7.1				8.0	150	67	69	8.0	9.5	71	46	9.6	9.2*	9.4	
5073	140	74	42	9.9	9.1*	77	33	10.8	8.9				9.0	150	68	59	8.0	8.8	71	45	9.4	9.0*	8.9	
5076	140	74	38	9.8	8.6*	77	23	11.0	8.0				8.3	150	68	95	4.6	6.7	71	71	8.3	10.0*	8.4	
5078	140	74	39	9.3	8.3*	77	25	11.3	8.5				8.4	150	68	93	5.2	7.5	71	57	9.1	9.7*	8.6	
5090	140	74	27	10.0	7.7*								7.7	150	67	88	5.5	7.6	70	54	8.2	8.6*	8.1	
5097	137	72	49	7.0	7.0*	74	25	8.3	6.3				6.6	150	67	85	7.5	10.1	70	47	9.6	9.3*	9.7	
5163	140	72	73	8.0	8.7	74	50	9.2	8.8*	77	27	10.4	7.8	8.8	150	67	82	10.2	12.0	70	65	8.6	9.4*	10.7
5256	140	73	81	7.0	8.2	77	31	9.7	7.6*				7.9	150	68	88	5.3	6.5	71	67	7.4	8.2*	7.4	
5257	140	73	63	8.5	9.1*								9.1	150	68	87	6.0	7.3	71	56	8.3	8.4*	7.8	
5265	140	72	79	6.2	7.1	74	44	8.1	7.3*	77	22	9.8	6.8	7.2	150	68	95	5.8	7.4	71	70	8.0	9.1*	8.2
5276	140	73	49	8.3	8.3*								8.3	150	68	83	5.9	7.8	71	47	7.9	7.6*	7.7	
5365	140	73	54	9.5	9.9*								9.9	150	67	68	5.7	6.1	70	55	7.7	8.1*	7.1	
5384	140	73	41	9.3	8.4*								8.4	150	67	40	9.4	8.5*	70	29	9.0	7.1	7.8	
Cometa	140	73	85	5.1										150	68	99	2.7		71	87	4.8			
Easy Pick	140	74	62	5.7	5.5*	77	38	7.1	5.6				5.6	149	68	93	6.5	7.8	71	76	7.5	8.2*	8.0	
Roma	140	72	73	7.5		74	49	8.5		77	33	8.7		149	67	95	5.0		70	85	8.1			
76-110	140	72	64	5.5		74	32	5.7		77	17	6.3		150	67	94	2.9		70	67	3.4			
RO168	140	72	42	7.3		74	26	9.2		77	20	9.5		150	68	59	8.1		71	45	9.5			

¹Mean 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 (percent 1-3 sieve in cases of Cometa and 76-110); tons = tons/acre; adj. = tons/acre adjusted to 50% 1-4 sieve, except 5163, 5256, 5257, and 5265, which were adjusted to 55% 1-4 sieve, and Easy Pick, which was adjusted to 65% 1-4 sieve. Analyses of variance calculated using the harvest closest to 50% 1-4 sieve for each line (55% for 5163, 5256, 5257, 5265, and 65% for Easy Pick), marked with *. LSD at 5% significance = 1.2 tons/acre for May planting, and 1.6 tons/acre for May 28 planting.

TABLE 3

Summary of average yields of selected Oregon State University
bean lines, 1982-1987

Line	1983 AV	1984 AV	1985 AV	1986 ²		1987 Planting Date						1987 AV	1986- 1987 AV	1982- 1987 AV					
				A	B	4-23		5-4		5-15					5-28		6-9	6-19	6-29
						9.5	8.8	10.4	7.7	8.6	14.4				10.4	10.0			
Ore 91C	9.1	8.1	7.6	9.6	9.9	9.5	8.8	10.4	7.7	8.6	14.4	10.4	10.0	10.0	8.9				
5024-1-9 ³	8.6	8.0	6.3	10.2	---	10.0	7.7	9.1	7.7	9.5	12.5	10.4	9.6	9.9	8.5				
5024-1-10 ³	8.6	8.0	6.3	10.6	---	10.7	8.3	9.1	8.0	9.5	12.7	9.8	9.7	10.2	8.6				
5024-1-15 ³	8.6	8.0	6.3	10.6	---	9.9	8.7	9.8	8.0	10.1	12.9	9.4	9.8	10.2	8.7				
5061	9.0	8.7	8.6	12.1	11.6	11.7	8.0	10.6	9.4	10.0	12.3	10.7	10.4	11.0	9.7				
5073	---	9.2	8.9	13.6	11.8	9.8	9.0	10.5	8.9	9.0	14.0	11.1	10.3	11.1	---				
5076	---	9.2	---	---	---	12.1	8.3	10.1	8.4	10.1	14.2	10.6	10.5	---	---				
5090	8.4	8.4	6.4	10.4	10.4	10.0	7.7	9.4	8.1	8.7	12.5	9.4	9.4	9.9	8.6				
5097	8.7	8.0	6.7	10.8	10.0	9.8	6.6	9.2	9.7	9.6	12.3	10.2	9.6	9.8	8.6				
5163	9.6	9.2	6.4	11.5	---	12.1	8.8	11.0	10.7	9.5	12.6	10.6	10.8	11.2	9.5				
5256	---	9.1	6.8	10.4	10.5	8.8	7.9	9.2	7.4	8.6	13.5	10.0	9.3	9.9	---				
5265	---	9.0	8.2	10.5	9.9	10.4	7.2	8.3	8.2	8.9	12.1	9.0	9.2	9.6	---				

¹ Adjusted to 50% 1-4 sieve except that in 1986 and 1987 5256 and 5265 were adjusted to 55% 1-4 sieve, and Easy Pick to 65% 1-4 sieve. 5163 adjusted to 55% 1-4 sieve in 1987.

² 1986 A = May 23 planting only, 1986 B = average of all 6 1986 trials. 1986 A was used to calculate 1986-1987 AV and 1982-1987 AV for 5024-1-9, 5024-1-10, 5024-1-15, and 5163. For all other varieties, 1986 B was used.

³ In 1983, 1984, and 1985, 5024 was used instead of daughter lines 5024-1-9, 5024-10, and 5024-1-15.

TABLE 4

Fusarium root rot and white mold infection, Oregon State University bean breeding lines, Corvallis, Oregon, 1987.

Line	Fusarium root rot ¹			White mold ²				
	Rep. 1	Rep. 2	Avg.	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Avg.
Ore. 91G ³	4	4	4.0	5	5	4.7	4.3	4.8
5022-1	3	3	3.0	4	6	8	7	6.2
5024-1-9	3	3	3.0	5	7	7	8	6.8
5024-1-10	3	3	3.0	6	7	6	7	6.5
5024-1-15	3	3	3.0	8	8	7	7	7.5
5061	4	4	4.0	7	7	6	7	6.8
5073	5	4	4.5	7	4	5	5	5.2
5076	4	3	3.5	8	7	5	6	6.5
5078	4	4	4.0	8	5	7	3	5.8
5090	3	3	3.0	9	5	5	7	6.5
5097	5	5	5.0	5	6	4	6	5.2
5163	3	4	3.5	6	3	4	5	4.5
5256	4	4	4.0	6	5	7	5	5.8
5257	4	3	3.5	6	4	7	7	6.0
5265	4	4	4.0	6	3	6	8	5.8
5276	4	3	3.5	7	4	4	5	5.0
5365	3	4	3.5	2	5	5	7	4.8
5384	4	3	3.5	4	5	4	5	4.5
Cometa	4	4	4.0	6	1	5	5	4.2
Easy Pick	5	4	4.5	5	3	4	6	4.5
Roma	3	3	3.0	4	7	5	8	6.0
76-110	5	3	4.0	3	2	2	5	3.0
RO 168	2	3	2.5					
B7022-26	4	3	3.5					
B7023-18	4	3	3.5					
B7023-31	3	3	3.0					
B7023-90	3	2	2.5					
B7030-14	3	4	3.5					
B7030-17	2	4	3.0					
B7030-24	3	3	3.0					
B7030-40	3	2	2.5					
Wis 46	2	3	2.5					
Wis 83	3	3	3.0					
RR 4270 ⁴	2.8	2.6	2.7					
RR 6950 ⁴	1.4	1.0	1.2					
B7126-1-1-1				3	2	3	2	2.5
B7126-33-1-1				5	4	4	3	4.0
B7126-33-1-2				2	2	3	2	2.2
B7126-33-2-1				2	7	2	2	3.2
B7126-54-2-1				2	2	2	4	2.5
B7127-2-1-1				4	2	4	4	3.5
B7127-2-3-1				3	2	4	2	2.8
B7127-19-1-1				3	5	4	3	3.8
B7127-20-2-1				7	5	2	7	5.2

TABLE 4 (cont.)

Fusarium root rot and white mold infection, Oregon State University bean breeding lines, Corvallis, Oregon, 1987 (cont.).

Line	Fusarium root rot ¹			White mold ²				
	Rep. 1	Rep. 2	Avg.	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Avg.
B7127-20-2-2				2	6	4	4	4.0
B7127-21-1-1				5	6	5	2	4.5
B7127-25-1-1				4	4	4	5	4.2
B7127-26-1-1				3	6	2	2	3.2
B7127-28-1-1				4	7	6	7	6.0
B7127-29-1-1				4	4	5	8	5.2
B7127-30-1-1				6	3	4	6	4.8
B7127-31-1-1				8	5	4	6	5.8
B7127-61-1-1				4	2	3	2	2.8
B7127-61-2-1				1	1	3	1	1.5
B7127-68-1-1				3	3	2	3	2.8
B7127-68-3-1				4	4	2	6	4.0
B7127-73-4-1				2	3	1	2	2.0
B7127-76-2-1				5	3	5	2	3.8
B7127-76-3-1				3	3	2	2	2.5
B7127-76-3-2				4	2	2	2	2.5
B7127-80-2-1				3	4	4	3	3.5
B7127-95-3-1				4	3	2	2	2.8
Ex Rico 23				2	2	1	5	2.5
Flo				3	1	2	3	2.2
MO 162				1	1	2	1	1.2
NY 2558				1	2	1	2	1.5
XPB 155				2	2	2	1	1.8
Laureat				2	2	3	1	2.0
XPB 266				1	1	1	2	1.2
A55				2	1	1	1	1.2
Rabia de Gato				3	1	2	2	2.0
PI 169787				1	2	1	2	1.5
PI 180753				1	1	1	2	1.2
PI 204717				2	2	2	2	2.0
PI 225846				3	2	2	4	2.8
PI 226865				1	2	1	2	1.5
PI 407463				5	3	5	6	4.8
PI 415965				2	1	1	3	1.8
PI 824758				5	5	6	3	4.8
PI 824775				1	1	3	2	1.8
2235				4	3	3	4	3.5
Aurora				3	5	3	3	3.5
Black Valentine				2	2	2	5	2.8
Harvester				2	2	6	3	3.2
L162				1	1	1	3	1.5
L192				1	1	1	1	1.0
Gabriella				2	3	1	3	2.2
Cape				2	3	5	4	3.5

TABLE 4 (cont.)

Fusarium root rot and white mold infection, Oregon State University bean breeding lines, Corvallis, Oregon, 1987 (cont.).

Line	Fusarium root rot ¹			White mold ²				
	Rep. 1	Rep. 2	Avg.	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Avg.
Evergreen				5	6	5	4	5.0
Slenderette				7	6	7	3	5.8
Dwarf Horticultural				1	1	1	1	1.0
Tendercrop				6	6	4	5	5.2
Red Kidney				1	1	1	1	1.0
Black Turtle				3	3	1	7	3.5
Bountiful				2	2	1	1	1.5

¹Fusarium root rot scores, 1-5 scale, 1 = trace, 5 = severe.

²White mold scores, 1-10 scale, 1 = trace, 10 = all plants dead.

³Each value shown is an average of 3 plots.

⁴Each value shown is an average of 5 plots.

TABLE 5. SENSORY QUALITY OF GREEN BEANS AFTER CANNING:
TOP-RATED NEWER VARIETAL LINES, 1987

Selection	Overall Score ¹	Higher Scores for These Attributes ²	
		5 Sieve	3 Sieve Whole
<u>Round Pod (5 Sieve)</u>			
Easy Pick	6.2	color; appear.; flesh	color; appear.
5090	6.1	color; appear., flesh.; text.	color
5256	6.1	flesh.; text.	color; appear.
5078	5.8	flesh.; text.; flav.	
5076	5.7	flesh.; text.; flav.	
5257	5.7	flesh.; text.	color; appear.
5265	5.7	color.	color; appear.
91G (ref.)	5.5	flav.	
<hr/>			
<u>Flat Italian Pod</u> (Mixed sieve)			
Ro-168	6.6	appear.; flesh.; text.; flav.	
Roma	5.0	flesh.; text.; flav.	

NOTES: ¹ 10 member panel using a 9-point preference scale where
9= outstanding and 1 = very poor.

² Individual attributes scored:
5 sieve cut: color, appearance, fleshing, texture and flavor
3 sieve whole: color; appearance

TABLE 6: Sensory Quality of Green Beans After Freezing:
Top-Rated Newer Varietal Lines, 1987

<u>Selection</u>	<u>Overall Score¹</u>	<u>Higher Scores for These Attributes²</u>
<u>Round Pod (4+5 Sieve)</u>		
5256	6.6	color; appear., flesh.; text.; flav.
5073	6.5	color; appear.; flesh.; text.; flav.
5090	6.1	color; appear.; flesh.; text
5257	6.0	appear.; flesh.; text.
5097	5.9	color; appear.; text.; flav.
5276	5.9	color; appear.
5061	5.7	flesh.
Easy Pick	5.7	color; flesh.
91G (ref.)	5.9	appear.; text.; flav.
<u>Flat Italian Pod (Mixed Sieve)</u>		
Ro-168	5.7	color; flesh
Roma	5.5	flesh;. text., flav.

NOTES: ¹ 10 member panel using a 9-point scale where 9 = outstanding and 1 = very poor.

² Individual attributes scored: color, appearance, fleshing, texture, and flavor. Higher scores considered 5.9 or above.

TABLE 7. 1987 CANNED GREEN BEAN QUALITY: SELECTED
ADVANCED LINES, HARVEST DATE COMPARISON

Oregon State University, Corvallis, Oregon

Line	Plant Date	1 to 4 Sieve Percent	Harv. Date	Sensory mean Scores, OSU Panel (n = 10) ¹							Sieve 3 whole		Objective Quality ²	
				Sieve 5 Cuts					Color	Appear.	% Seed	% Fiber		
				Overall	Color	Appear.	Flesh.	Text.					Flavor	
5024-1-9		65	7/23	5.9	6.1	6.0	5.6	6.3	6.0	6.2	6.2	4.4	0.007	
		45	7/25	6.0	6.0	5.0	6.8	5.6	6.2	6.2	5.4	5.1	0.007	
		30	7/27	5.0	5.7	5.2	4.3	5.8	6.1	5.9	5.3	5.8	0.010	
5024-1-15		55	7/24	5.7	6.1	6.7	5.1	5.7	6.0	6.6	6.1	3.6	0.009	
		30	7/27	5.6	5.7	5.7	5.4	6.3	5.7	5.7	5.4	6.1	0.009	
5061		55	7/24	5.9	6.3	5.4	5.6	6.4	5.5	6.3	5.8	4.5	0.010	
		35	7/27	5.8	5.4	5.4	6.5	6.0	5.8	5.9	6.1	7.0	0.013	
5090		60	7/25	6.1	6.4	6.4	6.1	6.3	5.9	6.4	6.4	3.8	0.011	
		40	7/27	5.7	5.8	5.5	5.6	6.2	6.1	6.1	5.4	5.7	0.009	
		30	7/29	5.9	6.6	5.7	5.5	6.3	6.1	6.8	5.7	6.3	0.012	
5097		65	7/23	6.1	6.9	6.1	5.3	6.4	6.0	6.6	6.0	5.1	0.013	
		35	7/25	5.4	5.9	5.8	5.3	5.3	5.4	6.1	5.5	6.1	0.012	
		25	7/27	5.6	5.9	5.8	4.9	5.9	5.4	6.1	5.9	9.7	0.017	
5265		70	7/24	6.3	6.4	6.4	5.9	6.6	6.4	6.9	6.6	(3.8)	(0.009)	
		45	7/27	6.5	6.6	6.4	6.1	6.6	6.3	6.7	6.7	6.1	0.013	
		40	7/29	5.9	6.3	5.9	5.4	6.0	6.1	6.1	5.9	8.7	0.013	
5256		65	7/25	5.6	6.0	5.9	5.4	5.5	5.6	6.3	6.2	4.8	0.011	
		45	7/27	5.6	6.4	5.4	5.9	5.4	6.0	6.6	5.5	8.0	0.014	
		35	7/29	5.4	6.0	5.3	5.4	5.6	5.8	5.7	5.8	8.7	0.012	
5075		50	7/27	5.4	5.1	5.3	5.7	6.5	5.7	4.9	4.7	3.8	0.009	
		40	7/29	5.8	5.5	5.4	6.1	6.1	6.1	5/8	5/0	6.4	0.009	
		20	7/31	5.5	5.7	5.2	6.0	5.6	5.7	6.1	5.1	7.3	0.010	
5024-1-10		60	7/24	5.4	5.7	5.1	5.7	5.4	5.7	6.3	5.4	3.4	0.010	
		30	7/27	5.3	5.7	4.7	4.9	6.3	6.1	6.4	5.6	6.4	0.010	
5073		50	7/24	5.7	5.8	6.0	5.5	5.6	6.0	6.3	5.1	5.1	0.012	
		35	7/27	5.5	5.9	5.4	5.1	5.6	5.6	5.9	5.4	6.7	0.015	
5163		65	7/25	5.7	6.3	6.0	4.8	5.8	5.7	6.1	6.4	6.1	0.015	
		45	7/27	6.5	6.5	6.5	6.8	6.2	6.4	6.5	6.3	8.0	0.012	
		35	7/31	5.4	5.5	5.7	5.7	5.3	5.5	5.7	6.5	12.0	0.016	
91G		60	7/23	5.9	6.0	5.7	6.4	5.9	5.8	6.8	6.7	4.9	0.011	
		45	7/25	5.9	5.9	5.9	5.8	6.2	6.2	5.8	6.4	5.3	0.013	
		30	7/27	5.6	5.5	5.7	5.8	6.0	6.0	5.4	5.8	6.9	0.014	

NOTES: ¹ Panel of 10 members. 9 point scoring scale where 9 = outstanding, 5 = average acceptable, 1 = very poor.

² % seed and % fiber values not in brackets represent 6 sieve pods; those in brackets represent 5 sieve pods. Beans with fiber content exceeding 0.15% are substandard by FDA, while a fiber content above 0.08% may be objectionable to some consumers.

Fig. 1 YIELD PATTERN, APRIL 23 PLANTING

— Non-adjusted yield - - - Adjusted yield -+--+ Z 1-4 Sieve

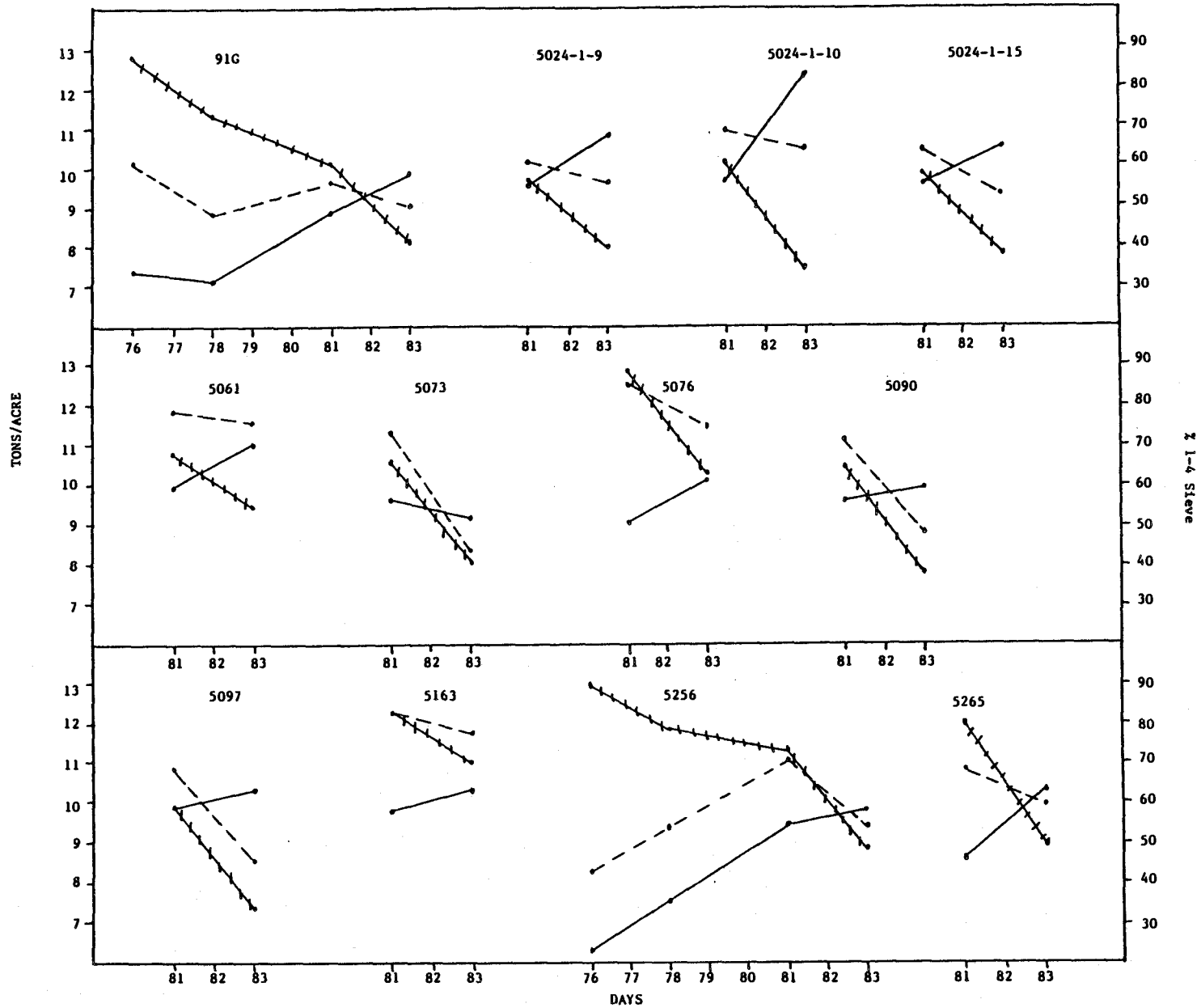
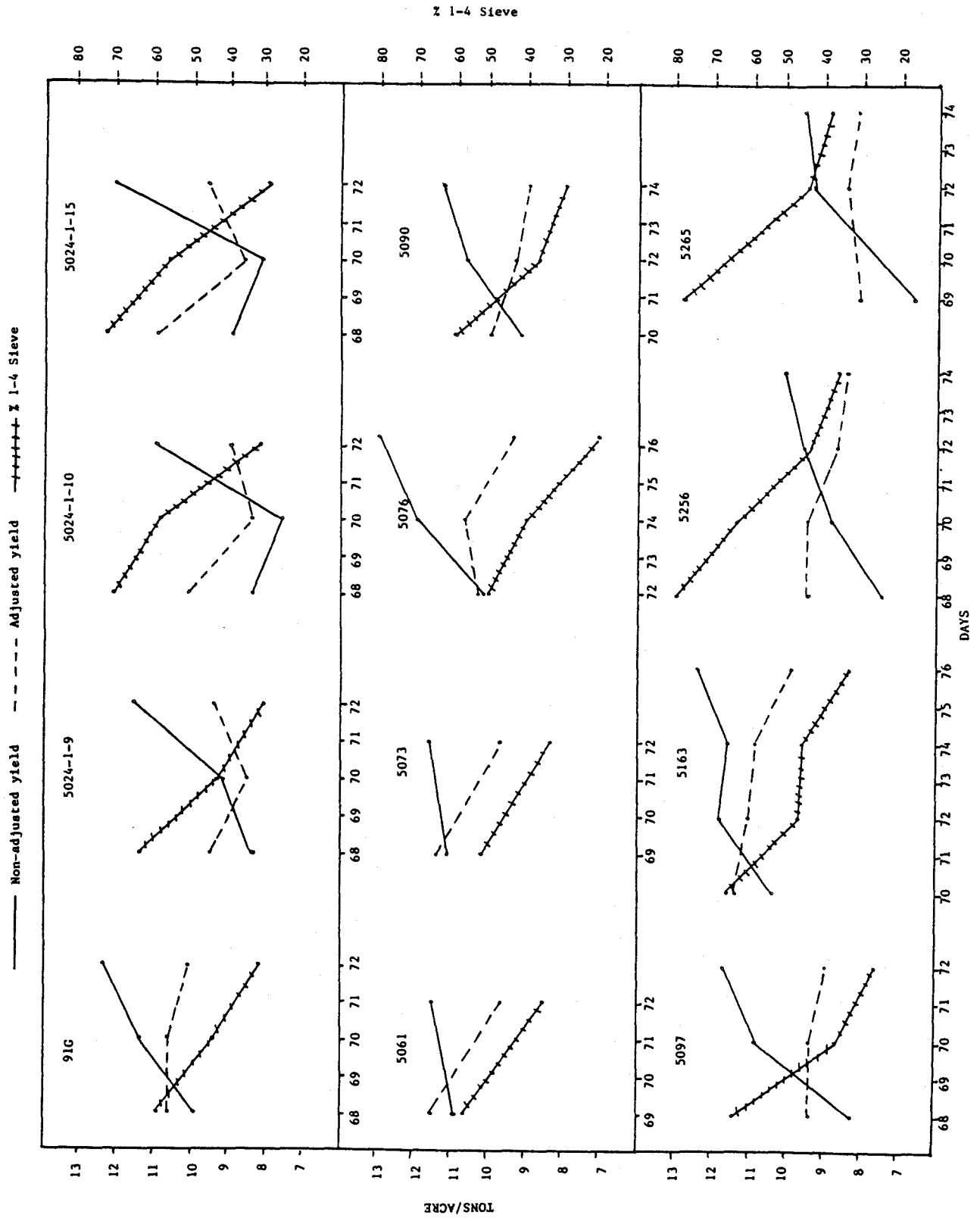


Fig. 2 YIELD PATTERNS, MAY 15 PLANTING



1-4 Sieve

TONS/ACRE

DAYS

Fig. 3 YIELD PATTERN, JUNE 9 PLANTING

— Non-adjusted yield - - - Adjusted yield -+--+ X 1-4 Sieve

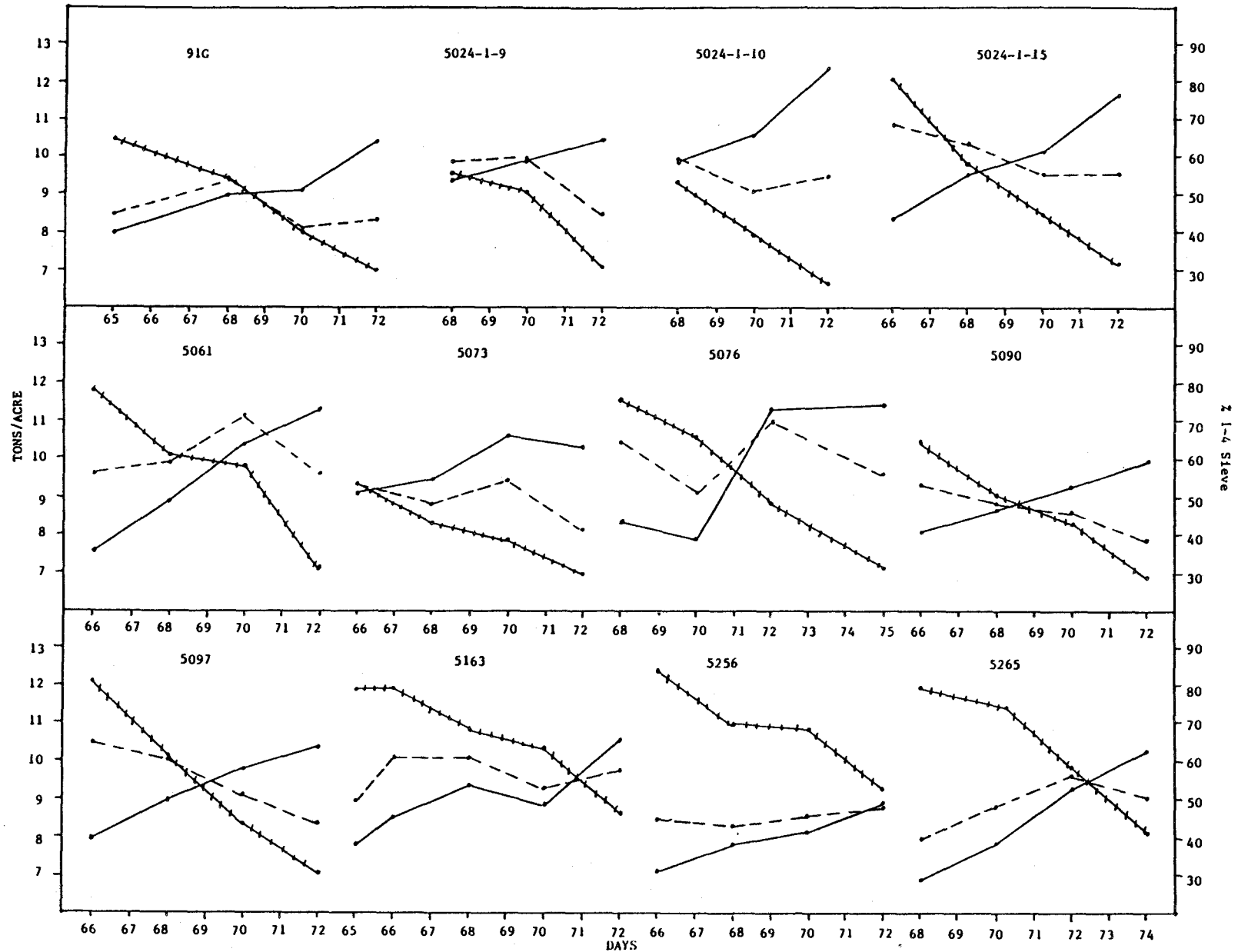


Fig. 4 YIELD PATTERN, JUNE 19 PLANTING

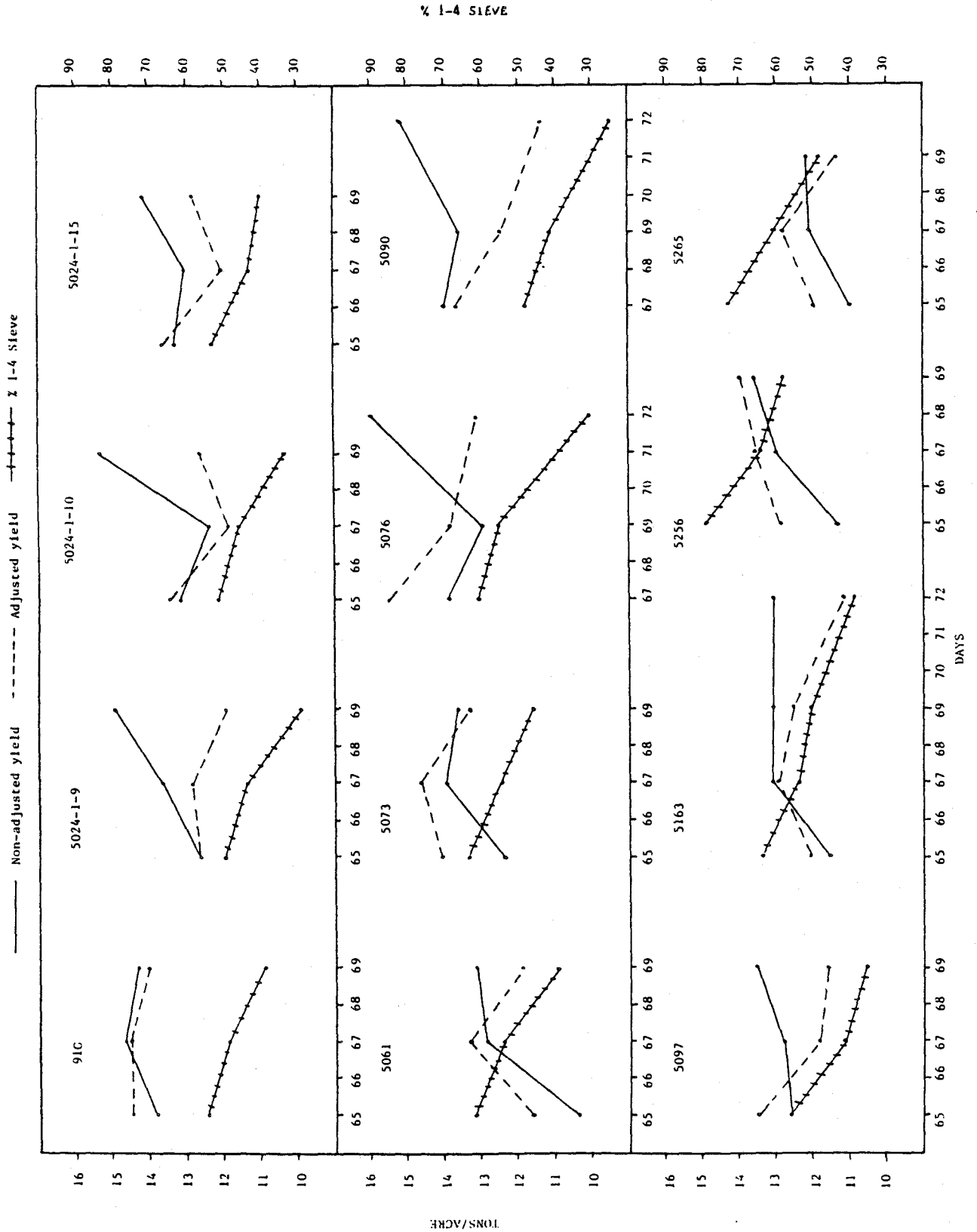


Fig. 5 YIELD PATTERN, JUNE 29 PLANTING

