

**Supplemental Report to the Oregon Processed Vegetable Commission  
1998-1999**

**Processing and Quality Evaluation of Experimental Green Beans**

<b><u>Title</u></b>	Green Bean Breeding and Evaluation
<b><u>Project Leaders</u></b>	Brian Yorgey, Food Science and Technology Dan Farkas, Food Science and Technology Jim Myers, Horticulture
<b><u>Project Dates</u></b>	July 1, 1998 - June 30, 1999
<b><u>Project Funding</u></b>	\$ 10,113

Processing funds were used for labor and supplies for processing of experimental beans, laboratory and data analysis, and industry evaluation.

**Objectives**

The general objective of the processing component of this research is to support the green bean breeding program being carried out by Dr. Jim Myers in the Horticulture Department. The specific objectives are:

- A. To provide Dr. Myers and the Oregon vegetable processing industry with frozen and canned samples of experimental green bean lines for comparison to varieties currently grown in Oregon,
- B. To organize and conduct the industry cutting for evaluation of experimental beans, including data analysis, and
- C. To analyze processed selections and varieties for objective quality characteristics.

**Report of Progress**

During the 1998 season, a total of thirty-nine green bean selections and varieties were canned and frozen in the Food Science Pilot Plant from five field trials planted at the OSU Horticulture Vegetable Farm. Eleven experimental OSU standard sieve beans were processed along with Oregon 91G and Oregon 54 as standards. Ten OSU experimental small sieve beans with Minuette and Medinah as commercial standards were harvested and processed. Twelve commercial selections were evaluated in the commercial trial.

Green Bean Varieties and Selections Processed in 1997

TYPE	VARIETY OR SELECTION	SOURCE
Standard Sieve	Oregon 91G	OR / OSU
	Oregon 54	OR / OSU
	5416	OSU
	5630	OSU
	5635	OSU
	5640	OSU
	5641	OSU
	5643	OSU
	5644	OSU
	5651	OSU
	5669	OSU
	5681	OSU
	5698	OSU
Small Sieve	Minuette	Harris Moran
	Medinah	Novartis
	5446	OSU
	5600	OSU
	5613	OSU
	5736	OSU
	5747	OSU
	5802	OSU
	5803	OSU
	5804	OSU
	5813	OSU
5814	OSU	
Commercial	HMX 5991	Harris Moran
	EX 378	Seminis
	SB 4218	Novartis
	FM 683	Ferry Morse
	PV 622	Crites-Moscow
	FM 680	Ferry Morse
	PV 623	Crites-Moscow
	SB 4124	Novartis
	SV 399	Seminis
	SV 401	Seminis
	SV 402	Seminis
SB 4178	Novartis	

## **Industry Evaluation**

The industry evaluation was held in February, 1999. Frozen samples were rated for color, straightness, smoothness, pod length, and overall quality. Canned samples were rated for color, straightness, smoothness, flavor, and overall quality. The rating scale ranged from 1 (totally unacceptable) to 9 (superior). Results were analyzed using the Friedman Analysis of Rank method to determine mean rankings and the Wilcoxin Signed Rank method to identify specific statistically significant differences. Both of these statistical tests yield values for the probability that there is no difference in the sets of data being compared. A "p" value of 1 means that it is a statistical certainty that there is no difference. A "p" value below .05 denotes a statistically significant difference at the 95% confidence limit.

### **Results - Standard Sieve**

**Color:** The Friedman analysis shows that there were significant differences in color scores among the standard sieve beans for both frozen and canned samples. For frozen samples, 91G was rated better than any other bean, though 5630, 54, 5669, and 5416 were not statistically different. Canned samples showed a similar pattern with 91G rated highest though not statistically different from 5643, 5630, 5641, and 5669.

**Straightness:** The Friedman analysis shows significance among frozen and canned samples. For frozen samples, 5416 was rated highest with 5640 close behind. Statistically, 5651, 5669, 54, 5635, 91G and 5644 were rated with 5416 and 5640. For canned samples, 91G was rated highest with only 54 close enough to show no statistical difference.

**Smoothness:** The Friedman analysis shows significance for frozen and canned samples. For frozen samples, 5669 was rated highest, followed by 5640, 5416, 5651, 54 and 5635 showing no statistical difference. For canned samples, 91G was rated highest with 5651 and 5635 showing no statistical difference.

**Pod Length (frozen only):** The Friedman analysis shows significance for frozen samples. 54 and 5416 were ranked highest with 91G, 5669, 5630, 5643, 5651 and 5698 lower but not significantly different.

**Flavor (canned only):** The p value from the Friedman analysis is slightly too high to indicate statistical significance for canned flavor. The Wilcoxin analysis shows 5651 and 5643 rated higher than the other samples.

**Overall Quality:** The Friedman test show significance for both frozen and canned samples. For frozen samples, 54, 5416, 91G and 5651 were all rated highly with 5669, 5640, 5630 and 5635 all showing no statistical difference from the higher group. For canned samples, 5651 was rated highest, followed by 5643, 5698, 5635, 5630 and 5641 showing no statistical difference.

## **Results - Small Sieve**

**Color:** Significant differences were detected among frozen and canned samples. For frozen samples 5747 was ranked highest. All the remaining lines were statistically similar except for Minuette and 5814. For the canned samples, 5446 and 5747 were ranked highest, followed by 5813, 5600, 5803 and 5814 showing no statistical difference. Minuette and 5802 were on the significance border.

**Straightness:** The Friedman analysis shows significant differences among frozen samples but not the canned. For the frozen samples, 5613 and 5600 were ranked highest, followed by Medinah showing no statistical difference. The only significance shown by the Wilcoxin analysis for the canned samples was that 5814, Minuette, Medinah and 5747 were rated statistically higher than 5600.

**Smoothness:** The Friedman analysis shows significant differences among the frozen and canned samples. For frozen samples Medinah was rated highest with, 5600, Minuette and 5613 showing no statistical difference. For canned samples, Medinah was rated highest by far, followed by only Minuette showing no statistical difference.

**Pod Length (frozen only):** The Friedman analysis shows significant differences among the frozen samples. 5613 was rated highest, followed by 5600 and Medinah showing no statistical difference.

**Flavor (canned only):** The Friedman analysis shows significant differences among the canned samples. Medinah was rated highest, followed by 5613, Minuette and 5600 showing no statistical difference.

**Overall Quality:** The Friedman analysis shows significance for frozen and canned samples. For frozen samples 5613 was rated highest, followed by 5600 and Medinah showing no statistical difference. For canned samples, Medinah was rated highest, followed by Minuette, 5613 and 5600 showing no statistical difference.

## **Results - Commercial Lines**

**Color:** The Friedman analysis shows significant differences among the frozen and canned samples. For frozen samples SB 4218 and HMX 5991 were ranked highest, followed by EX 378, SB 4178, SV 402, FM 680 and FM 683. For the canned samples, SB 4218 was ranked highest. Only SB 4124 and PV 622 were rated statistically lower.

**Straightness:** The Friedman analysis shows significant differences among frozen and canned samples. For the frozen samples, HMX 5991 was rated significantly higher than any other line. For the canned samples, Ex 378 was rated highest, followed by SB 4178, HMX 5991, FM 680 and SB 4218 showing no statistical difference.

**Smoothness:** The Friedman analysis shows significant differences among the frozen and canned samples. For frozen samples, HMX 5991 and SB 4218 were rated highest. For canned samples, EX 378 was rated highest, followed by SB 4178, HMX 5991 and SB 4218 showing no statistical difference.

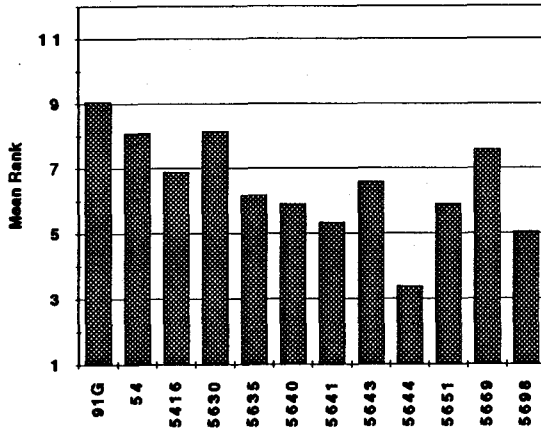
**Pod Length (frozen only):** The Friedman analysis shows significant differences among the frozen samples. SB 4218 was rated highest, followed by HMX 5991 showing no statistical difference.

**Flavor (canned only):** The Friedman analysis shows significant differences among the canned samples. EX 378 was rated highest, followed by HMX 5991, SB 4178 and PV 623 showing no statistical difference.

**Overall Quality:** The Friedman analysis shows significance for frozen and canned samples. For frozen samples HMX 5991 was rated highest by far, followed by SB 4218 showing no statistical difference. For canned samples, HMX 5991 was again rated highest, followed by EX 378 and PV 623 showing no statistical difference.

# 1998 Standard Sieve Green Beans - Frozen

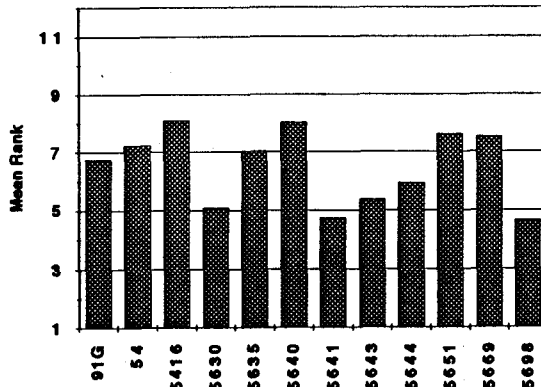
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

Mean Rank	
91G	9.1
5630	8.1
54	8.1
5669	7.6
5416	6.9
5643	6.6
5635	6.2
5640	5.9
5651	5.9
5641	5.3
5698	5.0
5644	3.4

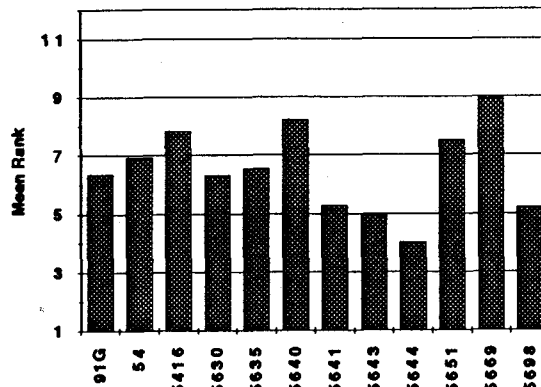
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0009$

Mean Rank	
5416	8.1
5640	8.0
5651	7.6
5669	7.5
54	7.2
5635	7.0
91G	6.8
5644	5.9
5643	5.4
5630	5.1
5641	4.7
5698	4.6

SMOOTHNESS

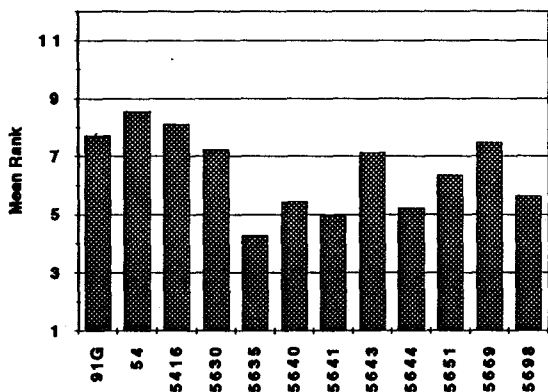


**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

Mean Rank	
5669	8.9
5640	8.2
5416	7.8
5651	7.5
54	6.9
5635	6.5
91G	6.4
5630	6.3
5641	5.3
5698	5.2
5643	4.9
5644	4.0

# 1998 Standard Sieve Green Beans - Frozen

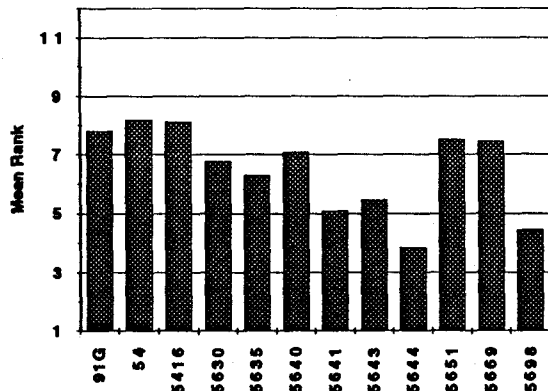
P  
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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

	Mean Rank
54	8.6
5416	8.1
91G	7.7
5669	7.5
5630	7.2
5643	7.1
5651	6.4
5698	5.6
5640	5.4
5644	5.2
5641	4.9
5635	4.3

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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

	Mean Rank
54	8.2
5416	8.1
91G	7.8
5651	7.5
5669	7.4
5640	7.1
5630	6.8
5635	6.3
5643	5.4
5641	5.1
5698	4.4
5644	3.8

# 1998 Green Beans - Standard Sieve, Frozen

## Wilcoxin Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	91G	5630	54	5669	5416	5643	5635	5640	5651	5641	5698	5644
91G	-	.190	.131	.103	.109	.009	.007	.006	.005	.004	.002	.001
5630	.190	-	.596	.578	.498	.215	.041	.036	.032	.010	.011	.001
54	.131	.596	-	.588	.403	.232	.184	.016	.024	.057	.032	.002
5669	.103	.578	.588	-	.961	.610	.245	.174	.203	.190	.048	.022
5416	.109	.498	.403	.961	-	.666	.650	.120	.118	.164	.059	.002
5643	.009	.215	.232	.610	.666	-	.874	.444	.330	.197	.118	.002
5635	.007	.041	.184	.245	.650	.874	-	.305	.359	.310	.164	.007
5640	.006	.036	.016	.174	.120	.444	.305	-	.617	.958	.592	.022
5651	.005	.032	.024	.203	.118	.330	.359	.617	-	.951	.639	.038
5641	.004	.010	.057	.190	.164	.197	.310	.958	.951	-	.772	.005
5698	.002	.011	.032	.048	.059	.118	.164	.592	.639	.772	-	.041
5644	.001	.001	.002	.022	.002	.002	.007	.022	.038	.005	.041	-

### STRAIGHTNESS

	5416	5640	5651	5669	54	5635	91G	5644	5643	5630	5641	5698
5416	-	.810	.356	.381	.154	.437	.253	.065	.021	.002	.027	.012
5640	.810	-	.577	.722	.307	.348	.558	.011	.007	.012	.006	.002
5651	.356	.577	-	.971	.577	.717	.638	.083	.026	.014	.032	.011
5669	.381	.722	.971	-	.887	.835	.695	.327	.187	.020	.217	.127
54	.154	.307	.577	.887	-	.886	.852	.396	.094	.052	.164	.081
5635	.437	.348	.717	.835	.886	-	.819	.334	.020	.136	.132	.039
91G	.253	.558	.638	.695	.852	.819	-	.470	.137	.188	.178	.083
5644	.065	.011	.083	.327	.396	.334	.470	-	.323	.213	.236	.166
5643	.021	.007	.026	.187	.094	.020	.137	.323	-	.685	.958	.958
5630	.002	.012	.014	.020	.052	.136	.188	.213	.685	-	.750	.799
5641	.027	.006	.032	.217	.164	.132	.178	.236	.958	.750	-	1.000
5698	.012	.002	.011	.127	.081	.039	.083	.166	.958	.799	1.000	-



# 1998 Green Beans - Standard Sieve, Frozen

## SMOOTHNESS

	5669	5640	5416	5651	54	5635	91G	5630	5641	5698	5643	5644
5669	-	.335	.291	.334	.169	.120	.018	.008	.061	.032	.039	.006
5640	.335	-	.828	.799	.502	.323	.217	.078	.065	.027	.058	.001
5416	.291	.828	-	.809	.429	.436	.143	.055	.168	.081	.069	.021
5651	.334	.799	.809	-	.501	.484	.399	.222	.053	.033	.046	.001
54	.169	.502	.429	.501	-	.924	.850	.495	.523	.334	.324	.088
5635	.120	.323	.436	.484	.924	-	.586	.922	.409	.236	.264	.141
91G	.018	.217	.143	.399	.850	.586	-	.829	.413	.193	.109	.067
5630	.008	.078	.055	.222	.495	.922	.829	-	.717	.328	.422	.162
5641	.061	.065	.168	.053	.523	.409	.413	.717	-	.763	.449	.102
5698	.032	.027	.081	.033	.334	.236	.193	.328	.763	-	.658	.165
5643	.039	.058	.069	.046	.324	.264	.109	.422	.449	.658	-	.398
5644	.006	.001	.021	.001	.088	.141	.067	.162	.102	.165	.398	-

## POD LENGTH

	54	5416	91G	5669	5630	5643	5651	5698	5640	5644	5641	5635
54	-	.916	.196	.244	.297	.426	.209	.137	.032	.010	.052	.018
5416	.916	-	.317	.118	.112	.253	.046	.013	.003	.015	.028	.002
91G	.196	.317	-	.617	.903	.823	.347	.070	.085	.143	.176	.028
5669	.244	.118	.617	-	.604	.943	.762	.265	.288	.161	.335	.115
5630	.297	.112	.903	.604	-	.959	.417	.205	.162	.111	.342	.008
5643	.426	.253	.823	.943	.959	-	.821	.131	.070	.055	.099	.077
5651	.209	.046	.347	.762	.417	.821	-	.438	.469	.346	.441	.017
5698	.137	.013	.070	.265	.205	.131	.438	-	.521	.248	.429	.185
5640	.032	.003	.085	.288	.162	.070	.469	.521	-	.755	.892	.424
5644	.010	.015	.143	.161	.111	.055	.346	.248	.755	-	.751	.905
5641	.052	.028	.176	.335	.342	.099	.441	.429	.892	.751	-	.459
5635	.018	.002	.028	.115	.008	.077	.017	.185	.424	.905	.459	-

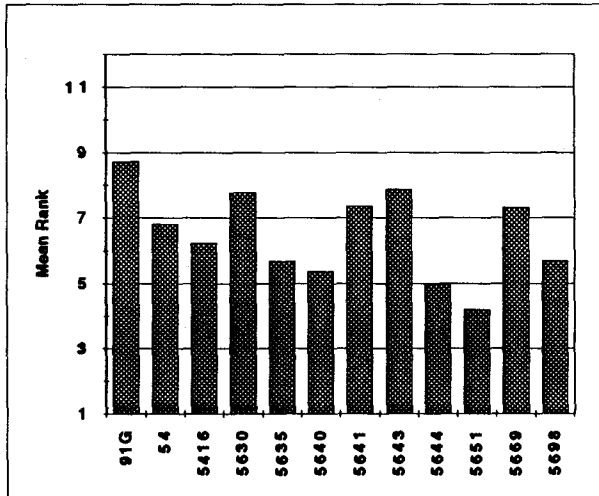
## 1998 Green Beans - Standard Sieve, Frozen

### OVERALL

	54	5416	91G	5651	5669	5640	5630	5635	5643	5641	5698	5644
54	-	.426	.719	.688	.336	.100	.282	.250	.021	.034	.004	.003
5416	.426	-	.811	.373	.362	.063	.070	.140	.007	.013	.002	.002
91G	.719	.811	-	.722	.715	.142	.237	.162	.026	.037	.005	.006
5651	.688	.373	.722	-	.609	.299	.796	.474	.031	.010	.007	.005
5669	.336	.362	.715	.609	-	.778	.874	.703	.225	.202	.099	.051
5640	.100	.063	.142	.299	.778	-	.549	1.000	.107	.138	.035	.013
5630	.282	.070	.237	.796	.874	.549	-	.749	.042	.092	.016	.003
5635	.250	.140	.162	.474	.703	1.000	.749	-	.138	.091	.028	.020
5643	.021	.007	.026	.031	.225	.107	.042	.138	-	.851	.680	.119
5641	.034	.013	.037	.010	.202	.138	.092	.091	.851	-	.579	.225
5698	.004	.002	.005	.007	.099	.035	.016	.028	.680	.579	-	.256
5644	.003	.002	.006	.005	.051	.013	.003	.020	.119	.225	.256	-

# 1998 Standard Sieve Green Beans - Canned

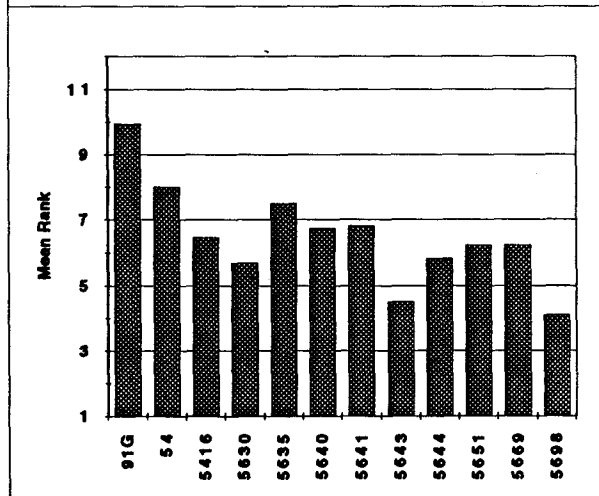
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0038

	Mean Rank
91G	8.7
5643	7.9
5630	7.8
5641	7.4
5669	7.3
54	6.8
5416	6.2
5635	5.7
5698	5.7
5640	5.4
5644	5.0
5651	4.2

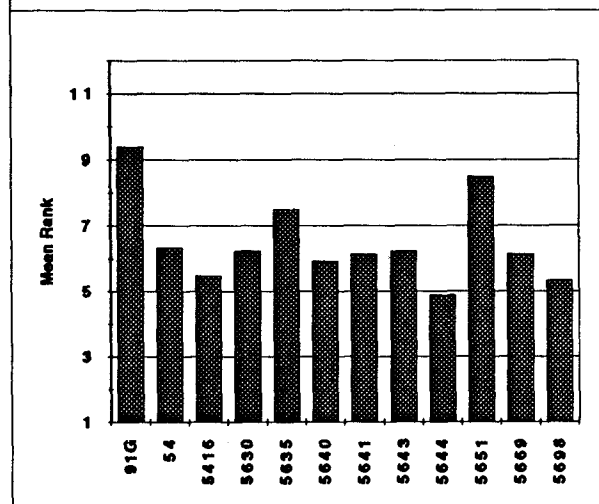
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0011

	Mean Rank
91G	10.0
54	8.0
5635	7.5
5641	6.8
5640	6.7
5416	6.5
5651	6.2
5669	6.2
5644	5.8
5630	5.7
5643	4.5
5698	4.1

SMOOTHNESS

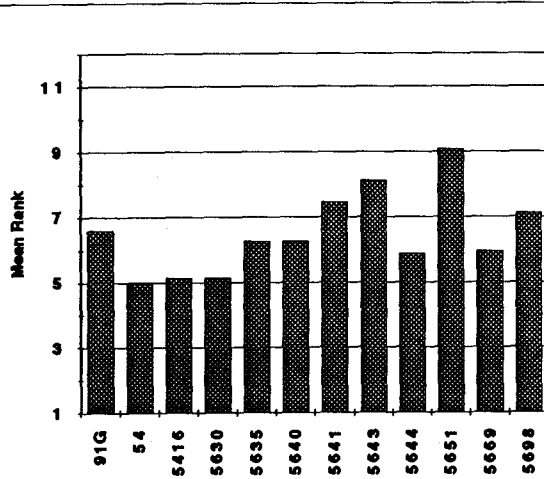


**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0277

	Mean Rank
91G	9.4
5651	8.5
5635	7.5
54	6.3
5630	6.2
5643	6.2
5641	6.1
5669	6.1
5640	5.9
5416	5.5
5698	5.3
5644	4.9

# 1998 Standard Sieve Green Beans - Canned

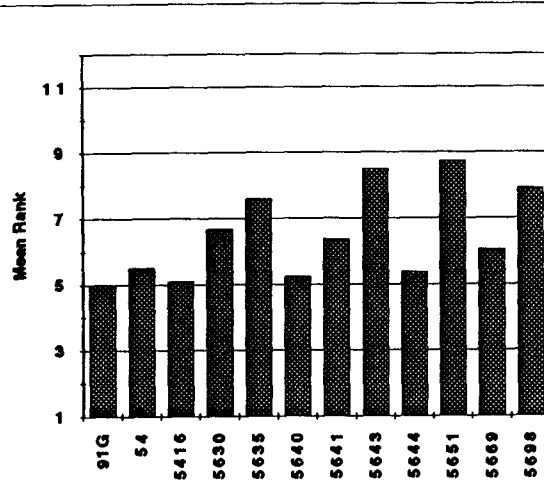
FLAVOR



**Friedman Analysis of Rank**  
 Probability of NO difference among samples  
 $p = .0555$

	Mean Rank
5651	9.1
5643	8.1
5641	7.5
5698	7.1
91G	6.6
5635	6.3
5640	6.3
5669	6.0
5644	5.9
5416	5.1
5630	5.1
54	5.0

OVERALL QUALITY



**Friedman Analysis of Rank**  
 Probability of NO difference among samples  
 $p = .0206$

	Mean Rank
5651	8.7
5643	8.5
5698	7.9
5635	7.6
5630	6.7
5641	6.4
5669	6.0
54	5.5
5644	5.4
5640	5.2
5416	5.1
91G	5.0

# 1998 Green Beans - Standard Sieve, Canned

## Wilcoxon Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	91G	5643	5630	5641	5669	54	5416	5635	5698	5640	5644	5651
91G	-	.395	.131	.141	.260	.038	.039	.042	.034	.026	.018	.010
5643	.395	-	.655	.317	.655	.435	.129	.063	.058	.059	.058	.021
5630	.131	.655	-	.564	.706	.748	.103	.034	.132	.063	.058	.005
5641	.141	.317	.564	-	.706	.783	.180	.046	.103	.059	.160	.020
5669	.260	.655	.706	.706	-	.739	.096	.068	.198	.059	.034	.046
54	.038	.435	.748	.783	.739	-	.257	.301	.480	.103	.305	.132
5416	.039	.129	.103	.180	.096	.257	-	.480	.706	.157	.527	.103
5635	.042	.063	.034	.046	.068	.301	.480	-	1.000	.706	.763	.257
5698	.034	.058	.132	.103	.198	.480	.706	1.000	-	.655	.915	.317
5640	.026	.059	.063	.059	.059	.103	.157	.706	.655	-	1.000	.480
5644	.018	.058	.058	.160	.034	.305	.527	.763	.915	1.000	-	.578
5651	.010	.021	.005	.020	.046	.132	.103	.257	.317	.480	.578	-

### STRAIGHTNESS

	91G	54	5635	5641	5640	5416	5651	5669	5644	5630	5643	5698
91G	-	.140	.027	.027	.017	.027	.011	.016	.010	.007	.007	.007
54	.140	-	.394	.235	.320	.174	.179	.523	.135	.048	.057	.042
5635	.027	.394	-	.462	.457	.336	.103	.943	.129	.190	.048	.026
5641	.027	.235	.462	-	.713	.581	.527	.786	.480	.417	.062	.154
5640	.017	.320	.457	.713	-	.680	.730	.786	.317	.473	.085	.233
5416	.027	.174	.336	.581	.680	-	.942	.322	.706	.590	.096	.285
5651	.011	.179	.103	.527	.730	.942	-	.739	.518	.605	.230	.024
5669	.016	.523	.943	.786	.786	.322	.739	-	.271	.234	.146	.025
5644	.010	.135	.129	.480	.317	.706	.518	.271	-	.931	.103	.332
5630	.007	.048	.190	.417	.473	.590	.605	.234	.931	-	.216	.524
5643	.007	.057	.048	.062	.085	.096	.230	.146	.103	.216	-	.861
5698	.007	.042	.026	.154	.233	.285	.024	.025	.332	.524	.861	-

# 1998 Green Beans - Standard Sieve, Canned

## SMOOTHNESS

	91G	5651	5635	54	5630	5643	5641	5669	5640	5416	5698	5644
91G	-	.160	.120	.020	.055	.020	.012	.038	.016	.016	.020	.010
5651	.160	-	.334	.306	.151	.159	.056	.131	.739	.024	.008	.024
5635	.120	.334	-	.501	.196	.188	.317	.222	.196	.079	.023	.039
54	.020	.306	.501	-	1.000	.852	.783	.861	.668	.414	.381	.168
5630	.055	.151	.196	1.000	-	.783	.763	.832	.903	.482	.732	.414
5643	.020	.159	.188	.852	.783	-	1.000	.832	.666	.651	.480	.387
5641	.012	.056	.317	.783	.763	1.000	-	.861	.739	.414	.381	.450
5669	.038	.131	.222	.861	.832	.832	.861	-	.726	.380	.336	.194
5640	.016	.739	.196	.668	.903	.666	.739	.726	-	.792	.726	.111
5416	.016	.024	.079	.414	.482	.651	.414	.380	.792	-	.706	.832
5698	.020	.008	.023	.381	.732	.480	.381	.336	.726	.706	-	.915
5644	.010	.024	.039	.168	.414	.387	.450	.194	.111	.832	.915	-

## FLAVOR

	5651	5643	5641	5698	91G	5635	5640	5669	5644	5416	5630	54
5651	-	.527	.046	.059	.084	.046	.035	.011	.047	.016	.025	.008
5643	.527	-	.414	.317	.429	.161	.160	.058	.121	.030	.039	.037
5641	.046	.414	-	.706	.581	.234	.180	.103	.167	.058	.101	.035
5698	.059	.317	.706	-	.862	.317	.527	.257	.334	.132	.176	.132
91G	.084	.429	.581	.862	-	.590	.942	.763	.381	.236	.223	.236
5635	.046	.161	.234	.317	.590	-	.706	.782	.589	.480	.317	.317
5640	.035	.160	.180	.527	.942	.706	-	.739	.380	.317	.206	.157
5669	.011	.058	.103	.257	.763	.782	.739	-	.739	.248	.248	.103
5644	.047	.121	.167	.334	.381	.589	.380	.739	-	.887	.763	.783
5416	.016	.030	.058	.132	.236	.480	.317	.248	.887	-	.706	1.000
5630	.025	.039	.101	.176	.223	.317	.206	.248	.763	.706	-	.763
54	.008	.037	.035	.132	.236	.317	.157	.103	.783	1.000	.763	-

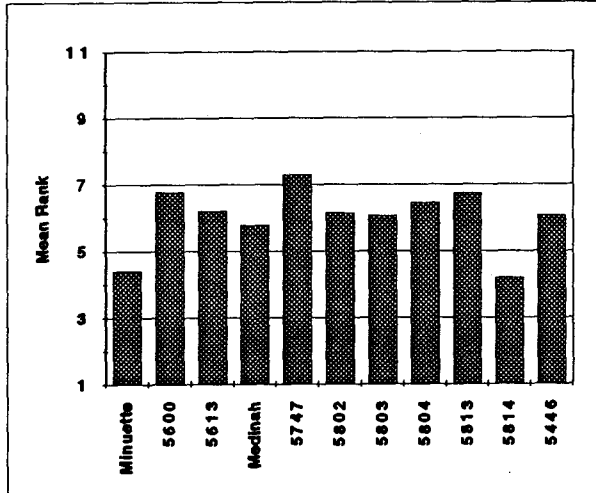
## 1998 Green Beans - Standard Sieve, Canned

### OVERALL

	5651	5643	5698	5635	5630	5641	5669	54	5644	5640	5416	91G
5651	-	.429	.083	.161	.072	.105	.037	.085	.033	.020	.033	.027
5643	.429	-	1.000	.257	.083	.058	.084	.098	.039	.014	.020	.021
5698	.083	1.000	-	.380	.105	.196	.119	.121	.056	.030	.040	.039
5635	.161	.257	.380	-	.129	.366	.236	.176	.084	.084	.034	.066
5630	.072	.083	.105	.129	-	.706	.942	.559	.414	.414	.429	.212
5641	.105	.058	.196	.366	.706	-	1.000	.317	.257	.180	.234	.163
5669	.037	.084	.119	.236	.942	1.000	-	.546	.558	.380	.292	.206
54	.085	.098	.121	.176	.559	.317	.546	-	.891	1.000	.861	.739
5644	.033	.039	.056	.084	.414	.257	.558	.891	-	1.000	.792	.671
5640	.020	.014	.030	.084	.414	.180	.380	1.000	1.000	-	.739	.527
5416	.033	.020	.040	.034	.429	.234	.292	.861	.792	.739	-	.527
91G	.027	.021	.039	.066	.212	.163	.206	.739	.671	.527	.527	-

# 1998 Small Sieve Green Beans - Frozen

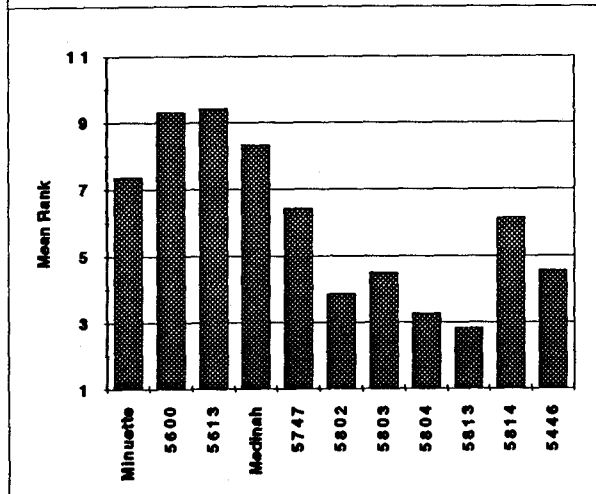
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0279$

	Mean Rank
5747	7.3
5600	6.8
5813	6.7
5804	6.4
5613	6.2
5802	6.1
5803	6.1
5446	6.1
Medinah	5.8
Minuette	4.4
5814	4.2

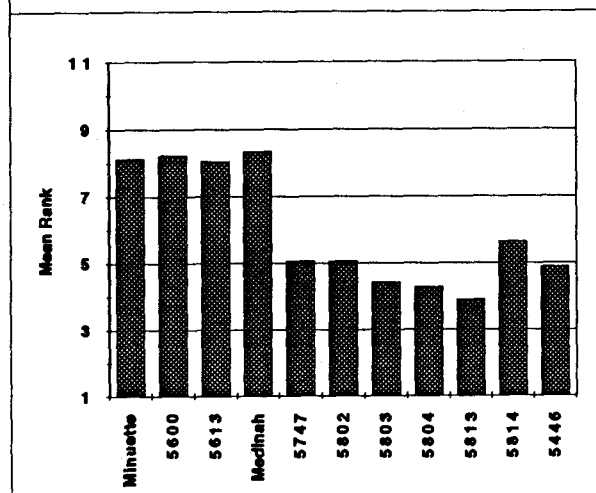
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

	Mean Rank
5613	9.4
5600	9.3
Medinah	8.3
Minuette	7.4
5747	6.4
5814	6.1
5446	4.6
5803	4.5
5802	3.9
5804	3.3
5813	2.8

SMOOTHNESS



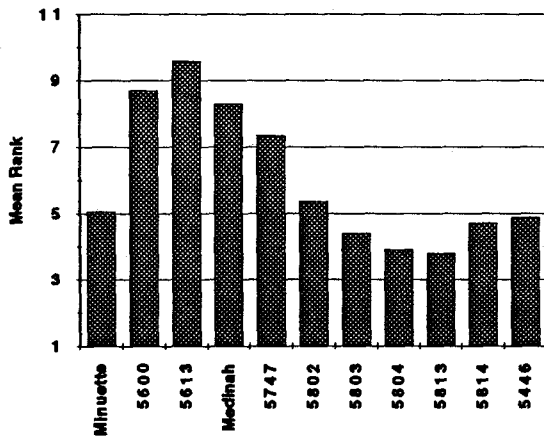
**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

	Mean Rank
Medinah	8.3
5600	8.2
Minuette	8.1
5613	8.1
5814	5.6
5747	5.1
5802	5.1
5446	4.9
5803	4.4
5804	4.3
5813	3.9



# 1998 Small Sieve Green Beans - Frozen

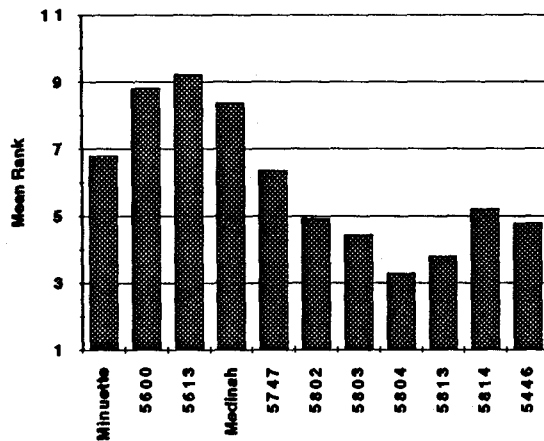
P  
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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

	Mean Rank
5613	9.6
5600	8.7
Medinah	8.3
5747	7.3
5802	5.4
Minuette	5.1
5446	4.9
5814	4.7
5803	4.4
5804	3.9
5813	3.8

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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

	Mean Rank
5613	9.2
5600	8.8
Medinah	8.4
Minuette	6.8
5747	6.3
5814	5.2
5802	4.9
5446	4.8
5803	4.4
5813	3.8
5804	3.3

# 1998 Green Beans - Small Sieve, Frozen

## Wilcoxin Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	5747	5600	5813	5804	5613	5802	5803	5446	Medlnah	Minuette	5814
5747	-	.711	.935	.717	.360	.236	.236	.096	.158	.018	.024
5600	.711	-	.782	.782	.405	.235	.427	.459	.176	.013	.007
5813	.935	.782	-	.951	.642	.349	.598	.451	.405	.027	.027
5804	.717	.782	.951	-	.744	.473	.280	.501	.409	.011	.046
5613	.360	.405	.642	.744	-	.716	.838	.819	.632	.053	.058
5802	.236	.235	.349	.473	.716	-	.951	.951	.748	.026	.068
5803	.236	.427	.598	.280	.838	.951	-	1.000	.500	.070	.084
5446	.096	.459	.451	.501	.819	.951	1.000	-	.432	.160	.068
Medlnah	.158	.176	.405	.409	.632	.748	.500	.432	-	.258	.270
Minuette	.018	.013	.027	.011	.053	.026	.070	.160	.258	-	.952
5814	.024	.007	.027	.046	.058	.068	.084	.068	.270	.952	-

### STRAIGHTNESS

	5613	5600	Medlnah	Minuette	5747	5814	5446	5803	5802	5804	5813
5613	-	.855	.310	.051	.002	.005	.000	.000	.001	.000	.000
5600	.855	-	.334	.032	.001	.003	.000	.000	.000	.000	.000
Medlnah	.310	.334	-	.172	.003	.003	.002	.001	.000	.000	.001
Minuette	.051	.032	.172	-	.066	.030	.014	.003	.002	.001	.001
5747	.002	.001	.003	.066	-	.803	.046	.011	.007	.001	.002
5814	.005	.003	.003	.030	.803	-	.144	.064	.007	.005	.003
5446	.000	.000	.002	.014	.046	.144	-	.480	.458	.058	.020
5803	.000	.000	.001	.003	.011	.064	.480	-	.732	.107	.029
5802	.001	.000	.000	.002	.007	.007	.458	.732	-	.083	.059
5804	.000	.000	.000	.001	.001	.005	.058	.107	.083	-	.627
5813	.000	.000	.001	.001	.002	.003	.020	.029	.059	.627	-

# 1998 Green Beans - Small Sieve, Frozen

## SMOOTHNESS

	Medlnah	5600	Minuette	5613	5814	5747	5802	5446	5803	5804	5813
Medlnah	-	.513	.209	.765	.004	.000	.001	.001	.001	.001	.001
5600	.513	-	.521	.780	.023	.009	.010	.002	.001	.001	.001
Minuette	.209	.521	-	.502	.013	.004	.013	.003	.001	.000	.000
5613	.765	.780	.502	-	.047	.003	.015	.002	.002	.005	.002
5814	.004	.023	.013	.047	-	.248	.429	.167	.064	.047	.017
5747	.000	.009	.004	.003	.248	-	.471	.926	.658	.637	.349
5802	.001	.010	.013	.015	.429	.471	-	.558	.499	.248	.279
5446	.001	.002	.003	.002	.167	.926	.558	-	.527	.429	.248
5803	.001	.001	.001	.002	.064	.658	.499	.527	-	.773	.417
5804	.001	.001	.000	.005	.047	.637	.248	.429	.773	-	.493
5813	.001	.001	.000	.002	.017	.349	.279	.248	.417	.493	-

## POD LENGTH

	5613	5600	Medlnah	5747	5802	Minuette	5446	5814	5803	5804	5813
5613	-	.033	.245	.004	.001	.000	.000	.001	.000	.001	.001
5600	.033	-	.638	.065	.001	.001	.001	.001	.000	.000	.000
Medlnah	.245	.638	-	.031	.002	.003	.003	.002	.000	.001	.002
5747	.004	.065	.031	-	.007	.010	.003	.004	.001	.002	.006
5802	.001	.001	.002	.007	-	.971	.429	.285	.166	.068	.073
Minuette	.000	.001	.003	.010	.971	-	.294	.577	.334	.128	.161
5446	.000	.001	.003	.003	.429	.294	-	.793	.782	.471	.349
5814	.001	.001	.002	.004	.285	.577	.793	-	.763	.305	.378
5803	.000	.000	.000	.001	.166	.334	.782	.763	-	.206	.285
5804	.001	.000	.001	.002	.068	.128	.471	.305	.206	-	1.000
5813	.001	.000	.002	.006	.073	.161	.349	.378	.285	1.000	-

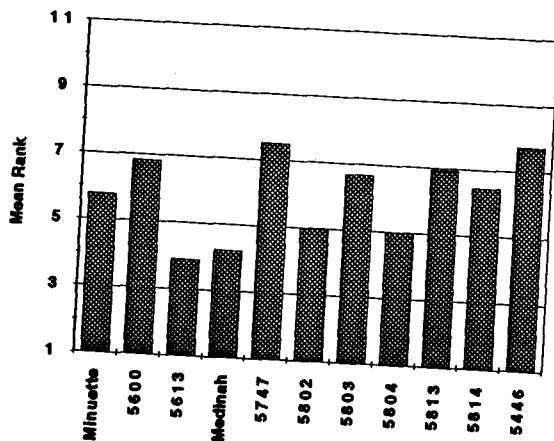
# 1998 Green Beans - Small Sieve, Frozen

## OVERALL

	5613	5600	Medinah	Minuette	5747	5814	5802	5446	5803	5813	5804
5613	-	.170	.352	.005	.001	.001	.001	.000	.000	.001	.000
5600	.170	-	.405	.039	.006	.003	.001	.000	.000	.000	.000
Medinah	.352	.405	-	.023	.005	.004	.001	.001	.001	.001	.001
Minuette	.005	.039	.023	-	.522	.046	.023	.049	.011	.004	.001
5747	.001	.006	.005	.522	-	.192	.075	.072	.024	.011	.012
5814	.001	.003	.004	.046	.192	-	.651	.720	.398	.013	.015
5802	.001	.001	.001	.023	.075	.651	-	.856	.434	.036	.025
5446	.000	.000	.001	.049	.072	.720	.856	-	.500	.145	.075
5803	.000	.000	.001	.011	.024	.398	.434	.500	-	.218	.063
5813	.001	.000	.001	.004	.011	.013	.036	.145	.218	-	.809
5804	.000	.000	.001	.001	.012	.015	.025	.075	.063	.809	-

# 1998 Small Sieve Green Beans - Canned

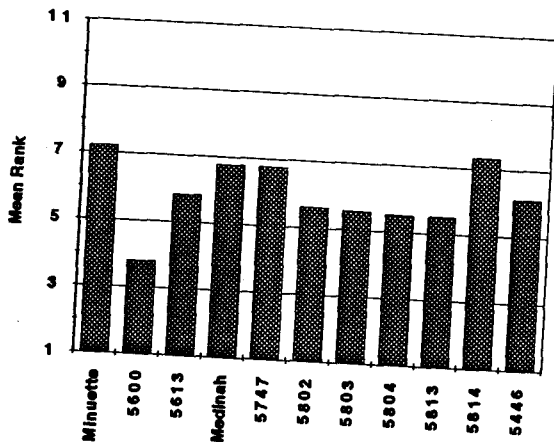
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0186$

	Mean Rank
5446	7.7
5747	7.5
5813	6.9
5600	6.6
5803	6.7
5814	6.4
Minuette	5.8
5802	5.0
5804	5.0
Medinah	4.2
5613	3.9

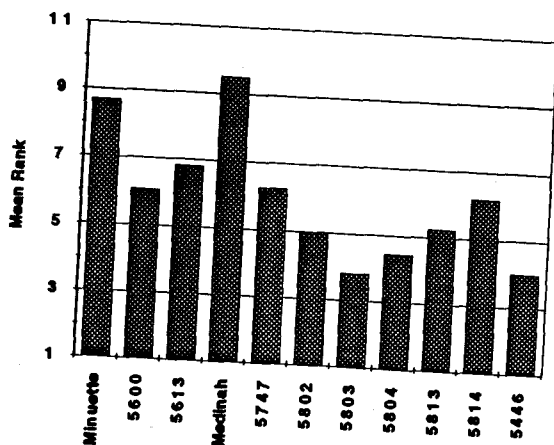
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .321$

	Mean Rank
5814	7.3
Minuette	7.2
Medinah	6.8
5747	6.8
5446	6.1
5613	5.8
5802	5.6
5803	5.6
5804	5.5
5813	5.5
5800	3.8

SMOOTHNESS

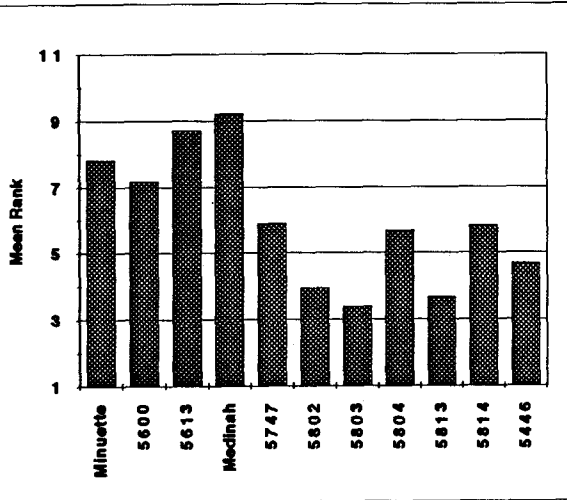


**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0002$

	Mean Rank
Medinah	9.5
Minuette	8.7
5613	6.8
5747	6.3
5814	6.2
5600	6.1
5813	5.3
5802	5.0
5804	4.4
5446	4.0
5803	3.8

# 1998 Small Sieve Green Beans - Canned

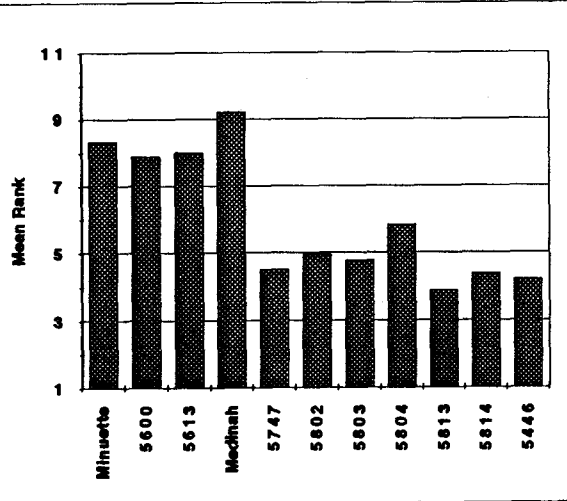
FLAVOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

	Mean Rank
Medinah	9.2
5613	8.7
Minuette	7.8
5600	7.2
5747	5.9
5814	5.8
5804	5.7
5446	4.7
5802	3.9
5813	3.7
5803	3.4

OVERALL QUALITY



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

	Mean Rank
Medinah	9.2
Minuette	8.3
5613	8.0
5600	7.9
5804	5.8
5802	4.9
5803	4.8
5747	4.5
5814	4.4
5446	4.2
5813	3.9

# 1998 Green Beans - Small Sieve, Canned

## Wilcoxon Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	5446	5747	5813	5600	5803	5814	Minuette	5802	5804	Medinah	5613
5446	-	.739	.083	.655	.317	.317	.059	.063	.034	.030	.023
5747	.739	-	.578	.914	.462	.739	.234	.129	.084	.071	.088
5813	.083	.578	-	.414	.655	.706	.414	.257	.046	.058	.068
5600	.655	.914	.414	-	.739	.564	.206	.059	.046	.046	.024
5803	.317	.462	.655	.739	-	1.000	.783	.180	.317	.238	.085
5814	.317	.739	.706	.564	1.000	-	.408	.103	.083	.053	.023
Minuette	.059	.234	.414	.206	.783	.408	-	.706	.480	.395	.206
5802	.063	.129	.257	.059	.180	.103	.706	-	1.000	.429	.194
5804	.034	.084	.046	.046	.317	.083	.480	1.000	-	.317	.103
Medinah	.030	.071	.058	.046	.238	.053	.395	.429	.317	-	1.000
5613	.023	.088	.068	.024	.085	.023	.206	.194	.103	1.000	-

### STRAIGHTNESS

	5814	Minuette	Medinah	5747	5446	5613	5802	5803	5804	5813	5600
5814	-	.726	.763	.414	.131	.288	.238	.429	.157	.099	.020
Minuette	.726	-	.726	1.000	.114	.257	.236	.157	.131	.131	.042
Medinah	.763	.726	-	.655	.262	.206	.206	.257	.257	.144	.026
5747	.414	1.000	.655	-	.271	.471	.317	.589	.257	.077	.014
5446	.131	.114	.262	.271	-	.792	.773	.915	.739	.579	.262
5613	.288	.257	.206	.471	.792	-	1.000	1.000	.854	.726	.131
5802	.238	.236	.206	.317	.773	1.000	-	.739	1.000	.490	.034
5803	.429	.157	.257	.589	.915	1.000	.739	-	1.000	1.000	.109
5804	.157	.131	.257	.257	.739	.854	1.000	1.000	-	.739	.129
5813	.099	.131	.144	.077	.579	.726	.490	1.000	.739	-	.336
5600	.020	.042	.026	.014	.262	.131	.034	.109	.129	.336	-

# 1998 Green Beans - Small Sieve, Canned

## SMOOTHNESS

	Medinah	Minuette	5613	5747	5814	5600	5813	5802	5804	5446	5803
Medinah	-	.103	.014	.014	.014	.014	.010	.017	.010	.017	.011
Minuette	.103	-	.025	.059	.059	.084	.014	.008	.014	.009	.009
5613	.014	.025	-	1.000	1.000	.792	.157	.059	.157	.020	.034
5747	.014	.059	1.000	-	1.000	.655	.059	.096	.096	.058	.034
5814	.014	.059	1.000	1.000	-	.783	.103	.059	.157	.058	.034
5600	.014	.084	.792	.655	.783	-	.157	.336	.103	.131	.103
5813	.010	.014	.157	.059	.103	.157	-	1.000	.564	.414	.317
5802	.017	.008	.059	.096	.059	.336	1.000	-	.783	.157	.317
5804	.010	.014	.157	.096	.157	.103	.564	.783	-	.706	.564
5446	.017	.009	.020	.058	.058	.131	.414	.157	.706	-	1.000
5803	.011	.009	.034	.034	.034	.103	.317	.317	.564	1.000	-

## FLAVOR

	Medinah	5613	Minuette	5600	5747	5814	5804	5446	5802	5813	5803
Medinah	-	.257	.471	.157	.015	.033	.026	.011	.014	.011	.011
5613	.257	-	1.000	.739	.023	.071	.024	.016	.011	.011	.011
Minuette	.471	1.000	-	.706	.038	.071	.071	.020	.010	.017	.026
5600	.157	.739	.706	-	.059	.086	.129	.046	.026	.026	.041
5747	.015	.023	.038	.059	-	.725	.739	.190	.034	.059	.041
5814	.033	.071	.071	.086	.725	-	.655	.160	.188	.014	.058
5804	.026	.024	.071	.129	.739	.655	-	.234	.157	.034	.066
5446	.011	.016	.020	.046	.190	.160	.234	-	.886	.706	.395
5802	.014	.011	.010	.026	.034	.188	.157	.886	-	.706	.180
5813	.011	.011	.017	.026	.059	.014	.034	.706	.706	-	.414
5803	.011	.011	.026	.041	.041	.058	.066	.395	.180	.414	-



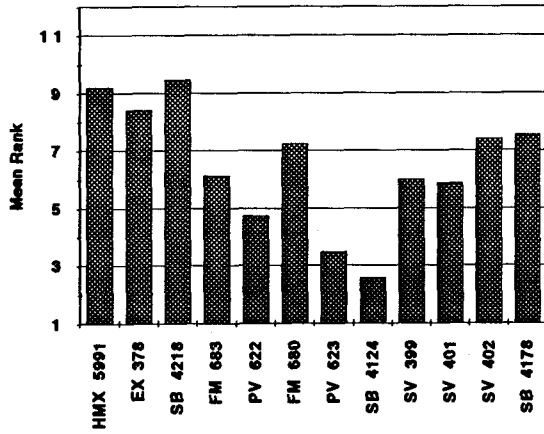
# 1998 Green Beans - Small Sieve, Canned

## OVERALL

	Medinah	Minuette	5613	5600	5804	5802	5803	5747	5814	5446	5813
Medinah	-	.157	.109	.157	.017	.011	.018	.007	.007	.010	.007
Minuette	.157	-	.590	1.000	.043	.011	.016	.007	.011	.012	.007
5613	.109	.590	-	.706	.167	.031	.058	.015	.007	.027	.014
5600	.157	1.000	.706	-	.074	.026	.048	.020	.016	.027	.011
5804	.017	.043	.167	.074	-	.480	.257	.334	.317	.132	.131
5802	.011	.011	.031	.026	.480	-	.462	.739	1.000	.234	.157
5803	.018	.016	.058	.048	.257	.462	-	.527	.726	.655	.914
5747	.007	.007	.015	.020	.334	.739	.527	-	.706	.190	.131
5814	.007	.011	.007	.016	.317	1.000	.726	.706	-	.271	.206
5446	.010	.012	.027	.027	.132	.234	.655	.190	.271	-	1.000
5813	.007	.007	.014	.011	.131	.157	.914	.131	.206	1.000	-

# 1998 Commercial Green Beans - Frozen

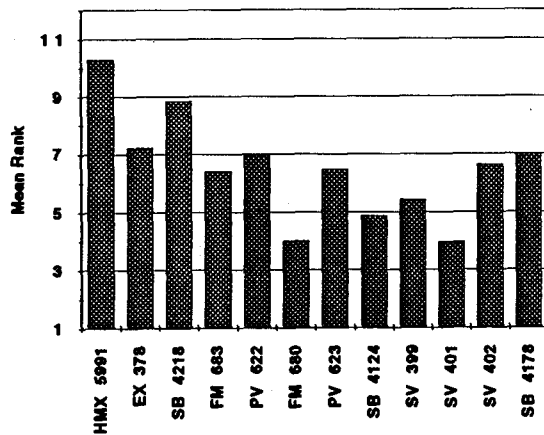
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

Sample	Mean Rank
SB 4218	9.5
HMX 5991	9.2
EX 378	8.4
SB 4178	7.5
SV 402	7.4
FM 680	7.2
FM 683	6.1
SV 399	6.0
SV 401	5.9
PV 622	4.7
PV 623	3.5
SB 4124	2.6

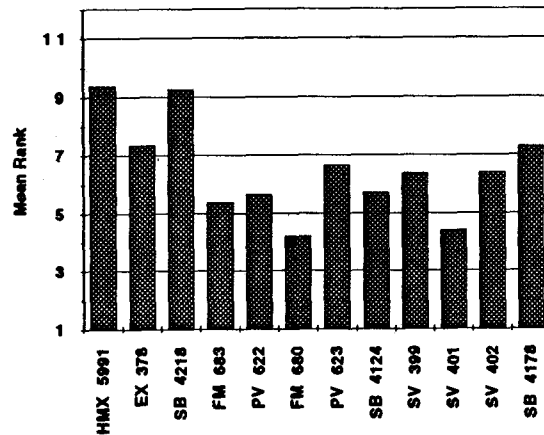
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

Sample	Mean Rank
HMX 5991	10.3
SB 4218	8.8
EX 378	7.2
SB 4178	7.0
PV 622	7.0
SV 402	6.6
PV 623	6.5
FM 683	6.4
SV 399	5.4
SB 4124	4.9
FM 680	4.0
SV 401	4.0

SMOOTHNESS

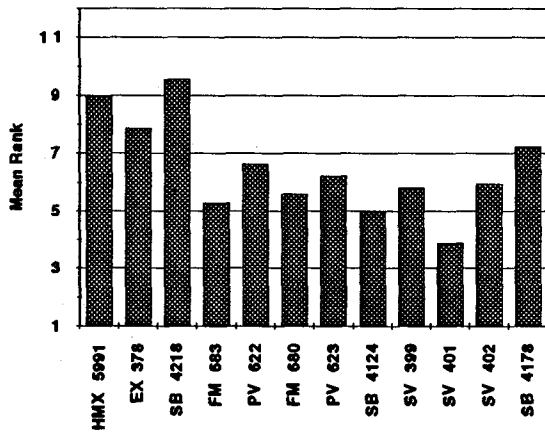


**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

Sample	Mean Rank
HMX 5991	9.4
SB 4218	9.3
EX 378	7.3
SB 4178	7.3
PV 623	6.7
SV 402	6.4
SV 399	6.4
SB 4124	5.7
PV 622	5.6
FM 683	5.4
SV 401	4.4
FM 680	4.2

# 1998 Commercial Green Beans - Frozen

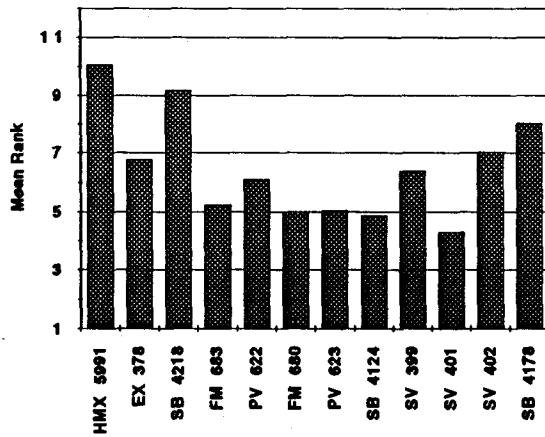
P  
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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

Mean Rank	
SB 4218	9.5
HMX 5991	9.0
EX 378	7.9
SB 4178	7.2
PV 622	6.6
PV 623	6.2
SV 402	6.0
SV 399	5.8
FM 680	5.6
FM 683	5.3
SB 4124	5.0
SV 401	3.9

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**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0001

Mean Rank	
HMX 5991	10.1
SB 4218	9.2
SB 4178	8.0
SV 402	7.0
EX 378	6.8
SV 399	6.4
PV 622	6.1
FM 683	5.2
PV 623	5.0
FM 680	5.0
SB 4124	4.9
SV 401	4.3

# 1998 Green Beans - Commercial Lines, Frozen

## Wilcoxin Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	SB 4218	HMX 5991	EX 378	SB 4178	SV 402	FM 680	FM 683	SV 399	SV 401	PV 622	PV 623	SB 4124
SB 4218	-	.935	.083	.097	.057	.330	.081	.003	.003	.017	.001	.0003
HMX 5991	.935	-	.305	.031	.026	.682	.026	.004	.001	.002	.001	.0002
EX 378	.083	.305	-	.685	.249	.799	.113	.022	.019	.032	.001	.0003
SB 4178	.097	.031	.685	-	.290	.969	.233	.031	.035	.026	.002	.001
SV 402	.057	.026	.249	.290	-	.587	.675	.046	.024	.026	.001	.0004
FM 680	.330	.682	.799	.969	.587	-	.188	.113	.067	.025	.004	.001
FM 683	.081	.026	.113	.233	.675	.188	-	.196	.044	.062	.004	.001
SV 399	.003	.004	.022	.031	.046	.113	.196	-	.336	.405	.008	.001
SV 401	.003	.001	.019	.035	.024	.067	.044	.336	-	.820	.033	.001
PV 622	.017	.002	.032	.026	.026	.025	.062	.405	.820	-	.020	.002
PV 623	.001	.001	.001	.002	.001	.004	.004	.008	.033	.020	-	.054
SB 4124	.0003	.0002	.0003	.001	.0004	.001	.001	.001	.001	.002	.054	-

### STRAIGHTNESS

	HMX 5991	SB 4218	EX 378	SB 4178	PV 622	SV 402	PV 623	FM 683	SV 399	SB 4124	FM 680	SV 401
HMX 5991	-	.019	.004	.015	.006	.003	.005	.001	.001	.001	.0004	.001
SB 4218	.019	-	.041	.058	.351	.018	.242	.031	.002	.005	.005	.001
EX 378	.004	.041	-	.417	.449	.927	.855	.833	.030	.045	.155	.020
SB 4178	.015	.058	.417	-	.829	.942	.566	1.000	.058	.032	.048	.005
PV 622	.006	.351	.449	.829	-	.273	.949	.204	.006	.010	.002	.002
SV 402	.003	.018	.927	.942	.273	-	.327	1.000	.046	.046	.039	.006
PV 623	.005	.242	.855	.566	.949	.327	-	.280	.019	.020	.003	.005
FM 683	.001	.031	.833	1.000	.204	1.000	.280	-	.121	.156	.031	.026
SV 399	.001	.002	.030	.058	.006	.046	.019	.121	-	.655	.850	.180
SB 4124	.001	.005	.045	.032	.010	.046	.020	.156	.655	-	.861	.527
FM 680	.0004	.005	.155	.048	.002	.039	.003	.031	.850	.861	-	.417
SV 401	.001	.001	.020	.005	.002	.006	.005	.026	.180	.527	.417	-

# 1998 Green Beans - Commercial Lines, Frozen

## SMOOTHNESS

	HMX 5991	SB 4218	EX 378	SB 4178	PV 623	SV 402	SV 399	SB 4124	PV 622	FM 683	SV 401	FM 680
HMX 5991	-	.952	.034	.165	.037	.012	.010	.003	.010	.008	.001	.011
SB 4218	.952	-	.070	.023	.118	.006	.008	.001	.013	.005	.001	.001
EX 378	.034	.070	-	.582	.397	.290	.444	.412	.462	.327	.058	.030
SB 4178	.165	.023	.582	-	.437	.320	.365	.258	.092	.341	.042	.093
PV 623	.037	.118	.397	.437	-	.484	.586	.399	.366	.626	.085	.012
SV 402	.012	.006	.290	.320	.484	-	1.000	.793	1.000	.623	.071	.230
SV 399	.010	.008	.444	.365	.586	1.000	-	.791	.963	.786	.053	.228
SB 4124	.003	.001	.412	.258	.399	.793	.791	-	.820	.552	.163	.346
PV 622	.010	.013	.462	.092	.366	1.000	.963	.820	-	.751	.052	.200
FM 683	.008	.005	.327	.341	.626	.623	.786	.552	.751	-	.070	.125
SV 401	.001	.001	.058	.042	.085	.071	.053	.163	.052	.070	-	1.000
FM 680	.011	.001	.030	.093	.012	.230	.228	.346	.200	.125	1.000	-

## POD LENGTH

	SB 4218	HMX 5991	EX 378	SB 4178	PV 622	PV 623	SV 402	SV 399	FM 680	FM 683	SB 4124	SV 401
SB 4218	-	.776	.013	.031	.023	.060	.022	.005	.005	.003	.002	.002
HMX 5991	.776	-	.011	.357	.041	.013	.034	.014	.018	.010	.002	.006
EX 378	.013	.011	-	.942	.832	.565	.767	.372	.418	.162	.262	.110
SB 4178	.031	.357	.942	-	.516	.706	.480	.317	.739	.429	.034	.035
PV 622	.023	.041	.832	.516	-	.917	.157	.021	.107	.070	.037	.008
PV 623	.060	.013	.565	.706	.917	-	.715	.208	.096	.255	.248	.067
SV 402	.022	.034	.767	.480	.157	.715	-	.096	.490	.250	.154	.013
SV 399	.005	.014	.372	.317	.021	.208	.096	-	.527	.791	.558	.103
FM 680	.005	.018	.418	.739	.107	.096	.490	.527	-	.490	.381	.083
FM 683	.003	.010	.162	.429	.070	.255	.250	.791	.490	-	.876	.454
SB 4124	.002	.002	.262	.034	.037	.248	.154	.558	.381	.876	-	.608
SV 401	.002	.006	.110	.035	.008	.067	.013	.103	.083	.454	.608	-

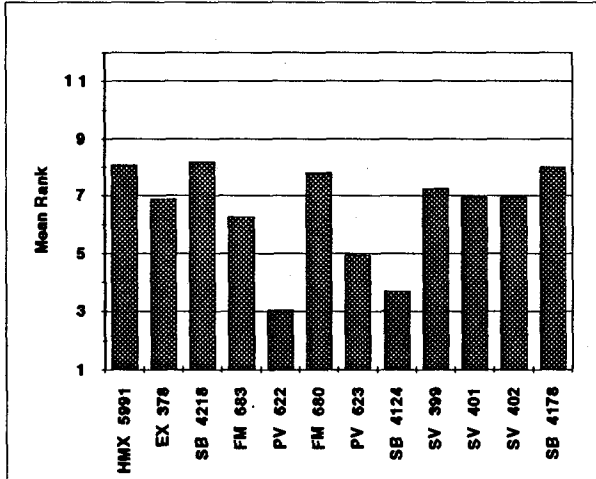
# 1998 Green Beans - Commercial Lines, Frozen

## OVERALL

	HMX 5991	SB 4218	SB 4178	SV 402	EX 378	SV 399	PV 622	FM 683	PV 623	FM 680	SB 4124	SV 401
<b>HMX 5991</b>	-	.090	.016	.005	.001	.002	.002	.003	.002	.0004	.0002	.0004
<b>SB 4218</b>	.090	-	.023	.023	.006	.003	.009	.021	.018	.002	.001	.001
<b>SB 4178</b>	.016	.023	-	.443	.055	.106	.119	.139	.021	.030	.008	.004
<b>SV 402</b>	.005	.023	.443	-	.582	.236	.482	.603	.193	.101	.010	.002
<b>EX 378</b>	.001	.006	.055	.582	-	.585	.755	.615	.060	.226	.041	.038
<b>SV 399</b>	.002	.003	.106	.236	.585	-	.610	.972	.319	.168	.018	.007
<b>PV 622</b>	.002	.009	.119	.482	.755	.610	-	.784	.255	.151	.017	.023
<b>FM 683</b>	.003	.021	.139	.603	.615	.972	.784	-	.524	.229	.088	.068
<b>PV 623</b>	.002	.018	.021	.193	.060	.319	.255	.524	-	.717	.258	.277
<b>FM 680</b>	.0004	.002	.030	.101	.226	.168	.151	.229	.717	-	.202	.361
<b>SB 4124</b>	.0002	.001	.008	.010	.041	.018	.017	.088	.258	.202	-	.522
<b>SV 401</b>	.0004	.001	.004	.002	.038	.007	.023	.068	.277	.361	.522	-

# 1998 Commercial Green Beans - Canned

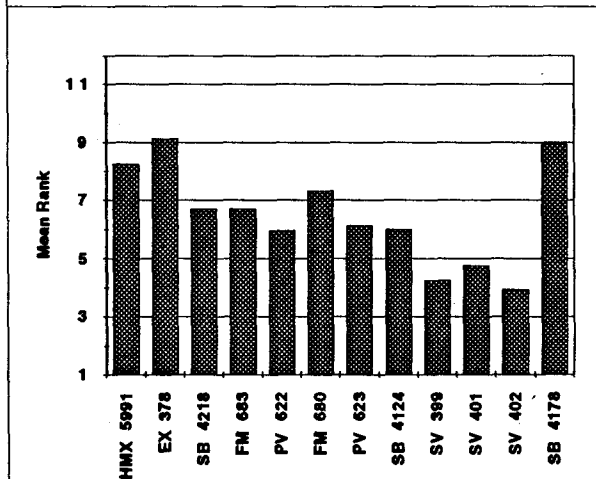
COLOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0033

Sample	Mean Rank
SB 4218	8.2
HMX 5991	8.1
SB 4178	8.0
FM 680	7.8
SV 399	7.3
SV 401	6.9
SV 402	6.9
EX 378	6.9
FM 683	6.3
PV 623	4.9
SB 4124	3.7
PV 622	3.1

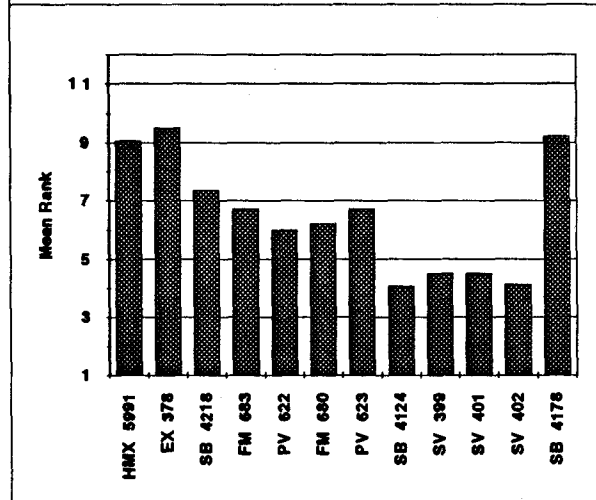
STRAIGHTNESS



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .006

Sample	Mean Rank
EX 378	9.1
SB 4178	8.9
HMX 5991	8.3
FM 680	7.3
SB 4218	6.7
FM 683	6.7
PV 623	6.1
SB 4124	6.0
PV 622	5.9
SV 401	4.8
SV 399	4.3
SV 402	3.9

SMOOTHNESS

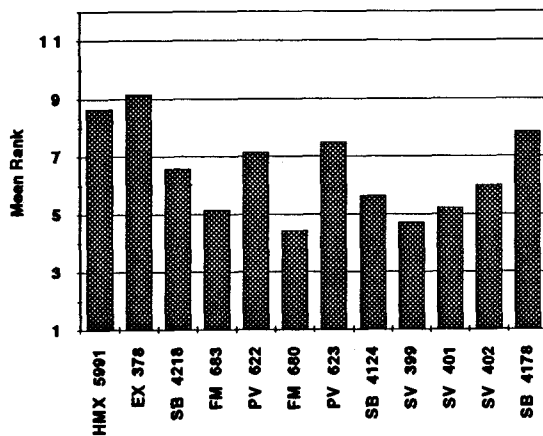


**Friedman Analysis of Rank**  
Probability of NO difference among samples  
p = .0004

Sample	Mean Rank
EX 378	9.5
SB 4178	9.2
HMX 5991	9.1
SB 4218	7.4
FM 683	6.7
PV 623	6.7
FM 680	6.2
PV 622	6.0
SV 399	4.5
SV 401	4.5
SV 402	4.1
SB 4124	4.1

# 1998 Commercial Green Beans - Canned

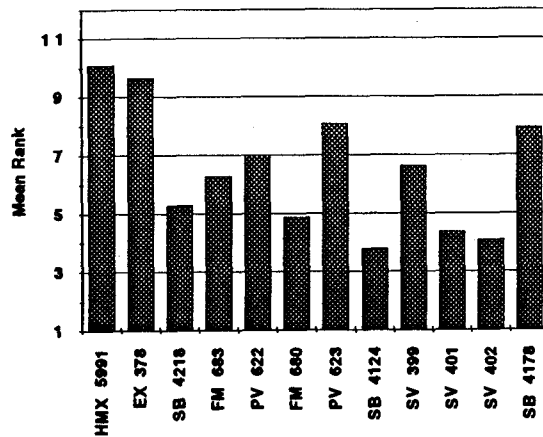
FLAVOR



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0182$

	Mean Rank
EX 378	9.1
HMX 5991	8.6
SB 4178	7.9
PV 623	7.5
PV 622	7.1
SB 4218	6.6
SV 402	6.0
SB 4124	5.6
SV 401	5.2
FM 683	5.1
SV 399	4.7
FM 680	4.4

OVERALL QUALITY



**Friedman Analysis of Rank**  
Probability of NO difference among samples  
 $p = .0001$

	Mean Rank
HMX 5991	10.1
EX 378	9.6
PV 623	8.1
SB 4178	7.9
PV 622	7.0
SV 399	6.6
FM 683	6.3
SB 4218	5.3
FM 680	4.9
SV 401	4.4
SV 402	4.1
SB 4124	3.8



# 1998 Green Beans - Commercial Lines, Canned

## Wilcoxin Signed Rank Analysis

p (prob of no difference)

p<.05 indicates a statistically significant difference at the 95% confidence level

### COLOR

	SB 4218	HMX 5991	SB 4178	FM 680	SV 399	SV 401	SV 402	EX 378	FM 683	PV 623	SB 4124	PV 622
SB 4218	-	.498	.713	.414	.071	.168	.176	.293	.096	.072	.010	.024
HMX 5991	.498	-	.731	.685	.416	.340	.547	.783	.206	.103	.011	.042
SB 4178	.713	.731	-	.713	.496	.783	.603	.888	.680	.066	.054	.010
FM 680	.414	.685	.713	-	.157	.236	.408	.891	.180	.068	.006	.023
SV 399	.071	.416	.496	.157	-	.564	.564	.581	.564	.034	.014	.023
SV 401	.168	.340	.783	.236	.564	-	.157	.590	.655	.034	.041	.023
SV 402	.176	.547	.603	.408	.564	.157	-	.891	.414	.034	.016	.020
EX 378	.293	.783	.888	.891	.581	.590	.891	-	.109	.102	.017	.017
FM 683	.096	.206	.680	.180	.564	.655	.414	.109	-	.160	.039	.014
PV 623	.072	.103	.066	.068	.034	.034	.034	.102	.160	-	.527	.129
SB 4124	.010	.011	.054	.006	.014	.041	.016	.017	.039	.527	-	.438
PV 622	.024	.042	.010	.023	.023	.023	.020	.017	.014	.129	.438	-

### STRAIGHTNESS

	EX 378	SB 4178	HMX 5991	FM 680	SB 4218	FM 683	PV 623	SB 4124	PV 622	SV 401	SV 399	SV 402
EX 378	-	.268	.915	.887	.131	.039	.026	.015	.096	.008	.026	.010
SB 4178	.268	-	.372	.622	.048	.119	.108	.058	.230	.066	.017	.032
HMX 5991	.915	.372	-	.861	.265	.319	.084	.062	.320	.047	.119	.010
FM 680	.887	.622	.861	-	.357	.256	.129	.125	.302	.089	.288	.031
SB 4218	.131	.048	.265	.357	-	1.000	.414	.131	.891	.216	.141	.083
FM 683	.039	.119	.319	.256	1.000	-	.739	.558	.680	.395	.496	.238
PV 623	.026	.108	.084	.129	.414	.739	-	1.000	.680	.450	.746	.157
SB 4124	.015	.058	.062	.125	.131	.558	1.000	-	.480	.655	.680	.527
PV 622	.096	.230	.320	.302	.891	.680	.680	.480	-	.414	.103	.198
SV 401	.008	.066	.047	.089	.216	.395	.450	.655	.414	-	.891	.180
SV 399	.026	.017	.119	.288	.141	.496	.746	.680	.103	.891	-	.480
SV 402	.010	.032	.010	.031	.083	.238	.157	.527	.198	.180	.480	-

# 1998 Green Beans - Commercial Lines, Canned

## SMOOTHNESS

	EX 378	SB 4178	HMX 5991	SB 4218	FM 683	PV 623	FM 680	PV 622	SV 399	SV 401	SV 402	SB 4124
EX 378	-	.340	.680	.196	.014	.070	.014	.020	.011	.007	.007	.007
SB 4178	.340	-	.119	.021	.031	.150	.085	.131	.011	.017	.011	.006
HMX 5991	.680	.119	-	.317	.119	.233	.103	.084	.008	.015	.016	.020
SB 4218	.196	.021	.317	-	.257	.459	.706	.480	.071	.053	.054	.038
FM 683	.014	.031	.119	.257	-	.774	.516	.706	.546	.157	.518	.194
PV 623	.070	.150	.233	.459	.774	-	.854	.336	.416	.112	.246	.389
FM 680	.014	.085	.103	.706	.516	.854	-	.317	.103	.034	.059	.084
PV 622	.020	.131	.084	.480	.706	.336	.317	-	.257	.157	.083	.103
SV 399	.011	.011	.008	.071	.546	.416	.103	.257	-	.706	1.000	.655
SV 401	.007	.017	.015	.053	.157	.112	.034	.157	.706	-	.655	1.000
SV 402	.007	.011	.016	.054	.518	.246	.059	.083	1.000	.655	-	.655
SB 4124	.007	.006	.020	.038	.194	.389	.084	.103	.655	1.000	.655	-

## FLAVOR

	EX 378	HMX 5991	SB 4178	PV 623	PV 622	SB 4218	SV 402	SB 4124	SV 401	FM 683	SV 399	FM 680
EX 378	-	.480	1.000	.589	.034	.034	.014	.024	.007	.034	.027	.010
HMX 5991	.480	-	.783	.527	.066	.026	.026	.040	.023	.068	.006	.010
SB 4178	1.000	.783	-	.891	.317	.058	.038	.059	.038	.084	.039	.039
PV 623	.589	.527	.891	-	.317	.336	.131	.059	.059	.161	.026	.039
PV 622	.034	.066	.317	.317	-	1.000	.480	.257	.317	.593	.206	.103
SB 4218	.034	.026	.058	.336	1.000	-	.480	.783	.706	.792	.236	.234
SV 402	.014	.026	.038	.131	.480	.480	-	1.000	1.000	1.000	.480	.180
SB 4124	.024	.040	.059	.059	.257	.783	1.000	-	1.000	.931	.157	.317
SV 401	.007	.023	.038	.059	.317	.706	1.000	1.000	-	1.000	.234	.257
FM 683	.034	.068	.084	.161	.593	.792	1.000	.931	1.000	-	.417	.317
SV 399	.027	.006	.039	.026	.206	.236	.480	.157	.234	.417	-	.706
FM 680	.010	.010	.039	.039	.103	.234	.180	.317	.257	.317	.706	-

# 1998 Green Beans - Commercial Lines, Canned

## OVERALL

	HMX 5991	EX 378	PV 623	SB 4178	PV 622	SV 399	FM 683	SB 4218	FM 680	SV 401	SV 402	SB 4124
<b>HMX 5991</b>	-	.178	.262	.026	.016	.006	.026	.004	.007	.008	.005	.005
<b>EX 378</b>	.178	-	.429	.014	.020	.016	.016	.008	.006	.007	.005	.007
<b>PV 623</b>	.262	.429	-	.706	.157	.066	.344	.198	.041	.026	.017	.014
<b>SB 4178</b>	.026	.014	.706	-	.564	.257	.450	.180	.025	.023	.016	.011
<b>PV 622</b>	.016	.020	.157	.564	-	.317	.888	.414	.046	.034	.024	.034
<b>SV 399</b>	.006	.016	.066	.257	.317	-	.301	.516	.564	.034	.024	.257
<b>FM 683</b>	.026	.016	.344	.450	.888	.301	-	.579	.131	.071	.039	.039
<b>SB 4218</b>	.004	.008	.198	.180	.414	.516	.579	-	.317	.103	.045	.059
<b>FM 680</b>	.007	.006	.041	.025	.046	.564	.131	.317	-	.103	.074	.317
<b>SV 401</b>	.008	.007	.026	.023	.034	.034	.071	.103	.103	-	.786	.257
<b>SV 402</b>	.005	.005	.017	.016	.024	.024	.039	.045	.074	.786	-	.131
<b>SB 4124</b>	.005	.007	.014	.011	.034	.257	.039	.059	.317	.257	.131	-