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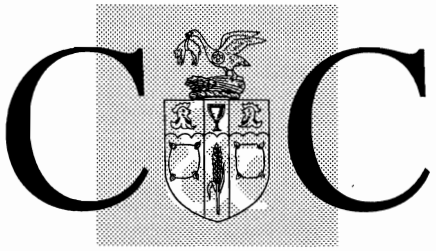
R&D REPORT NO. 23

Vining Pea Varieties for Freezing 1995

January 1996



Campden & Chorleywood
Food Research Association

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CCFRA Project No. 20709

R&D Report No. 23

Vining Pea Varieties for Freezing 1995

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January 1996

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SUMMARY

A trial of vining peas was carried out at Campden & Chorleywood Food Research Association in 1995, to assess suitability for quick freezing. This was part of an ongoing trial series. Fourteen new varieties were compared with standard commercial varieties.

Of the new varieties in the trial for the first time, Jaguar, CMG 293F (Samish), CMG 279F, Balmoral and Purser all showed sufficient promise to be promoted for further trialing in 1996.

Four varieties were being trialled for the 2nd and 3rd year. Of these, the early variety Arise and the midseason variety Kalamo both had good frozen quality. Arise finished three years in trial in 1995. Another variety completing three years in trial was Snake, a late variety which had been consistently high yielding.

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1. INTRODUCTION

The 1995 vining pea trials continued an ongoing series grown each year at Chipping Campden, to assess field performance and suitability for freezing, for UK markets. Fourteen new varieties were compared, with standard commercial varieties acting as controls.

Varieties first enter the trial as 'Preliminary Trial' or first year varieties. Their results are reviewed by CCFRA's Variety Working Party and those which are considered to show sufficient promise are promoted to 'Main Trial' for a further two years. Varieties already in commercial use are also accepted for the trials.

This report details the results of the 1995 trials. Summaries have also been produced for a large number of varieties in commercial use and which have passed through the trial system (Bedford 1993 and 1994).

2. METHODS

Seed was received directly from the seed companies. Companies were requested to provide seed which had been shown to be free from pea seed borne mosaic virus. Only varieties which were either listed in the EEC Common Catalogue of varieties or were undergoing tests for inclusion in this list were eligible for the trials.

The trial was grown at Larkstoke Hill near Chipping Campden, Glos. A randomised block design was used, with three replicates of the Main Trial varieties (varieties in trial for the 2nd or 3rd year) and two replicates of first year (Preliminary Trial) varieties. The standard commercial varieties Avola, Scout, Waverex and Puget were included as controls. Details of cultural practices are given in Appendix B.

2.1 Agronomic Assessments

For harvesting, each plot was divided into three sub-plots five metres in length. The end sections of each plot were used as sampling areas for tenderometer readings (TR), to monitor crop maturity. Each variety was harvested on two or three separate occasions, in order to cover the optimum maturity for freezing (TR100). Plots were hand harvested and vined using a mini viner.

2.2 Varietal Characteristics

The following varietal characteristics were recorded: haulm length and standing ability, pod shape and number per truss. A key to the tables is given in Appendix D.

2.3 Size Grading

After vining, the peas were sieved through a Mather and Platt grader using the following sieve sizes:

Size Grade	Large Seeded Varieties (mm)	Petits Pois Varieties (mm)
Large	over 10.20	over 9.30
Medium	10.20 - 8.75	9.30 - 8.75
Small	8.75 - 7.50	8.75 - 8.20
Very small	under 7.50	8.20 - 7.50
Extra small	-	under 7.50

The size-graded peas were weighed and the weight of each grade was expressed as a percentage of the total yield. The seed size distribution for a variety can vary considerably from year to year and site to site. For this reason the results are also given in terms of sieve scores (see below). Sieve scores are based on percentages of peas less that 8.75mm and peas over 10.20mm in the sample, and they provide more consistent results than the actual percentage values.

Sieve size scoring system

Percentage in sample	Score for small	Score for large
0-10	10	1
11-20	9	2
21-30	8	3
31-40	7	4
41-50	6	5
51-60	5	6
61-70	4	7
71-80	3	8
81-90	2	9
91-100	1	10

Sieve score = the mean of the large and small scores.

Note: Petits pois varieties are given a score of 0 for large.

2.4 Yield

Yields were measured at each of the harvests and predicted yields at TR100 were derived by regression analysis. This statistical method was also used to predict the percentage of seeds in the different size grades and the days to harvest.

2.5 Processing Methods

Samples for freezing were selected as near as possible to TR100. The peas were blanched for 1½ minutes in tap water at 93°C, cooled, and then flow frozen at -40°C for three minutes.

2.6 Quality Appraisal

The method of quality appraisal for varieties of vegetables has previously been explained in detail (Adams and Bedford, 1981). The scoring system for frozen and canned peas is reproduced in Appendix E. Colour, flavour and texture were divided into their component

parameters and each was scored on a scale of 1-5. Three samples of each variety were assessed by each of three trained quality appraisal staff. The results were analysed using the Mann Whitney "U" test for non-parametric comparisons.

3. RESULTS AND DISCUSSION

There was adequate rainfall during the first three months of 1995 and the plots were drilled in April into damp soil. Most varieties emerged well and plant populations achieved were, in general, close to the 90 plants per square metre target (Appendix C). The lowest population was that of Favorit at 79ppm^2. Most varieties were vigorous with good early growth. However, seed stocks of Alfa, Favorit and Orion had poor vigour. Plants looked more yellow and did not grow well. After emergence some weevil damage was noted. This affected Waverex in particular, causing reduced plant growth in this variety.

Most of the new varieties were of standard size, although all but Snake and Purser were smaller than Puget or Scout (Table 1). Fristo was the smallest of the new varieties. Arise had the best standing ability. Balmoral was noted as setting three or even four pods per node.

There was a nine day maturity interval between Avola and Puget (Table 2). Many varieties outyielded the controls, the highest yielding being two late varieties Balmoral and Snake.

Temperatures began to increase at the end of June and it was very hot and dry during the harvest period, at the end of July. Some, but not all, of the varieties very quickly became overmature in these conditions. Others such as Arise, Jaguar, Alfa and Favorit were slower to pass from TR100 to TR120.

Another feature of the season was a tendency to poor podding. This also varied between varieties. Control varieties Avola and Puget vined well, but Scout vined less well. Waverex produced short pods with a single mature pea which did not open when vined. Best podding trial varieties were Kalamo, Jaguar, Barle, Snake and CMG 279F.

Table 3 details the size grades of all the varieties. The field results for individual varieties are described in detail in Section 5.

In sensory assessments of frozen peas (Table 4), Arise and Kalamo were noted as having sweeter flavour and Alfa as being stronger. Springreen, Jaguar, CMG 279F, Balmoral and Purser were the deepest green in the trial. Arise and Snake were the brightest. Most varieties had good texture. CMG 293F and CMG 279F had more mealy texture even at optimum TR.

A number of varieties were in their first or preliminary year of trial. They are indicated by (P) in the tables. Results of these varieties, all of which are described in detail in Section 4, were discussed by CCFRA's Variety Working Party. The following varieties showed sufficient promise to be promoted to Main Trial in 1996:- Jaguar, CMG 293F (Samish), CMG 279F, Balmoral and Purser. Springreen was being discontinued by the breeder. Fristo was considered to be too pale for the UK market. The poor performance of Alfa, Favorit and Orion may have been due to the poor vigour of their seed stocks.

Cabree and Kalamo were both in their second year of trial. Cabree is a first early with slightly smaller seed than Avola and this year slightly lower yield. Colour has been pale and less uniform in both years. Kalamo, a semi-leafless midseason variety, had smaller sieve size and similar yield to Scout and good quality frozen samples in both years.

Two varieties, Arise and Snake (CMG 298), completed three years in trial in 1995.

The first early, semi-leafless variety Arise had lower yield than Avola in all three seasons but smaller sieve size and consistently good frozen quality. The late variety Snake has given high yields in all three years' trials and generally average frozen quality.

Barle, a commercial variety entered by the breeder for further comparison with new varieties, yielded well, as in previous years and had good frozen quality. It was one of the varieties which vined best.

TABLE 1: VARIETAL CHARACTERISTICS

Variety		Seed Source	Seed Size	Haulm		Pod		
				Standing Ability	Length (mm)	Shape	No. per Truss *	Length (mm)
Puget	(C)	BRO	Large	2.3	653	SB	1-2-3	63
Scout	(C)	RSL	Medium - Large	2.7	716	SB	2	57
Barle +	(D)	RSL	Medium - Large	3.7	502	SB	2	63
Purser +	(P)	SEG	Medium - Large	3.0	519	SB	2	66
Snake (CMG 298)		RSL	Medium - Large	2.3	521	SB	1-2-3	60
Jaguar	(P)	SHA	Medium	2.0	661	SB	1-2	63
CMG 293F(Samish)	(P)	RSL	Medium	2.0	671	SB	2	67
Avola	(C)	ASG	Medium	2.7	768	SB	1	75
CMG 279F (Methow)	(P)	RSL	Medium	3.0	604	SB	2-3	59
Springreen	(P)	SEG	Medium	2.0	662	SB	1-2	60
Kalamo (XPF 274)		ASG	Medium	2.0	668	SB	2-3	59
Arise		ASG	Medium	4.0	777	SB	1	58

TABLE 1 (CONTD.): - VARIETAL CHARACTERISTICS

Variety		Seed Source	Seed Size	Haulm		Pod		
				Standing Ability	Length (mm)	Shape	No. per Truss *	Length (mm)
Balmoral	(P)	SHA	Medium	3.0	668	SB	1-2-3-4	58
Alfa	(P)	AGI	Medium	3.5	699	Sor SL CB	2	56
Favorit	(P)	AGI	Medium - Small	3.0	677	CB	2	56
Orion	(P)	AGI	Medium - Small	3.0	748	SL CB	1-2	56
Cabree		ASG	Medium - Small	2.3	666	SB	1-2	61
Fristo	(P)	ASG	Small	3.5	653	SL CB	1-2	58
Waverex	(C)	BRO	Very Small	2.0	402	SL CB	2	51

* Underlined figure is the most common case
\+ Semi leafless

(P) Preliminary or 1st year Trial Varieties
(C) Control Variety
(D) Commercial Variety

Pod Shape
S = Straight
C = Curved
B = Blunt ends
P = Painted ends
SL = Slightly

TABLE 2: MATURITY AND YIELD AT FREEZING STAGE (TR100) AND SPEED IN REACHING TR120

Variety		Maturity Relative to Avola +/- days	Time from TR100 to TR120 (days)	Yield	
				T/ha	as % Avola
Cabree		-0.4	0.8	3.4*	92*
Springreen	(P)	-0.2	0.5	3.1*	84*
Avola	(C)	0 = 94.1 days	0.9	3.7	100
Arise		+ 0.6	2.5	3.3	88
Fristo	(P)	+ 2.4	1.5	3.9	105
Jaguar	(P)	+ 3.3	2.4	4.9	132
CMG 293F (Samish)	(P)	+ 6.0	0.6	5.3	144
Favorit	(P)	+ 6.0	2.2	3.9	106
Waverex		+ 6.2	1.7	4.1	112
Kalamo		+ 6.6	1.1	4.6	124
Alfa	(P)	+ 6.8	2.3	3.3	90
Scout	(C)	+ 7.0	0.9	4.8	129
Barle	(D)	+ 7.3	1.5	5.2	142
CMG 279F	(P)	+ 7.8	0.5	5.2	141
Orion	(P)	+ 8.5	0.6	1.9	51
Puget	(C)	+ 8.8	0.7	5.4	146
Balmoral	(P)	+ 9.0	-	5.6*	151*
Purser	(P)	+ 9.3	1.6	4.4	118
Snake (CMG 298)		+ 10.3	0.6	6.2	169

* Taken from actual plot yields at TR101 (Cabree), 105 (Springreen), and 108 (Balmoral)

TABLE 3 SIEVE SIZE AT FREEZING STAGE (TR100)

Variety		% in Different Sieve Sizes (mm)					Sieve Size Score
		Large > 10.2	Medium 8.75 - 10.2	Small 7.5 - 8.75	Very Small < 7.5		
Puget	(C)	58	36	5	1		8.0
Scout	(C)	49	44	6	1		7.5
Barle	(D)	44	47	8	1		7.5
Purser	(P)	43	49	7	1		7.5
Snake		44	50	5	1		7.5
Jaguar	(P)	39	49	10	2		6.5
CMG 293F	(P)	33	51	12	4		6.5
Avola	(C)	33	57	8	2		6.5
CMG 279F	(P)	31	57	10	2		6.5
Springreen	(P)	24	64	10	2		6.0
Kalamo		21	58	18	3		5.5
Arise		26	52	17	5		5.5
Balmoral	(P)	26*	63*	10*	1*		5.0*
Alfa	(P)	17	63	18	2		5.0
Favorit	(P)	11	54	30	5		4.5
Orion	(P)	12	53	29	6		4.5
Cabree		8	56	31	5		4.0
Variety (Petit pois)		% in Different Sieve Sizes (mm)					Sieve Size Score
		Large > 9.3	Medium 8.75 - 9.3	Small 8.2 - 8.75	Very Small < 7.5-8.2	Extra Small < 7.5	
Fristo	(P)	8	17	29	27	19	1.5
Waverex	(C)	2	7	22	32	37	0.5

* Sieve Sizes at TR108

TABLE 4 QUALITY OF FROZEN PEAS

Variety	TR	Colour	Flavour	Texture
Avola (c)	99	Medium green, with slight amounts of yellow and very slight grey tints. Moderately bright, very non-uniform	Slightly weak flavour, with moderate sweetness and slight bitterness	Moderately firm skins, slightly firm, slightly mealy flesh
Cabree	101	One of the palest, most yellow, least uniform in the trial	As control	One of those with firmest flesh in the trial
Springreen	105	Deeper green, with more grey than control. One of the most uniform in the trial	As control	As control
Arise	99	More uniform, less yellow than control. One of the brightest in the trial	One of the sweetest in the trial	As control
Fristo	97	More grey than control. One of the most yellow, least uniform in the trial	As control	As control
Jaguar	93	One of the deepest green, most uniform in the trial. Less yellow, more grey than control	As control	As control
CMG 293F (Samish)	102	As control	As control	One of most mealy in the trial
Favorit	96	One of the palest green, most yellow, least uniform in the trial	As control	As control
Waverex	104	One of the most uniform in the trial	Stronger flavour than control, with the particular flavour note characteristic of the variety and which the panel described as "viney"	Softer skins than control

TABLE 4 (CONTD.): QUALITY OF FROZEN PEAS

Variety	TR	Colour	Flavour	Texture
Kalamo	104	More grey tints than control. One of the most yellow in the trial	One of the sweetest in the trial	As control
Alfa	92	More uniform than control and one of the brightest in the trial	Stronger flavour than control	As control
Alfa	113	Less yellow, but more grey than control and one of most uniform in the trial	As control	One of the firmest skins and most mealy flesh in the trial, but at a higher TR
Scout	97	As control. One of the least uniform in trial	Stronger flavour than control	As control
Barle	100	More uniform, less yellow than control	As control	As control
CMG 279F	102	Deeper green, less yellow, more grey than control, with very slight khaki tints. One of the most uniform in the trial	As control	More mealy than control
Orion	110	As control, but one of the most yellow, least uniform in the trial	Stronger flavour than control with the same "viney" note found in Waverex	One of those with firmest flesh, but at a higher TR
Balmoral	108	Deeper, less bright, less yellow, more grey green than control	As control	More mealy than control, but at a higher TR
Purser	96	Deeper green, with more grey tints than control, with very slight khaki tints	As control	As control
Snake	95	One of brightest in the trial	As control	As control

4. VARIETY NOTES

Alfa

This semi-leafless midseason variety was in its first year of trial. It matured at the same time as Scout and was smaller seeded and lower yielding. It was one of those taking longest to mature from TR100 - TR120. The seed stock had poor early vigour. Pods were straight or slightly curved and blunt ended.

Frozen samples had good colour. Two lots were tasted, one below and one above the optimum. From these the flavour and texture were found to be average.

Arise

This first early semi-leafless variety, in its third year of trial, matured at the same time as Avola. It has been lower yielding than Avola in all three seasons, but had smaller sieve size. Like Avola it tended to produce only one pod per node with a second pod aborting. In this hot season it was one of the slowest varieties to pass from TR100 to TR120. Standing ability was noted as good this season, as it had been in 1993.

Frozen quality has been good in all three years of trial. This year frozen samples were uniform, bright green and the variety was one of the sweetest in the trial.

Balmoral

This new late variety matured at the same time as Puget and was high yielding, despite its smaller seed size. Many plants set three or four pods per node.

Frozen samples had deeper, but duller colour than the control variety Avola and average flavour ratings.

Barle

This semi-leafless early maincrop variety matured at the same time as Scout this year. It outyielded Scout, having similar yield to Puget. Standing ability was good. It was one of those with fewer unopened pods after vining.

Frozen quality was good. Colour was uniform medium green. Flavour and texture were average.

Cabree

This first early variety was in its second year of trial and matured very slightly earlier than Avola. Yield was 8% below this control, but seed was smaller. Standing ability was below average.

Colour of frozen samples was pale and less uniform. It was one of those with firmest flesh in the trial.

CMG 279F

The variety, which was in its first year of trials, matured one day earlier than Puget and had similar yield and slightly smaller seed than this control. It was triple podded. It was one of the best varieties in terms of ease of podding.

Colour of frozen samples was good with deep green colour, flavour was average, but texture was more mealy than the control.

CMG 293F (Samish)

This midseason variety, in its first year of trial, matured one day earlier than Scout, outyielded this variety and had slightly smaller sieve size. Standing ability was below average.

Colour and flavour of frozen samples was average but the variety was one of the most mealy in the trial.

Favorit

This variety, in its first year of trial, matured a day earlier than Scout, was lower yielding than this control, but had a smaller sieve size. The seed stock appeared to lack vigour in the early stages of growth. It was one of those which took longest to pass from TR100 to TR120. Pods were curved but blunt ended. Many pods remained unopened after vining.

The replicate plot harvested at the correct stage for freezing had some pale peas in the sample. This was reflected in frozen colour ratings. It was one of the palest, least uniform in the trial. Flavour and texture were average. The other replicate did not suffer from this defect and would have produced better colour results. However, it was at too high a TR for processing.

Fristo

This variety, in its first year of trial, matured two days after Avola and had similar yield to this early season control. Seed size was small, qualifying it as a petit pois but it was not as small as Waverex. Pod type was similar to Waverex.

Frozen samples had below average colour, being more grey than the control. Flavour and texture were average.

Jaguar

This preliminary trial variety was three days later to mature than Avola, outyielded Avola and had similar yield to Scout. Seed size was similar to Avola and in this hot season it was one of the slowest to pass from TR100 to TR120. Standing ability was below average. It was one of those with fewer unopened pods after vining.

Quality of frozen samples was good with deep uniform pea colour.

Kalamo

This semi-leafless variety, in its second year of trial, matured at the same time as Scout, with similar yield, but smaller sieve size, confirming last year's performance. Standing ability was below average. The variety was one of those with fewer unopened pods after vining.

Quality of frozen product was good, with mid green peas. It was one of the sweetest in the trial. In 1994 it had been rated as one of the least bitter.

Orion

This late variety, in its first year of trial, matured at the same time as Puget. It was much lower yielding than Puget and had medium to small sieve size. The seed stock had poor early vigour. Many pods remained unopened after vining.

Frozen quality was generally average, but it was one of the more yellow varieties in colour. The firmer flesh texture could be related to higher TR.

Purser

This first year maincrop variety matured at the same time as Puget. Sieve size was similar to Scout and it was lower yielding than both these varieties.

Frozen samples had deep green colour and average flavour and texture.

Springreen

This first early variety, in its first year of trial, had similar maturity to Avola, lower yield and slightly smaller sieve size. Standing ability was below average.

Quality of frozen samples was good with deep green, even colour.

Snake

This semi-leafless maincrop variety, in its third year of trial, matured one day earlier than Puget. It had similar yield and slightly smaller seed than this control. It was one of the best podders in the trial, but, as in previous years, it had below average standing ability.

Quality of frozen product was good. It was one of the brightest and most uniform coloured in the trial, with average flavour and texture.

5. CONCLUSIONS

Most of the varieties in the trial grew vigorously right up to maturity, despite the hot dry conditions later in the season. Problems such as poor podding and rapid maturity were associated with these weather conditions and varietal differences were noted. These factors will be particularly important if warmer summers become the norm. The best podding varieties were the control varieties Avola and Puget, together with Kalamo, Jaguar, Barle, Snake and CMG 279F. Arise, Jaguar, Alfa and Favorit were all slower to mature from TR100 to TR120.

The most promising preliminary or first year varieties in terms of overall field performance and sensory quality were Jaguar, CMG 293F (Samish), CMG 279F, Balmoral and Purser.

Kalamo, in its second year of trial, was a promising midseason variety with good flavour ratings in both years of trial. Two varieties finished three years of trial in 1995. The early variety Arise had had consistently good frozen quality. Snake, a late variety, had been high yielding.

6. REFERENCES

Adams, M.J. and Bedford, L.V., revised by Geering, J. (1981) A Method for the Sensory Appraisal of Quality of Processed Vegetable Varieties. CFDRA Technical Memorandum No. 278.

Bedford, L.V. (1993) Vining Pea Varieties for Freezing. CCFRA Agrifood Report No. 7.

Bedford, L.V. (1994) Peas for Freezing and Fresh Market Use. CCFRA Agrifood Report No. 10.

APPENDIX A

SOURCES OF SEED

Code	Company
ASG	Asgrow Seed Company, USA
BRO	Brotherton Seed Co Inc, USA
PLS	Pure Line Seeds Inc, USA
RSL	Royal Sluis Ltd., Netherlands and UK
SEG	S & G Seeds, Netherlands and UK
SHA	Sharpes International Seeds Ltd., UK

APPENDIX B

CULTURAL PRACTICES FOR 1995 PEA TRIALS

Site:	Larkstoke Hill
Sowing date:	7th April
Drill type:	Ojyord
Plot size:	1.8m x 23.0m
No. and spacing of rows per plot	10 x 140mm
Soil conditions:	Moist
NPK base dressing	NIL
Herbicide	Fortrol + Gramoxone 100
Rate	2.5 1/ha + 0.5 l/ha
Date applied	11th April
Insecticide	Sumicidin
Active ingredient	Fenvalerate
Rate	300ml/ha
Dates applied	4th May and 18th June
Insecticide	Aphox
Active ingredient	Pirimicarb
Rate	280g/ha
Date applied	4th July

APPENDIX C

PLANT POPULATION COUNTS

(Mean number of plants per m^2)

Variety	Plant Population
Avola	99
Scout	104
Puget	86
Waverex	115
Kalamo	87
Arise	98
Cabree	90
Barle	109
Snake	100
Springreen	101
Balmoral	90
Jaguar	96
Purser	93
Favorit	79
Alfa	108
CMG 279	95
CMG 293	102

APPENDIX D

KEY TO TABLES

VARIETAL CHARACTERISTICS

(C) = Control	(P) = Preliminary Trial Variety	
* = Semi Leafless	(D) = Commercial Variety	
Standing Ability	1 = very poor - plants flat on the ground	5 = very good - all plants completely erect
Pod Shape	S = straight	C = curved
	B = blunt end	P = pointed end

Sl = Slightly

+ underlined figure is the most common case

MATURITY, YIELD AND SIEVE SIZE

AHUs = Accumulated Heat Units. (A heat unit is the amount by which the daily temperature exceeds the base temperature for growth, i.e. for peas 4.4°C. Thus, accumulated heat units are the summed heat units calculated from the date of drilling).

SENSORY APPRAISAL

Optimum Scores: Green - depends on preference of processors.

Green	
Other colours	0 or 1
Brightness	5
Uniformity	5
Skins and Flesh	1 - 2
Mealiness	1
Sweetness	2 - 3
Bitterness	1
Strength	Depends on individual preference

APPENDIX E

SCORING SYSTEMS FOR QUALITY APPRAISAL OF VINING PEAS

		SCORE				
		1	2	3	4	5
Colour	Green	Very pale	Slightly to moderately pale	Medium green	Slightly to moderately dark	Very dark
	Amounts of other colours (yellow, khaki, brown and grey)	Very slight	Slight	Moderate	Considerable	Very large
	Brightness	Dull	Slightly dull	Moderately bright	Very bright	Extremely bright
	Uniformity	Extremely non-uniform	Very non-uniform	Moderately non-uniform	Slightly non-uniform	Very uniform
Flavour	Sweetness	Not at all	Slightly	Moderately	Very	Extremely
	Bitterness	Not at all	Slightly	Moderately	Very	Extremely
	Strength of natural pea flavour	Moderately weak	Fairly weak	Slightly weak	Slightly strong	Moderately strong
Texture	of skins	Not at all firm	Slightly firm	Moderately firm	Very firm	Extremely firm
	of flesh	Not at all firm	Slightly firm	Moderately firm	Very firm	Extremely firm
	Mealiness of flesh	Not at all	Slightly	Moderately	Very	Extremely

APPENDIX F

Quality of Frozen Peas 1995

Colour

Variety	TR	Green	Yellow	Khaki	Grey	Bright	Uniform
Avola (C)	99	3.0	2.0	0.1	1.0	3.2	2.4
Cabree	101	2.3B	2.9B	0.0B	1.4	3.3	1.9B
Springreen	105	3.8*	0.9A	0.6	1.8*	3.0	3.3A
Arise	99	3.3A	0.7**	0.1	1.3	3.6A	3.7*
Fristo	97	2.7	2.7B	0.2	2.4**	3.0	2.1B
Jaguar	93	3.4A	1.1*	0.2	2.1**	2.8	3.3A
CMG 293F	102	3.6AC	1.2A	0.6	1.8	2.7	3.0
Favorit	96	2.4D	3.0B	0.1	1.4	3.4	2.0B
Waverex	104	3.1	1.6	0.1	1.7	3.4	3.2A
Kalamo	104	2.8	2.1B	0.4	2.0**	3.2	2.4
Alfa	92	3.2	1.1A	0.0B	1.4	3.6A	3.8**
Alfa	113	3.2	0.6**	0.4	2.1***	3.1	3.3A
Scout	97	3.1	2.1	0.3	1.6	2.9	2.1B
Barle	100	3.1	0.6**	0.1	1.4	3.0	3.6*
CMG 279F	102	3.8*	1.0*	0.8A	2.0**	2.7	3.2A
Orion	110	2.6	2.8B	0.0B	1.8	3.1	2.1B
Balmoral	108	4.0***	0.8**	0.6	2.7***	2.1**	2.8
Purser	96	4.0***	1.6	0.8A	2.3**	2.4B	2.6
Snake	95	3.0	1.6	0.0B	1.6	3.6A	3.1
Overall Mean		3.2	1.6	0.3	1.8	3.1	2.8

Texture and Flavour

Variety	Skins	Flesh	Mealiness	Sweet	Bitter	Strength	Viney	Comments Other Off- flavours
Avola	2.9	2.2	1.9	2.6	1.7	2.0		(8)
Cabree	3.3	2.9A	1.9	2.2	2.4	3.0		(4)
Springreen	3.3	2.9	2.4	2.2	2.3	2.4		(3)
Arise	2.6A	2.6	1.7B	3.2AC	1.9	3.3	(2)	(2)
Fristo	3.6	2.7	2.6	1.8B	2.2	1.8	(2)	(6)
Jaguar	2.9	1.9BD	2.1	2.4	2.1	2.3		(4)
CMG 293F	3.3	2.2	2.7C	2.6	2.0	2.9		(3)
Favorit	3.1	2.2	2.2	2.7	1.9	2.7		(3)
Waverex	2.0*	2.2	1.6BD	2.4	2.4	3.8***	(5)	(1)
Kalamo	2.8	2.1B	2.1	2.9C	2.1	2.8		(3)
Alfa	2.8	2.0BD	1.8B	2.8	1.9	3.3**		
Alfa	3.7B	2.6	2.9A	2.4	2.1	2.4		(5)
Scout	2.8	2.2	2.6	2.7	2.1	3.1*		(3)
Barle	3.0	2.1B	2.0	2.4	1.9	2.6		
CMG 279F	3.2	2.2	3.0*	2.1D	2.4	2.1		(3)
Orion	2.8	2.9C	2.6	2.6	2.0	3.3*	(4)	(1)
Balmoral	3.4	2.6	3.2*	2.3	2.1	2.4		(3)
Purser	3.2	2.2	2.3	2.3	2.1	2.7	(2)	(3)
Snake	3.0	2.1B	2.4	2.2	1.9	2.6		
Overall mean	3.0	2.4	2.3	2.5	2.1	2.7		

Confidences of differences from Control. (Confidences are per Column of 19 varieties based on Fisher's Modified LSD procedure)

* 95% ** 99% *** 99.9

Varieties marked A are significantly different from those marked B
Varieties marked C are significantly different from those marked D

Jaguar, Fristo and Kalamo were described as gritty/watery; other varieties most commonly as stale/sour