Project title:	Vining Peas: Evaluation of new varieties sown at appropriate commercial timings
Project number:	FV 154c
Project leader:	Mr. S.J. Belcher, PGRO
Report:	Annual report, February 2011
Previous report:	
Key staff:	Mr. S.J. Belcher Dr. A.J. Biddle (pathology) Ms. S. Johnson
Location of project:	PGRO, Great North Road, Thornhaugh, Peterborough
Industry representative:	Mr. R Fitzpatrick, Holbeach Marsh Co-op, Manor Farm, Holbeach Hurn, Spalding, PE12 8LR
Date project commenced:	1 March 2010
Date project completed (or expected completion date):	28 February 2013

The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

[Name] Salvador Potter
[Position] Chief Executive Officer
[Organisation] Processors and Growers Research Organistaion

Signature ..... Date 11/02/2011.....

[Name]
[Position]
[Organisation]

Signature ..... Date .....

Report authorised by:

[Name]
[Position]
[Organisation]

Signature ..... Date .....

[Name]
[Position]
[Organisation]

Signature ..... Date .....

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Grower summary

Headline

This work will enable growers to have further information on relative yields and maturities of vining pea varieties within a maturity group and maturity data is particularly important for varieties that have to be included in a harvesting schedule that is based on the provision of crops that can be harvested over a six week period within defined limits of maturity.

Background

Varietal selection is an important and key element of vining pea crop production to ensure a programmed harvest period and to maintain high quality produce.

PGRO evaluates around 15 varieties annually at National List stage funded by PGRO Levy and the most promising are evaluated in trials for a further two years. Trials are usually sown early and to improve and refine the evaluation process, additional information is needed to supplement data from established trials. Growers indicate that up to 35% of sowings occur in May, but PGRO trials are sown in March – April. Data are therefore required from varieties sown at a timing appropriate for their maturity.

Results

For full and comprehensive results please refer to the full trials report.

Variety Name	Leaf Type	Source	Maturity
Pizarro	Semi-leafless	Seminis Vegetable Seeds, France	-1
Avola	Conventional	Seminis Vegetable Seeds, France	0
Salinero	Conventional	Seminis Vegetable Seeds, France	0
Sherwood	Conventional	Seminis Vegetable Seeds, France	+1
Anubis	Conventional	Limgagrain, UK	+1
Hesbana	Semi-leafless	Nunhems Seeds, Netherlands	+1
Cosima	Conventional	van Waveren, Germany	+3
Romance	Semi-leafless	Seminis Vegetable Seeds, France	+3
Superana	Conventional	Nunhems Seeds, Netherlands	+4
Premio	Semi-leafless	Maribo Seeds, Denmark	+5
Chinook	Semi-leafless	Limgagrain UK	+6
Recital	Semi-leafless	Syngeta Seeds, France	+6
Bingo	Semi-leafless	Syngeta Seeds, France	+7
Bikini	Semi-leafless / semi-fascaited	Syngeta Seeds, France	+8
Biktop	Semi-leafless / semi-fascaited	Syngeta Seeds, France	+8
Ashton	Conventional	Seminis Vegetable Seeds, France	+9
Tommy	Semi-leafless	Limgagrain UK	+9
Spandimo	Semi-leafless	Seminis Vegetable Seeds, France	+9
Yoda	Semi-leafless	Maribo Seeds, Denmark	+9
Boogie	Semi-leafless	Nunhems Seeds, Netherlands	+9
Zephyr	Semi-leafless	Limgagrain UK	+11
Butana	Semi-leafless	Nunhems Seeds, Netherlands	+11
Ambassador	Conventional	van Waveren, Germany	+12
Elvas	Conventional	Maribo Seeds, Denmark	+12
Hippee	Semi-leafless	Maribo Seeds, Denmark	+12
Naches	Semi-leafless	Crites Seeds, USA	+13
Kenobi	Semi-leafless	Maribo Seeds, Denmark	+13

Trial site details

Variety Trials and powdery mildew trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF069019.

Downy Mildew Trial: Silt loam soil. OS Ref TF269482 Manor Farm, Langrick, Lincs

Tables of % yield, % size grade, haulm length and standing ability - 2010

Early-season Trial

	@TR100					@TR120		
Variety	Yield % of Bikini	% in size grades L	M	S	VS	Yield % of Bikini	Haulm length cm	Standing Ability 9=erect 1=lodged
Sherwood	43-	25	54	17	4	54-	35	5
Pizarro	51-	49	45	5	1	57-	37	8
Avola	51-	70	26	3	1	56-	41	4
Salinero	50-	47	44	7	2	51-	35	5
Anubis	60-	40	45	12	3	56-	29	7
Hesbana	48-	16	54	26	4	48-	40	8
Cosima	63-	43	41	13	3	66-	34	6
Superana	60-	8	44	40	8	64-	40	9
Romance	77-	23	45	27	5	83-	38	8
Bikini	100 (6.57t/ha)	22	58	19	1	100	32	6
Premio	98	18	50	30	2	96	46	7

Full information on all varieties can be found in the Full Trial Report.

Mid-season Trial

	@TR100					@TR120		
Variety	Yield % of Bikini	% in size grades L	M	S	VS	Yield % of Bikini	Haulm length cm	Standing Ability 9=erect 1=lodged
Chinook	74-	12	54	33	1	88	45	8
Recital	58-	5	43	47	5	65-	46	4
Biktop	98	23	51	24	2	98	51	9
Boogie	90	30	59	10	1	91	45	4
Bingo	96	26	53	18	3	92	42	4
Bikini	100 (4.46t/ha)	29	53	16	2	100 (5.02t/ha)	53	9
Tommy	96	9	43	42	6	92	51	5
Ashton	104	19	55	24	2	102	44	3
Yoda	69-	20	52	24	4	71-	53	3
Spandimo	84-					80-	50	9

Late-season Trial

Variety	@TR100 Yield % of Bikini	% in size grades L	M	S	VS	@TR120 Yield % of Bikini	Haulm length cm	Standing Ability 9=erect 1=lodged
Bikini	100 (4.58t/ha)	19	52	27	2	100 (4.58t/ha)	38	3
Zephyr	81	14	50	33	3	106	39	3
Kenobi	90	21	61	17	1	100	50	3
Butana	64-	12	55	31	2	67-	54	9
Naches	90	18	62	18	2	95	42	3
Hippee	65-	10	46	38	6	74	46	3
Elvas	68-	11	56	31	2	71-	42	3
Ambassador	70-	34	42	21	3	80	58	2

Standard Pea Early Season Trial, Thornhaugh

Bikini the yield standard gave good yields considering the seasonal weather. Many of the early and second early varieties did not yield well compared to Bikini. These varieties suffered more than most in the very dry conditions and were possibly caught by late spring frosts when starting to flower.

Sherwood and Pizarro were the first varieties to mature, maturing one day before Avola.

Sherwood had shorter haulm than Avola and had average standing ability at harvest. Yields were lower than Avola, but produce was smaller, medium-large size grade.

Pizarro was semi-leafless, had shorter haulm the Avola and stood erect at harvest. Yields were similar to Avola and produce was smaller large-medium size grade.

Avola was the first variety to mature and gave significantly lower yields than Bikini. Haulm was relatively short and the variety lodged. Produce was very large size grade.

Salinero matured at the same time as Avola. Haulm was shorter haulm than Avola and standing ability at harvest was average. Yields were similar to Avola. Produce was smaller than Avola large-medium size grade.

Annubis matured one day later than Avola. Haulm was very short and the variety stood well at harvest. Yields were a little higher than Avola at TR100 and produce was smaller medium-large size grade.

Hesbana was semi-leafless and matured 2 days later than Avola. Haulm was similar in length to Avola and the variety was erect at harvest. Yields were lower than Avola, but not significantly so. Produce was much smaller than Avola medium-small size grade.

Cosima matured 3 days later than Avola and gave higher, but not significantly higher yields than Avola. Haulm was shorter than Avola and the variety had better than average standing ability. Produce was smaller than Avola, large-medium size grade.

Superana was semi-leafless, had short haulm and stood erect at harvest. Yields were higher than Avola, but not significantly higher. Produce was much smaller than Avola, medium-small size grade.

Roamance was semi-leafless, had short haulm and stood erect at harvest. Yields were significantly higher than Avola, but significantly lower than Bikini. Produce was medium size grade at TR100 and medium-large at TR120.

Maturing 7 days later than Avola, **Bikini** was semi-leafless and semi-fasciated, had short haulm and stood reasonably well at harvest. Yields were good, particularly at TR100. Produce was medium size grade.

Premio matured at the same time as Bikini, later than expected. Haulm was longer than Avola and the variety stood well at harvest. Yields were good, only a little below Bikini and significantly higher than Avola. Produce was much smaller than Avola and a little smaller than Bikini, medium-small size grade at TR100.

Standard Pea Mid-season Trial, Thornhaugh

Yields of Bikini were a 2.1t/ha lower than the early sown trial at TR100.

Chinook was semi-leafless and was the first variety to mature, 2 days before Bikini. Haulm was short, shorter than Bikini and was erect at harvest. Yields were lower than Bikini, significantly so at TR100. Produce was smaller than Bikini, medium-small size grade.

Semi-leafless **Recital** matured one day before Bikini. Haulm was shorter than Bikini and the variety had lodged somewhat at harvest. Yields were low, significantly lower than Bikini. Produce was much smaller than Bikini, however, small-medium size grade at TR100 and medium-small at TR120.

Biktop, Boogie, and Bingo matured at the same time as Bikini.

Biktop was semi-leafless and semi-fasciated like Bikini. Haulm was similar in length to Bikini and like Bikini stood erect at harvest. Yields were similar to Bikini and produce was only very slightly smaller, medium size grade.

Boogie was semi-leafless, had shorter haulm than Bikini and had less than average standing ability at harvest. Yields were lower than Bikini, but not significantly so. Produce was a little larger than Bikini, medium-large size grade.

Bingo was semi-leafless, had shorter haulm than Bikini and had less than average standing ability. Yields were only a little lower than Bikini at TR100. Produce size was similar to Bikini.

Bikini was semi-leafless and semi-fasciated and stood erect at harvest. Yields were good, but lower than the early sown trial. Produce was medium-large size grade.

Tommy, Ashton, Yoda and Spandimo matured one day later than Bikini.

Tommy was semi-leafless, had similar length haulm to Bikini and average standing ability at harvest. Yields were a little lower than Bikini at TR100. Produce was smaller than Bikini, medium-small size grade.

Ashton had shorter haulm than Bikini and was lodged at harvest. Yields were a little higher than Bikini. Produce was smaller than Bikini, medium size grade.

Yoda was semi-leafless, had similar length haulm to Bikini, but was lodged at harvest. Yields were low, significantly lower than Bikini. Produce was a little smaller than Bikini, medium size grade.
Spandimo was semi-leafless, had similar length haulm to Bikini and had excellent standing ability at harvest. Yields were significantly lower than Bikini and produce a little smaller, medium size grade.

Standard Pea late-season Trial, Thornhaugh

Bikini the yield standard gave a similar yield at TR100 to the mid-season trial, but gave little yield increase from TR100 to TR120. Produce size was generally a little smaller in this trial than usually seen. Standing ability at harvest for most varieties in this trial was poor.

Bikini was semi-leafless and semi-fasciated and was the first variety to mature, 4 days before Ambassador. Haulm was short and the variety was lodged at harvest. Produce was medium size grade.

Maturing 4 days later than Bikini, **Zephyr** was semi-leafless, had similar length haulm to Bikini and was lodged at harvest. Yields were lower than Bikini at TR100, but a little higher at TR120. Produce was a little smaller than Bikini, medium-small size grade.

Kenobi and Butana matured 5 days later than Bikini.

Kenobi was semi-leafless, had longer haulm than Bikini and was lodged at harvest. Yields were similar to Bikini at TR120. Produce contained a high percentage of peas in the medium size grade.

Semi-leafless **Butana** had longer haulm than Bikini and excellent standing ability at harvest. Yields were low, significantly lower than Bikini but produce was smaller, medium-small size grade.

Naches, Hippee and Elvas matured at the same time as Ambassador, 6 days later than Bikini.

Naches was semi-leafless, had similar length haulm to Bikini and was lodged at harvest. Yields were a little lower than Bikini at TR120. Produce contained a high percentage of peas in the medium size grade.

Hippee was semi-leafless, had longer haulm than Bikini and was lodged at harvest. Yields were lower than Bikini, significantly so at TR100. Produce was smaller than Bikini, medium-small size grade.

Elvas had similar length haulm to Bikini. Yields were low, significantly lower than Bikini. Produce was smaller than Bikini, medium-small size grade.

Ambassador had the longest haulm and was lodged badly at harvest. Yields were low, significantly lower than Bikini at TR100. Produce was larger than Bikini, medium-large size grade.

Main conclusions

This vining pea variety work is a very valuable addition to previous variety trials in that it is matching maturity groups to drilling periods of the season appropriate to the commercial vining pea business. The data produced from this work is an extremely valuable addition to the knowledge base of group managers and fieldsmen when planning variety choice.

Many of the early and second early varieties did not yield well compared to Bikini. These varieties suffered more than most in the very dry conditions and were possibly caught by late spring frosts when starting to flower. The exception was Premio gave yields similar to Bikini, however maturity was similar to Bikibi, later than previously seen.

In the mid-season group maturities were similar to previous results. With exception of Bingo and Ashton all varieties gave lower yields than previous results when compared to Bikini. Chinook, Recital, Yoda and Spandimo gave low yields.

In the late-season varieties most varieties had later maturity the previously seen when compared to Bikini. However, maturity was similar to previous results when compared to Ambassador the late maturity standard. As in the Mid-season trial Bikini yielded well and all varieties including Ambassador were lower yielding than previous results suggest when compared to Bikini. However, when yields were compared to Ambassador yield rankings and differences were similar to previously seen results.

Full trial report

Introduction

Vining peas are a major vegetable crop grown for processing and for the fresh market. Peas for canning and freezing occupy 36,000 ha per annum, with a farmgate value of £42M.

The peas market is worth £216M in value and has been in growth by 11% year on year. (TNS Worldpanel,52W 14 June 2009)

Varietal selection is an important and key element of vining pea crop production to ensure a programmed harvest period and to maintain high quality produce.

PGRO evaluates around 15 varieties annually at National List stage funded by PGRO Levy and the most promising are evaluated in trials for a further two years. Trials are usually sown early and to improve and refine the evaluation process, additional information is needed to supplement data from established trials. Growers indicate that up to 35% of sowings occur in May, but PGRO trials are sown in March – April. Data are therefore required from varieties sown at a timing appropriate for their maturity.

Variety Name	Leaf Type	Source	Maturity
Pizarro	Semi-leafless	Seminis Vegetable Seeds, France	-1
Avola	Conventional	Seminis Vegetable Seeds, France	0
Salinero	Conventional	Seminis Vegetable Seeds, France	0
Sherwood	Conventional	Seminis Vegetable Seeds, France	+1
Anubis	Conventional	Limgagrain, UK	+1
Hesbana	Semi-leafless	Nunhems Seeds, Netherlands	+1
Cosima	Conventional	van Waveren, Germany	+3
Romance	Semi-leafless	Seminis Vegetable Seeds, France	+3
Superana	Conventional	Nunhems Seeds, Netherlands	+4
Premio	Semi-leafless	Maribo Seeds, Denmark	+5
Chinook	Semi-leafless	Limgagrain UK	+6
Recital	Semi-leafless	Syngeta Seeds, France	+6
Bingo	Semi-leafless	Syngeta Seeds, France	+7
Bikini	Semi-leafless / semi-fascaited	Syngeta Seeds, France	+8
Biktop	Semi-leafless / semi-fascaited	Syngeta Seeds, France	+8
Ashton	Conventional	Seminis Vegetable Seeds, France	+9
Tommy	Semi-leafless	Limgagrain UK	+9
Spandimo	Semi-leafless	Seminis Vegetable Seeds, France	+9
Yoda	Semi-leafless	Maribo Seeds, Denmark	+9
Boogie	Semi-leafless	Nunhems Seeds, Netherlands	+9
Zephyr	Semi-leafless	Limgagrain UK	+11
Butana	Semi-leafless	Nunhems Seeds, Netherlands	+11
Ambassador	Conventional	van Waveren, Germany	+12
Elvas	Conventional	Maribo Seeds, Denmark	+12
Hippee	Semi-leafless	Maribo Seeds, Denmark	+12
Naches	Semi-leafless	Crites Seeds, USA	+13
Kenobi	Semi-leafless	Maribo Seeds, Denmark	+13

Trial site details

Variety Trials and powdery mildew trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF069019.

Downy Mildew Trial: Silt loam soil. OS Ref TF269482 Manor Farm, Langrick, Lincs

Production details

Several promising varieties have been tested in recent years and more information on their performance and relative maturity of varieties within a maturity group is needed at the likely commercial sowing time. Early varieties would therefore be tested under cool establishment conditions with a long period from sowing to harvest while, in contrast, maincrop varieties would be tested under conditions of rapid establishment and growth. Work is needed over three years to gain experience in contrasting weather conditions.

Sown: Early Trial 19 March 2010
Mid-season Trial 14 April 2010
Late-season Trial 29 April 2010

Grown under best local and commercial practice.

Fungicide seed treatment: Wakil XL
Broad-leaved weeds were controlled pre-emergence and (post-emergence where required).
Aphid and pea moth (Cydia nigricana) were controlled (monitored by pea moth traps).
Fungicide sprays were applied to control Botrytis and Mycosphaerella (where required).
No irrigation was applied.
Haulm lengths and standing ability were measured post flowering.
Maturity was assessed from the sampling areas to achieve correct harvest dates for quick-freezing and TR120 harvest stage for vined peas using a Martin Pea Tenderometer.
Sub-plots were harvested when appropriate by hand, vined in a static plot pea viner, sieved and washed. Peas were size-graded with a Mather & Platt size-grader, weighed and total yield measured.
Samples were blanched, sorted and quick-frozen at @TR100 for quality appraisal and inspection by processors and growers.
Quality aspects of the defrosted and cooked frozen samples were assessed for colour, eveness of colour, brightness of colour, numbers of blond peas, sweetness and strength of flavour.
Measure of sweetness was assessed by Brix measurement.

Specific Objective:

1. Yield relative to a standard at TR100 and TR120
2. Maturity relative to a standard at TR100 and TR120
3. Size-grade specification
4. Haulm length
5. Standing ability
6. Standing ability at harvest
7. Disease susceptibility to downy mildew (Peronospora viciae)
8. Disease susceptibility powdery mildew (Erysiphe pisi) where no previous data exist.
9. Provision of Processed samples for evaluation
10. Basic sensory appraisal of processed samples

Trial design

Each trial early, mid-season, late-season had:
Bikini as the yield standard, common across all 3 trials

The trials additionally had the standards below:
Early-season trials Avola
Mid-season trials Bikini
Late-season trials Ambassador

Trial layout: Randomised block, 3 replications.
Plot size: 1.83 m x 19 m
Sub-plots: 1.83 m x 5 m for up to three harvests taken at @TR 100 (range 95-105), @TR 120 Range 115-130) and a third harvest if required.
Sampling areas for TR assessment: 1.83 m x 2.0 m
Sown with an Øyjord plot drill to achieve a population of 90 plants/m²
Yields were corrected to TR100 and TR120 and statistically analysed using ANOVA.
On completion of the project yields will be corrected to TR100 and TR120 and statistically analysed using fitted constant REML analysis.

Powdery Mildew Trial
Varieties that had not been previously screened for powdery mildew resistance were planted in a double row plot with two replications at Thornhaugh in late early June. Natural infection of powdery mildew was assessed after flowering and varieties were scored as susceptible or resistant.

Downy Mildew Trials
Varieties that came with untreated seed were planted in a double row plot with two replications at two sites in commercial crops of vining peas with a long history of pea growing where natural infection from soil borne oospores was likely to occur. Infection scores were made on two occasions during the season and these scores converted to a scale of relative field resistance.

Fields were chosen where there has been a long history of pea cultivation and the potential for a high population of downy mildew (Peronospora viciae) was high. Sowing was carried out at a time which was favourable to natural infection taking place. Two replicates of 200 seeds of each variety without any fungicidal seed treatment were drilled in a double row 5m long. The varieties were randomised. At two occasions, disease assessments were made, the first at about the 4 node stage when the percentage of primary infected seedlings was estimated and the second assessment was an estimate of the percentage plants showing downy mildew infection and an estimate of the percentage leaf area infected. The scores of these assessments were amalgamated and an overall infection level calculated. Based on the level of infection, a resistance score was allocated using a 1-9 scale where 1 is very susceptible and 9 indicates good field resistance

Trial records and data collected

2010, after a cold and wet February March was also cold. Rainfall was less than half the normal, with most falling in the last 10 days. April was mostly fine and dry, with some high daytime temperatures, but occasional frosts. Rainfall was less than half the average, with bulk falling on the last day of the month. May had a cool start, but temperatures rose to above normal in the 3rd week. There were occasional showers, but rainfall was less than one third of average for the month. June was very warm with daily maximum temperatures

2.5 C higher than normal. Rainfall was less than half the normal with bulk falling on the 8/9 June. Temperatures in July were above average. Rainfall was 55% of average, mostly falling in the middle 2 weeks.

TABLE 1 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Funded Early Variety Trial, Thornhaugh - 2010
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 19 March
Results are means of three replicates. Target population 90 plants per m² sown in ten 15 cm rows.

				@ TR 100						@ TR 120									
Variety		Source	1000 Seed Weight g	Maturity (± days) Avola	Yield % of Bikini	% in size grades L	M	S	VS	Maturity (± days) Avola	Yield % of Bikini	% in size grades L	M	S	VS	Haulm length cm	Standing Ability 9=erect 1=lodged	Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark
Sherwood		SVS	165	- 1	43^{-}	25	54	17	4	0	54^{-}	45	45	8	2	35	5	21	5.5
Pizarro	SL	SVS	194	- 1	51^{-}	49	45	5	1	0	57^{-}	74	22	3	1	37	8	22	5.8
Avola		SVS	204	0(20/6)	51^{-}	70	26	3	1	0(22/6)	56^{-}	81	16	2	1	41	4	24	5.8
Salinero		SVS	202	0	50^{-}	47	44	7	2	0	51^{-}	64	29	5	2	35	5	22	5.7
Anubis		LUK	221	+ 1	60^{-}	40	45	12	3	+ 1	56^{-}	60	32	7	1	29	7	23	5.3
Hesbana	SL	Nun	205	+ 2	48^{-}	16	54	26	4	+ 3	48^{-}	37	62	1	0	40	8	20	5.3
Cosima		vW	162	+ 3	63^{-}	43	41	13	3	+ 4	66^{-}	54	34	10	2	34	6	28	5.2
Superana	SL	Nun	137	+ 4	60^{-}	8	44	40	8	+ 4	64^{-}	10	55	31	4	40	9	27	5.4
Romance	SL	SVS	169	+ 5	77^{-}	23	45	27	5	+ 4	83^{-}	36	57	7	0	38	8	26	5.5
Bikini	SLSF	Syn	222	+ 7	100 (6.57t/ha)	22	58	19	1	+ 5	100 (7.36t/ha)	26	59	14	1	32	6	32	5.9
Premio		Mar	182	+ 7	98	18	50	30	2	+ 6	96	19	65	16	0	46	7	33	5.9
Significance @ P=0.05					SD						SD								
LSD @ P=0.05					16.7						16.5								
CV %					13.3						12.9								

KEY: Yield: $^{+}$ Significantly greater than Bikini @ P = 0.05; $^{-}$ Significantly less than Bikini @ P = 0.05
Size grades: L = large > 10.2mm; M = medium 8.75 - 10.2mm; S = small 7.5 - 8.75mm; VS = very small < 7.5mm
SL = Semi-leafless; SF = Semi-fasciated
Source of varieties see Appendix 1

TABLE 2 - VINING PEA VARIETY STUDIES. Summary of quality data - Early Variety Trial, Thornhaugh – 2010

Variety	Tenderometer Reading	Appearance				Taste		
		Colour	Brightness	Uniformity	No. of blonds	Flavour	Texture	Brix
		(3-8)	(1-2)	(1-5)	(1-5)	(1-5)	(1-5)	%
Sherwood	99.5	5.17	1.00	4.00	1.3	4.00	2.00	10.8
Pizarro	97.0	5.67	1.00	4.33	1.3	3.00	2.00	10.8
Avola	104.5	5.17	1.33	4.67	1.0	3.00	2.67	9.3
Salinero	104.0	5.83	1.00	4.67	1.0	3.33	2.00	8.6
Anubis	99.5	5.33	1.00	4.33	1.0	3.00	2.00	10.0
Hesbana	95.0	4.17	1.67	2.67	1.3	2.33	2.00	10.9
Cosima	102.0	5.50	1.00	4.67	1.0	3.33	2.67	8.7
Superana	99.0	5.33	1.00	4.67	1.0	3.00	2.00	10.8
Romance	99.0	6.17	1.00	5.00	1.0	3.33	2.33	9.6
Bikini	102.0	5.83	1.00	4.67	1.0	2.67	2.67	9.1
Premio	96.5	5.33	1.00	4.67	1.0	2.33	2.67	8.5

KEY: Uniformity; Uniformity; No. of blonds; Flavour; Texture: (1-5) - a high figure indicates that the variety shows the character to a high degree
Colour: a high figure indicates a darker green; Brightness: 1 = bright, 2 = dull; Brix - measured using Atago pocket refractometer PAL-1 and gives an indication of sugar content

TABLE 3 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Funded Mid-Season Variety Trial, Thornhaugh - 2010
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 14 April
Results are means of three replicates. Target population 90 plants per m² sown in ten 15 cm rows.

				@ TR 100							@ TR 120								
Variety		Source	1000 Seed Weight g	Maturity ± days) Bikini	Yield % of Bikini	% in size grades L	M	S	VS	Maturity ± days) Bikini	Yield % of Bikini	% in size grades L	M	S	VS	Haulm length cm	Standing Ability 9=erect 1=lodged	Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark
Chinook	SL	LUK	169	- 2	74^{-}	12	54	33	1	- 1	88	14	56	28	2	45	8	24	5.5
Recital	SL	Syn	147	- 1	58^{-}	5	43	47	5	0	65^{-}	10	54	32	4	46	4	13	5.4
Biktop	SLSF	Syn	210	0	98	23	51	24	2	0	98	27	55	16	2	51	9	22	6.0
Boogie	SL	vW	206	0	90	30	59	10	1	0	91	42	52	5	1	45	4	20	5.8
Bingo	SL	Syn	238	0	96	26	53	18	3	0	92	32	54	12	2	42	4	18	5.3
Bikini	SLSF	Syn	222	0(3/7)	100 (4.46t/ha)	29	53	16	2	0(4/7)	100 (5.02t/ha)	36	54	9	1	53	9	21	6.0
Tommy	SL	LUK	138	+ 1	96	9	43	42	6	+ 1	92	10	51	35	4	51	5	24	5.7
Ashton		SVS	211	+ 1	104	19	55	24	2	+ 1	102	24	60	15	1	44	3	21	5.4
Yoda	SL	Mar	175	+ 1	69^{-}	20	52	24	4	+ 2	71^{-}	31	57	11	1	53	3	15	5.7
Spandimo	SL	SVS	196	+ 1	84^{-}	21	51	25	3	+ 2	80^{-}	30	56	13	1	50	9	18	5.6
Significance @ P=0.05					SD						SD								
LSD @ P=0.05					14.6						13.8								
CV %					9.8						9.2								

KEY: Yield: $^{+}$ Significantly greater than Bikini @ P = 0.05; $^{-}$ Significantly less than Bikini @ P = 0.05
Size grades: L = large > 10.2mm; M = medium 8.75 - 10.2mm; S = small 7.5 - 8.75mm; VS = very small < 7.5mm
SL = Semi-leafless; SF = Semi-fasciated
Source of varieties see Appendix 1

TABLE 4 - VINING PEA VARIETY STUDIES. Summary of quality data – Mid-season Variety Trial, Thornhaugh – 2010

Variety	Tenderometer Reading	Colour	Brightness	Uniformity	No. of blonds	Flavour	Texture	Brix
		(3-8)	(1-2)	(1-5)	(1-5)	(1-5)	(1-5)	%
Chinook	100.0	5.33	1.00	4.00	1.3	3.00	2.67	10.6
Recital	101.5	5.33	1.00	4.33	1.0	3.67	2.33	10.5
Biktop	98.5	5.33	1.00	4.00	1.3	4.00	3.00	9.1
Boogie	102.0	6.17	1.33	4.67	1.0	2.33	4.00	10.2
Bingo	100.0	5.17	1.00	4.33	1.0	2.33	3.33	10.4
Bikini	98.0	5.83	1.33	4.33	1.0	3.33	2.67	10.7
Tommy	102.5	5.83	1.67	4.00	1.3	2.00	2.67	10.3
Ashton	99.0	5.33	1.00	3.33	1.0	2.67	2.67	11.1
Yoda	100.0	5.17	1.33	4.00	1.0	3.00	2.67	10.4
Spandimo	98.0	5.83	1.33	4.00	1.3	3.67	2.33	10.1

KEY: Uniformity; Uniformity; No. of blonds; Flavour; Texture: (1-5) - a high figure indicates that the variety shows the character to a high degree
Colour: a high figure indicates a darker green; Brightness: 1 = bright, 2 = dull; Brix - measured using Atago pocket refractometer PAL-1 and gives an indication of sugar content

T**ABLE 5 - VINING PEA VARIETY STUDIES**. Summary of agronomic data Standard Vining Pea HDC Funded Late Season Variety Trial, Thornhaugh - 2010
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 29 April
Results are means of three replicates. Target population 90 plants per m² sown in ten 15 cm rows.

				@ TR 100							@ TR 120								
Variety		Source	1000 Seed Weight g	Maturity ± days) Bikini	Yield % of Bikini	% in size grades L	M	S	VS		Maturity ± days) Bikini	Yield % of Bikini	% in size grades L	M	S	VS	Haulm length cm	Standing Ability 9=erect 1=lodged	Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark
Bikini	SLSF	Syn	222	0(10/7)	100 (4.58t/ha)	19	52	27	2		0(12/7)	100 (4.58t/ha)	23	56	19	2	38	3	24	6.0
Zephyr	SL	LUK	178	+ 4	81	14	50	33	3		+ 3	106	16	60	22	2	39	3	23	5.5
Kenobi	SL	Mar	191	+ 5	90	21	61	17	1		+ 4	100	28	58	13	1	50	3	24	5.8
Butana	SL	Nun	178	+ 5	64⁻	12	55	31	2		+ 4	67⁻	16	61	22	1	54	9	16	5.5
Naches	SL	CS	205	+ 6	90	18	62	18	2		+ 5	95	24	62	13	1	42	3	24	5.6
Hippee	SL	Mar	155	+ 6	65⁻	10	46	38	6		+ 5	74	12	53	31	4	46	3	20	5.4
Elvas		Mar	191	+ 6	68⁻	11	56	31	2		+ 5	71⁻	14	61	24	1	42	3	24	5.6
Ambassador		vW	232	+ 6	70⁻	34	42	21	3		+ 5	80	36	53	10	1	58	2	18	5.3
Significance @ P=0.05					SD							SD								
LSD @ P=0.05					25.9							28.4								
CV %					13.4							13.9								

KEY: Yield: ⁺ Significantly greater than Bikini @ P = 0.05; ⁻ Significantly less than Bikini @ P = 0.05
Size grades: L = large > 10.2mm; M = medium 8.75 - 10.2mm; S = small 7.5 - 8.75mm; VS = very small < 7.5mm
SL = Semi-leafless; SF = Semi-fasciated
Source of varieties see Appendix 1

TABLE 6 - VINING PEA VARIETY STUDIES. Summary of quality data – late season Variety Trial, Thornhaugh – 2010

Variety	Tenderometer Reading	Colour	Brightness	Uniformity	No. of blonds	Flavour	Texture	Brix
		(3-8)	(1-2)	(1-5)	(1-5)	(1-5)	(1-5)	%
Bikini	115.0	5.67	1.33	4.67	1.3	2.00	4.33	10.1
Zephyr	99.0	5.17	1.67	4.33	1.0	1.67	3.00	9.7
Kenobi	100.0	5.50	1.00	4.67	1.0	2.00	4.00	9.7
Butana	96.0	5.17	1.33	4.00	1.0	2.00	3.33	8.5
Naches	99.0	5.33	1.00	4.67	1.3	2.00	4.33	9.1
Hippee	105.0	5.17	1.00	4.33	1.0	1.67	3.33	9.2
Elvas	100.0	5.33	1.00	3.33	1.3	2.00	3.67	8.9
Ambassador	101.0	5.33	1.33	4.33	1.3	2.67	2.67	8.2

KEY: Uniformity; Uniformity; No. of blonds; Flavour; Texture: (1-5) - a high figure indicates that the variety shows the character to a high degree
Colour: a high figure indicates a darker green; Brightness: 1 = bright, 2 = dull; Brix - measured using Atago pocket refractometer PAL-1 and gives an indication of sugar content

Varietal Susceptibility of Vining Peas to Powdery Mildew (Erysiphe pisi) - 2010

Varieties that had not been screened for powdery mildew in previous evaluations were included in the powdery mildew evaluation

Plants were scored for natural infection at the full pod growth stage. The scores reflected resistance and susceptibility and are shown below

Susceptible *– Premio*

Varietal Susceptibility of Vining Peas to Downy Mildew (Peronospora viciae) - 2010

The trial was situated in a commercial crop of vining peas with a history of pea growing. The soil type was a silt loam and the trial was drilled on 20 April.

Plants were scored for infection on two occasions during the season, to include both primary systemically infected seedlings and secondary infection on the foliage and pods. The data were combined to give an indication of the relative susceptibility to downy mildew on a 1-9 scale of increasing field resistance.

1	3	7	8	9
Susceptible	**Moderately Susceptible**	**Slightly Susceptible**	**Moderate Field Resistance**	**Good Field Resistance**
Elvas Cosima	Anubis	Zephyr Boogie Yoda Chinook Bingo	Biktop Naches Tommy	Hippee Romance Kenobi Premio

Discussion

Standard Pea Early Season Trial, Thornhaugh – Tables 1 &2

Bikini the yield standard gave good yields considering the seasonal weather. Many of the early and second early varieties did not yield well compared to Bikini. These varieties suffered more than most in the very dry conditions and were possibly caught by late spring frosts when starting to flower.

Sherwood and Pizarro were the first varieties to mature, maturing one day before Avola.

Sherwood had shorter haulm than Avola and had average standing ability at harvest. Yields were lower than Avola, but produce was smaller, medium-large size grade.

Pizarro was semi-leafless, had shorter haulm the Avola and stood erect at harvest. Yields were similar to Avola and produce was smaller large-medium size grade.

Avola was the first variety to mature and gave significantly lower yields than Bikini. Haulm was relatively short and the variety lodged. Produce was very large size grade.

Salinero matured at the same time as Avola. Haulm was shorter haulm than Avola and standing ability at harvest was average. Yields were similar to Avola. Produce was smaller than Avola large-medium size grade.

Annubis matured one day later than Avola. Haulm was very short and the variety stood well at harvest. Yields were a little higher than Avola at TR100 and produce was smaller medium-large size grade.

Hesbana was semi-leafless and matured 2 days later than Avola. Haulm was similar in length to Avola and the variety was erect at harvest. Yields were lower than Avola, but not significantly so. Produce was much smaller than Avola medium-small size grade.

Cosima matured 3 days later than Avola and gave higher, but not significantly higher yields than Avola. Haulm was shorter than Avola and the variety had better than average standing ability. Produce was smaller than Avola, large-medium size grade.

Superana was semi-leafless, had short haulm and stood erect at harvest. Yields were higher than Avola, but not significantly higher. Produce was much smaller than Avola, medium-small size grade.

Roamance was semi-leafless, had short haulm and stood erect at harvest. Yields were significantly higher than Avola, but significantly lower than Bikini. Produce was medium size grade at TR100 and medium-large at TR120.

Maturing 7 days later than Avola, **Bikini** was semi-leafless and semi-fasciated, had short haulm and stood reasonably well at harvest. Yields were good, particularly at TR100. Produce was medium size grade.

Premio matured at the same time as Bikini, later than expected. Haulm was longer than Avola and the variety stood well at harvest. Yields were good, only a little below Bikini and significantly higher than Avola. Produce was much smaller than Avola and a little smaller than Bikini, medium-small size grade at TR100.

Standard Pea Mid-season Trial, Thornhaugh – Tables 3 & 4

Yields of Bikini were a 2.1t/ha lower than the early sown trial at TR100.

Chinook was semi-leafless and was the first variety to mature, 2 days before Bikini. Haulm was short, shorter than Bikini and was erect at harvest. Yields were lower than Bikini, significantly so at TR100. Produce was smaller than Bikini, medium-small size grade.

Semi-leafless **Recital** matured one day before Bikini. Haulm was shorter than Bikini and the variety had lodged somewhat at harvest. Yields were low, significantly lower than Bikini. Produce was much smaller than Bikini, however, small-medium size grade at TR100 and medium-small at TR120.

Biktop, Boogie, and Bingo matured at the same time as Bikini.

Biktop was semi-leafless and semi-fasciated like Bikini. Haulm was similar in length to Bikini and like Bikini stood erect at harvest. Yields were similar to Bikini and produce was only very slightly smaller, medium size grade.

Boogie was semi-leafless, had shorter haulm than Bikini and had less than average standing ability at harvest. Yields were lower than Bikini, but not significantly so. Produce was a little larger than Bikini, medium-large size grade.

Bingo was semi-leafless, had shorter haulm than Bikini and had less than average standing ability. Yields were only a little lower than Bikini at TR100. Produce size was similar to Bikini.

Bikini was semi-leafless and semi-fasciated and stood erect at harvest. Yields were good, but lower than the early sown trial. Produce was medium-large size grade.

Tommy, Ashton, Yoda and Spandimo matured one day later than Bikini.

Tommy was semi-leafless, had similar length haulm to Bikini and average standing ability at harvest. Yields were a little lower than Bikini at TR100. Produce was smaller than Bikini, medium-small size grade.

Ashton had shorter haulm than Bikini and was lodged at harvest. Yields were a little higher than Bikini. Produce was smaller than Bikini, medium size grade.

Yoda was semi-leafless, had similar length haulm to Bikini, but was lodged at harvest. Yields were low, significantly lower than Bikini. Produce was a little smaller than Bikini, medium size grade.
Spandimo was semi-leafless, had similar length haulm to Bikini and had excellent standing ability at harvest. Yields were significantly lower than Bikini and produce a little smaller, medium size grade.

Standard Pea late-season Trial, Thornhaugh – Tables 5 &6

Bikini the yield standard gave a similar yield at TR100 to the mid-season trial, but gave little yield increase from TR100 to TR120. Produce size was generally a little smaller in this trial than usually seen. Standing ability at harvest for most varieties in this trial was poor.

Bikini was semi-leafless and semi-fasciated and was the first variety to mature, 4 days before Ambassador. Haulm was short and the variety was lodged at harvest. Produce was medium size grade.

Maturing 4 days later than Bikini, **Zephyr** was semi-leafless, had similar length haulm to Bikini and was lodged at harvest. Yields were lower than Bikini at TR100, but a little higher at TR120. Produce was a little smaller than Bikini, medium-small size grade.

Kenobi and Butana matured 5 days later than Bikini.

Kenobi was semi-leafless, had longer haulm than Bikini and was lodged at harvest. Yields were similar to Bikini at TR120. Produce contained a high percentage of peas in the medium size grade.

Semi-leafless **Butana** had longer haulm than Bikini and excellent standing ability at harvest. Yields were low, significantly lower than Bikini but produce was smaller, medium-small size grade.

Naches, Hippee and Elvas matured at the same time as Ambassador, 6 days later than Bikini.

Naches was semi-leafless, had similar length haulm to Bikini and was lodged at harvest. Yields were a little lower than Bikini at TR120. Produce contained a high percentage of peas in the medium size grade.

Hippee was semi-leafless, had longer haulm than Bikini and was lodged at harvest. Yields were lower than Bikini, significantly so at TR100. Produce was smaller than Bikini, medium-small size grade.

Elvas had similar length haulm to Bikini. Yields were low, significantly lower than Bikini. Produce was smaller than Bikini, medium-small size grade.

Ambassador had the longest haulm and was lodged badly at harvest. Yields were low, significantly lower than Bikini at TR100. Produce was larger than Bikini, medium-large size grade.

Conclusions

Many of the early and second early varieties did not yield well compared to Bikini. These varieties suffered more than most in the very dry conditions and were possibly caught by late spring frosts when starting to flower. The exception was Premio gave yields similar to Bikini, however maturity was similar to Bikibi, later than previously seen.

In the mid-season group maturities were similar to previous results. With exception of Bingo and Ashton all varieties gave lower yields than previous results when compared to Bikini. Chinook, Recital, Yoda and Spandimo gave low yields.

In the late-season varieties most varieties had later maturity the previously seen when compared to Bikini. However, maturity was similar to previous results when compared to Ambassador the late maturity standard. As in the Mid-season trial Bikini yielded well and all varieties including Ambassador were lower yielding than previous results suggest when compared to Bikini. However, when yields were compared to Ambassador yield rankings and differences were similar to previously seen results.

Technology transfer

Trials were demonstrated at the PGRO Vining Pea Trials day on 8 June 2010. Trials were visited by seedsmen at intervals throughout the harvest period.

Samples of harvested produce and a summary of 2010 results were presented at the PGRO Varieties Day on 9 November 2010.

A new PGRO publication ‘Vining Pea Growers Guide’ was produced and distributed. Data from these trials will be included in this publication. Data from other PGRO trials are also presented. This Publication is available free of charge and via the PGRO website.

The same data is also available in a leaflet format.

Appendix 1

KEY TO SOURCE OF VARIETIES

CS	Crites Seed Inc., USA
LUK	Limagrain UK Ltd, UK
Mar	Maribo Seed A/S, Denmark
Nun	Nunhems Zaden BV., Holland
SVS	Seminis Vegetabke Seeds, France
Syn	Syngenta Seeds SAS, France
vW	van Waveren, Germany

Appendix 2

PROCESSING DETAILS FOR FROZEN SAMPLES

All samples were sorted to remove damaged or diseased produce and extraneous matter, washed and then blanched in water of 6° hardness. After cooling in tap water and further sorting the samples were packed for freezing.

The processing details for vining peas are given below:-

Blanch:	1.5 min. @ 93°C
Blast frozen	@ -30°C
Stored	@ -18°C