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:	Final report, February 2014
Previous report:	Annual report, February 2011, Annual report February 2012, Annual report February 2013 (Early varieties)
Key staff:	Mr. S.J. Belcher Dr. A.J. Biddle / Dr. K. Maguire (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):	31 December 2013

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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] Roger Vickers
[Position] Chief Executive Officer
[Organisation] Processors and Growers Research Organistaion

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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.

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. 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.

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

Because of delayed sowing by wet weather and bird damage the mid-season and Late-season trials were not taken through to harvest in 2012. These trials were repeated in 2013. The early maturing trial series was completed in 2012. However data from the downy and powdery mildew disease trials was obtained in years 2012 and 2013.

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

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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	Limagrain, 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	Limagrain UK	+6
Bingo	Semi-leafless	Syngenta Seeds, France	+7
Bikini	Semi-leafless / semi-fasciated	Syngenta Seeds, France	+8
Biktop	Semi-leafless / semi-fasciated	Syngenta Seeds, France	+8
Ashton	Conventional	Seminis Vegetable Seeds, France	+9
Tommy	Semi-leafless	Limagrain UK	+9
Spandimo	Semi-leafless	Seminis Vegetable Seeds, France	+9
Boogie	Semi-leafless	Nunhems Seeds, Netherlands	+9
Zephyr	Semi-leafless	Limagrain UK	+11
Butana	Semi-leafless	Nunhems Seeds, Netherlands	+11
Ambassador	Conventional	van Waveren, Germany	+12
Hippee	Semi-leafless	Syngenta Seeds, France	+12
Naches	Semi-leafless	Crites Seeds, USA	+13
Kenobi	Semi-leafless	Syngenta Seeds, France	+13

Trial site details

Variety Trials and powdery mildew trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF070017.

Downy Mildew Trials: 2013 Silt loam soil. OS Grid Ref TF436310. Red House Farm, Holbeach St Matthew, Lincs & silt loam soil. OS Ref TL500927, Manea, Cambs.

Tables of % yield, % size grade, haulm length and standing ability – 2010, 2011 & 2013

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Early Main Crop 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
Chinook	93	18	58	23	1	100	42	8
Boogie	87	50	45	5	0	90	46	7
Biktop	96	26	58	15	1	95	40	9
Bingo	107	29	53	16	2	107	45	6
Bikini	100	33	55	11	1	100	44	8
Spandimo	93	30	55	13	2	93	44	8
Tommy	94	15	56	26	3	97	54	7
Ashton	96 (5.77t/ha)	26	58	14	2	104 (6.21t/ha)	48	3

Main Crop 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	28	53	9	1	100	39	6
Zephyr	94	25	55	18	2	102	41	5
Butana	105	19	62	18	1	104	58	8
Hippee	99	24	56	18	2	97	47	6
Kenobi	113	31	56	12	1	109	54	6
Naches	112	38	51	10	1	110	46	6
Ambassador	107 (4.91t/ha)	54	36	9	1	114 (5.37t/ha)	59	3

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

Standard Pea Early Main Crop Trial, Thornhaugh 2010, 2011 & 2013 – Tables 5 & 6

Overall there were no significant yield differences between Bikini and other varieties.

Chinook (Limagrain UK) was semi-leafless and matured 2 days before Bikini. Yields of medium size grade peas were similar to Bikini. Standing ability was very good.

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

Boogie (van Waveren) was semi-leafless and had good standing ability. Yields of large size grade peas were lower than Bikini.

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Biktop (Syngenta) was semi-leafless and semi-fasciated, like Bikini and had excellent standing ability. Yields of medium-large size grade peas were a little lower than Bikini.

Bingo (Syngenta) was semi-leafless and had average standing ability. Yields of medium-large size grade peas were a little higher than Bikini.

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

Spandimo (Seminis) was semi-leafless and had very good standing ability. Yields of medium size grade peas were a little lower than Bikini.

Tommy (Limagrain UK) was semi-leafless and stood well. Yields of medium-small size grade peas were a little lower than Bikini.

Ashton (Seminis) was lodged at harvest. Yields of medium-large size grade peas were a little higher than Bikini.

Standard Pea Main Crop Trial, Thornhaugh 2010, 2011 & 2013 – Tables 7 & 8

Bikini was the first variety to mature, 5 days before Ambassador. Overall there were no significant yield differences between Bikini and other varieties.

Zephyr (Limagrain UK) was semi-leafless and matured 3 days later than Bikini. Yields of medium-large size grade peas were similar to Bikini at TR120. Standing ability was average.

Butana (Nunhems) was semi-leafless and matured 4 days later than Bikini. Yields of medium size grade peas were a little higher than Bikini. Standing ability was very good.

Hippee (Syngenta) was semi-leafless and matured 4 days later than Bikini. Yields of medium-large size grade peas were similar to Bikini.

Kenobi (Syngenta) was semi-leafless and matured 4 days later than Bikini. Yields of medium-large size grade peas were higher than Bikini and the highest in this trial series at TR100.

Naches (Crites Seed) was semi-leafless and matured at the same time as Ambassador, 5 days later than Bikini. Yields of medium-large size grade peas were higher than Bikini.

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Ambassador matured 5 days later than Bikini and was lodged at Harvest. Yields of large size grade peas were the highest in this trial series at TR120.

Conclusions

The varieties have been trialed in three very contrasting years. Varietal differences in maturity is key in planning sowing and harvesting programmes and it is reassuring to find that there were no major variances from previous data.

In the early main crops Chinook consistently matured first, with other varieties maturing 1-2 days later than Bikini.

With the exception of Bingo all varieties gave lower yields than previously seen when compared to Bikini. This suggests that Bikini has performed well in these 3 years. Bingo gave the highest yields overall, but was no data was available for 2011 as incorrect seed was supplied.

Most varieties gave produce of medium-large size grade, but Chinook and Tommy gave produce of medium size grade.

Ashton showed very good field resistance to Downy mildew and Spandimo and Bikini were slightly susceptible.

Ashton, Bingo and were resistant to powdery mildew.

In the Main crop group, all varieties matured later than Bikini. Maturities were similar to those previously seen to within a day earlier or later than Ambassador.

Yields varied considerably over the 3 years. Bikini performed well in 2010 and other varieties were lower yielding as a result. However, yields overall were similar to those previously seen when compared to Bikini. The exception was Zephyr, which was lower yielding, particularly at TR100.

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SCIENCE SECTION

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
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Sherwood	Conventional	Seminis Vegetable Seeds, France	+1
Anubis	Conventional	Limagrain, 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	Limagrain UK	+6
Bingo	Semi-leafless	Syngenta Seeds, France	+7
Bikini	Semi-leafless / semi-fasciated	Syngenta Seeds, France	+8
Biktop	Semi-leafless / semi-fasciated	Syngenta Seeds, France	+8
Ashton	Conventional	Seminis Vegetable Seeds, France	+9
Tommy	Semi-leafless	Limagrain UK	+9
Spandimo	Semi-leafless	Seminis Vegetable Seeds, France	+9
Boogie	Semi-leafless	Nunhems Seeds, Netherlands	+9
Zephyr	Semi-leafless	Limagrain UK	+11
Butana	Semi-leafless	Nunhems Seeds, Netherlands	+11
Ambassador	Conventional	van Waveren, Germany	+12
Hippee	Semi-leafless	Syngenta Seeds, France	+12
Naches	Semi-leafless	Crites Seeds, USA	+13
Kenobi	Semi-leafless	Syngenta Seeds, France	+13

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Trial site details

Variety Trials and powdery mildew trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF070017.

Downy Mildew Trials: 2013 Silt loam soil. Red House Farm, Holbeach St Matthew, Lincs & silt loam soil. Manea, Cambs.

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 Maincrop Trial 19 April 2013
Maincrop Trial sown 24 April 2013

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 and numbers of blond peas
Measure of sweetness was assessed by Brix measurement.

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Specific Objectives

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

The trial had:

Bikini as the yield standard and Avola as the early standard

Trial layout: Randomised block, 3 replications.
Plot size: 1.83 m x 19 m
Sub-plots: 1.83 m x 5 m for upto 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/m^2
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

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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

March 2013 was a cold month, about 3°C lower than average. Much of the UK was drier than average, but at Thornhaugh rainfall was 143.8% of average. Much of this fell in the first three weeks of the month, which delayed drilling until April. April was also cold, but as the Easterly winds gave way to South Westerlies, temperatures rose throughout the month. April was much drier receiving only 55% of average rainfall. Temperatures in May were at or below average and rainfall was a little above average, 135.5% of log-term. Temperatures in June were close to average and rainfall was only 43.2% of average. June was much warmer. Overall the UK was 1.9°C warmer than average for the month. Rainfall was 108.7 % of average and in the hot temperatures was much needed. August continued to be warmer than Average and with only 65.4% of rainfall.

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TABLE 1 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Early Maincrop Variety Trial, Thornhaugh - 2013
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 19 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
Boogie	SL	vW	213	- 1	85	60	38	2	0	- 1	96	64	34	2	0	47	7	20	5.3
Chinook	SL	LUK	214	- 1	120	22	64	13	1	- 1	120	25	64	10	1	36	7	23	5.5
Biktop	SLSF	Syn	195	0	90	27	57	14	2	0	92	41	49	9	1	33	8	20	5.5
Bingo	SL	Syn	213	0	112	31	55	13	1	0	122	48	45	6	1	47	8	20	5.3
Bikini	SLSF	Syn	165	0 (16/7)	100 (5.55t/ha)	37	53	9	1	0 (18/7)	100 (5.55t/ha)	54	42	4	0	38	8	18	5.5
Tommy	SL	LUK	152	+ 1	92	14	58	26	2	0	109	17	63	19	1	58	7	21	5.3
Ashton		SVS	154	+ 1	66⁻	28	57	13	2	0	88	33	58	8	1	51	3	16	5.3
Spandimo	SL	SVS	168	+ 1	63⁻	30	58	10	2	+ 1	80	43	53	4	0	42	7	14	5.3
Significance @ P=0.05					SD						NSD								
LSD @ P=0.05					26.7						24.8								
CV %					16.7						14.1								

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

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TABLE 2 - VINING PEA VARIETY STUDIES. Summary of quality data Standard Vining Pea HDC Early Maincrop Variety Trial, Thornhaugh – 2013

Variety	Tenderometer Reading	Appearance				Brix
		Colour (3-8)	Brightness (1-2)	Uniformity (1-5)	No. of blonds (1-5)	%
Chinook	124.0	5.8	1.3	4.7	1.0	10.8
Bikini	99.0	5.7	1.0	4.8	1.0	10.7
Biktop	100.0	5.8	1.0	5.0	1.0	10.2
Bingo	101.5	5.2	1.0	3.8	1.0	10.3
Ashton	102.0	4.8	1.0	3.0	3.0	10.2
Tommy	99.5	5.5	1.0	4.0	1.0	9.8
Spandimo	104.0	5.7	1.0	5.0	1.0	11.8

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

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TABLE 3 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Maincrop Variety Trial, Thornhaugh - 2013
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 24 April.
Results are means of three replicates. Target population 90 plants per m² sown in ten 15 cm rows.

Variety		Source	1000 Seed Weight g	@ TR 100 Maturity (± days) Bikini	@ TR 100 Yield % of Bikini	@ TR 100 % in size grades L	M	S	VS	@ TR 120 Maturity (± days) Bikini	@ TR 120 Yield % of Bikini	@ TR 120 % 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	165	0 (19/7)	100 (5.37t/ha)	32	56	11	1	0 (21/7)	100 (5.37t/ha)	45	49	6	0	39	8	21	5.7
Hippee	SL	Syn	139	+ 2	95	25	68	7	0	+ 1	107	23	70	7	0	45	7	21	5.7
Butana	SL	Nun	179	+ 2	90	14	73	13	0	+ 1	100	20	71	9	0	60	7	17	6.0
Zephyr	SL	LUK	193	+ 3	77	33	58	8	1	+ 2	102	35	60	5	0	40	6	18	5.7
Kenobi	SL	Syn	214	+ 3	113	33	60	7	0	+ 3	122^{+}	39	57	4	0	56	6	20	5.9
Naches	SL	CS	198	+ 3	110	51	46	3	0	+ 3	121^{+}	48	50	2	0	49	7	19	6.0
Ambassador		vW	232	+ 4	108	56	42	2	0	+ 3	120^{+}	57	41	2	0	60	3	17	5.3
Significance @ P=0.05					NSD						SD								
LSD @ P=0.05					23.1						17.1								
CV %					13.1						8.7								

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

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TABLE 4 - VINING PEA VARIETY STUDIES. Summary of quality data Standard Vining Pea HDC Maincrop Variety Trial, Thornhaugh – 2013

Variety	Tenderometer Reading	Appearance				Brix
		Colour (3-8)	Brightness (1-2)	Uniformity (1-5)	No. of blonds (1-5)	%
Butana	112.0	5.8	1.3	4.3	1.3	10.1
Hippee	115.0	5.3	1.0	4.3	1.0	10.5
Zephyr	103.0	5.7	1.0	4.3	1.0	10.3
Kenobi	97.5	5.7	1.0	4.7	1.0	11.1
Naches	105.0	5.3	1.3	4.2	1.3	9.0
Ambassador	105.0	5.7	1.0	4.0	1.3	9.1

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

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TABLE 5 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Early Maincrop Variety Trial, Thornhaugh – 2010, 2011 & 2013
Varieties placed in order of maturity. Standard varieties underlined

Variety		Source	1000 Seed Weight g	@ TR 100 Maturity (± days) Bikini	@ TR 100 Yield % of Bikini	@ TR 100 % in size grades L	M	S	VS	@ TR 120 Maturity (± days) Bikini	@ TR 120 Yield % of Bikini	@ TR 120 % 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
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Boogie	SL	vW	212	0	87	50	45	5	0	0	90	58	39	3	0	46	7	21	5.7
Biktop	SLSF	Syn	192	0	96	26	58	15	1	0	95	36	53	10	1	40	9	22	5.7
Bingo	SL	Syn	217	0	107	29	53	16	2	0	107	40	49	9	2	45	6	19	5.3
Bikini	SLSF	Syn	199	0	100 (5.77t/ha)	33	55	11	1	0	100 (6.21t/ha)	45	49	6	0	44	8	21	5.7
Spandimo	SL	SVS	187	+ 1	93	30	55	13	2	+ 2	93	40	54	6	0	44	8	21	5.6
Tommy	SL	LUK	150	+ 1	94	15	56	26	3	+ 1	97	17	60	21	2	54	7	23	5.6
Ashton		SVS	192	+ 1	96	26	58	14	2	+ 1	104	33	57	9	1	48	3	22	5.4
Significance @ P=0.05					NSD						NSD								
LSD @ P=0.05					30.7						22.2								
CV %					18.2						12.8								

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

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TABLE 6 - VINING PEA VARIETY STUDIES. Summary of quality data – data Standard Vining Pea HDC Early Maincrop Variety Trial, Thornhaugh – 2010, 2011 & 2013

Variety	Year	Tenderometer Reading	Appearance				Brix %
			Colour (3-8)	Brightness (1-2)	Uniformity (1-5)	No. of blonds (1-5)	
Boogie	10	102.0	6.2	1.3	4.7	1.0	10.2
	11	101.0	6.3	1.0	4.2	1.0	10.1
	13	125.0	5.8	1.0	5.0	1.0	10.1
Chinook	10	100.0	5.3	1.0	4.0	1.3	10.6
	11	101.0	6.3	1.0	4.0	1.0	10.1
	13	124.0	5.8	1.3	4.7	1.0	10.8
Biktop	10	98.5	5.3	1.0	4.0	1.3	9.1
	11	103.5	6.7	1.0	4.2	1.0	10.4
	13	100.0	5.8	1.0	5.0	1.0	10.2
Bingo	10	100.0	5.2	1.0	4.3	1.0	10.4
	11	100.5	6.0	1.3	4.0	1.0	9.7
	13	101.5	5.2	1.0	3.8	1.0	10.3
Bikini	10	98.0	5.8	1.3	4.3	1.0	10.7
	11	103.5	6.7	1.0	4.7	1.0	9.5
	13	99.0	5.7	1.0	4.8	1.0	10.7
Tommy	10	102.5	5.8	1.7	4.0	1.3	10.3
	11	100.5	7.0	1.0	3.7	1.7	10.0
	13	99.5	5.5	1.0	4.0	1.0	9.8
Ashton	10	99.0	5.3	1.0	3.3	1.0	11.1
	11	107.5	6.2	1.3	3.0	2.0	10.5
	13	102.0	4.8	1.0	3.0	3.0	10.2
Spandimo	10	98.0	5.8	1.3	4.0	1.3	10.1
	11	101.0	6.7	1.0	4.7	1.0	9.7
	13	104.0	5.7	1.0	5.0	1.0	11.8

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

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TABLE 7 - VINING PEA VARIETY STUDIES. Summary of agronomic data Standard Vining Pea HDC Maincrop Variety Trial, Thornhaugh – 2010, 2011 & 2013
Varieties placed in order of maturity. Standard varieties underlined

Variety		Source	1000 Seed Weight g	@ TR 100 Maturity (± days) Bikini	@ TR 100 Yield % of Bikini	@ TR 100 % in size grades L	M	S	VS	@ TR 120 Maturity (± days) Bikini	@ TR 120 Yield % of Bikini	@ TR 120 % 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	199	0	100 (4.91t/ha)	28	53	9	1	0	100 (5.37t/ha)	36	52	11	1	39	6	23	5.8
Zephyr	SL	LUK	196	+ 3	94	25	55	18	2	+ 3	102	27	60	12	1	41	5	21	5.5
Butana	SL	Nun	178	+ 4	105	19	62	18	1	+ 3	104	26	60	13	1	58	8	19	5.6
Hippee	SL	Syn	160	+ 4	99	24	56	18	2	+ 4	97	28	57	14	1	47	6	21	5.4
Kenobi	SL	Syn	196	+ 4	113	31	56	12	1	+ 4	109	37	53	9	1	54	6	22	5.7
Naches	SL	CS	206	+ 5	112	38	51	10	1	+ 4	110	42	50	7	1	46	6	23	5.6
Ambassador		vW	218	+ 5	107	54	36	9	1	+ 4	114	57	38	5	0	59	3	20	5.2
Significance @ P=0.05					NSD						NSD								
LSD @ P=0.05					28.7						26.8								
CV %					15.5						14.3								

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

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TABLE 8 - VINING PEA VARIETY STUDIES. Summary of quality data – data Standard Vining Pea HDC Maincrop Variety Trial, Thornhaugh – 2010, 2011 & 2013

Variety	Year	Tenderometer Reading	Appearance				Brix %
			Colour (3-8)	Brightness (1-2)	Uniformity (1-5)	No. of blonds (1-5)	
Ambassador	10	101.0	5.3	1.3	4.3	1.3	8.2
	11	108.5	6.0	1.3	3.5	1.0	7.6
	13	105.0	5.7	1.0	4.0	1.3	9.1
Bikini	10	115.0	5.7	1.3	4.7	1.3	10.1
	11	103.0	6.5	1.3	4.2	1.0	8.3
	13	103.0	5.8	1.0	5.0	1.0	10.9
Butana	10	96.0	5.2	1.3	4.0	1.0	8.5
	11	100.5	5.8	1.3	3.7	1.0	8.4
	13	112.0	5.8	1.3	4.3	1.3	10.1
Hippee	10	105.0	5.2	1.0	4.3	1.0	9.2
	11	95.5	5.8	1.3	3.7	1.0	8.5
	13	115.0	5.3	1.0	4.3	1.0	10.5
Kenobi	10	100.0	5.5	1.0	4.7	1.0	9.7
	11	97.0	6.2	1.0	4.0	1.0	8.8
	13	97.5	5.7	1.0	4.7	1.0	11.1
Naches	10	99.0	5.3	1.0	4.7	1.3	9.1
	11	106.0	6.2	1.0	4.0	1.0	8.3
	13	105.0	5.3	1.3	4.2	1.3	9.0
Zephyr	10	99.0	5.2	1.7	4.3	1.0	9.7
	11	103.0	6.0	1.3	4.5	1.0	7.8
	13	103.0	5.7	1.0	4.3	1.0	10.3

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

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Varietal Susceptibility of Vining Peas to Downy Mildew (Peronospora viciae) - 2013

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.

Susceptible	Moderately Susceptible	Slightly Susceptible	Good Field Resistance
Naches	Hippee	Spandimo	Ashton
Bingo	Tommy	Salinero (8530702)	
Cosima (WAV 335)	Zephyr	Sherwood	
Boogie	Chinook	Bikini	
Avola		Biktop	

The results of these tests and those of previous years were incorporated in the PGRO Advisory Leaflet of Vining Pea Varieties.

Varietal Susceptibility of Vining Peas to Powdery Mildew (Erysiphe pisi) - 2013

As part of the variety evaluation work varieties of vining peas were sown in a disease observation trial at Thornhaugh.

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

Vining Peas

Resistant	Ashton, Bingo, Boogie, Hippee, Kenobi, Naches
Susceptible	Biktop, Salinero (8530702), Sherwood, Spandimo (085 20657), Zephyr

The results of these tests and those of previous years were incorporated in the PGRO Descriptive List of Vining Pea Varieties.

Discussion

Because of delayed sowing by wet weather and bird damage the mid-season and Late-season trials were not taken through to harvest in 2012 these were repeated in 2012. The early maturing was completed and reported in 2012. These trials were repeated in 2013. However data from the downy and powdery mildew disease trials was obtained.

The 2013 results for both the early main crop and main crop trials are presented in tables 1 – 4.

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Standard Pea Early Main Crop Trials, Thornhaugh 2010, 2011 & 2013–Tables 5 & 6

Overall there were no significant yield differences between Bikini and other varieties.

Chinook (Limagrain UK) was semi-leafless and matured 2 days before Bikini. Yields of medium size grade peas were similar to Bikini. Standing ability was very good.

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

Boogie (van Waveren) was semi-leafless and had good standing ability. Yields of large size grade peas were lower than Bikini.

Biktop (Syngenta) was semi-leafless and semi-fasciated, like Bikini and had excellent standing ability. Yields of medium-large size grade peas were a little lower than Bikini.

Bingo (Syngenta) was semi-leafless and had average standing ability. Yields of medium-large size grade peas were a little higher than Bikini.

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

Spandimo (Seminis) was semi-leafless and had very good standing ability. Yields of medium size grade peas were a little lower than Bikini.

Tommy (Limagrain UK) was semi-leafless and stood well. Yields of medium-small size grade peas were a little lower than Bikini.

Ashton (Seminis) was lodged at harvest. Yields of medium-large size grade peas were a little higher than Bikini.

Standard Pea Main Crop Trials, Thornhaugh 2010, 2011 & 2013 – Tables 7 & 8

Bikini was the first variety to mature, 5 days before Ambassador. Overall there were no significant yield differences between Bikini and other varieties.

Zephyr (Limagrain UK) was semi-leafless and matured 3 days later than Bikini. Yields of medium-large size grade peas were similar to Bikini at TR120. Standing ability was average.

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Butana (Nunhems) was semi-leafless and matured 4 days later than Bikini. Yields of medium size grade peas were a little higher than Bikini. Standing ability was very good.

Hippee (Syngenta) was semi-leafless and matured 4 days later than Bikini. Yields of medium-large size grade peas were similar to Bikini.

Kenobi (Syngenta) was semi-leafless and matured 4 days later than Bikini. Yields of medium-large size grade peas were higher than Bikini and the highest in this trial series at TR100.

Naches (Crites Seed) was semi-leafless and matured at the same time as Ambassador, 5 days later than Bikini. Yields of medium-large size grade peas were higher than Bikini.

Ambassador matured 5 days later than Bikini and was lodged at Harvest. Yields of large size grade peas were the highest in this trial series at TR120.

Conclusions

The varieties have been trialed in three very contrasting years. Varietal differences in maturity is key in planning sowing and harvesting programmes and it is reassuring to find that there were no major variances from previous data.

In the early main crops Chinook consistently matured first, with other varieties maturing 1-2 days later than Bikini.

With the exception of Bingo all varieties gave lower yields than previously seen when compared to Bikini. This suggests that Bikini has performed well in these 3 years. Bingo gave the highest yields overall, but was no data was available for 2011 as incorrect seed was supplied.
Most varieties gave produce of medium-large size grade, but Chinook and Tommy gave produce of medium size grade.

Ashton showed very good field resistance to Downy mildew and Spandimo and Bikini were slightly susceptible.

Ashton, Bingo and were resistant to powdery mildew.

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In the Main crop group, all varieties matured later than Bikini. Maturities were similar to those previously seen to within a day earlier or later than Ambassador.

Yields varied considerably over the 3 years. Bikini performed well in 2010 and other varieties were lower yielding as a result. However, yields overall were similar to those previously seen when compared to Bikini. The exception was Zephyr, which was lower yielding, particularly at TR100.

Industry representative comments

Vining peas are at their optimum - in terms of quality of taste and yield -for as little as 24 hours of their life cycle. In order to harvest peas in this 'quality' window there needs to be a succession of plantings throughout the Spring. Normally the drilling season for vining peas stretches from late February to mid/late May. Therefore I consider this to be an essential project in order to evaluate main crop varieties sown at times that are more realistic to the commercial situation.

It is unfortunate that this project has been affected by extremes of weather during its three year duration. However it is a very worthwhile project and reassuring to know that results do not differ greatly from previous yield data. It will give the industry confidence when deciding on drilling programs that varieties drilled throughout the program have the potential to achieve optimum yield and quality.

Technology transfer

Trials were demonstrated at the PGRO Vining Pea Trials day on 11 June 2013. Trials were visited by seedsmen at intervals throughout the harvest period.

The PGRO publication ‘Vining Pea Growers Guide 2014’ was produced and distributed in November 2013. Data from these trials were included in this publication. Data from other PGRO trials are also presented. This Publication is available free of charge and via the PGRO website.

Results will be presented at future meeting of the Vegetable Agronomists Association meeting.

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Appendices

APPENDIX 1

KEY TO SOURCE OF VARIETIES

CS	Crites Seed Inc., USA
LUK	Limagrain UK Ltd, UK
Nun	Nunhems Zaden BV., Holland
SVS	Seminis Vegetable Seeds, France
Syn	Syngenta Seeds SAS, France
vW	van Waveren, Germany

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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

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