

Project Title: Vining Peas: Evaluation of new and established varieties sown at appropriate commercial timings

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‘The results and conclusions in this report are based on an investigation conducted over one year. The conditions under which the experiment was carried out and the results obtained have been reported with detail and accuracy. However because of the biological nature of the work it must be borne in mind that different circumstance 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’.

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GROWERS SUMMARY

Headlines

Variety choice is important for vining pea production and reliable and accurate information is key to this. PGRO is the only independent source of information for variety data.

Data obtained in this project is added to the 'Advisory Leaflet on Vining Pea Varieties' and builds on data previously obtained through HDC and PGRO trials.

This leaflet is available free of charge from PGRO can be downloaded from the PGRO Website www.pgro.org.

Using this leaflet, growers can make informed decisions on varietal choice, but it should be noted that varietal performance can differ with site and seasons and small areas of a new variety should be evaluated before planning a large programme

Background

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

The PGRO evaluates a large number of varieties per annum including approximately 15 at National List Stage in Preliminary Trial and about 5 of the best ones are chosen for further evaluation in the Main Trial. Varieties are replicated three times and each plot has to be harvested at different stages of maturity to enable yield and size grade data to be presented for the practical freezing stage (TR 100) and practical canning stage (TR 120). This dictates that the trials are only sown on one date (usually early to mid-March for the Main Trial and mid-April for the Preliminary Trial), despite the fact that both trials contain early, mid-season and late varieties which commercially would be sown from late February to mid-May respectively.

Several promising varieties have been tested in recent years and more information on their performance and relative maturity 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. Further work is needed to gain experience in contrasting seasonal weather conditions.

Summary of results

Two early (Twinkle and Dakota), 8 early maincrop (Cabaret, Starlight, Gallant, Zelda, Urbana, Zodiac, Serge and Website), 2 petits pois (Nalesa and Arnesa) and 5 maincrop (Ranger, Kiros, Ibis, Akura and Geisha) varieties of vining peas were compared to Bikini for yield and maturity. Avola was included as a maturity check in the Early Trial, Waverex in the Petits Pois Trial and Ambassador in the Maincrop Trial.

Early and Second Early Varieties

Twinkle matured at the same time as Avola, 7 days before Bikini and gave high yields, significantly higher than Bikini at TR100. Produce from Twinkle was smaller than Avola, medium-small size grade. Twinkle had shorter haulm.

Dakota matured 2 days later than Avola. Yields of medium size grade, bright coloured peas were significantly lower than Bikini. Haulm was a little shorter than Avola.

Early Maincrop Varieties

There were no statistically significant yield differences between the varieties in trial and Bikini, but there were some significant differences between varieties.

Cabaret matured one day before Bikini and gave similar yields. Produce was smaller than Bikini, however, with a high percentage of peas in the medium size grade. Cabaret had longer haulm than Bikini.

Bikini was semi-leafless, semi-fasciated and erect at harvest. Produce was medium-large size grade at TR100 and very large size grade at TR120.

Zelda and Starlight matured 3 days later than Bikini.

Semi-leafless Zelda had longer haulm than Bikini, but was erect at harvest. Yields were similar to Bikini. Produce was larger than Bikini at TR100 and similar in size at TR120.

Starlight gave good high yields, but not significantly high than Bikini. Produce was a little larger than Bikini at TR100.

Website, Zodiac, Urbana and Gallant matured 4 days later than Bikini and all were semi-leafless.

Website had short haulm like Bikini and stood well. Produce, although smaller than Bikini was a little more variable in size.

Zodiac gave the highest yields in this trial, but yields were not significantly higher than Bikini. Haulm was longer than Bikini, but Zodiac stood well. Produce was smaller than Bikini, medium size grade at TR100 and medium-large size grade at TR120.

Urbana had long haulm, but stood well. Yields were similar to Bikini, but produce was smaller, medium size grade.

Gallant had short haulm, like Bikini and was erect at harvest. Yields were lower than Bikini, but not significantly so. Produce was similar size grade to Bikini at TR100, and smaller at TR120.

Semi-leafless Serge was erect at harvest and was the latest variety to mature 5 days later than Bikini. Yields were a little higher than Bikini, but produce was larger.

Petits Pois Varieties

Generally produce colour was not as even as the Thornhaugh site, but yields were very high. Bikini gave statistically significantly higher yields than all other varieties. There were no statistically significant yield differences between Waverex and any other petits pois variety.

Nalesa and Arnesa matured 4 and 5 days later than Bikini respectively. Both varieties were semi-leafless and were semi-erect at harvest. Arnesa set many nodes with 3 pods and several with 4. Nalesa was the taller of the two varieties having long haulm. Yields were similar, and higher than Waverex at TR100. Nalesa gave higher yields at TR120. Nalesa gave produce of small size grade, larger than Waverex, with 72% of the peas <8.75mm diameter. Arnesa gave smaller produce with 89% of the peas <8.75mm diameter.

Maincrop Varieties

This late sown trial suffered from soil capping at emergence and populations were lower as a result and this contributed to high variability in the trial. Produce size grade was smaller than in other trials. Yields were lower than other trials.

Akura, Ibis and Geisha were all semi-leafless and matured 3 days later than Bikini.

Akura had very short haulm, like Bikini and gave lower, but not significantly lower yields than Bikini. Produce was a little smaller at TR100, but a little larger at TR120.

Ibis gave the highest yields in this trial, significantly higher than Bikini and a little higher than Ambassador. Produce was a little smaller than Bikini at TR100, but a little larger at TR120. Ibis had longer haulm than Bikini, similar in length to Ambassador.

Geisha was a little lower yielding than Bikini at TR100, but a little higher yielding at TR120. Produce was similar in size to Bikini at TR100, but a little larger at TR120.

Kiros and Ranger matured at the same time as Ambassador, 7 days later than Bikini.

Kiros had much shorter haulm than Ambassador. Yields were high, but not significantly higher than Bikini. Produce was similar in size to Bikini at TR100, but larger at TR120.

Ranger had short haulm, similar to Bikini and gave high yields, significantly higher than Bikini at TR120. Produce was a little larger than Bikini.

Varietal susceptibility of vining peas to downy mildew (*Peronospora viciae*)

Varieties of vining peas were sown in disease observation trials at three sites (seed of Dakota, Gallant and Akura came pre treated with Wakil XL and so were not included in the 2004 trials). Each trial was situated in a field with a history of pea growing.

Plants were scored for infection on two or three 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	5	7	8	9
Very Susceptible	Susceptible	Moderately Susceptible	Slightly Susceptible	Moderate Field Resistance	Good Field Resistance
Cabaret	Arnesa	Kiros	Geisha	Ibis	Nalesa
Twinkle	Ranger	Serge	Zodiac	Zelda	
Website	Starlight	Urbana			

Varieties varied in their susceptibility to downy mildew. The good field resistance of Nalesa was confirmed, while Cabaret, Twinkle and Website appeared a little more susceptible than in previous years.

Varietal susceptibility of vining peas to powdery mildew (*Erysiphe pisi*)

Varieties of vining peas were sown in a disease observation trial at one site at Thornhaugh.

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

Resistant	Akura, Dakota, Gallant, Geisha, Ibis, Ranger, Serge, Urbana, Website, Zelda, Zodiac
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Susceptible	Arnesa, Cabaret, Kiros, Nalesa, Starlight, Twinkle

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

Potential benefits

New vining pea varieties in trial represent improvements in yield, size-grade and uniformity compared with varieties such as Avola and Scout (no longer used in PGRO trials) which have been grown for very many years.

Improvements in colour avoid deductions in payment which can be up to 5%. Growers, processors, retailers and consumers are likely to benefit from these improvements.

The data will provide additional information for the growers leaflet 'Vining pea varieties: a descriptive list'. This, together with yearly trials results can be obtained by contacting PGRO or downloaded from the PGRO website www.pgro.org.

SCIENCE SECTION

Introduction

Varietal selection is an important and key element of crop production to ensure a programmed harvest period and to maintain high quality produce. To this end PGRO evaluate a large number of varieties per annum including 15 at National List Stage in Preliminary Trial and about 5 of the best ones are chosen for Main Trial. The variety treatment is replicated three times and each plot has to be harvested at different stages of maturity to enable yield and size grade data to be presented for the freezing stage Tenderometer Reading (TR) 100 and TR 120. This dictates that the trials are only sown on one date (usually mid-March for the Main Trial and mid-April for the Preliminary Trial), despite the fact that both trials contain early, mid-season and late varieties which commercially would be sown from late February to mid-May respectively.

Several promising new vining pea varieties with improved yield, and with more uniform size-grade and colour have been evaluated in PGRO Main and Preliminary Trials since the 1999 - 2000 project FV 154a. Both Main and Preliminary trials are sown on one date despite the fact that both trials contain early, mid-season and late varieties which commercially would be sown from late February to mid-May respectively. A further factor of vining pea variety evaluation is that because of the specialised equipment needed during harvesting and processing, the independent systematic evaluation of varieties is restricted to the PGRO, Thornhaugh site and one site for petits pois varieties in a commercial crop. This forms the basis for the selection and development of varieties for the 35,000 ha of commercial crops. In practice, commercial programmes are based on the use of a minimum of 4 varieties and it is more likely that 6 or 7 will be used to give a spread of maturity and to allow production for special markets. On the latter point, these can either be premium 'petits pois' or '150 minute' peas or, economy/value packs.

Varietal characteristics affect:

- yield
- quality (colour, flavour, size and texture)
- ease of harvesting
- disease vulnerability
- timeliness
- ease of integration in the harvest programme

and new ones are being actively sought by growers so that they can meet processors specifications for quality with the most productive, reliable and cost effective varieties.

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.

Methods

Vining peas grown according to commercial practice.

Yield standard Bikini

Standards for each group underlined.

Sown:	4 March	29 March	14 March	21 April
Group/trial:	early/second early	early maincrop	petits pois	maincrop
	<u>Avola</u>	<u>Bikini</u>	<u>Waverex</u>	<u>Ambassador</u>
	<u>Bikini</u>	Cabaret	<u>Bikini</u>	<u>Bikini</u>
	Twinkle	Starlight	Nalesa	Ranger
	Dakota	Gallant	Arnesa	Kiros
		Zelda		Ibis
		Urbana		Akura
		Zodiac		Geisha
		Serge		
		Website		

Sites: sandy loam soil at Thornhaugh, Cambs in a vining pea growing area; petits pois on a light silt soil in a commercial crop of petits pois in South Lincolnshire

Trial layout: Randomised complete block, 3 replications for trials at Thornhaugh. Randomised block, 2 replications (petits pois).

Plot size: 1.83 m x 19 m

Sub-plots: 1.83 m x 5 m for each of three harvest taken at @TR value 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 m

Fungicide seed treatment: Wakil XL

Sown with an Øyjord plot drill to achieve a population of 90 plants/m²

Broad-leaved weeds were controlled pre-emergence and post-emergence if necessary.

Aphids were controlled if thresholds reached. Pea moth (*Cydia nigricana*) was controlled if necessary (monitored by pea moth traps).

Fungicide sprays were applied to control *Botrytis* and *Mycosphaerella* depending on weather conditions.

No irrigation was applied.

Haulm lengths measured and standing ability assessed just before harvest.

Maturity assessed from the sampling areas to achieve correct harvest dates for quick-freezing for vined peas using a Martin Pea Tenderometer.

Sub-plots were harvested when appropriate by hand, vined in a plot pea viner and washed. Peas were size-graded with a Mather & Platt size-grader, and weighed and total yield measured.

Samples were quick-frozen for quality appraisal and inspection by processors and growers.

Statistical analysis of yield and haulm length data for each maturity group in each year using ANOVA.

Combined analysis for three years data at the end of year 3.

Disease observation trials

i). Downy mildew

Varieties that came with untreated seed were planted in a double row plot with two replications at three 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. The choice of site increased the likelihood of infection and could include a wider range of pathotypes. Infection scores were made on two occasions during the season and these scores converted to a scale of relative field resistance.

ii) Powdery mildew

Resistance to powdery mildew is controlled by a single gene and varieties are either fully resistant or fully susceptible to the disease. Varieties were planted at Thornhaugh in early June. Natural infection of powdery mildew occurred after flowering in late sown peas and varieties were scored as susceptible or resistant.

Results

February had a mild and wet start but ended cold with widespread frosts. Overall, February was drier than average. Early March was also cold with the lowest temperature of -3.9°C being recorded on 1 March. Mean temperatures during the rest of March were above normal and rainfall was below average for the month. April was a very wet month (223.7% of average), but there were long dry periods punctuated by heavy downpours. Temperatures in April were well above average. May had average rainfall, but the middle 2 weeks were dry. Temperatures in May were again well above average. June was a dry month receiving only 57.6% average rainfall. Temperatures were high at the start of the month (31°C on 8 June), but cooler at the end of the month. July was very wet overall (238.1% of average) with 52.0 and 25.56mm of rainfall being recorded on 6 and 7 July respectively. Temperatures during much of July were close to average

Dry conditions at the beginning of March allowed an early start to drilling. Peas emerged well and evenly, with few field losses despite dry conditions at emergence. The late sown trial did suffer from some seedbed capping.

The harvest started very early on 14 June and was completed on 21 July. The peas matured rapidly at the start of the season. Wetter and cooler conditions during July delayed maturity for the later maturing varieties.

At Thornhaugh, pea colour for most varieties was excellent this year and unless otherwise stated the uniformity of colour was also good. More vigorous growth at the petits pois site gave rise to some unevenness in pea colour for some varieties.

Early and Second Early Varieties - Tables 1 & 2

Twinkle matured at the same time as Avola, 7 days before Bikini. Both varieties gave high yields, but Twinkle gave significantly higher yields than Bikini at TR100. Avola gave the largest produce, medium-large size grade and was a little uneven in colour. Produce from Twinkle was smaller, medium-small size grade. Avola, had long haulm. Twinkle had shorter haulm.

Dakota matured 2 days later than Avola. Yields of medium size grade, bright coloured peas were significantly lower than Bikini. Haulm was a little shorter than Avola.

Maturing 7 days later than Avola, **Bikini** was semi-leafless and semi-fasciated with short haulm, but was erect at harvest. Several varieties significantly outyielded Bikini at TR100, but yields were better at TR120. Produce was medium-large size grade, similar to Avola.

Early Maincrop Varieties - Tables 3 & 4

Nine varieties including standard Bikini were evaluated. Bikini yielded well and gave a small yield increase from TR100 to TR120. There were no statistically significant yield differences between the varieties in trial and the standard, but there were some significant differences between varieties.

Cabaret matured one day before Bikini and gave similar yields. Produce was smaller than Bikini, however, with a high percentage of peas in the medium size grade. Cabaret had longer haulm than Bikini.

Bikini was semi-leafless, semi-fasciated and erect at harvest. Produce was medium-large size grade at TR100 and very large size grade at TR120.

Zelda and Starlight matured 3 days later than Bikini.

Semi-leafless Zelda had longer haulm than Bikini, but was erect at harvest. Yields were similar to Bikini. Produce was larger than Bikini at TR100 and similar in size at TR120.

Starlight gave good high yields, but not significantly high than Bikini. Produce was a little larger than Bikini at TR100.

Website, Zodiac, Urbana and Gallant matured 4 days later than Bikini and all were semi-leafless.

Website had short haulm like Bikini and stood well. Produce, although smaller than Bikini was a little more variable in size.

Zodiac gave the highest yields in this trial, but yields were not significantly higher than Bikini. Haulm was longer than Bikini, but Zodiac stood well. Produce was smaller than Bikini, medium size grade at TR100 and medium-large size grade at TR120.

Urbana had long haulm, but stood well. Yields were similar to Bikini, but produce was smaller, medium size grade.

Gallant had short haulm, like Bikini and was erect at harvest. Yields were lower than Bikini, but not significantly so. Produce was similar size grade to Bikini at TR100, and smaller at TR120.

Semi-leafless Serge was erect at harvest and was the latest variety to mature 5 days later than Bikini. Yields were a little higher than Bikini, but produce was larger.

Petits Pois Varieties – Tables 5 & 6

A week of very wet weather was experienced prior to harvesting Bikini and later varieties. Growth in this trial was much more vigorous than at the Thornhaugh site and in the wet conditions many varieties showed signs of rotting of the lower foliage. Generally produce colour was not as even as the Thornhaugh site, but yields were very high. Bikini gave statistically significantly higher yields than all other varieties. There were no statistically significant yield differences between Waverex and any other petits pois variety.

Bikini was used as the yield and maturity standard and Waverex the petits pois standard.

Semi-leafless and semi fasciated Bikini was nearly erect at harvest. Produce was medium-large size grade.

Waverex matured one day later than Bikini and had longer haulm, but was lodged at harvest. Yields were significantly lower than Bikini. Produce was very small size grade with 81% of the peas <8.75mm diameter.

Nalesa and Arnesa matured 4 and 5 days later than Bikini respectively. Both varieties were semi-leafless and were semi-erect at harvest. Arnesa set many nodes with 3 pods and several with 4. Nalesa was the taller of the two varieties having long haulm. Yields were similar, and higher than Waverex at TR100. Nalesa gave higher yields at TR120. Nalesa gave produce of small size grade, larger than Waverex, with 72% of the peas <8.75mm diameter. Arnesa gave smaller produce with 89% of the peas <8.75mm diameter.

Maincrop Varieties - Tables 7 & 8

7 Varieties were evaluated including standards Bikini and Ambassador. This late sown trial suffered from soil capping at emergence and populations were lower as a result and this contributed to high variability in the trial. Produce size grade was smaller than in other trials. Yields were lower than other trials.

Bikini matured first, 7 days before Ambassador. Bikini was semi-leafless and semi-fasciated and had very short haulm in this trial. Produce was smaller than in other trials, medium-small size grade at TR100 and medium size grade at TR120.

Akura, Ibis and Geisha were all semi-leafless and matured 3 days later than Bikini.

Akura had very short haulm, like Bikini and gave lower, but not significantly lower yields than Bikini. Produce was a little smaller at TR100, but a little larger at TR120.

Ibis gave the highest yields in this trial, significantly higher than Bikini and a little higher than Ambassador. Produce was a little smaller than Bikini at TR100, but a little larger at TR120. Ibis had longer haulm than Bikini, similar in length to Ambassador.

Geisha was a little lower yielding than Bikini at TR100, but a little higher yielding at TR120. Produce was similar in size to Bikini at TR100, but a little larger at TR120.

Kiros and Ranger matured at the same time as Ambassador, 7 days later than Bikini.

Kiros had much shorter haulm than Ambassador. Yields were high, but not significantly higher than Bikini. Produce was similar in size to Bikini at TR100, but larger at TR120.

Ranger had short haulm, similar to Bikini and gave high yields, significantly higher than Bikini at TR120. Produce was a little larger than Bikini.

Ambassador gave high yields, significantly higher than Bikini. Produce was similar in size to Bikini at TR100, but a little larger at TR120.

Varietal susceptibility of vining peas to downy mildew (*Peronospora viciae*)

Varieties of vining peas were sown in disease observation trials at three sites (seed of Dakota, Gallant and Akura came pre treated with Wakil XL and so were not included in the 2004 trials). Each trial was situated in a field with a history of pea growing.

Plants were scored for infection on two or three 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	5	7	8	9
Very Susceptible	Susceptible	Moderately Susceptible	Slightly Susceptible	Moderate Field Resistance	Good Field Resistance
Cabaret	Arnesa	Kiros	Geisha	Ibis	Nalesa
Twinkle	Ranger	Serge	Zodiac	Zelda	
Website	Starlight	Urbana			

Varieties varied in their susceptibility to downy mildew. The good field resistance of Nalesa was confirmed, while Cabaret, Twinkle and Website appeared a little more susceptible than in previous years.

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

Varietal susceptibility of vining peas to powdery mildew (*Erysiphe pisi*)

Varieties of vining peas were sown in disease observation trials at one site at Thornhaugh.

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

Resistant	Akura, Dakota, Gallant, Geisha, Ibis, Ranger, Serge, Urbana, Website, Zelda, Zodiac
Susceptible	Arnesa, Cabaret, Kiros, Nalesa, Starlight, Twinkle

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

CONCLUSIONS

New varieties are chosen either by the processor or by growers in consultation with their processor. They can provide additional yield and additional reliability. It is particularly important that maturity data will allow new peas to be correctly integrated into drilling and harvesting programmes. Four new petits pois varieties completed PGRO trials in 2004. These will be added to the petits pois trial and evaluated for the remaining 2 years of the project.

Information from the trials has been incorporated into the data used to produce the PGRO advisory leaflet on vining pea varieties updated November 2004, a leaflet used extensively by growers, processors and merchants.

REFERENCES

PGRO Variety Trial Results: November 2004

PGRO Vining Pea Varieties: advisory leaflet November 2004

PGRO Information Sheet 142: The choice of herbicides for spring peas revised February 2004

TABLES OF RESULTS

TABLE 1 - VINING PEA VARIETY STUDIES. Summary of agronomic data - Vining Pea HDC Early Maturing Trial, Thornhaugh - 2004
 Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 4 March
 Results are means of three replicates. Target population 90 plants per m² sown in ten 15 cm rows.

Variety	Source	@ TR 100								@ TR 120								Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark
		1000	Maturity	Yield	% in size grades				Maturity	Yield	% in size grades				Haulm				
		Seed Weight g	(± days) Avola	% of Bikini	L	M	S	VS	(± days) Avola	% of Bikini	L	M	S	VS	cm				
Twinkle	Sh	189	0	119 ⁺	26	52	19	3	0	114	43	50	7	0	55	22	5.0		
<u>Avola</u>	<u>As</u>	<u>199</u>	<u>0(14/6)</u>	<u>114</u>	<u>34</u>	<u>54</u>	<u>11</u>	<u>1</u>	<u>0(17/6)</u>	<u>110</u>	<u>47</u>	<u>46</u>	<u>7</u>	<u>0</u>	<u>67</u>	<u>22</u>	<u>5.0</u>		
Dakota	S&G	197	+2	70 ⁻	28	50	19	3	+2	69 ⁻	36	55	8	1	62	19	5.0		
<u>Bikini</u>	<u>SLSF</u> <u>S&G</u>	<u>197</u>	<u>+7</u>	<u>100</u>	<u>34</u>	<u>54</u>	<u>11</u>	<u>1</u>	<u>+7</u>	<u>100</u>	<u>54</u>	<u>42</u>	<u>4</u>	<u>0</u>	<u>44</u>	<u>17</u>	<u>5.0</u>		
				(5.13t/ha)						(6.33t/ha)									
Significance @ P=0.05				SD						SD									
LSD @ P=0.05				18.4						23.2									
CV %				9.9						13.4									

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 - Vining Pea HDC Early Maturing Trial, Thornhaugh - 2004

Variety	Tenderometer Reading	Appearance			Flavour		Texture		
		Colour (3-6)	Brightness (1-2)	Uniformity (1-5)	Sweetness (1-5)	Strength (1-5)	Skin firmness (1-5)	Flesh firmness (1-5)	Flesh mealiness (1-5)
Twinkle	99.0	5.75	1.75	3.75	2.75	3.13	3.25	2.38	1.25
Avola	103.0	5.13	1.75	3.00	3.38	3.00	3.00	3.00	1.50
Dakota	100.0	5.13	2.00	3.88	2.50	3.00	3.25	2.50	2.00
Bikini	98.5	5.50	2.00	4.38	4.25	3.50	2.63	1.25	1.25

KEY: Uniformity; Sweetness; Strength; Skin & Flesh Firmness; Flesh mealiness: (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

TABLE 3 - VINING PEA VARIETY STUDIES. Summary of agronomic data - Vining Pea HDC Early Maincrop Variety Trial, Thornhaugh - 2004
 Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 29 March
 Results are means of Three replicates. Target population 90 plants per m² sown in ten 15cm rows.

Variety	Source	@ TR 100								@ TR 120								Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark		
		1000	Maturity	Yield	% in size grades				Maturity	Yield	% in size grades				Haulm						
		Seed Weight g	(± days) Bikini	% of Bikini	L	M	S	VS	(± days) Bikini	% of Bikini	L	M	S	VS	length cm						
Cabaret	Sh	197	- 1	96	22	61	16	1	- 1	106	30	62	8	0	56	22	5.0				
<u>Bikini</u>	<u>SLSF</u> <u>S&G</u>	<u>197</u>	0 (29/6)	<u>100</u> (6.80t/ha)	<u>39</u>	<u>50</u>	<u>10</u>	<u>1</u>	0 (1/7)	<u>100</u> (7.01t/ha)	<u>69</u>	<u>29</u>	<u>2</u>	<u>0</u>	<u>44</u>	<u>22</u>	<u>5.5</u>				
Zelda	SL Dan	205	+ 3	100	56	36	7	1	+ 3	105	68	27	4	1	58	22	5.5				
Starlight	Sh	206	+ 3	110	48	45	6	1	+ 3	108	62	35	3	0	51	23	5.0				
Website	SL S&G	180	+ 4	89	39	43	15	3	+ 4	91	51	41	7	1	48	22	5.0				
Zodiac	SL Sh	213	+ 4	112	23	58	17	2	+ 4	116	34	59	6	1	55	25	5.0				
Urbana	SL Nun	155	+ 4	97	16	55	26	3	+ 4	99	27	54	18	1	63	18	5.0				
Gallant	SL S&G	162	+ 4	81	36	46	15	3	+ 4	84	48	45	6	1	46	20	5.0				
Serge	SL PLS	190	+ 5	106	54	39	6	1	+ 5	106	73	24	3	0	50	24	5.0				
Significance @ P=0.05				NSD								NSD									
LSD @ P=0.05				21.6								23.9									
CV %				12.5								13.5									

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

Sources of varieties see Appendix 1

TABLE 4 - VINING PEA VARIETY STUDIES. Summary of quality data – HDC Early Maincrop Variety Trial, Thornhaugh - 2004

Variety	Tenderometer Reading	Appearance			Flavour		Texture		
		Colour (3-6)	Brightness (1-2)	Uniformity (1-5)	Sweetness (1-5)	Strength (1-5)	Skin firmness (1-5)	Flesh firmness (1-5)	Flesh mealiness (1-5)
Cabaret	103.0	5.13	1.25	4.75	3.25	3.25	4.00	3.13	1.25
Bikini	98.0	5.38	1.75	4.50	2.88	3.13	3.25	2.75	1.75
Zelda	100.5	5.75	1.50	4.13	1.50	3.50	3.75	2.50	2.00
Starlight	102.0	5.50	2.00	4.13	2.38	3.25	3.63	3.00	1.63
Website	97.0	5.75	1.75	4.50	3.63	3.00	3.50	2.38	1.50
Zodiac	104.0	5.50	1.75	4.38	2.75	3.00	3.88	2.13	2.00
Urbana	103.0	6.00	1.50	4.25	2.75	3.25	3.50	2.50	1.00
Gallant	109.0	6.00	1.50	4.63	2.50	3.00	3.25	2.88	2.00
Serge	100.0	5.38	1.00	4.75	2.50	3.25	3.25	2.25	2.50

KEY: Uniformity; Sweetness; Strength; Skin & Flesh Firmness; Flesh mealiness: (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

TABLE 5 - VINING PEA VARIETY STUDIES. Summary of agronomic data - Vining Pea HDC Petits Pois Trial, Holbeach Hurn, Lincs - 2004
 Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 14 March
 Results are means of two replicates. Target population 90 plants per m² sown in ten 15 cm rows

Variety	Source	@ TR 100										@ TR 120					Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark	
		1000	Maturity (± days) Bikini	Yield % of Bikini	% in size grades					Maturity (± days) Bikini	Yield % of Bikini	% in size grades							Haulm length cm
		Seed Weight g			L	M	S2	S1	VS			L	M	S2	S1	VS			
<u>Bikini</u>	<u>SLSF</u> <u>S&G</u>	<u>197</u>	<u>0</u> (14/7)	<u>100</u> (9.04t/ha)	<u>31</u>	<u>49</u>	<u>10</u>	<u>7</u>	<u>3</u>	<u>0</u> (17/7)	<u>100</u> (9.54t/ha)	<u>34</u>	<u>47</u>	<u>9</u>	<u>6</u>	<u>4</u>	<u>58</u>	<u>18</u>	<u>5.5</u>
<u>Waverex</u>	<u>VW</u>	<u>120</u>	<u>+1</u>	<u>62</u>	<u>2</u>	<u>17</u>	<u>14</u>	<u>25</u>	<u>42</u>	<u>+1</u>	<u>72</u>	<u>2</u>	<u>20</u>	<u>18</u>	<u>30</u>	<u>30</u>	<u>61</u>	<u>12</u>	<u>5.0</u>
Nalesa	SL Nun	123	+4	71 ⁻	2	26	19	27	26	+4	83	4	32	27	25	12	89	12	5.0
Arnesa	SL Nun	82	+5	70 ⁻	1	10	15	35	39	+5	66 ⁻	1	19	23	36	21	66	16	5.0
Significance @ P=0.05				SD							SD								
LSD @ P=0.05				16.39							20.34								
CV %				11.6							13.1								

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; S2 = small2 >8.2 - 8.75mm; S1 = small1 >7.5 - 8.2mm; 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 - Vining Pea HDC Petits Pois Trial, Holbeach Hurn, Lincs - 2004

Variety	Tenderometer Reading	Appearance			Flavour		Texture		
		Colour (3-6)	Brightne ss (1-2)	Uniformity (1-5)	Sweetness (1-5)	Strength (1-5)	Skin firmness (1-5)	Flesh firmness (1-5)	Flesh mealiness (1-5)
Bikini	102.5	5.25	1.00	3.13	2.13	3.25	3.25	3.13	1.50
Waverex	100.0	4.63	1.50	3.00	2.13	3.38	3.00	2.75	1.50
Nalesa	100.0	5.00	1.50	3.75	2.00	2.75	2.25	2.00	1.25
Arnesa	102.0	5.25	1.00	4.38	2.38	3.25	3.50	2.50	1.50

KEY: Uniformity; Sweetness; Strength; Skin & Flesh Firmness; Flesh mealiness: (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

TABLE 7 - VINING PEA VARIETY STUDIES. Summary of agronomic data - Vining Pea HDC Maincrop Variety Trial, Thornhaugh - 2004
 Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 21 April.
 Results are means of Three replicates. Target population 90 plants per m² sown in ten 15cm rows.

Variety	Source	@ TR 100								@ TR 120								Pea wt. as % of total weight	Raw pea colour 1=pale 6=dark
		1000 Seed Weight g	Maturity (± days) Bikini	Yield % of Bikini	% in size grades				Maturity (± days) Bikini	Yield % of Bikini	% in size grades				Haulm length cm				
					L	M	S	VS			L	M	S	VS					
<u>Bikini</u>	<u>SLSF</u> <u>S&G</u>	<u>197</u>	<u>0</u> (11/7)	<u>100</u> (3.58t/ha)	<u>14</u>	<u>47</u>	<u>32</u>	<u>7</u>	<u>0</u> (14/7)	<u>100</u> (3.81t/ha)	<u>25</u>	<u>38</u>	<u>30</u>	<u>7</u>	<u>32</u>	<u>15</u>	<u>5.0</u>		
Akura	SL As	166	+3	79	12	38	35	15	+3	74	15	46	31	8	35	14	5.0		
Ibis	SL Dan	175	+3	154 ⁺	15	39	35	11	+3	183 ⁺	17	52	25	6	42	18	5.0		
Geisha	SL Sh	193	+3	94	17	48	28	7	+3	110	18	54	23	5	36	20	5.0		
Kiros	vWB	174	+7	132	13	48	32	7	+7	132	18	60	20	2	34	19	5.5		
Ranger	Sh	193	+7	132	24	50	22	4	+7	154 ⁺	30	54	14	2	32	20	5.5		
<u>Ambassador</u>	<u>VW</u>	<u>180</u>	<u>+7</u>	<u>153</u> ⁺	<u>17</u>	<u>45</u>	<u>32</u>	<u>6</u>	<u>+7</u>	<u>161</u> ⁺	<u>21</u>	<u>53</u>	<u>23</u>	<u>3</u>	<u>44</u>	<u>18</u>	<u>5.5</u>		
Significance @ P=0.05				SD						SD									
LSD @ P=0.05				42.9						36.8									
CV %				20.0						15.9									

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

Sources of varieties see Appendix 1

TABLE 8 - VINING PEA VARIETY STUDIES. Summary of quality data – HDC Maincrop Variety Trial, Thornhaugh - 2004

Variety	Tenderometer Reading	Appearance			Flavour		Texture		
		Colour (3-6)	Brightness (1-2)	Uniformity (1-5)	Sweetness (1-5)	Strength (1-5)	Skin firmness (1-5)	Flesh firmness (1-5)	Flesh mealiness (1-5)
Bikini	105.0	5.75	1.50	4.50	3.25	3.25	3.38	2.25	1.50
Akura	102.5	5.75	1.25	4.50	3.00	3.50	3.13	2.75	1.25
Ibis	102.0	5.25	2.00	4.00	2.88	3.25	3.63	2.75	2.25
Geisha	104.0	5.50	2.00	4.38	1.25	3.75	3.75	3.00	3.38
Kiros	101.5	5.25	1.50	4.63	3.38	3.50	3.50	2.63	1.50
Ranger	98.5	5.25	1.25	4.50	2.88	4.00	3.75	2.63	1.50
Ambassador	99.0	5.50	1.75	4.50	3.25	3.25	3.63	2.13	1.75

KEY: Uniformity; Sweetness; Strength; Skin & Flesh Firmness; Flesh mealiness: (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

APPENDIX 1

KEY TO SOURCE OF VARIETIES

<u>CODE</u>	<u>NAME & ADDRESS</u>	<u>COUNTRY</u>
As	Asgrow Research Center PO Box 1235 Twin Falls Idaho. 83303-1235.	USA
vWB	W. Brotherton Seed Co. Inc. P.O. Box 1136 Moses Lake Washington 98837	USA
CM	Crites-Moscow Growers Inc. Box 8912 Moscow Idaho 83843	USA
Dan	Danisco Seed A/S Højbygårdvej 31 DK-4960 Holeby	Denmark
Nun	Nunhem Zaden BV Postbus 4005 6080 AA Haelen	Holland
PLS	Pure Line Seeds Inc. P.O. Box 8866 Moscow Idaho 83843	USA
S&G	Syngenta Seeds SAS. Route de Pouillé B.P. 39 49135 Les Ponts de Cé Cedex	France
Sh	Sharpes, Advanta Seeds UK Ltd. Boston Road Sleaford Lincolnshire NG34 7HA	UK
vW	WAV Industriesaaten GmbH Bordeler Berg 4 D-37127 Dransfield	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