

Project Title: Evaluation of new and established broad bean varieties for processing

Final Report: 1998

Project Number: FV 182

Project Leader: Ms. C. M. Knott  
Great North Road  
Thornhaugh  
Peterborough  
Cambs PE8 6HJ

Location of Project: Processors and Growers Research Organisation  
Great North Road  
Thornhaugh  
Peterborough  
Cambs PE8 6HJ

Project Co-ordinator: P. H. Shepherd, OBE

Date Project Commenced: 1 February 1995

Date Project Completed: November 1998

Key Words: Broad beans, varieties, processing, relative yields, maturities

## INDEX

	<u>Page No</u>
PRACTICAL SECTION FOR GROWERS	2 - 5
SCIENCE SECTION	
Introduction	6
Materials and methods	7
Results	8 - 9
Source of varieties	10 - 16

## **PRACTICAL SECTION FOR GROWERS**

### **Objectives and Background**

In most years PGRO evaluates broad beans from four plant breeding companies and the trials are funded by the breeder. Varieties are sometimes entered for only one year in a screening trial, and testing is less comprehensive than the system for peas and green beans.

Comparative reliable data for yield and maturity of commercially grown and new varieties to be grown in the same trial for at least three years with the aim of providing a descriptive list similar to the PGRO leaflets on vining pea and green bean varieties. Varieties will include newer small seeded broad beans which are lower yielding than the standard types. Samples of quick-frozen produce to be provided for quality assessment by the industry.

### **Summary of Results**

A summary of yield and maturity data for replicated experiments on a sandy loam soil in 1995, 96 & 98 are shown in Table 5. In 1997 the trial was affected by severe outbreaks of different diseases and viruses, and the data were excluded from the series. 1998 was the final year of the series in which 11 varieties were compared with Medes for yield and maturity.

Broad bean varieties were tested in very different seasons. The weather in 1995 was exceptionally dry with much lower rainfall from sowing until harvest than the long-term average, and with above average temperatures during pod-fill and harvest stage. The 1996 season was also dry with lower than long-term average rainfall but temperatures were not as high as in the previous year. In contrast, in 1997, May, June, and July were wetter than normal, with rainfall in June 307% higher than the long-term average. In 1998 rainfall was very high in April and June, but May and July were dry months. Temperatures were lower than normal and there was little sunshine.

### Standard seed size

Listra gave the highest yields throughout the series and appears more resistant to downy mildew (*Peronospora viciae*) than Medes or Metissa. Metissa, which also yielded better than Medes, was particularly susceptible, and where it occurs early, the growing point is killed and flowering and pod set are reduced. Listra, according to the breeder, has a higher level of self fertility than older varieties and this would explain more consistent performance.

Medes the standard in all years yielded lower, (but not significantly lower) than Listra, Metissa and Statissa and has become outclassed.

Optica did not perform well in any year, with yields which were lower than the standard Medes, and significantly lower than the other varieties in this group.

Statissa the coloured flowered variety, is unsuitable for canning. It has limited use for quick-freezing because it is susceptible to discolouration and bruising, thus handling the commercial crop is more difficult. It is large seeded. However, Statissa appears less susceptible to disease and gave exceptional yields in some years.

Nun 5166 a new variety in 1998 with slightly smaller seed size did not outyield Listra. It matured earlier than Medes.

### Smaller seeded

Danko was the largest seeded in this group and overall the highest yielding, but yields were poor in 1998.

Gold & Diamant produced similar yields over the three years, with exceptional yields in 1998. Seed size was similar but with Gold a more elongated, rounder bean. Gold suffered from downy mildew in 1998, but not in 1997 when levels of infection were higher on other varieties.

Talia was a very short strawed variety and it may be difficult to harvest commercially on a drought stressed site, and yields were low in the dry year in the 1995 trial. Otherwise it performed consistently well, with seed size slightly smaller than the other beans in this group.

New variety HS5150 tested for the first time in 1998 has similar seed size to Talia. It was late maturing and yields were good.

### Very small seeded

Beryl was tested in two years and was grown commercially for a niche market. In 1997 the variety was no longer available from the breeder. It was very small seeded and hence the lowest yielding.

### Green seeded

These varieties have potential as a new product.

Verdy was the highest yielding variety of this type over the three years. It was affected by a very severe attack of chocolate spot which caused yield loss in 1997. Produce had the most attractive green colour in this group, and bean size was even.

New variety Nun 6409 was a similar type to Verdy but with significantly higher yields in the 1998 trial, where it was tested for the first time.

Greeny the longest strawed variety was late maturing. Yields were variable between years. Produce was a bright lime green not as attractive as Verdy. The variety is to be withdrawn by the breeder.

Jade another late, tall variety gave low yields in a dry season but performed well in 1998 (& 1997). Produce was similar in colour to Greeny, a bright lime green.

Table 5. BROAD BEAN VARIETY STUDIES. Three year summary 1995, 1996 and 1998, Thornhaugh. Standard variety Medes underlined

Variety	Source	Seeds/kg.	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm
			Maturity $\pm$ days relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity $\pm$ days relative to Medes	Yield as % of Medes	Mean length 10 beans mm	
<u>Standard seed size</u>									
Metissa	NiS	1017	-2	112.7	212	-2	113.9	217	64
Statissa C	NiS	1068	-1	112.9	214	-1	112.4	218	79
Optica	NiS	1403	-1	82.1	199	-1	78.4-	205	74
<u>Medes</u>	<u>NiS</u>	<u>1236</u>	<u>0</u>	<u>100</u> (7.13 t/ha)	<u>204</u>	<u>0</u>	<u>100</u> (8.04 t/ha)	<u>210</u>	<u>86</u>
Listra	Nun	1366	+3	119.6	203	+3	115.8	210	80
<u>Smaller seeded</u>									
Diamant	NiS	1417	-1	76.8-	176	-2	80.7	179	69
Danko	Nun	1523	-1	83.7	182	0	81.7	184	68
Gold	NiS	1600	-1	75.2-	175	0	85.8	177	71
Talia	Nun	1691	+1	78.2-	171	0	78.3-	175	63
<u>Very small seeded</u>									
Beryl #	S & G	2311	+9	54.3-	155	+9	55.2-	160	77
<u>Green seeded</u>									
Verdy	Nun	1489	+3	80.8	177	+3	81.9	182	73
Greeny	Nun	1731	+7	75.2-	167	+7	76.7-	172	88
Jade	NiS	1515	+8	64.4-	173	+8	64.4-	176	80
Significance @ P = 0.05				SD	SD		SD	SD	SD
LSD @ P=0.05				19.94	8.44		19.55	8.26	7.0
CV %				13.7	2.7		13.4	2.6	5.6

C = Coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes @ P = 0.05

Practical freezing stage: TR 110 - 140 for a 140g sample; Practical canning stage: TR 115 - 140 for a 56g sample

Beryl # tested 1995 & 96 only, variety no longer available.

NiS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV; S & G = S & G Semences

## **SCIENCE SECTION**

### **General Introduction**

In most years PGRO evaluates new varieties of broad beans from plant breeding companies in a screening trial. Varieties are seldom entered for more than one year and testing is less comprehensive than for green beans. In recent years new lower yielding, small seeded varieties are becoming popular and varieties with bright green seeds have been tested. In the third year 1997 some varieties were affected with a severe outbreak of different diseases and viruses, which were responsible for variable plot yields and a high coefficient of variation. It was agreed that another years data were needed to produce a descriptive list of varieties of broad beans for growers.

## Materials and methods

### 1998

In 1998 four standard sized broad beans including coloured flowered Statissa were compared with Medes, the yield and maturity standard. The trial also included four smaller seeded and three green seeded broad beans. Beryl, very small seeded, tested in 1995 - 1996 is no longer available. Three new varieties were also screened.

The broad beans were grown according to commercial practice. The beans were grown on a sandy loam soil. The soil status (ADAS scale) was phosphorous index 4.3, potassium 2.7 and magnesium 2.3 thus no fertiliser was required

Seed of all varieties was treated with fungicide to control 'damping off' disease.

The broad beans were sown on 28 April so they followed vining peas in the harvesting sequence. They were drilled to achieve a final plant population of 18 pl/m<sup>2</sup>.

Broad leaved weeds were controlled with Reflex T (fomesafen/terbutryn) pre-emergence and Basagran (bentazone) was sprayed post-emergence to control cleavers.

The beans emerged quickly but initial growth was slow throughout a cool period in April and early May. The weather was also cooler than average for much of June and July. June was a very wet month, with 217% of the long term average rainfall.

Folio (chlorothalonil/metalaxyl) was applied on 8 May and 1 June to control chocolate spot and downy mildew (*Peronospora viciae*) as a preventative measure. Aphox (pirimicarb) was also included on these occasions to control aphid, although none were seen.

In the later stages of growth there was an infection of downy mildew and then an outbreak of bean rust. Assessments were made for % area of leaf infected with disease although this probably occurred too late to affect yield. Two varieties Greeny and Optica also suffered on attack of Bean Yellow Mosaic virus, and in addition Greeny suffered Pea Enation Mosaic virus, which are aphid (or pea and bean weevil) borne and this appeared to delay maturity slightly.

Plant height was measured.

Harvesting commenced on 28 July. The pods were harvested by hand and threshed in the bean podding machine. Samples were quick-frozen at about 115 TR (Tenderometer value) for a 140g sample, and harvested at canning stage at about 120 TR for a 56g sample. Length of 10 bean seeds was measured per plot. The data were statistically analysed using ANOVAR.

### 1995 - 1998

Data for variety yields and bean seed lengths at quick-freezing and canning stage, and plant heights for the trials 1995, 1996 & 1998 were analysed using ANOVAR.



## Results

Results for 1995, 96, 97 & 98 are shown in Tables 1, 2, 3 & 4 respectively.

### 1998

As in 1997 some varieties suffered an attack of downy mildew (*Peronospora viciae*) in spite of fungicide sprays, but this occurred late, after flowering had finished. The most susceptible variety was Metissa, followed by Medes & Jade. There was also infection with bean rust (*Uromyces fabae*) at the end of July, and Nun 6409 & Listra, Nun 5166 had the highest percentage of leaf area infected.

The earliest variety to mature was Metissa, the latest were Jade, Greeny and HS1050

Yield, maturity and seed size data are shown in Table 4.

#### Large seeded:-

Medes, a tall vigorous variety and the control for yield, performed well.

Listra gave similar yields to Metissa, higher than Medes but differences were not statistically significant. The beans were a uniform seed size.

Metissa matured early, and yielded well. It was short strawed and susceptible to downy mildew. Seeds were larger than Medes.

Statissa at quick-freezing stage outyielded all other varieties in trial. However it is coloured flowered and cannot be used for canning. It was also large seeded.

Optica yields were lower than Medes, significantly so at canning stage. Seed size was smaller than Metissa.

#### Smaller seeded:-

Gold, Danko and Diamant had similar seed size, Talia was the smallest seeded.

Diamant gave lower yields than in previous years. Seeds were uniform size.

Danko also yielded significantly less than Medes in this trial.

Gold was the highest yielding variety at canning stage, yields were similar to Medes. The beans were of uniform size and more elongated than Diamant.

Talia outyielded Diamant this year.

### Green seeded:-

All the beans in this group were smaller than Medes, Verdy was the largest seeded in this group.

Verdy was slightly lower yielding at quick-freezing stage than Greeny and Jade but gave the most even, attractive green sample of beans.

Greeny was significantly lower yielding than Medes and seed size was uneven. Produce was a lime green colour. It matured late and was long strawed.

Jade was also long strawed and late maturing, yields were the best in this group and higher than in previous years. Seed size was uniform and the colour also lime green.

### Screening varieties in trial for the first year

Nun 5166 yielded slightly higher than Medes but not significantly so, and seed size was similar.

Nun 6409 a new green seeded variety looked promising. It gave significantly higher yields than Verdy and Greeny. Seeds were a fresh bright green colour and similar size to Verdy.

HS1050 a new small seeded variety similar size to Talia. Yields were higher than Talia but differences were not statistically significant.

**4 - BROAD BEAN VARIETY STUDIES.** Summary of agronomic data - Main (and Screening) Variety Trials, Thornhaugh - 1998  
 Varieties placed in order of maturity within each group. Standard varieties underlined. All varieties sown on 28 April  
 Results are means of three replicates. Target population 18 plants per m<sup>2</sup>. Row width 30 cm.

Variety	Source	Seeds /kg	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm	Downy mildew infection % leaf area	Bean rust % leaf area
			Maturity (± Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity (± Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm			
<u>Standard seed size</u>											
Metissa	NiS	1101	-3	111	226	-4	116	229	69	29.0	10.0
Statissa (C)	NiS	1221	-2	128*	227	-3	122	228	89	2.1	3.4
Optica	NiS	1829	-2	75	206	-2	72	216	85	4.7	8.3
<u>Medes</u>	<u>NiS</u>	<u>1181</u>	<u>0</u>	<u>100</u>	<u>210</u>	<u>0</u>	<u>100</u>	<u>221</u>	<u>92</u>	<u>16.7</u>	<u>4.7</u>
Listra	Nun	1445	+2	112	209	+1	109	220	86	1.8	13.9
<u>Smaller seeded</u>											
Diamant	NiS	1599	-1	64	185	-1	74	187	75	5.7	3.2
Danko	Nun	1389	-1	79	187	-1	81	189	71	2.2	8.3
Gold	NiS	1297	-1	88	185	-1	103	186	80	13.3	9.5
Talia	Nun	1727	+2	79	179	+1	82	181	69	10.7	2.2
<u>Green seeded</u>											
Verdy	Nun	1511	+4	74	186	+3	84	192	82	7.3	9.4
Greeny	Nun	1742	+7	81	170	+6	86	177	89	7.3	4.3
Jade	NiS	1481	+7	91	175	+6	93	178	90	17.3	2.8
<u>Screening Trial</u>											
NUN 6409 (green)	Nun	1060	-3	95	185	-4	98	189	89	2.2	21.7
NUN 5166	Nun	1419	-2	104	202	-1	107	209	84	0.7	12.8
HS 1050	HS	1435	+6	88	175	+6	93	176	86	1.3	1.8
Significance @ P=0.05			SD	SD	SD	SD	SD	SD	SD		
LSD @ P=0.05			13.6	13.6	3.3	12.3	12.3	2.0	4.9		
CV%			8.6	8.6	1.0	7.8	7.8	0.6	3.6		

Key:

C= coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes @ P = 0.05  
 Practical freezing stage: TR 110 - 140 for a 140g sample; Practical canning stage: TR 115 - 140 for a 56g sample  
 NiS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV; HS = Holland Select

### Three year summary 1995, 1996 & 1998

Yield and maturity data for three replicated experiments 1995, 96 & 98 are shown in Table 5. The 1997 trial, which had severe levels of several diseases gave variable plot yields and the data was excluded.

#### Standard seed size

Listra gave the highest yields throughout the series and appears more resistant to downy mildew (*Peronospora viciae*) than Medes or Metissa. Metissa, which also yielded better than Medes, was particularly susceptible, and where it occurs early, the growing point is killed and flowering and pod set are reduced. Listra, according to the breeder, has a higher level of self fertility than older varieties and this would explain more consistent performance.

Medes the standard in all years yielded lower, (but not significantly lower) than Listra, Metissa and Statissa and has become outclassed.

Optica did not perform well in any year, with yields which were lower than the standard Medes, and significantly lower than the other varieties in this group.

Statissa the coloured flowered variety, is unsuitable for canning. It has limited use for quick-freezing because it is susceptible to discolouration and bruising, thus handling the commercial crop is more difficult. It is large seeded. However, Statissa appears less susceptible to disease and gave exceptional yields in some years.

Nun 5166 a new variety in 1998 with slightly smaller seed size did not outyield Listra. It matured earlier than Medes.

#### Smaller seeded

Danko was the largest seeded in this group and overall the highest yielding, but yields were poor in 1998.

Gold & Diamant produced similar yields over the three years, with exceptional yields in 1998. Seed size was similar but with Gold a more elongated, rounder bean. Gold suffered from downy mildew in 1998, but not in 1997 when levels of infection were higher on other varieties.

Talia was a very short strawed variety and it may be difficult to harvest commercially on a drought stressed site, and yields were low in the dry year in the 1995 trial. Otherwise it performed consistently well, with seed size slightly smaller than the other beans in this group.

New variety HS5150 tested for the first time in 1998 has similar seed size to Talia. It was late maturing and yields were good.

#### Very small seeded

Beryl was tested in two years, and was grown commercially for a niche market. In 1997 the variety was no longer available from the breeder. It was very small seeded and hence the lowest yielding.

### Green seeded

These varieties have potential as a new product.

Verdy was the highest yielding variety of this type over the three years. It was affected by a very severe attack of chocolate spot which caused yield loss in 1997. Produce had the most attractive green colour in this group, and bean size was even.

New variety Nun 6409 was a similar type to Verdy but with significantly higher yields in the 1998 trial, where it was tested for the first time.

Greeny the longest strawed variety was late maturing. Yields were variable between years. Produce was a bright lime green not as attractive as Verdy. The variety is to be withdrawn by the breeder.

Jade another late, tall variety gave low yields in a dry season but performed well in 1998 (& 1997). Produce was similar in colour to Greeny, a bright lime green.

Table 5. BROAD BEAN VARIETY STUDIES. Three year summary 1995, 1996 and 1998, Thornhaugh. Standard variety Medes underlined

Variety	Source	Seeds/kg.	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm
			Maturity ± days relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity ± days relative to Medes	Yield as % of Medes	Mean length 10 beans mm	
<u>Standard seed size</u>									
Metissa	NiS	1017	-2	112.7	212	-2	113.9	217	64
Statissa C	NiS	1068	-1	112.9	214	-1	112.4	218	79
Optica	NiS	1403	-1	82.1	199	-1	78.4-	205	74
<u>Medes</u>	<u>NiS</u>	<u>1236</u>	<u>0</u>	<u>100</u> (7.13 t/ha)	<u>204</u>	<u>0</u>	<u>100</u> (8.04 t/ha)	<u>210</u>	<u>86</u>
Listra	Nun	1366	+3	119.6	203	+3	115.8	210	80
<u>Smaller seeded</u>									
Diamant	NiS	1417	-1	76.8-	176	-2	80.7	179	69
Danko	Nun	1523	-1	83.7	182	0	81.7	184	68
Gold	NiS	1600	-1	75.2-	175	0	85.8	177	71
Talia	Nun	1691	+1	78.2-	171	0	78.3-	175	63
<u>Very small seeded</u>									
Beryl #	S & G	2311	+9	54.3-	155	+9	55.2-	160	77
<u>Green seeded</u>									
Verdy	Nun	1489	+3	80.8	177	+3	81.9	182	73
Greeny	Nun	1731	+7	75.2-	167	+7	76.7-	172	88
Jade	NiS	1515	+8	64.4-	173	+8	64.4-	176	80
Significance @ P = 0.05				SD	SD		SD	SD	SD
LSD @ P=0.05				19.94	8.44		19.55	8.26	7.0
CV %				13.7	2.7		13.4	2.6	5.6

C = Coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes @ P = 0.05

Practical freezing stage: TR 110 - 140 for a 140g sample; Practical canning stage: TR 115 - 140 for a 56g sample

Beryl # tested 1995 & 96 only, variety no longer available.

NiS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV; S & G = S & G Semences

TABLE 1 - BROAD BEAN VARIETY STUDIES. Summary of agronomic data - Variety Trial 1995  
 Varieties placed in order of maturity within each group. Standard varieties underlined. All varieties sown in 13 April  
 Results are means of three replicates. Target population 18 plants per m<sup>2</sup>. Row width 30 cm.

Variety	Source	Seeds /kg	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm	Height 1st pod cm
			Maturity ( $\pm$ Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity ( $\pm$ Days) relative to Medes	Yield as % of Medes	Mean length 10 beans		
<u>Standard seed size</u>										
Metissa	NiS	1022	-2	103	204	-2	99	209	61	19
Statissa (C)	NiS	1179	-1	89	203	-1	95	205	70	19.7
Optica	NiS	1329	-1	63-	200	-1	62-	202	67	18.7
<u>Medes</u>	<u>NiS</u>	<u>1347</u>	0	<u>100</u> (6.0 t/ha)	<u>202</u>	0	100	<u>205</u>	77	21.3
			(18/7)			(21/7)	6.9 t/ha			
Listra	Nun	1303	+3	112	200	+3	107	203	73	19.7
Scorpio (HS108)	HS	1468	+8	64-	185	+8	65-	188	68	32.7
<u>Smaller seeded</u>										
Danko	Nun	1381	-1	81-	181	0	76-	183	63	17.3
Diamant	NiS	1326	-1	71-	171	-2	79-	176	64	20
NIZ90-196*	NiS	1694	0	51-	164	0	58-	166	60	18.3
Talia	Nun	1671	+1	66-	168	0	76-	174	51	13.3
<u>Very small</u>										
Beryl	S&G	2312	+9	53-	143	+9	50-	146	65	37.7
<u>Green seeded</u>										
Jade	NiS	1535	+8	43-	168	+8	46-	172	67	38.7
Verdy	Nun	1446	+3	69-	168	+3	72-	170	77	19.3
Greeny	Nun	1696	+7	61-	159	+7	58-	165	64	38.7
Significance @ P = 0.05				SD			SD		SD	
LSD @ P=0.05				12.8			9.9		3.2	
CV%				10.4			7.8		2.9	

Key:  
 C= coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes @ P = 0.05; \* entered by the breeder;  
 Practical freezing stage: TR 110 - 140 for a 140g sample; Practical canning stage: TR 115 - 140 for a 56g sample  
 HS = Holland Select; NiS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV; S & G = S & G Semences

TABLE 2 - BROAD BEAN VARIETY STUDIES. Summary of agronomic data - Variety Trial, Thornhaugh - 1996. Varieties placed in order of maturity within each group. Standard varieties underlined. All varieties sown on 10 April. Results are means of three replicates. Target population 18 plants per m<sup>2</sup>. Row width 30 cm.

Variety	Source	Seeds /kg	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm
			Maturity ( $\pm$ Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity ( $\pm$ Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	
<u>Standard seed size</u>									
Metissa	NiS	1019	- 3	120+	205	- 2	123	215	63
Optica	NiS	1052	- 2	101	191	- 2	95	196	71
Statissa (C)	NiS	811	- 1	118+	212	- 1	117	219	77
Medes	NiS	1181	0	100	199	0	100	203	88
			(22/7)	(8.8 t/ha)		(26/7)	(9.9 t/ha)		
Listra	Nun	1351	+ 1	131+	200	+ 1	127	206	81
<u>Smaller seeded</u>									
Diamant	NiS	1326	- 4	91	171	- 3	87-	175	69
Gold (NIZ90-196)	NiS	1809	- 1	82-	177	- 1	93	179	74
Danko	Nun	1800	- 1	89	178	0	86-	181	70
Talia	Nun	1675	+ 1	86	167	+ 1	77-	171	67
<u>Very small</u>									
Beryl	S&G	2309	+10	56-	160	+10	58-	165	83
<u>Green seeded</u>									
Verdy	Nun	1511	+ 3	94	176	+ 3	87-	183	74
Greeny	Nun	1756	+ 7	80-	172	+ 7	83-	175	99
Jade	NiS	1530	+ 9	60-	175	+ 9	56-	178	82
Significance @ P = 0.05				SD	SD		SD	SD	SD
LSD @ P = 0.05				15.4	3.8		12.7	2.9	6.25
CV%				10.0	1.2		8.4	0.9	4.8

Key:  
 C = coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes @ P = 0.05  
 Practical freezing stage: TR 110 - 140 for a 140g sample; Practical canning stage: TR 115 - 140 for a 56g sample  
 NiS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV; S & G = S & G Semences



TABLE 3 - BROAD BEAN VARIETY STUDIES. Summary of agronomic data - Main Variety Trial, Thornhaugh - 1997. Varieties placed in order of maturity within each group. Standard varieties underlined. All varieties sown on 10th April. Results are means of three replicates. Target population 18 plants per m<sup>2</sup>. Row width 30 cm.

Variety	Source	Seeds /kg	At Practical Freezing Stage			At Practical Canning Stage			Plant height cm
			Maturity (± Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	Maturity (± Days) relative to Medes	Yield as % of Medes	Mean length 10 beans mm	
<u>Standard seed size</u>									
Metissa	NIS	971	-3	108	219	-3	109	221	77
Optica	NIS	1342	-2	97	215	-2	89	221	103
Statissa (C)	NIS	838	-2	185+	238	-1	177+	239	108
<u>Medes</u>	<u>NIS</u>	<u>742</u>	<u>0</u>	<u>100</u>	<u>224</u>	<u>0</u>	<u>100</u>	<u>228</u>	<u>121</u>
			(1/8)	(5.8 t/ha)		(5/8)	(7.2 t/ha)		
Listra	Nun	1203	+1	178+	219	+2	157+	220	117
<u>Smaller seeded</u>									
Diamant	NIS	1287	-4	120	178	-5	118	180	91
Gold (NIZ90-196)	NIS	1477	+2	90	183	+1	81-	187	97
Danko	Nun	1239	-2	105	193	-2	105	196	92
Talia	Nun	1773	+3	90	176	+2	91	180	102
<u>Green seeded</u>									
Verdy	Nun	1518	+3	46-	187	+3	51-	190	100
Greeny	Nun	1686	+7	77	177	+5	82	181	120
Jade	NIS	1484	+8	93	178	+7	82	179	109
Significance @ P = 0.05				SD	SD		SD	SD	SD
LSD @ P = 0.05				24.7	3.3		18.9	3.1	8.5
CV%				14.4	1.0		11.4	0.9	5.0

Key:

C = coloured flowered; - Significantly lower yields than Medes @ P = 0.05; + Significantly higher yield than Medes  
 Practical canning stage: TR 115 - 140 for a 56g; Practical canning stage: TR 115 - 140 for a 56g sample  
 NIS = Nickerson Seeds Ltd; Nun = Nunhems Zaden BV