# PROCESSORS & GROWERS RESEARCH ORGANISATION

## 1991
## VINING PEA TRIALS

## 1991
## COMBINING PEA TRIALS

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## THE SEASON

The weather experienced in the 1991 season would in the past have been described as "atypical of normal weather conditions usually experienced in the pea and bean growing areas". It has been "atypical" for the last three seasons, perhaps these are becoming the normal conditions to expect.

It was generally a mild winter, but frost during a few days in early February weathered the soil so it was possible to achieve satisfactory seedbeds after pre-drilling cultivations.

Temperatures in March and April were average for the time of year. Rainfall in March was 15 mm below the long term average, and average in April, but it was only 38% of the long term average in May.

June rainfall was 10 mm higher than average and this resulted in vigorous growth. Maximum temperatures were about 3°C lower than normal and these conditions delayed the predicted start of harvest.

July and August were both hot and dry months with maximum temperatures in excess of 25°C. Only 32% of the expected rainfall fell in July and just 20% in August.

Fungal diseases caused some problems in peas in the wetter areas this season after rain in June, particularly *Botrytis*, and downy mildew *(Peronospora viciae)* and also *Mycosphaerella*. In many areas aphid infestations occurred late, after flowering and pod set.

The vining pea harvest started at the beginning of July, a little later than in 1990. In the hot weather, crops matured rapidly and a high percentage of commercial crops were by-passed and subsequently harvested for seed. The dried pea harvest was carried out under ideal dry conditions.

## METEREOLOGICAL DATA

| Month | 1991 Average Temperature | | Long Term Average Temperature | |
|---|---|---|---|---|
| | Maximum °C | Minimum °C | Maximum °C | Minimum °C |
| March | 11.2 | 5.1 | 9.0 | 1.9 |
| April | 11.6 | 4.1 | 11.9 | 4.0 |
| May | 14.1 | 7.3 | 15.7 | 6.5 |
| June | 15.8 | 8.8 | 19.1 | 9.5 |
| July | 22.4 | 12.9 | 20.6 | 11.1 |
| August | 23.0 | 12.4 | 20.4 | 11.4 |

| Month | 1991 Monthly Rainfall (mm) | Long Term Average Rainfall (mm) |
|---|---|---|
| March | 29.4 | 44.1 |
| April | 45.0 | 42.3 |
| May | 17.4 | 46.2 |
| June | 17.0 | 49.7 |
| July | 16.8 | 52.5 |
| August | 12.6 | 63.5 |

Source 1991 data - PGRO; Long Term Average - Metereological Office

# VINING PEAS

*SUMMARY - MAIN TRIAL VARIETIES TESTED 1989 - 1991*

All three seasons followed relatively mild and dry winters. Rainfall in March 1990 was particularly low, which lead to uneven and patchy emergence. In April 1991 and 1990 rainfall was average, but in 1989 was twice the long-term average. June received less than the long-term average rainfall in 1989 and 1990, and temperatures were higher than average. This contrasted with June 1991 which was cooler and wetter than average, and this gave rise to vigorous vegetative growth. Harvesting began during the first week of July in 1991, about two weeks later than 1989 and 1990.

Relative maturity differences between varieties may be less than usual.

Lambado has medium length straw, fine foliage and matures one day later than Sprite. Yields have been variable over the three years, but overall they are similar to those of Sprite. Produce is smaller size grade than Sprite, small/medium.

Micro matures 4 days after Sprite. It is semi-leafless, tall and stiff-strawed and generally remains erect to harvest. Micro is a petits pois with an attractive appearance, and more uniform in size than Waverex. Maturation near to freezing stage is rather rapid and in the three years tested, the top 2 - 3 trusses of pods have failed to fill.

Caty has medium length straw and fine foliage and has been variable in terms of yield and maturity over the three years tested. Overall maturity is 2 - 3 days later than Scout. Yields are higher than for Waverex, but the dark coloured produce is larger in size grade, small/medium.

Lynx is late maturing (a day later than Puget). Straw is long, but foliage fine and lodging generally occurs late. Produce is petits pois size grade, only slightly larger than Waverex. Yields have been similar to Waverex and many nodes set triple pods.

Polo is also late maturing (a day later than Puget). Yields have been consistently higher than Scout over the three years. Produce is smaller than Scout, medium/small size grade. Haulm is long like Scout, but not heavy and in some years the variety may remain erect to harvest.

*TRIALS IN 1991*

Varieties were evaluated in Main, Preliminary and Screening Trials. Promising varieties from 1989 and 1990 Preliminary Trials were assessed in the Main Trial. Varieties entered in the Preliminary Trial are at National List stage of testing in an EEC member country, while breeders material at an early stage of development is evaluated in the Screening Trial.

Seed of all varieties was treated to control downy mildew and *Ascochyta*. Breeders stock of standard varieties was used in all trials. Sprite was the standard variety for maturity and quality; Waverex the petits pois standard; Scout the yield standard; and Puget the late maturing standard.

The Main and Preliminary Trials were sown on the 15th and 27th March respectively. Drilling was delayed slightly due to wet conditions in early March. Seedbeds were moist and better than in the previous two seasons and emergence was good and even. Pea and bean weevil *(Sitona lineatus)* were very active during a spell of warm weather soon after emergence. The Screening Trial was drilled on 24th April after a period of rainfall. Weevils were less active after emergence than in the earlier sown trials. The Main Trial required a post-emergence treatment for broad-leaved weed control. Temperatures in late April to mid-May were cooler, but they were

above average throughout most of the season. May, as in 1990, was a particularly dry month, but June was wetter than the long term average, with rain being recorded on most days. July was again very dry. The early varieties in the Main and Preliminary Trials suffered slightly from *Botrytis* and rotting of the lower foliage towards the end of June, subsequent dry conditions, however, prevented further problems. Aphid were not present until late in the growing period and did not warrant spraying. Levels of foliar diseases were low. Growth was quite vigorous and haulm long and plants of many varieties lodged to some extent.

Harvesting began on the 5th July and was completed by the 30th July. The season was relatively short and peas matured rapidly, however, most varieties were harvested near to the optimum tenderometer reading. Information on relative maturity differences should be treated with reserve again this season.

Samples from all three trials were quick-frozen and canned as in previous years without colour additive.

*MAIN TRIAL, THORNHAUGH - 1991*

*Winner (Wav 750)* and *Masterfon* were early maturing. Both varieties were slightly shorter strawed than Sprite and were of medium weight foliage. Produce was also similar in size, medium/small, but Masterfon was slightly darker and more even in colour, with fewer pale peas in the frozen sample. Yields from Winner were excellent, significantly higher than Scout. Yields from Masterfon were lower than either Scout or Sprite, but not significantly so.

*Sprite* the maturity standard yielded well this year, a little higher than Scout. Produce was medium/large size grade, similar to Scout.

*Lambado* a second early variety, matured one day after Sprite and yielded a little higher than Sprite. This variety had fine foliage and shorter straw than Sprite. The produce was small/medium size grade and contained a few paler peas.

*Solo* matured 3 days after Sprite. Haulm was long and heavy like Scout. Produce was medium size grade and dark coloured, but there were more paler peas than in the frozen sample of Scout. Yields were lower than Scout at TR 100, but higher at TR 120.

*Micro* a petits pois variety was semi-leafless with medium length straw and remained erect to harvest. As in previous trials the top 2-3 trusses failed to fill pods and yields were lower than Waverex, but not significantly so. Micro gave an attractive, even coloured sample of produce which was petits pois size grade, but more uniform size than Waverex.

*Scout* the yield standard performed well. Haulm was long and heavy, but there were only a few paler peas in the frozen sample. Scout matured 5 days after Sprite this year.

*Caty* matured at the same time as Scout. Straw was medium length and the variety lodged late. Produce was dark and even coloured, but larger than Waverex, small/medium size grade. Yields were higher than Waverex, but significantly lower than Scout.

*Waverex* the petits pois standard also matured 5 days after Sprite. Yields were better than in 1990, but still significantly lower than Scout. Produce was very small (91% < 8.75mm), but uneven in size and colour with several blond peas in the frozen sample.

*Deltafon* had fine, dark coloured foliage but standing ability was as poor as Scout. Yields were a little higher than Scout and the produce smaller, medium/small size grade. Peas were dark coloured, but there were a few blond peas in the frozen sample. Deltafon matured 6 days after Sprite.

*Bastion* also matured 6 days after Sprite. Bastion performed well, giving high yields of mostly small size grade peas. Straw was long like Scout, but foliage was finer and lodging occurred just prior to harvest.

*Puget* matured 7 days after Sprite. Yields were higher than Scout and produce was a similar size.

*Polo* was late maturing and yielded a little higher than Scout. Produce was dark, even coloured and smaller than either Scout or Puget. Straw was longer than Scout but foliage was finer and the variety remained erect almost to harvest.

*Lynx* had long straw but fine foliage and lodging occurred late. Produce was a little larger than Waverex, but the peas were more even in size and colour than Waverex. Yields were lower than Waverex but not significantly so. Lynx also matured late.

*PRELIMINARY TRIAL, THORNHAUGH - 1991*

Varieties in this trial are at National List stage of testing, and 31 varieties, including the standards were evaluated. A range of plant types was seen, including several semi-leafless and semi-fasciated varieties. Most varieties were of early maincrop maturity.

RS 25408 and Leda matured one day before Sprite. *RS 25408* had short straw, lush foliage and lodged. Yields were a little higher than Sprite, but produce was medium/small, rather pale and contained many blond peas. *Leda* had finer foliage and similar size produce, but pea colour was better, with fewer blond peas. Yields, however, were significantly lower than Sprite.

*Sprite* yielded very well compared with Scout. Produce was medium/large with several blond peas in the frozen sample. CO 400 and Luna matured at the same time as Sprite. *CO 400* had fine foliage and although the variety lodged early, the medium/small size grade produce had a good, bright even colour. Yields were significantly higher than Scout. *Luna* had rather heavy foliage and yields were lower than Sprite. Produce was similar in size to Sprite, with several blond peas in the frozen sample.

The following varieties were of second early maturity:

Produce of *Bornita* was similar in size to Sprite, but yields were significantly lower. *XPF 241* and *Quattro* were semi-leafless and matured 2 and 3 days respectively later than Sprite. Both varieties were significantly higher yielding than Scout and remained erect nearly to harvest. Produce from Quattro was medium/large with dark rather uneven colour and poor flavour. XPF 241 was smaller in size, with a few paler peas in the frozen sample. *Remus* matured one day later than Quattro and gave yields a little lower than Scout at TR 100. Produce was medium in size, but the frozen sample contained many blond peas.

*Scout* matured 5 days after Sprite this year and did not yield well, particularly at TR 100.

The following varieties matured at the same time as Scout:

*Waverex* gave very good yields at TR 100, but yields were significantly lower than Scout at TR 120. This petits pois standard gave 85% of peas in the < 8.75 mm size grade with several blond peas in the frozen sample. *RS 22412* had fine foliage and produce was similar in size, but with a better colour than Waverex. Yields were significantly lower than Waverex. *CMG 270 AF* was semi-leafless, semi-fasciated and short strawed. Standing ability was good and yields were excellent, significantly higher than Scout. The peas were dark and even in colour, but produce was larger than Scout. Semi-leafless *FR 774* gave yields a little lower than Scout and smaller size produce. Pea colour was good, but with a few blond peas. *Wav 557* was also semi-leafless and gave significantly higher yields than Scout. Produce was larger than Scout, with a few blond peas in the frozen sample. Yields from *Aurigo* were similar to Scout and the produce was only a little larger than Waverex, with several blond peas in the frozen sample.

The following varieties matured 6 days after Sprite:

*Willow* and *Sancho* were semi-leafless and long strawed with good standing ability, and both outyielded Scout. Produce of Willow was medium size grade, a little larger than Sancho and both varieties gave peas with a good, bright even colour. However Willow was not easy to vine because of its long stiff straw. *CO 385* and *CO 402* were significantly lower yielding than Scout. Produce of CO 385 was small/medium size grade. CO 402 was larger and both had blond peas in the frozen produce. *CMG 281 AF* was semi-leafless, semi-fasciated, and short strawed and remained erect to harvest. Yields were very high and although the produce was large in size, the peas were dark and evenly coloured.

The following varieties matured 7 days after Sprite:

*CMG 264 F* gave higher yields than Scout at TR 100. Produce was medium size grade, with a few blond peas in the frozen sample. *CMG 271 AF* was semi-leafless and semi-fasciated, with short plants and very good standing ability. Produce was large in size, with dark, evenly coloured peas, but yields were low. *Puget* matured earlier than usual this year and yields were similar to Scout at TR 100. *Bornella* had pale, medium size grade produce and was significantly lower yielding than Scout. *Wav 864* was long strawed and also gave low yields of medium/small size grade peas. The frozen produce contained many blond peas.

*Wav 701*, *Wav 863* and *Array* matured 8 days after Sprite and were also long strawed and low yielding. Produce of *Wav 701* was very small (95% petits pois), but with many blond peas in the frozen sample. Produce of *Wav 863* was medium/small size grade and contained many blond peas. *Array* gave very low yields, with 86% of peas in the petits pois size grade (< 8.75 mm) and with uneven colour.

*Quad* and *Wav 866* matured 9 days after Sprite. *Quad* gave yields a little lower than Scout at TR 100. Produce was medium size grade, but with uneven colour and several blond peas in the frozen sample. *Wav 866*, a petits pois type, yielded less than Waverex, but peas were a better colour.

The most promising varieties in trial included CO 400, Bikini types (semi-leafless, semi-fasciated)CMG 270 AF, CMG 281 AF, second early XPF 241 and FR 774 and Sancho.

Although some petits pois varieties gave more attractive samples than Waverex, none gave higher yields.

*SCREENING TRIAL, THORNHAUGH - 1991*

Twenty six varieties including the standards were evaluated. A variation in plant type was seen and included several semi-leafless varieties. No variety yielded significantly higher than Scout. Waverex, the petits pois standard was omitted from the results because this variety was selectively grazed by hares.

*CMG 276 F* was early maturing, 1 day before Sprite and yields were lower. Haulm was very short and produce was larger than Scout. *Sprite* as in the other trials yielded well. *90-5* and *NZ 152* matured at the same time as Sprite. 90-5 gave high yields of medium/small size grade peas with a good, dark, even colour. Frozen produce of NZ 152 was rather pale in colour and medium/small size grade. Yields were significantly lower than Scout at TR 100.

Several varieties were of second early maturity:

Semi-leafless *90-474* matured one day later than Sprite and gave yields similar to Scout. The frozen produce was of medium size grade and a little uneven in colour. *Wav 726* had long straw and was significantly lower yielding than Scout. Produce was small/medium size grade with blond peas in the frozen sample. *90-35* also had long straw and lower yields than Scout. Peas were medium/small size grade with a bright colour, but there were several blond peas in the frozen sample. *90-10* was a semi-leafless variety. The medium/small size grade produce had a bright, even colour, but yields were significantly lower than Scout at TR 100.

*90-55* and *Wav 907* matured 2 days later than Sprite and both were significantly lower yielding than Scout at TR 100. Both varieties lodged severely. Frozen produce of 90-55 was even coloured and a little pale. Produce of Wav 907 was uneven in colour.

*VSB 4647* matured 3 days after Sprite and gave good yields. Produce was medium size grade, but uneven in colour and straw was long.

The following matured 4 days later than Sprite:

*12.485* was semi-leafless and remained fairly erect to harvest. Produce was medium size grade and colour was good, but yields were lower than Scout. *Wav 023*, a petits pois variety, gave very low yields, with blond peas in the frozen produce. *Conf 662* was semi-leafless, stood well and gave good yields. The produce was even in colour and medium/small size grade.

Boretta and Conf 762 matured 5 days after Sprite. *Boretta* was lower yielding than Scout and gave produce of medium/small size grade. Haulm was rather heavy and the variety lodged. Peas were a little pale in colour and the frozen produce contained several blond peas. *Conf 762* was also lower yielding than Scout and produce medium size grade. The variety lodged and the frozen produce contained several blond peas.

*Scout* matured 6 days later than Sprite. Produce was medium/large with a good colour. *Conf 1* matured at the same time as Scout and lodged severely. Yields were lower than Scout and peas were dark coloured but with a few blond peas, and of medium/small size grade.

The following varieties matured 9 days later than Sprite:

*Puget* gave good yields of peas of similar size to Scout, but the frozen sample of produce contained many blond peas. *Conf 2* lodged and the produce also contained many blond peas. Yields were significantly lower

than Scout. *4-9150* was a little lower yielding than Scout. The peas were a dark, even colour but large. 4-9150 was semi-leafless, with large stipules and the variety lodged, but lodging was not severe. Pods were very long and curved. *90-92* lodged, but the small size grade produce had an even colour. Yields were significantly lower than Scout. *90-95* gave small size grade produce, but was low yielding. *Nun 8872* was long strawed but had a good semi-leafless plant habit and remained erect to harvest. The produce had a good colour, but yields were significantly lower than Scout. *Conf 932* lodged severely and the medium size grade produce contained several blond peas. Yields were significantly lower than Scout.

Promising varieties from this trial included 90-5 and 90-474, both early and semi-leafless, and the highest yielding semi-leafless Conf 662.

*DISEASE RESISTANCE TESTS - 1991*

Although varieties were sown at two sites in 1991, no downy mildew developed and no results are available.

VINING PEA VARIETY STUDIES. Summary of agronomic data - Summary of Vining Peas Tested 1989 - 1991
Varieties placed in order of maturity. Standard varieties underlined
Results are means of three replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | Breeder (UK Agent) | Seeds /kg | At Practical Freezing Stage | | | | | | At Practical Canning Stage | | | | | | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades L | M | S | VS | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades L | M | S | VS | | | |
| Sprite | As | 4786 | 0 | 77⁻ | 38 | 41 | 17 | 4 | 0 | 76 | 48 | 41 | 9 | 2 | 54 | 14 | 4.0 |
| Lambado (D 9611) | S&G (BS) | 9393 | + 1 | 76⁻ | 3 | 28 | 46 | 23 | 0 | 73⁻ | 3 | 35 | 46 | 16 | 52 | 15 | 4.0 |
| Micro (XPF 224) (SL) | As | 10154 | + 4 | 54⁻ | 0 | 7 | 43 | 50 | + 4 | 56⁻ | 0 | 16 | 49 | 35 | 65 | 11 | 4.0 |
| Scout | CM (RS) | 5073 | + 5 | 100 (5.68t/ha) | 32 | 49 | 15 | 4 | + 5 | 100 (6.35t/ha) | 41 | 48 | 9 | 21 | 69 | 18 | 5.0 |
| Waverex | vW (DT) | 10636 | + 6 | 56⁻ | 1 | 9 | 36 | 54 | + 6 | 56⁻ | 1 | 15 | 43 | 41 | 48 | 13 | 4.0 |
| Caty (Cl 626 S) | Cl | 7705 | + 7 | 64⁻ | 4 | 35 | 48 | 13 | + 7 | 62⁻ | 3 | 41 | 46 | 10 | 57 | 15 | 4.5 |
| Puget | Bro (DT/Sh) | 6102 | + 8 | 106 | 20 | 49 | 23 | 8 | + 8 | 107 | 25 | 54 | 16 | 5 | 63 | 17 | 4.0 |
| Lynx | MJ (JS) | 11523 | + 9 | 57⁻ | 1 | 17 | 47 | 35 | + 8 | 56⁻ | 1 | 21 | 54 | 24 | 68 | 10 | 3.5 |
| Polo (876 PH 5.4) | Sh | 6749 | + 9 | 110 | 8 | 43 | 36 | 13 | + 9 | 109 | 9 | 51 | 31 | 9 | 72 | 18 | 4.5 |
| Significance @ P = 0.05 | | | | SD | | | | | | SD | | | | | | | |
| LSD @ P = 0.05 | | | | 22.8 | | | | | | 25.1 | | | | | | | |
| CV % | | | | 17.0 | | | | | | 18.7 | | | | | | | |

KEY: YIELD: ⁻ Significantly less than Scout @ P = 0.05
Size grades: L = large > 10.3 mm; M = medium 8.75 - 10.3 mm; S = small 7.5 - 8.75 mm; VS = very small < 7.5 mm
(SL) = Semi-leafless
Source of varieties see appendix I

8/1991

VINING PEA VARIETY STUDIES. Summary of agronomic data - Main Variety Trial, Thornhaugh - 1991
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 15th March
Results are means of three replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | Source | Seeds /kg | At Practical Freezing Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades L | M | S | VS | At Practical Canning Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades L | M | S | VS | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Winner (WAV 750) | vW | 5200 | - 1 | 121+ | 14 | 39 | 41 | 6 | - 2 | 123+ | 17 | 53 | 28 | 2 | 56 | 19 | 4.0 |
| Masterfon (RS 25509) | RS | 6369 | - 1 | 84 | 13 | 41 | 37 | 9 | - 1 | 94 | 17 | 56 | 24 | 3 | 51 | 16 | 4.5 |
| Sprite | As | 4486 | 0(8/7) | 104 | 33 | 50 | 15 | 2 | 0(10/7) | 102 | 47 | 47 | 5 | 1 | 59 | 15 | 4.0 |
| Lambado (D 9611) | S&G | 9435 | + 1 | 107 | 4 | 27 | 48 | 21 | 0 | 111 | 4 | 29 | 52 | 15 | 54 | 20 | 4.0 |
| Solo (336 PH 1.5) | Sh | 4808 | + 3 | 89 | 16 | 46 | 30 | 8 | + 3 | 109 | 21 | 53 | 22 | 4 | 80 | 17 | 4.5 |
| Micro (SL) | As | 9603 | + 4 | 50- | 0 | 6 | 41 | 53 | + 4 | 50- | 1 | 12 | 49 | 38 | 77 | 9 | 4.0 |
| Scout | CM | 5015 | + 5 | 100 (5.73t/ha) | 33 | 51 | 14 | 2 | + 4 | 100 (6.11t/ha) | 41 | 50 | 8 | 1 | 82 | 19 | 4.5 |
| Caty | Cl | 7952 | + 5 | 72- | 7 | 36 | 50 | 7 | + 4 | 67- | 6 | 38 | 49 | 7 | 69 | 14 | 4.5 |
| Waverex | vW | 10636 | + 5 | 62- | 1 | 8 | 36 | 55 | + 5 | 64- | 1 | 12 | 49 | 38 | 58 | 13 | 4.0 |
| Deltafon (RS 26414) | RS | 7092 | + 6 | 105 | 10 | 48 | 37 | 5 | + 6 | 101 | 9 | 48 | 40 | 3 | 75 | 18 | 4.5 |
| Bastion | Nun | 8259 | + 6 | 95 | 2 | 19 | 62 | 17 | + 6 | 93 | 2 | 22 | 63 | 13 | 84 | 16 | 4.0 |
| Puget | Bro | 9603 | + 7 | 110 | 31 | 55 | 13 | 1 | + 6 | 104 | 28 | 57 | 14 | 1 | 77 | 17 | 4.0 |
| Polo (876 Ph 5.4) | Sh | 5814 | + 7 | 105 | 10 | 43 | 40 | 7 | + 7 | 99 | 11 | 46 | 37 | 6 | 92 | 17 | 4.5 |
| Lynx | JS | 11339 | + 8 | 49- | 2 | 23 | 53 | 22 | + 8 | 57- | 2 | 26 | 57 | 15 | 83 | 9 | 3.5 |
| Significance @ P = 0.05 | | | | SD | | | | | | SD | | | | | | | |
| LSD @ P = 0.05 | | | | 17.8 | | | | | | 14.1 | | | | | | | |
| CV % | | | | 11.8 | | | | | | 9.3 | | | | | | | |

KEY: YIELD: + Significantly greater than Scout @ P = 0.05; - Significantly less than Scout @ P = 0.05
Size grades: L = large > 10.3 mm; M = medium 8.75 - 10.3 mm; S = small 7.5 - 8.75 mm; VS = very small < 7.5 mm
(SL) = Semi-leafless
Source of varieties see Appendix I

9/1991

VINING PEA VARIETY STUDIES. Summary of agronomic data - Preliminary Variety Trial, Thornhaugh - 1991
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 27th March
Results are means of three replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | Source | Seeds /kg | At Practical Freezing Stage | | | | | | | At Practical Canning Stage | | | | | | | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades L | M | S | VS | | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades L | M | S | VS | | | | |
| RS 25408 | RS | 7634 | - 1 | $128^{+}$ | 14 | 45 | 34 | 7 | | - 1 | 108 | 19 | 52 | 26 | 3 | | 65 | 17 | 4.0 |
| Leda | S&G | 7047 | - 1 | $73^{-}$ | 14 | 47 | 34 | 5 | | - 1 | $71^{-}$ | 16 | 55 | 27 | 2 | | 72 | 12 | 4.0 |
| CO 400 | JS | 7608 | 0 | $118^{+}$ | 12 | 48 | 35 | 5 | | 0 | 105 | 15 | 58 | 24 | 3 | | 78 | 17 | 4.5 |
| Luna | AGIS | 5530 | 0 | 108 | 26 | 47 | 24 | 3 | | 0 | 105 | 34 | 51 | 13 | 2 | | 68 | 17 | 4.0 |
| Sprite | As | 4486 | 0(11/7) | $124^{+}$ | 28 | 55 | 15 | 2 | | 0(13/7) | 111 | 36 | 54 | 9 | 1 | | 68 | 16 | 4.0 |
| Bornita | AGIS | 6803 | + 1 | 85 | 21 | 46 | 27 | 6 | | + 1 | 90 | 34 | 55 | 9 | 2 | | 85 | 14 | 4.5 |
| XPF 241 (SL) | As | 7319 | + 2 | $120^{+}$ | 12 | 49 | 34 | 5 | | + 2 | 111 | 12 | 54 | 31 | 3 | | 84 | 18 | 4.0 |
| Quattro (SL) | Sh | 4739 | + 3 | $123^{+}$ | 31 | 58 | 10 | 1 | | + 3 | 103 | 36 | 59 | 4 | 1 | | 72 | 17 | 4.5 |
| Remus (Mure) | AGIS | 6488 | + 4 | 97 | 12 | 51 | 33 | 4 | | + 4 | $80^{-}$ | 17 | 64 | 18 | 1 | | 77 | 12 | 4.0 |
| Waverex | vW | 10636 | + 5 | 96 | 1 | 14 | 48 | 37 | | + 5 | $83^{-}$ | 1 | 17 | 55 | 27 | | 63 | 14 | 4.0 |
| RS 22412 | RS | 8547 | + 5 | $80^{-}$ | 1 | 11 | 49 | 39 | | + 5 | $73^{-}$ | 0 | 11 | 58 | 31 | | 84 | 11 | 4.0 |
| CMG 270 AF (SL/SF) | CM | 4468 | + 5 | $126^{+}$ | 38 | 53 | 8 | 1 | | + 5 | $130^{+}$ | 53 | 42 | 4 | 1 | | 67 | 16 | 5.0 |
| FR 774 (SL) | Bro | 4725 | + 5 | 96 | 13 | 52 | 31 | 4 | | + 5 | 99 | 21 | 64 | 14 | 1 | | 78 | 13 | 4.5 |
| WAV 557 (SL) | vW | 4088 | + 5 | $124^{+}$ | 47 | 44 | 8 | 1 | | + 5 | 115 | 58 | 37 | 4 | 1 | | 84 | 15 | 4.0 |
| Aurigo | Nun | 10592 | + 5 | 100 | 1 | 13 | 55 | 31 | | + 6 | $84^{-}$ | 2 | 25 | 62 | 11 | | 78 | 13 | 4.5 |
| Scout | CM | 5015 | + 5 | 100 (4.69t/ha) | 35 | 47 | 15 | 3 | | + 6 | 100 (6.07t/ha) | 42 | 45 | 11 | 2 | | 95 | 15 | 5.0 |
| Willow (1037 Ph 7.44) (SL) | Sh | 5405 | + 6 | $132^{+}$ | 20 | 56 | 19 | 5 | | + 6 | 104 | 26 | 58 | 12 | 4 | | 102 | 16 | 4.5 |
| Sancho (1036 Ph 2.1) (SL) | Sh | 6173 | + 6 | $126^{+}$ | 8 | 44 | 41 | 7 | | + 6 | $117^{+}$ | 12 | 55 | 30 | 3 | | 93 | 18 | 5.0 |
| CO 385 | JS | 7777 | + 6 | $77^{-}$ | 5 | 32 | 51 | 12 | | + 6 | $81^{-}$ | 5 | 40 | 48 | 7 | | 90 | 13 | 4.5 |
| CO 402 | JS | 8177 | + 6 | $67^{-}$ | 14 | 51 | 26 | 9 | | + 6 | $64^{-}$ | 20 | 57 | 19 | 4 | | 84 | 9 | 4.0 |
| CMG 281 AF (SL/SF) | CM | 4998 | + 6 | $140^{+}$ | 36 | 51 | 12 | 1 | | + 6 | $123^{+}$ | 55 | 41 | 3 | 1 | | 63 | 18 | 4.5 |

continued/....

(continued) VINING PEA VARIETY STUDIES. Summary of agronomic data - Preliminary Variety Trial, Thornhaugh - 1991
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 27th March
Results are means of three replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | Source | Seeds /kg | At Practical Freezing Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades L | M | S | VS | At Practical Canning Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades L | M | S | VS | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMG 264 F | CM | 5848 | + 7 | 106 | 21 | 54 | 20 | 5 | + 6 | 92 | 26 | 55 | 15 | 4 | 97 | 14 | 4.5 |
| CMG 271 AF (SL/SF) | CM | 4705 | + 7 | 85 | 38 | 52 | 9 | 1 | + 7 | 72⁻ | 48 | 45 | 6 | 1 | 52 | 11 | 5.0 |
| Puget | Bro | 4753 | + 7 | 104 | 33 | 51 | 13 | 3 | + 7 | 84⁻ | 42 | 49 | 8 | 1 | 84 | 13 | 4.0 |
| Bornella | AGIS | 6993 | + 7 | 81⁻ | 12 | 47 | 34 | 7 | + 7 | 66⁻ | 15 | 53 | 28 | 4 | 77 | 10 | 3.5 |
| WAV 864 | vW | 5704 | + 7 | 75⁻ | 8 | 42 | 40 | 10 | + 8 | 65⁻ | 16 | 62 | 22 | 0 | 103 | 9 | 4.0 |
| WAV 701 | vW | 9223 | + 8 | 68⁻ | 0 | 5 | 40 | 55 | + 7 | 58⁻ | 1 | 8 | 46 | 45 | 97 | 8 | 4.5 |
| WAV 863 | vW | 6001 | + 8 | 85 | 8 | 38 | 41 | 13 | + 8 | 74⁻ | 10 | 46 | 35 | 9 | 102 | 11 | 4.5 |
| Array (XPF 226) | As | 8360 | + 8 | 52⁻ | 1 | 13 | 44 | 42 | + 9 | 52⁻ | 2 | 22 | 50 | 26 | 97 | 8 | 4.5 |
| Quad (CMG 289 F) | CM | 6666 | + 9 | 95 | 25 | 55 | 16 | 4 | + 8 | 76⁻ | 31 | 55 | 12 | 2 | 87 | 13 | 4.0 |
| WAV 866 | vW | 8359 | + 9 | 54⁻ | 1 | 10 | 52 | 37 | + 9 | 46⁻ | 1 | 19 | 57 | 23 | 89 | 7 | 4.5 |
| Significance @ P = 0.05 | | | | SD | | | | | | SD | | | | | | | |
| LSD @ P = 0.05 | | | | 14.95 | | | | | | 15.2 | | | | | | | |
| CV % | | | | 9.3 | | | | | | 10.5 | | | | | | | |

KEY: YIELD: ⁺ Significantly greater than Scout @ P = 0.05; ⁻ Significantly less than Scout @ P = 0.05
Size grades: L = large > 10.3 mm; M = medium 8.75 - 10.3 mm; S = small 7.5 - 8.75 mm; VS = very small < 7.5 mm
(SL) = Semi-leafless; (SF) = Semi-fasciated
Source of varieties see Appendix I

VINING PEA VARIETY STUDIES. Summary of agronomic data - Screening Variety Trial, Thornhaugh - 1991
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 24th April
Results are means of two replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | | Source | Seeds /kg | At Practical Freezing Stage | | | | | | | At Practical Canning Stage | | | | | | | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades L | M | S | VS | | Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades L | M | S | VS | | | | |
| CMG 276 F | | CM | 3925 | - 1 | 93 | 52 | 34 | 12 | 2 | | - 2 | 89 | 60 | 32 | 6 | 2 | | 59 | 14 | 4.5 |
| 90-5 | (SL) | PLS | 6237 | 0 | 116 | 11 | 47 | 33 | 9 | | - 1 | 100 | 17 | 54 | 25 | 4 | | 80 | 15 | 4.5 |
| NZ 152 | | AGIS | 6173 | 0 | 74- | 22 | 46 | 25 | 7 | | 0 | 80 | 38 | 47 | 13 | 2 | | 61 | 11 | 4.5 |
| Sprite | | As | 4486 | 0(18/7) | 105 | 35 | 47 | 15 | 3 | | 0(21/7) | 104 | 47 | 45 | 7 | 1 | | 76 | 12 | 4.5 |
| 90-474 | (SL) | PLS | 4592 | + 1 | 99 | 33 | 50 | 15 | 2 | | 0 | 102 | 53 | 40 | 6 | 1 | | 75 | 14 | 5.0 |
| WAV 726 | | vW | 6222 | + 1 | 78- | 8 | 35 | 40 | 17 | | 0 | 75- | 10 | 47 | 34 | 9 | | 89 | 11 | 4.5 |
| 90-35 | | PLS | 4865 | + 1 | 84 | 16 | 48 | 30 | 6 | | 0 | 80 | 21 | 56 | 19 | 4 | | 85 | 12 | 5.0 |
| 90-10 | (SL) | PLS | 6303 | + 1 | 81- | 8 | 40 | 36 | 16 | | 0 | 90 | 13 | 49 | 29 | 9 | | 73 | 15 | 5.0 |
| 90-55 | | PLS | 4678 | + 2 | 83- | 30 | 47 | 19 | 4 | | + 2 | 78- | 40 | 56 | 4 | 0 | | 71 | 10 | 4.5 |
| WAV 907 | | vW | 6523 | + 2 | 72- | 2 | 24 | 47 | 27 | | + 2 | 83 | 6 | 42 | 45 | 7 | | 83 | 11 | 4.5 |
| VSB 4647 | | Sh | 6209 | + 3 | 109 | 19 | 44 | 29 | 8 | | + 3 | 120 | 27 | 57 | 14 | 2 | | 89 | 15 | 4.5 |
| 12.485 | (SL) | Sh | 5988 | + 4 | 91 | 25 | 47 | 23 | 5 | | + 3 | 85 | 36 | 48 | 14 | 2 | | 77 | 13 | 4.5 |
| WAV 023 | | vW | 8386 | + 4 | 59- | 1 | 10 | 48 | 41 | | + 4 | 64- | 1 | 15 | 60 | 24 | | 67 | 8 | 4.5 |
| Conf 662 | (SL) | Conf | 6328 | + 4 | 113 | 14 | 43 | 36 | 7 | | + 4 | 116 | 19 | 55 | 17 | 9 | | 79 | 16 | 4.5 |
| Boretta | | AGIS | 8000 | + 5 | 97 | 12 | 48 | 35 | 5 | | + 4 | 85 | 18 | 58 | 22 | 2 | | 61 | 14 | 4.0 |
| Conf 762 | | Conf | 5467 | + 5 | 93 | 27 | 54 | 16 | 3 | | + 4 | 93 | 41 | 52 | 6 | 1 | | 83 | 12 | 4.5 |
| Conf 1 | | Conf | 5493 | + 6 | 93 | 32 | 55 | 11 | 2 | | + 5 | 85 | 36 | 53 | 9 | 2 | | 72 | 13 | 5.0 |
| Scout | | CM | 5015 | + 6 | 100 (4.4t/ha) | 42 | 43 | 12 | 3 | | + 6 | 100 (5.16t/ha) | 54 | 38 | 6 | 2 | | 85 | 14 | 4.5 |

continued/....

(continued) VINING PEA VARIETY STUDIES. Summary of agronomic data - Screening Variety Trial, Thornhaugh - 1991
Varieties placed in order of maturity. Standard varieties underlined. All varieties sown on 24th April
Results are means of two replicates. Target population 90 plants per $m^2$ sown in ten 15 cm rows

| Variety | | Source | Seeds /kg | At Practical Freezing Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 100 | % in size grades: L | M | S | VS | At Practical Canning Stage: Maturity relative to Sprite (± days) | Yield of shelled peas as % Scout @ TR 120 | % in size grades: L | M | S | VS | Haulm length cm | Pea wt. as % of total weight | Raw pea colour 1=pale 5=dark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Puget | | Bro | 4753 | + 9 | 115 | 30 | 56 | 12 | 2 | + 8 | 101 | 41 | 50 | 8 | 1 | 79 | 15 | 4.5 |
| Conf 2 | | Conf | 6802 | + 9 | 53⁻ | 12 | 48 | 35 | 5 | + 8 | 50⁻ | 12 | 53 | 31 | 4 | 88 | 10 | 4.0 |
| 4-9150 | (SL) | Mar | 4348 | + 9 | 95 | 46 | 40 | 12 | 2 | + 8 | 98 | 65 | 30 | 4 | 1 | 88 | 13 | 4.5 |
| 90-92 | | PLS | 6457 | + 9 | 83⁻ | 6 | 33 | 46 | 15 | + 8 | 72⁻ | 9 | 44 | 38 | 9 | 83 | 12 | 4.0 |
| 90-95 | | PLS | 7129 | + 9 | 54⁻ | 3 | 23 | 43 | 31 | + 8 | 51⁻ | 6 | 35 | 42 | 17 | 86 | 9 | 4.0 |
| Nun 8872 | (SL) | Nun | 5452 | + 9 | 76⁻ | 17 | 51 | 28 | 4 | + 8 | 67⁻ | 22 | 54 | 22 | 2 | 94 | 10 | 4.0 |
| Conf 932 | | Conf | 5489 | + 9 | 95 | 21 | 50 | 26 | 3 | + 8 | 89 | 31 | 51 | 16 | 2 | 68 | 17 | 4.0 |
| Significance @ P = 0.05 | | | | | SD | | | | | | SD | | | | | | | |
| LSD @ P = 0.05 | | | | | 16.1 | | | | | | 20.9 | | | | | | | |
| CV % | | | | | 8.8 | | | | | | 11.6 | | | | | | | |

KEY: YIELD: ⁻ Significantly less than Scout @ P = 0.05
Size grades: L = large > 10.3 mm; M = medium 8.75 - 10.3 mm; S = small 7.5 - 8.75 mm; VS = very small < 7.5 mm
(SL) = Semi-leafless
Source of varieties see Appendix I

# COMBINING PEAS

*TRIALS IN 1991*

In 1991 PGRO again had a large variety trials programme, consisting of five replicated trials. Many varieties in trial were semi-leafless and a significant number were tare-leaved. The control varieties this year were Solara, Orb and Baroness and their mean yield was used as the yield control. Maturities were related to Baroness. The human consumption quality standards were marrowfat Maro and small blue Conquest.

The Screening, Preliminary, one of the Recommended List (RL) Trials and a Confidential Trial were carried out at Thornhaugh on a sandy clay loam soil type. The other PGRO RL trial site was at Chatteris, Cambs on an organic sandy clay loam. The RL trials form part of the PGRO/NIAB co-ordinated series of trials, from which the Recommended List is produced. Varieties in these trials are either fully or provisionally recommended or are candidates for the Recommended List jointly selected from the most promising registered varieties. Four varieties were in the RLO category, where extra data is sought before putting them forward for full Recommended List evaluation. Varieties in the Preliminary trial are at National List stage of testing. Breeders material at an earlier stage of development is evaluated in the Screening trial.

Seed for the trials was treated with fungicide to control damping off diseases, *Ascochyta* and downy mildew. At Thornhaugh, drilling was delayed slightly due to rain in early March. Trials were drilled during the period 13th to the 25th March. Seedbeds were good and peas emerged well and evenly. All trials received a post-emergence herbicide to control broad-leaved weeds. Growth was vigorous and final haulm lengths were much longer than in the previous two seasons. Disease levels were low. Aphids (*Acyrthosiphon pisum*) were present in significant numbers only towards the end of the growing period and pea moth (*Cydia nigricana*) were few in number. Insecticides were not applied. At Chatteris seedbed conditions were good and moist and the peas established well. In mid-April the trial suffered frost damage, but all the varieties recovered well and subsequent growth was very vigorous. The peas withstood the dry conditions better on this moisture retentive soil than at the Thornhaugh site. Haulm was very long and all varieties lodged to some extent. Aphids and pea moth were controlled and fungicides were applied. Secondary infections of downy mildew (*Peronospora viciae*) were present in the trial but at a very late stage in the growing period.

The hot, dry weather advanced maturity and varieties were combined under ideal conditions, during the period 2nd to 19th August. Maturity was uneven for some varieties however, with stems and occasional pods remaining green particularly at the top of the plants.

Produce quality was again good this season, although some bleaching of the marrowfats and small blues was encountered; levels of staining and *Botrytis* were low and were not recorded. All small blue and marrowfat varieties from the Thornhaugh trials were canned to assess quality for human consumption. These samples were evaluated by a panel from the British Edible Pulse Association. Dry produce and canned samples were sent for evaluation by canning companies.

*RECOMMENDED LIST TRIAL, THORNHAUGH - 1991 (NIAB/PGRO)*

Yields were higher than in 1990. In the hot dry conditions the peas matured rapidly and maturity differences may be less than normal.

*Conquest* was the lowest yielding of the small blue seeded peas and significantly lower than the mean of the control varieties. *Mascot* was significantly higher yielding than Conquest and has potential for canning and human consumption. *Orb* and *Echo* were semi-leafless and yields were similar to the control. Echo showed good standing ability, Orb as in other trials this year was inferior. Tare-leaved Mascot stood longer than Conquest, which lodged early, but both suffered severe lodging and Conquest was not easy to harvest. Mascot was the earliest of the small blues, maturing 7 days before Baroness and Orb matured 6 days before Baroness. The canned sample of Mascot showed less breakdown this year and the canned produce was a little smaller than that of Conquest. Orb and Echo had poor canning quality and exhibited excessive amounts of breakdown.

*Solara* and *Arena* were large blue seeded and semi-leafless. Solara had short straw, stood well and was easy to harvest. Arena had longer straw and standing ability and ease of harvest were inferior to Solara. Yields were similar, being comparable to the mean of the control varieties. Arena was later maturing, 1 day after Baroness.

The majority of varieties in the trial were white seeded. *Bohatyr*, *Rex* and *Celeste* were conventional-leaved and showed similar standing ability and yielded well. Bohatyr was a little longer strawed than Rex (both long strawed). Celeste was much shorter and matured 5 days before Baroness. Tare-leaved *Messire* was the only variety in trial to yield significantly higher than the controls. It had medium length straw but poor standing ability. The remainder of the white seeded peas *Montana*, *Tivoli*, *Fanfare*, *Baroness*, and *Countess* were semi-leafless. Countess was significantly lower yielding than the control. Standing ability of these varieties was similar. Like Countess, *Grafila* was late maturing. Grafila was also semi-leafless, long strawed and showed slightly superior standing ability and ease of harvest. Yields of Baroness were disappointing.

The marrowfat peas were all of late maturity and significantly lower yielding than the mean of the control varieties. *Progreta* was the earliest of these. *Princess* was one day later to mature than Baroness and *Bunting*, *Guido* and *Maro* 2 days later. Bunting was the lowest yielding of all the varieties in the trial. Semi-leafless Princess showed the best standing ability, and Progreta (tare-leaved), Maro, Guido and Bunting (conventional-leaved) were poor by comparison. Guido gave the best canned sample of marrowfat peas showing very little breakdown of the peas. The canned produce of Guido was larger than that of Maro, that from Progreta was much smaller. Princess exhibited poor canning characteristics, showing excessive breakdown of the peas.

*RECOMMENDED LIST TRIAL, CHATTERIS - 1991 (NIAB/PGRO)*

Here growth was very vigorous and varietal differences in straw lengths and lodging were highlighted at this site. However, because conditions were dry, problems usually associated with lodging and wet weather, such as rotting of the lower foliage and staining of the produce were minimal. Due to the bulk of haulm and lodging, harvesting was not as easy as at the Thornhaugh site. The mean yield of the control varieties was extremely high 8.00 t/ha (but a little lower than 1990) and some varieties outyielded this figure. Maturity differences were greater than at the Thornhaugh site, but still not as great as in previous years.

The small blue seeded varieties were all significantly lower yielding than the mean of the control varieties. As at Thornhaugh *Orb* and *Echo* (both semi-leafless) yielded similarly and showed good standing ability and ease of harvest. *Mascot* yielded significantly better than *Conquest*, which was the lowest yielding variety in this group. Standing ability of Conquest and Mascot (tare-leaved) was poor and both varieties lodged early. As at

the Thornhaugh site Mascot was the earliest maturing variety, 3 days before Conquest.

Large blue seeded *Solara* and *Arena* (both semi-leafless) performed well at this site. Solara was short strawed and had better than average standing ability. Arena was longer strawed and standing ability was slightly inferior to that of Solara.

Tivoli and Celeste were the earliest of the white seeded peas to mature, 4 days before Baroness. *Celeste* was conventional-leaved, had medium length haulm and standing ability was poor. Yields, however, were the highest in the trial, significantly higher than the control. Semi-leafless *Tivoli* had long straw like Countess and average standing ability for this site. Yields, unlike Thornhaugh, were significantly lower than the controls. *Bohatyr* and *Rex* (conventional leaved) were very long strawed and had poor standing ability, but were not too difficult to harvest. Yields of Bohatyr were similar to the control and Rex was a little higher yielding. *Montana* was semi-leafless but standing ability was poor at this site. Yields, however, were significantly higher than the control. Tare-leaved *Messire* had medium length straw and standing ability was poor, but yields were comparable to the control. *Baroness* was long strawed and performed better at this site, outyielding the mean of the controls. *Fanfare* and *Grafila* (both semi-leafless) matured at the same time as Baroness and were also long strawed. Standing ability was slightly better than Baroness. Grafila was significantly higher yielding than the controls. *Countess* matured one day later than Baroness and was much lower yielding than the controls.

The marrowfat varieties were late maturing with Guido and Maro the latest. *Guido* yielded very well here, only a little lower than the mean of the control varieties. The other marrowfat peas were significantly lower yielding than the control with Maro the lowest. Semi-leafless Princess showed slightly better standing ability than the other marrowfat varieties. Tare-leaved Progreta lodged similar to Maro, Guido and Bunting, but was a little easier to harvest. Produce of Guido was again larger than that of Maro.

*PRELIMINARY TRIAL, THORNHAUGH - 1991*

Twenty one varieties most at the National List stage of testing were evaluated; 13 were semi-leafless and 1 was tare-leaved. While the preliminary trial is not an official National List site, it contains some of the varieties entered into the official trials system and provides a useful "shop window" for seed companies. The marrowfat varieties were assessed for suitability for canning.

*Orb* was the only small blue-seeded variety in the trial. Standing ability was average and yields were a little lower than the mean of the control varieties. Produce of Orb was not canned.

*Ascona* and *Solara* were of similar plant habit; short strawed and semi-leafless. Yields were also similar, a little higher than the control mean of the control varieties. Solara matured one day earlier than Baroness and Ascona 4 days earlier

Most varieties in the trial were white seeded. The following varieties were conventional leaved: *Trim* and *P 133* were early maturing, 5 days before Baroness and both showed poor standing ability. Yields, however, were good, higher than the mean of the controls, but not significantly so. Yields of *P 674* were also higher than the control, but standing ability was poor. *SH 92* and *Jersey (4-9033)* matured 2 days before Baroness and gave yields a little higher than the control. Straw was medium in length

and standing ability poor. *Junak* matured a day before Baroness and standing ability was slightly better than the other conventional-leaved varieties in the trial. Yields were similar to the control.

The remainder of the white seeded peas were semi-leafless: *MF 89-2* matured 2 days before Baroness and had long straw and inferior standing ability. Yields were slightly lower than the controls. *4-9073* had medium length straw and yields were similar to the controls. *TWY 87/64* showed poor standing ability and significantly low yields. *4-9085* stood as well as Baroness, but yields were lower. *4-9076* had the best standing ability in the trial and together with Trim, 4-9076 was jointly the highest yielding variety in the trial. *Baroness* had long straw and stood reasonably well. *Saxo (4-9005)* matured at the same time as Baroness and yields were a little below the controls. *4-9091* matured one day later than Baroness giving higher yields than the controls, but standing ability was not as good as Baroness.

*Jaygee* was coloured flowered, semi-leafless and long strawed. Yields were significantly lower than the mean of the control varieties and standing ability was poor.

Two new marrowfat varieties were entered this year. Yields of tare-leaved *TWY 87/18* were a little lower than those of *Maro* and significantly lower than the mean of the control varieties. Standing ability, like Maro, was poor. Semi-leafless *Ceb 1215* stood well and was easy to harvest. Yields were good, a little higher than the control and significantly higher than Maro. The canned produce of Maro showed slight breakdown of the peas. Canning characteristics of Ceb 1215 were slightly better than Maro, and produce was a similar size. Canning properties of TWY 87/18 were similar to Maro, but the produce was much smaller.

*SCREENING TRIAL, THORNHAUGH - 1991*

Twenty one varieties at an early stage of evaluation were tested. 15 varieties were semi-leafless, 4 were tare-leaved and only 2 were conventional leaved. A significant number of new marrowfat varieties were entered this year.

Orb matured 6 days before Baroness, followed one day later by PC 2. *PC 2* was semi-leafless, long strawed and standing ability was inferior to that of Orb. *Orb* yielded a little below the mean of the controls and PC 2 a little lower still. The canning properties of PC 2 were poor compared with Conquest, which was grown in an area adjacent to the trial.

PBInc 14-2 matured 2 days before Baroness. Solara and 425 matured one day earlier. *Solara* was short strawed and standing ability was not as good as in other trials, but was easily harvested. Yields were slightly lower than the control. Tare-leaved *PBInc 14-2* had medium length straw and standing ability was not as good as Solara, but yields were a little higher than the control. *425* was semi-leafless and also yielded a little higher than the control. Straw was long and standing ability good, better than Baroness.

PBInc 05-1 was tare-leaved, the other white seeded peas were semi-leafless. *Conf 2* was the earliest maturing, 5 days before Baroness. It was short strawed and standing ability was rather poor. Yields were good, significantly higher than the control. *Conf 1* matured 2 days before Baroness. Yields were higher than the control and a little lower than Conf 2. Standing ability was similar to Conf 2 and it was longer strawed. *4-9094* was long strawed and stood as well as Baroness. Yields were the highest in the trial, significantly higher than the control. *4-9080* also performed well, outyielding the controls. It matured a day later and straw was not as long as 4-9094. *Conf 840* was also higher yielding than the

control and although standing ability was not as good, harvesting was relatively easy. Tare-leaved *PBInc 05-1* and semi-leafless *4-9101* showed relatively poor standing ability and yields were significantly lower than the control. *4-9084* was late maturing, standing ability was similar to Solara and yields were similar to the controls.

Several new marrowfat varieties were entered into trial this year. *PBIcc 52-1* had a tare-leaved plant type and matured one day before Baroness. Standing ability was very poor. Yields were higher than Maro, which was low yielding in this trial. The canning characteristics were acceptable, but the size of produce was rather small. Yields of *XAF 06 AT* were higher than Maro, but significantly lower than the control. XAF 06 AT canned well, but the peas were smaller than those of Maro. Yields of semi-leafless *OU 2/3* were significantly higher than Maro. Straw was long and although OU 2/3 is semi-leafless standing ability was similar to Maro. This variety appears to have good potential for canning and there was little breakdown of the peas. Tare-leaved *PBIcc 34-1* was higher yielding than Maro, but lower than the mean of the controls. Produce of PBIcc 34-1 was of a similar size to Maro and canned very well. Yields from *Maro* were low in this trial and standing ability as in other trials was poor. The canned produce of Maro was good, but there was slight breakdown of the peas. *4-9013* had a conventional leaf type and standing ability was similar to Maro. Yields were lower than the control, but significantly higher than Maro. Produce of 4-9013 was larger than Maro, but showed more breakdown when canned. Semi-leafless *871-8* had long straw and slightly better standing ability and ease of harvest than Maro. Like Maro it was late maturing. Yields were higher than Maro, but lower than the controls. The canned produce was of a similar size to Maro, but showed more breakdown of the peas.

COMBINING PEA VARIETY STUDIES. Summary of agronomic data - Recommended List Variety Trial, Thornhaugh - 1991
Standard varieties underlined. Control varieties for yield; Solara, Orb and Baroness. All varieties sown on 19th March
Results are means of three replicates

| Variety | | Source | Seed 1000 grain weight(g) | Maturity days (±)Baroness | Yield % of Control @ 15% MC | Straw length (cm) | Standing ability 9=erect 1=lodged | Ease of harvest 9=easy 1=difficult | 1000 grain weight (g) | Water uptake % |
|---|---|---|---|---|---|---|---|---|---|---|
| **SMALL BLUES: Target population 95 plants/m$^2$** | | | | | | | | | | |
| Mascot | (TL) | PBI | 175 | - 7 | 94 | 76 | 2 | 4 | 183 | 108 |
| Orb | (SL) | Sh | 226 | - 6 | 101 | 79 | 3 | 6 | 220 | 95 |
| Echo | (SL) | Ni | 223 | - 4 | 99 | 88 | 5 | 7 | 235 | 95 |
| Conquest | | Sh | 198 | - 4 | 71$^-$ | 89 | 2 | 3 | 202 | 103 |
| **LARGE BLUES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| Solara | (SL) | D | 284 | - 2 | 100 | 69 | 5 | 7 | 308 | |
| Arena | (SL) | Ni | 228 | + 1 | 101 | 96 | 3 | 5 | 240 | |
| **WHITES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| Celeste | | Ni | 256 | - 5 | 106 | 93 | 3 | 5 | 250 | |
| Montana (Ceb 1418) | (SL) | SI | 276 | - 4 | 106 | 87 | 4 | 6 | 264 | |
| Bohatyr | | Ni | 275 | - 3 | 103 | 116 | 3 | 5 | 266 | |
| Rex | | Ni | 265 | - 3 | 103 | 106 | 3 | 5 | 243 | |
| Messire (SER 4405) | (TL) | Twy | 235 | - 2 | 108$^+$ | 86 | 2 | 4 | 267 | |
| Tivoli | (SL) | ICI | 277 | - 1 | 100 | 104 | 4 | 6 | 288 | |
| Fanfare (FK 1) | (SL) | Sh | 310 | 0 | 102 | 100 | 4 | 6 | 325 | |
| Baroness | (SL) | Sh | 302 | 0(8/8) | 99 | 106 | 4 | 6 | 314 | |
| Grafila | (SL) | Sh | 291 | + 1 | 101 | 111 | 5 | 7 | 290 | |
| Countess | (SL) | Sh | 333 | + 1 | 92$^-$ | 99 | 4 | 6 | 370 | |
| **MARROWFATS: Target population 65 plants/m$^2$** | | | | | | | | | | |
| Progreta | (TL) | Prog | 282 | 0 | 90$^-$ | 96 | 2 | 4 | 330 | 110 |
| Princess | (SL) | Sh | 312 | + 1 | 92$^-$ | 96 | 6 | 8 | 350 | 104 |
| Bunting | | Bat | 357 | + 2 | 81$^-$ | 88 | 2 | 3 | 376 | 103 |
| Guido | | SI | 425 | + 2 | 88$^-$ | 90 | 2 | 3 | 443 | 117 |
| Maro | | GA | 308 | + 2 | 92$^-$ | 89 | 2 | 3 | 378 | 114 |
| Mean yield of control varieties t/ha | | | | | 5.28 | | | | | |
| Significance @ P = 0.05 | | | | | SD | | | | | |
| LSD @ P = 0.05 | | | | | 6.4 | | | | | |
| CV % | | | | | 5.0 | | | | | |

KEY: Yield: $^+$ Significantly greater than control @ P = 0.05; $^-$ Significantly less than control @ P = 0.05
(SL) = Semi-leafless; (TL) = Tare-leaved
Source of varieties see Appendix I

COMBINING PEA VARIETY STUDIES. Summary of agronomic data - Recommended List Variety Trial, Chatteris - 1991
Standard varieties underlined. Control varieties for yield; Solara, Orb and Baroness. All varieties sown on 13th March
Results are means of three replicates

| Variety | | Source | Seed 1000 grain weight(g) | Maturity days (±)Baroness | Yield % of Control @ 15% MC | Straw length (cm) | Standing ability 9=erect 1=lodged | Ease of harvest 9=easy 1=difficult | 1000 grain weight (g) |
|---|---|---|---|---|---|---|---|---|---|
| **SMALL BLUES: Target population 95 plants/$m^2$** | | | | | | | | | |
| Mascot | (TL) | PBI | 175 | - 8 | 86$^-$ | 81 | 1 | 3 | 202 |
| Orb | (SL) | Sh | 226 | - 7 | 90$^-$ | 81 | 3 | 5 | 249 |
| Conquest | | Sh | 198 | - 5 | 75$^-$ | 101 | 1 | 3 | 215 |
| Echo | (SL) | Ni | 223 | - 4 | 92$^-$ | 96 | 3 | 5 | 259 |
| **LARGE BLUES: Target population 70 plants/$m^2$** | | | | | | | | | |
| Solara | (SL) | D | 284 | - 2 | 103 | 79 | 4 | 6 | 354 |
| Arena | (SL) | Ni | 228 | 0 | 103 | 95 | 3 | 5 | 273 |
| **WHITES: Target population 70 plants/$m^2$** | | | | | | | | | |
| Tivoli | (SL) | ICI | 277 | - 4 | 92$^-$ | 112 | 3 | 5 | 293 |
| Celeste | | Ni | 256 | - 4 | 111$^+$ | 101 | 2 | 4 | 287 |
| Rex | | Ni | 265 | - 3 | 105 | 117 | 2 | 4 | 282 |
| Montana (Ceb 1418) | (SL) | SI | 276 | - 3 | 108$^+$ | 86 | 2 | 4 | 316 |
| Bohatyr | | Ni | 275 | - 3 | 100 | 133 | 2 | 4 | 286 |
| Messire (SER 4405) | (TL) | Twy | 235 | - 2 | 104 | 90 | 2 | 3 | 304 |
| Baroness | (SL) | Sh | 302 | 0 | 108$^+$ | 122 | 3 | 5 | 322 |
| Fanfare (FK 1) | (SL) | Sh | 310 | 0 | 103 | 112 | 4 | 6 | 359 |
| Grafila | (SL) | Sh | 291 | 0 | 109$^+$ | 119 | 4 | 6 | 310 |
| Countess | (SL) | Sh | 333 | + 1 | 94 | 112 | 3 | 5 | 382 |
| **MARROWFATS: Target population 65 plants/$m^2$** | | | | | | | | | |
| Princess | (SL) | Sh | 312 | 0 | 90$^-$ | 104 | 3 | 5 | 344 |
| Progreta | (TL) | Prog | 282 | 0 | 90$^-$ | 102 | 2 | 4 | 353 |
| Bunting | | Bat | 357 | 0 | 85$^-$ | 100 | 2 | 3 | 406 |
| Guido | | SI | 425 | + 2 | 96 | 103 | 2 | 3 | 453 |
| Maro | | GA | 308 | + 3 | 79$^-$ | 113 | 2 | 3 | 400 |
| Mean yield of control varieties t/ha | | | | | 8.00 | | | | |
| Significance @ P = 0.05 | | | | | SD | | | | |
| LSD @ P = 0.05 | | | | | 6.50 | | | | |
| CV % | | | | | 5.1 | | | | |

KEY: Yield: $^+$ Significantly greater than control @ P = 0.05; $^-$ Significantly less than control @ P = 0.05
(SL) = Semi-leafless; (TL) = Tare-leaved
Source of varieties see Appendix I

COMBINING PEA VARIETY STUDIES. Summary of agronomic data - Preliminary Variety Trial, Thornhaugh - 1991
Standard varieties underlined. Control varieties for yield; Solara, Orb and Baroness. All varieties sown on 22nd March
Results are means of three replicates

| Variety | | Source | Seed 1000 grain weight(g) | Maturity days (±)Baroness | Yield % of Control @ 15% MC | Straw length (cm) | Standing ability 9=erect 1=lodged | Ease of harvest 9=easy 1=difficult | 1000 grain weight (g) | Water uptake % |
|---|---|---|---|---|---|---|---|---|---|---|
| **SMALL BLUES: Target population 95 plants/m$^2$** | | | | | | | | | | |
| Orb | (SL) | Sh | 226 | - 6 | 96 | 78 | 4 | 6 | 215 | |
| **LARGE BLUES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| Ascona | (SL) | SI | 290 | - 4 | 102 | 75 | 4 | 6 | 276 | |
| Solara | (SL) | D | 284 | - 1 | 104 | 82 | 3 | 5 | 316 | |
| **WHITES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| Trim | | Dalt | 278 | - 5 | 108 | 89 | 1 | 3 | 297 | |
| P 133 | | PH | 284 | - 5 | 107 | 86 | 1 | 3 | 253 | |
| P 674 | | PH | 216 | - 4 | 107 | 93 | 1 | 3 | 203 | |
| SH 92 | | PH | 237 | - 3 | 104 | 87 | 1 | 3 | 229 | |
| Jersey (4-9033) | | Mar | 251 | - 3 | 105 | 88 | 1 | 3 | 240 | |
| MF 89-2 | (SL) | Mar | 283 | - 2 | 99 | 106 | 3 | 5 | 272 | |
| 4-9073 | (SL) | Mar | 269 | - 1 | 99 | 83 | 2 | 4 | 252 | |
| TWY 87/64 | (SL) | Twy | 180 | - 1 | 90$^-$ | 96 | 1 | 3 | 208 | |
| 4-9085 | (SL) | Mar | 217 | - 1 | 93 | 89 | 5 | 7 | 201 | |
| 4-9076 | (SL) | Mar | 336 | - 1 | 108 | 97 | 7 | 8 | 297 | |
| Junak | | PH | 262 | - 1 | 101 | 87 | 2 | 4 | 293 | |
| Saxo (4-9005) | (SL) | Mar | 381 | 0 | 98 | 97 | 3 | 5 | 345 | |
| Baroness | (SL) | Sh | 302 | 0(9/8) | 100 | 103 | 5 | 7 | 311 | |
| 4-9091 | (SL) | Mar | 348 | + 1 | 107 | 83 | 3 | 5 | 339 | |
| **COLOURED FLOWERED: Target population 65 plants/m$^2$** | | | | | | | | | | |
| Jaygee | (SL) | JS | 278 | - 1 | 91$^-$ | 104 | 2 | 4 | 272 | |
| **MARROWFATS: Target population 65 plants/m$^2$** | | | | | | | | | | |
| TWY 87/18 | (TL) | Twy | 270 | 0 | 91$^-$ | 88 | 1 | 3 | 319 | 110 |
| Ceb 1215 | (SL) | SI | 396 | + 1 | 102 | 92 | 5 | 7 | 398 | 115 |
| Maro | | GA | 308 | + 2 | 93 | 89 | 2 | 4 | 383 | 115 |
| Mean yield of control varieties t/ha | | | | | 5.37 | | | | | |
| Significance @ P = 0.05 | | | | | SD | | | | | |
| LSD @ P = 0.05 | | | | | 8.17 | | | | | |
| CV % | | | | | 4.9 | | | | | |

KEY: Yield: $^-$ Significantly less than control @ P = 0.05
(SL) = Semi-leafless; (TL) = Tare-leaved
Source of varieties see Appendix I

21/1991

COMBINING PEA VARIETY STUDIES. Summary of agronomic data - Screening Variety Trial, Thornhaugh - 1991
Standard varieties underlined. Control varieties for yield; Solara, Orb and Baroness. All varieties sown on 25th March
Results are means of two replicates

| Variety | | Source | Seed 1000 grain weight(g) | Maturity days (±)Baroness | Yield % of Control @ 15% MC | Straw length (cm) | Standing ability 9=erect 1=lodged | Ease of harvest 9=easy 1=difficult | 1000 grain weight (g) | Water uptake % |
|---|---|---|---|---|---|---|---|---|---|---|
| **SMALL BLUES: Target population 95 plants/m$^2$** | | | | | | | | | | |
| Orb | (SL) | Sh | 226 | - 6 | 96 | 81 | 4 | 6 | 224 | |
| PC 2 | (SL) | Sh | 180 | - 5 | 93 | 103 | 2 | 4 | 215 | 108 |
| **LARGE BLUES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| PBInc 14-2 | (TL) | PBI | 274 | - 2 | 104 | 88 | 2 | 4 | 260 | |
| Solara | (SL) | D | 284 | - 1 | 99 | 74 | 3 | 5 | 314 | |
| 425 | (SL) | ICI | 279 | - 1 | 104 | 96 | 6 | 7 | 290 | |
| **WHITES: Target population 70 plants/m$^2$** | | | | | | | | | | |
| Conf 2 | (SL) | Conf | 186 | - 5 | 110$^+$ | 79 | 2 | 4 | 229 | |
| Conf 1 | (SL) | Conf | 212 | - 2 | 107 | 95 | 2 | 4 | 258 | |
| 4-9094 | (SL) | Mar | 299 | - 1 | 114$^+$ | 106 | 5 | 7 | 312 | |
| Conf 840 | (SL) | Conf | 324 | - 1 | 108 | 92 | 3 | 5 | 333 | |
| PBInc 05-1 | (TL) | PBI | 337 | 0 | 90$^-$ | 94 | 2 | 4 | 362 | |
| 4-9101 | (SL) | Mar | 247 | 0 | 88$^-$ | 90 | 2 | 4 | 244 | |
| Baroness | (SL) | Sh | 302 | 0(9/8) | 104 | 103 | 5 | 7 | 324 | |
| 4-9080 | (SL) | Mar | 307 | 0 | 111$^+$ | 93 | 4 | 6 | 314 | |
| 4-9084 | (SL) | Mar | 277 | + 1 | 101 | 89 | 3 | 5 | 268 | |
| **MARROWFATS: Target population 65 plants/m$^2$** | | | | | | | | | | |
| PBIcc 52-1 | (TL) | PBI | 303 | - 1 | 92 | 87 | 1 | 3 | 311 | 106 |
| XAF 06 AT | (SL) | JS | 255 | 0 | 88$^-$ | 99 | 3 | 5 | 299 | 103 |
| OU 2/3 | (SL) | Sh | 359 | 0 | 94 | 108 | 2 | 4 | 372 | 122 |
| PBIcc 34-1 | (TL) | PBI | 332 | 0 | 92 | 96 | 2 | 4 | 355 | 109 |
| Maro | | GA | 308 | + 1 | 84$^-$ | 92 | 2 | 3 | 378 | 128 |
| 4-9013 | | Mar | 311 | + 1 | 94 | 94 | 2 | 3 | 357 | 117 |
| 871-8 | (SL) | Sh | 346 | + 1 | 93 | 103 | 3 | 5 | 372 | 128 |
| Mean yield of control varieties t/ha | | | | | 5.34 | | | | | |
| Significance @ P = 0.05 | | | | | SD | | | | | |
| LSD @ P = 0.05 | | | | | 8.82 | | | | | |
| CV % | | | | | 4.4 | | | | | |

KEY: Yield: $^+$ Significantly greater than control @ P = 0.05; $^-$ Significantly less than control @ P = 0.05
(SL) = Semi-leafless; (TL) = Tare-leaved
Source of varieties see Appendix I

# APPENDIX I

## KEY TO SOURCE OF VARIETIES

| | | |
|---|---|---|
| AGIS | AGIS<br>P.O. Box 1162<br>D-3400 Gottingen | Germany |
| As | Asgrow Seed Company<br>9634-190-31<br>7000 Portage Road<br>Kalamazoo<br>MI 49001 | USA |
| Bat | Brooke Bond Foods Limited<br>Wadsley Bridge<br>Sheffield S6 1NG | UK |
| Bro | W. Brotherton Seed Co. Inc.<br>P.O. Box 1136<br>Moses Lake<br>Washington 98837 | USA |
| BS | Breeders Seeds Limited<br>17 Summerwood Lane<br>Halsall<br>Ormskirk<br>Lancashire L39 8RQ | UK |
| Cl | Société Clause<br>Compatabilité<br>1 Avenue Lucien Clause<br>91220 Bretigny<br>Cedex | France |
| CM | Crites-Moscow Growers Inc.<br>Box 8912<br>Moscow<br>Idaho 83843 | USA |
| Conf | Confidential | |
| D | Dalgety Agriculture Limited<br>Dalgety House, Works Lane<br>Setchey<br>Kings Lynn<br>Norfolk PE33 0AU | UK |
| Dalt | J.E. & V.M. Dalton Limited<br>Dalmark House<br>Eye<br>Peterborough<br>Cambridgeshire PE6 7UD | UK |
| DT | David Trethewey<br>38 Electric Station Road<br>Sleaford<br>Lincolnshire NG34 7QJ | UK |
| GA | General Availability | |

| | | |
|---|---|---|
| ICI | ICI Seeds UK Limited<br>Marsh Lane<br>Boston<br>Lincolnshire PE21 7RR | UK |
| JS | Johnson Seeds Limited<br>W.W. Johnson & Son Limited,<br>London Road<br>Boston<br>Lincolnshire PE21 8AD | UK |
| Mar | Maribo (UK) Ltd.<br>Potterhanworth<br>Lincoln LN4 2DY | UK |
| MJ | CO.VA.L.P.A. - Mon Jardin Soc. Coop a.r.l.<br>Viale Gramsci<br>39 I-41037<br>Mirandola (Modena) | Italy |
| Ni | Nickerson Seeds Limited<br>Rothwell<br>Lincoln LN7 6DT | UK |
| Nun | Nunhems Zaden BV<br>Postbus 4005<br>6080 AA Haelen | Holland |
| PBI | Plant Breeding International Cambridge<br>Maris Lane<br>Trumpington<br>Cambridge CB2 2LQ | UK |
| PH | Pioneer Hi-Bred (UK) Limited<br>Road One<br>Winsford Industrial Estate<br>Winsford<br>Cheshire CW7 3PR | UK |
| PLS | Pure Line Seeds Inc.<br>P.O. Box 8866<br>Moscow<br>Idaho 83843 | USA |
| Prog | Progreta Limited<br>The Stone House<br>Back Lane<br>Leadenham<br>Lincoln LN5 0PW | UK |
| RS | Royal Sluis<br>Postbus 22<br>1600 AA Enkhuizen | Holland |
| S&G | Sluis & Groot BV<br>P.O. Box 13<br>Enkhuizen | Holland |
| Sh | Sharpes International Seeds Limited<br>Boston Road<br>Sleaford<br>Lincolnshire NG34 7HA | UK |

| | | |
|---|---|---|
| SI | Seed Innovations Limited<br>1 Paradise Road<br>Downham Market<br>Norfolk PE38 9HS | UK |
| Twy | Twyford Seeds Limited<br>Scotts Farm<br>Kings Sutton<br>Banbury<br>Oxfordshire OX17 3QW | UK |
| vW | van Waveren Pflanzenzucht GmbH<br>D-3405 Rosdorf<br>Uber Gottingen | Germany |