

Project title: Snap peas: Evaluation of varieties sown at the appropriate commercial timing.

Project number: FV 419

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Location of project:

- 1) PGRO trial ground, Thorney, OS Ref: TF309015
- 2) Downy Mildew Trial sites A) Redhouse farm, Holbeach St Matthew, PE12 9NJ OS Grid Ref: TF437311. B) Curf Fen, Chatteris OS Grid Ref: TL394887.
- 3) Herbicide variety interaction trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF070017.

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AUTHENTICATION

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

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GROWER SUMMARY

Headline

Growers now have information on previously untested varieties to enable choice of variety with improved quality and yield, and maturity information to help plan harvesting schedules.

Background

The project provides information on agronomic and quality factors relating to varieties of snap peas and their suitability for fresh market. Varieties were sown at the appropriate commercial timing for snap peas and harvested as they reached maturity. All varieties were treated with Wakil XL seed treatment to prevent damping off and primary downy mildew. Assessments of pod finish, determinacy, maturity, pod length, stringiness, plant height, vigour and yield were made. Varieties were assessed for resistance to downy mildew. Varieties were assessed for tolerance to selected pre-emergence herbicides. The results give growers, processors and retailers information on new varieties of snap peas. Data will be published in an HDC factsheet and will include agronomic advice as well as data for the characteristics evaluated.

Results

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

Variety Name	Leaf Type	Source	Maturity
Sugar Sprint	Conventional	ProVeg Seeds	-5
Delikett	Conventional	Elsoms	-3
Zuccola	Conventional	Tozer Seeds	-1
Sugar Heart	Conventional	ProVeg Seeds	-1
Norbu	Conventional	Tozer Seeds	-1
Quartz	Semi leafless	Tozer Seeds	0
Cascadia	Conventional	Tozer Seeds	0
Sugar Lace	Semi leafless	ProVeg Seeds	+1
Sapphire	Conventional	Crites Seeds (Elsoms)	+1
Sugar Lady	Semi leafless	ProVeg Seeds	+1

Trial site details

- 4) Variety Trial: Thorney Trial site, Upper Knarr Fen, Thorney; OS Grid Ref TF306015.
- 5) Downy Mildew Trial sites A) Redhouse farm, Holbeach St Matthew, PE12 9NJ OS Grid Ref: TF437311. B) Curf Fen, Chatteris OS Grid Ref: TL394887.
- 6) Herbicide variety interaction trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF070017.

Variety trial summary

Variety	Yield % of Cascadia	Pod stringiness 5= v stringy 1= none	Pod length mm	Pod width mm	Haulm length cm	Standing ability 9=erect 1=lodged
Cascadia	100	4	70	16.1	60	7
Norbu	101	1	84	16.8	57	7
Quartz	89	1	86	13.6	56	8
Sugar Sprint	107	3	69	12.8	46	6
Sugar Lady	100	1	86	15.0	61	8
Delikett	100	4	86	11.3	71	7
Sugar Heart	122+	1	86	13.9	54	8
Sugar Lace	114	1	86	16.2	52	8
Zuccola	128+	5	86	14.6	61	7
Sapphire	113	1	86	16.3	51	8

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

Herbicide variety interaction trial

Double rows of each of the varieties were drilled and pre-emergence spray applications were made across the direction of drilling. Unsprayed strips were included for comparison.

Treatments:

Treatment	Product	Rate (l/ha or kg/ha)	Registration
1	Lingo	2.0	EAMU for edible podded peas
2	Nirvana	3.5	Vining Peas Only
3	Stomp	2.2	EAMU for edible podded peas
4	Centium	0.25	Vining Peas Only
5	Nirvana	3.0	Vining Peas Only
6	Stomp Aqua + Centium	2.2 + 0.25	Vining Peas Only
7	Dual Gold	1.0	Vining Peas Future
8	Lingo + Stomp Aqua	1.5 + 1.5	Vining Peas Only
9	Nirvana + Centium	3.5 + 0.25	Vining Peas Only

EAMU = Extension of Authorisation for Minor Use.

Herbicide Snap Pea Variety interaction trial –Assessment 14 May

Assessment 14th May	Lingo 2.0l/ha	Nirvana 3.5l/ha	Stomp Aqua 2.2 l/ha	Centium 0.25 l/ha	Nirvana 3.0 l/ha	Stomp Aqua + Centium (2.2 + 0.25)	Dual Gold 1.0l/ha	Lingo + Stomp Aqua (1.5 + 1.5l/ha)	Nirvana + Centium (3.5 + 0.25)
GS: 102									
Cascadia	2.5	2	1.5	1	1	1	1	2.5	2
Sapphire	3	2	1.5	1.5	1.5	1.5	1.5	3	3
Norbu	2.5	2	1	1	2.5	1.5	2	3	2.5
Sugar Heart	2.5	2	1.5	1.5	2	1.5	1	2.5	2
Sugar Sprint	3.5	2.5	2	2	2.5	1.5	1	3	2.5
Delikett	3	2.5	2	2	2	2	2	2.5	2
Quartz	3	2	2	2	2.5	2	1.5	2.5	2
Sugar Lady	3	2.5	2.5	2	3	2	2.5	3	2.5

Scores are a mean of 2 replications. GS = Growth Stage

KEY:

1 = highly tolerant, 2 = tolerant, 3 = slightly sensitive, 4 = moderately sensitive, 5 = highly sensitive

Downy mildew trials

Thiram treated seed was sown in a double row plot with two replications at two sites in commercial crops of vining peas with a long history of pea growing, where natural infection was likely to occur. Infection scores were made on three occasions during the season and these scores converted to a scale of relative field resistance.

Downy Mildew Susceptibilities

Susceptible	Moderately Susceptible	Slightly Susceptible	Moderate Field Resistance	Good Field Resistance
Avola	Cascadia	Ambassador		
Delikett	Norbu			
Quartz	Zuccola (1 site only)			
Sapphire				

Main conclusions

Quartz, Sugar Lady and Sugar Lace were semi-leafless types while all the other varieties were conventional leaf types.

Zuccola had the most string, while Delikett, Cascadia and Sugar Sprint had less string. Norbu, Quartz, Sugar Lady, Sugar Heart, Sugar Lace and Sapphire were all stringless.

All of the varieties had very similar pod length except Cascadia and Sugar Sprint which were slightly shorter.

Norbu had the widest pod width and Delikett the narrowest.

Sapphire and Zuccola gave significantly higher yields than Cascadia. No variety gave significantly lower yields than Cascadia. Zuccola gave the highest yields in the trial

Cascadia showed the greatest early vigour with Quartz and Sugar Lace exhibiting the least.

Sapphire was the most determinate variety while Delikett was the least determinate.

Zuccola had the best pod finish in the trial while Quartz gave produce with the lowest quality pod finish.

Delikett had the longest haulm length, while Sugar Sprint had the shortest.

Most of the varieties had good standing ability and were all fairly erect, but Sugar Sprint did not stand as well.

At the time of writing only Lingo and Stomp Aqua have an EAMU for use on edible podded peas (sugar snaps), however, this work shows that any of the products tested which have full vining pea registration, have the potential for future EAMU's on edible podded peas.

Overall in there was little sensitivity to the herbicides tested. Sensitivity was only recorded at the time of the first assessment (14 May).

Varieties were most sensitive to Lingo, either as a standalone treatment or with a partner product. Cascadia and Sugar Heart were the only two varieties to have shown tolerance across all the treatments.

On the following two assessments (31 May and 19 June) all varieties were tolerant across all of the treatments. However, there was still some lower leaf chlorosis on varieties treated with Lingo and Lingo + Stomp Aqua. This appeared to be present on older leaves only and all new growth was healthy and symptom free.

Compared to Avola, Delikett Quartz and Sapphire were susceptible to downy mildew. Cascadia, Norbu and Sapphire were moderately susceptible to downy mildew.

FULL TRIAL REPORT

Introduction

Growers will have information on previously untested varieties to enable choice of varieties with improved quality and yield. The quality criteria will include those for spring sown crops for the fresh market. 200 tonnes of fresh snap peas are harvested each year with a value of £2.20 per kg giving a current total value of £440,000. A proportion of this is sold into supermarkets and the rest to schools. The market has grown from almost nil five years ago and continues to grow at around 20% per annum, making a potential market of £528,000 for 2013. The project will provide valuable information currently unavailable to the industry.

The project will provide information on agronomic and quality factors relating to varieties of snap peas and their suitability for fresh market. Varieties will be sown at the appropriate commercial timing for snap peas and harvested as they reach maturity. All varieties will be treated with Wakil XL seed treatment to prevent damping off and primary downy mildew. Assessments of pod finish, ease of removal of pods from plants, determinacy, maturity, pod length, stringiness, plant height, vigour and yield will be made. Where appropriate, leaf and pod spot and any other factors that affect pod quality will be made. Varieties will be assessed for resistance to downy mildew and powdery mildew in specific trials. Varieties will be assessed for tolerance to appropriate herbicides. The results will enable growers, processors and retailers to have information on new varieties of snap peas. The results will be published in an HDC fact sheet and will include agronomic advice as well as data for the characteristics evaluated.

Variety Name	Leaf Type	Source	Maturity
Sugar Sprint	Conventional	ProVeg Seeds	-5
Delikett	Conventional	Elsoms	-3
Zuccola	Conventional	Tozer Seeds	-1
Sugar Heart	Conventional	ProVeg Seeds	-1
Norbu	Conventional	Tozer Seeds	-1
Quartz	Semi leafless	Tozer Seeds	0
Cascadia	Conventional	Tozer Seeds	0
Sugar Lace	Semi leafless	ProVeg Seeds	+1
Sapphire	Conventional	Crites Seeds (Elsoms)	+1
Sugar Lady	Semi leafless	ProVeg Seeds	+1

Trial site details

- 1) Variety Trial: Thorney Trial site, Upper Knarr Fen, Thorney; OS Grid Ref TF306015.
- 2) Downy Mildew Trial sites A) Redhouse farm, Holbeach St Matthew, PE12 9NJ OS Grid Ref: TF437311. B) Curf Fen, Chatteris OS Grid Ref: TL394887.

- 3) Herbicide variety interaction trial: PGRO, The Research Station, Great North Road, Thornhaugh, Peterborough PE8 6HJ. OS Grid Ref: TF070017.

Herbicide Snap Pea Variety interaction trial

Varieties: Drilled 24 April 2013 in good conditions.

Application Details: All treatments are pre-emergence.

Applied 6 May 2013

Weather: 14°C, 20% Relative Humidity, Wind Speed 2 - 4mph, 10% Cloud Cover.

Soil moist. Crop growth stage 002-003.

Applied with an Azo precision plot sprayer in 200l/ha water volume. 2 bar pressure. XR Teejet 110 02VP nozzles.

Double rows of each of the snap pea varieties were drilled. Spray applications were made across the direction of drilling. Unsprayed strips were included for comparison. After spraying on 6 May assessments were made on 14 May, 31 May and 19 June.

The varieties Zuccola and Sugar Lace were not included in the herbicide variety interaction trial due to lack of seed.

Treatments:

Treatment	Product timing	Rate (l/ha or kg/ha)	
1	Lingo	2.0	pre-emergence
2	Nirvana	3.5	pre-emergence
3	Stomp	2.2	pre-emergence
4	Centium	0.25	pre-emergence
5	Nirvana	3.0	pre-emergence
6	Stomp Aqua + Centium	2.2 + 0.25	pre-emergence
7	Dual Gold	1.0	pre-emergence
8	Lingo + Stomp Aqua	1.5 + 1.5	pre-emergence
9	Nirvana + Centium	3.5 + 0.25	pre-emergence

Product	Formulation	Active ingredients	Concentration of actives
Centium	CS	Clomazone	360g/l
Dual Gold	EC	S-Metolachlor	960g/l
Lingo	CS + SC	Clomazone + Linuron	45g/l + 250g/l
Nirvana	EC	Imazamox + Pendimethalin	16.7g/l + 250g/l
Stomp Aqua	CS	Pendimethalin	455g/l

Powdery Mildew Trial

There was not sufficient seed to proceed with this trial.

Downy Mildew Trials

Trial details

Trial	Sown	Assessment 1	Assessment 2	Assessment 3
Red house farm	22/04/2013	31/05/2013	26/06/2013	10/07/2013
Curf Fen	25/04/2013	31/05/2013	28/06/2013	10/07/2013

Seed of Sugar Lace, Sugar Lady, Sugar Heart and Sugar Sprint were received treated with Wakil XL seed treatment, which protects against downy mildew. These were therefore not included in the downy mildew tolerance trials.

For the remaining varieties, thiram treated seed was sown in a double plot with two replications at two sites in commercial crops of vining peas with a long history of pea growing where natural infection from soil borne oospores was likely to occur. Infection scores were made on three occasions during the season and these scores converted to a scale of relative field resistance.

Fields were chosen where there has been a long history of pea growing and the potential for a high population of downy mildew (*Peronospora viciae*) was high. Sowing was carried out at a time which was favourable for natural infection. Two randomized replicates of 200 seeds (thiram treated) of each variety were drilled in a double row 5m long. On three occasions, disease assessments were made, the first at about the 4 node stage when the percentage of primary infected seedlings was estimated, the second assessment was an estimate of the percentage plants showing downy mildew infection and an estimate of the percentage leaf area infected, followed by a third assessment at a later stage. The scores of these assessments were amalgamated and an overall infection level calculated. Based on the level of infection, a resistance score was allocated using a 1-9 scale, where 1 is very susceptible and 9 indicates good field resistance.

Variety Trial

The Variety Cascadia was used as the yield and maturity standard. Maturity was also compared with early maturing vining pea Avola.

Trial layout: Randomised block, 3 replications.

Plot size: 1.83 m x 7 m

Sub-plots: 1.83 m x 1 m for two harvests taken at approximately 25 percentage shell out and a third harvest if required.

Sampling areas for maturity assessment: 1.83 m x 1.0 m

Sown with an Øyjord plot drill to achieve a population of 50 plants/m².

Yield data were statistically analysed using ANOVA.

Sown: 18 April 2013

Grown under best local and commercial practice.

Fungicide seed treatment: Wakil XL

Broad-leaved weeds were controlled pre-emergence.

Aphid and pea moth (*Cydia nigricana*) were controlled (monitored by pea moth traps).

Fungicide sprays were applied to control *Botrytis* and *Mycosphaerella*.

No irrigation was applied.

Haulm lengths, standing ability and determinacy were measured post flowering.

Maturity was assessed from the sampling areas to achieve correct harvest dates based on percentage shell out.

Sub-plots were harvested by hand.

Plant lengths were measured and the pods pulled off by hand. Pods were weighed and a percentage shell out obtained to assess maturity.

Pods length and width were measured.

Pods were assessed for pod finish.

Specific Objectives

1. Yield relative to a standard at a percentage shell out of 25%
2. Maturity relative to a standard at percentage shell out 25%
3. Haulm length
4. Pod Width mm
5. Pod Length mm
6. Standing ability at harvest
7. Determinacy
8. Early Vigour
9. Disease susceptibility to downy mildew (*Peronospora viciae*)
10. Assessment of pod finish
11. Evaluation of varieties for herbicide tolerance

Trial records and data collected

Varietal Susceptibility of Snap Peas to Downy Mildew (*Peronospora viciae*)

Plants were scored for infection on 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. The varieties Sugar Lace, Sugar Lady, Sugar Heart and Sugar Sprint were all received treated with Wakil XL seed treatment, which protects against downy mildew. These were therefore not included in the downy mildew tolerance trials. Zuccola had enough seed to be sown at one site only.

Table 1 - Downy Mildew Susceptibilities

Susceptible	Moderately Susceptible	Slightly Susceptible	Moderate Field Resistance	Good Field Resistance
Avola	Cascadia	Ambassador		
Delikett	Norbu			
Quartz	Zuccola (1 site only)			
Sapphire				

None of the varieties showed good or moderate field resistance. The vining pea control Ambassador was slightly susceptible. Cascadia, Norbu and Zuccola were classified as moderately susceptible. The vining pea control variety Avola is described as susceptible along with the snap peas Delikett, Quartz and Sapphire.

TABLE 2 – SUGAR SNAP VARIETY STUDIES. Summary of agronomic data Sugar Snap Pea, HDC funded variety trial – Thorney 2013
 Varieties placed in order of maturity. Standard variety underlined. All varieties sown on 18 April 2013 Results are means of two replicates.
 Target population 50 plants per m² sown in eight 19 cm rows.

Variety	Leaf Type	Source	1000 Seed Weight g	Maturity (± days) Cascadia	Yield % of Cascadia	% Shellout	Pod Stringiness 5=stringy 1=none	Pod Length mm	Pod Width mm	Early Vigour 5=most 1=least	Haulm Length cm	Standing Ability 9=erect 1=lodged	Determinacy 5=most 1=least	Pod Finish 5=good 1=poor
<u>Cascadia</u>		<u>TS</u>	<u>286</u>	<u>0(14/7)</u>	<u>100</u>	<u>21.4</u>	<u>4</u>	<u>70</u>	<u>16.1</u>	<u>5.0</u>	<u>60</u>	<u>7</u>	<u>3</u>	<u>3-4</u>
Norbu		TS	280	-1	101	22.9	1	84	16.8	4.3	57	7	3	3-4
Quartz	SL	TS	266	0	89	26.6	1	86	13.6	3.3	56	8	2	2-3
Sugar Sprint		PVS	253	-5	107	24.4	3	69	12.8	4.2	46	6	3	3
Sugar Lady	SL	PVS	269	+1	100	24.7	1	86	15.0	3.8	61	8	2	4
Delikett		EI	175	-3	100	27.7	4	86	11.3	4.6	71	7	1	4
Sugar Heart		PVS	237	-1	122+	26.1	1	86	13.9	3.5	54	8	3	4
Sugar Lace	SL	PVS	276	+1	114	26.8	1	86	16.2	3.3	52	8	3	3
Zuccola		TS	195	-1	128+	24.1	5	86	14.6	3.5	61	7	2	4-5
Sapphire		CS	229	+1	113	26.3	1	86	16.3	4.5	51	8	4	3
					<u>(9.09t/ha)</u>									
Significance @ P=0.05					SD									
LSD @ P=0.05					18.5									
CV %					7.6									

Avola reached TR 105 on the 13 July

KEY: Yield: + Significantly greater than Cascadia @ P = 0.05

SL = Semi-leafless; Source of varieties see Appendix 1

Herbicide Snap Pea Variety interaction trial

Table 3 – 14 May

Assessment 14th May	Lingo 2.0l/ha	Nirvana 3.5l/ha	Stomp Aqua 2.2 l/ha	Centium 0.25 l/ha	Nirvana 3.0 l/ha	Stomp Aqua + Centium (2.2 + 0.25)	Dual Gold 1.0l/ha	Lingo + Stomp Aqua (1.5 + 1.5l/ha)	Nirvana + Centium (3.5 + 0.25)
GS: 102									
Cascadia	2.5	2	1.5	1	1	1	1	2.5	2
Sapphire	3	2	1.5	1.5	1.5	1.5	1.5	3	3
Norbu	2.5	2	1	1	2.5	1.5	2	3	2.5
Sugar Heart	2.5	2	1.5	1.5	2	1.5	1	2.5	2
Sugar Sprint	3.5	2.5	2	2	2.5	1.5	1	3	2.5
Delikett	3	2.5	2	2	2	2	2	2.5	2
Quartz	3	2	2	2	2.5	2	1.5	2.5	2
Sugar Lady	3	2.5	2.5	2	3	2	2.5	3	2.5

Scores are a mean of 2 replications.

KEY:

1 = highly tolerant, 2 = tolerant, 3 = slightly sensitive, 4 = moderately sensitive, 5 = highly sensitive

Table 4 – 31 May

Assessment 31 May	Lingo 2.0l/ha	Nirvana 3.5l/ha	Stomp Aqua 2.2 l/ha	Centium 0.25 l/ha	Nirvana 3.0 l/ha	Stomp Aqua + Centium (2.2 + 0.25)	Dual Gold 1.0l/ha	Lingo + Stomp Aqua (1.5 + 1.5l/ha)	Nirvana + Centium (3.5 + 0.25)
GS: 105									
Cascadia	2	1.5	1	1	1	1	1	1.5	1.5
Sapphire	2	1.5	1	1	1.5	1.5	1	2	2
Norbu	2.5	1	1	1	1	1	1	1.5	1.5
Sugar Heart	2.5	1	1	1	1	1.5	1	2	1
Sugar Sprint	2.5	1	1	1	1	1	1	2	1.5
Delikett	2	1	1	1	1	1	1	2	1
Quartz	2	1	1	1	1	1	1	1	1
Sugar Lady	1.5	1	1	1	1	1	1	1.5	1.5

Scores are a mean of 2 replications.

KEY:

1 = highly tolerant, 2 = tolerant, 3 = slightly sensitive, 4 = moderately sensitive, 5 = highly sensitive

Table 5 – 19 June

Assessment 19 June	Lingo 2.0l/ha	Nirvana 3.5l/ha	Stomp Aqua 2.2 l/ha	Centium 0.25 l/ha	Nirvana 3.0 l/ha Stomp Aqua Centium (2.2 + 0.25)	Dual Gold 1.0l/ha	Lingo + Stomp Aqua (1.5 + 1.5l/ha)	Nirvana + Centium (3.5 + 0.25)
GS: 108-201								
Cascadia	2	1	1.5	1	1	1	1.5	1.5
Sapphire	2	1.5	1	1	1	1.5	1.5	1.5
Norbu	2	1.5	1	1	1	1.5	1.5	1.5
Sugar Heart	2	1.5	1.5	1	1	1	1.5	1.5
Sugar Sprint	2	1	1	1	1	1	1.5	1.5
Delikett	2	1.5	1	1	1	1.5	1.5	1.5
Quartz	2	1	1	1	1	1.5	1.5	1.5
Sugar Lady	2	1	1	1	1	1	2	1.5

Scores are a mean of 2 replications.

KEY:

1 = highly tolerant, 2 = tolerant, 3 = slightly sensitive, 4 = moderately sensitive, 5 = highly sensitive

Discussion

Herbicide variety interaction trial

4.2 mm of rain fell between application 2 May and the first assessment 14 May. There was heavy rain on the 14 May and then over 40mm fell from this point to the end of the month with 15mm 28 May. Little rain fell up to the time of the final assessment in June (see appendix 2). On the 14 May (Table 3), varieties were overall showing good tolerance to the treatments. However, some slight sensitivity (chlorosis) was noted. Variety Sapphire was slightly sensitive to Lingo, Lingo + Stomp Aqua and Nirvana + Centium.

Norbu showed slight sensitivity to Lingo + Stomp Aqua. Delikett and Quartz were slightly sensitive to Lingo. Sugar Sprint and Sugar Lady were slightly sensitive to Lingo and Lingo + Stomp Aqua.

At the time of this assessment it would appear that Lingo and Lingo + Stomp Aqua were causing the highest degree of sensitivity.

On the 31 May (Table 4) all varieties were tolerant across all treatments. Varieties scored slightly higher for Lingo with scores of 2 and 2.5. Nonetheless, these scores still demonstrate tolerance. Some slight chlorosis was noted on the lower leaves with the treatment Lingo. However, new growth was healthy with no chlorosis seen.

On the 19 June (Table 5) all varieties remained tolerant across all treatments. There was some chlorosis noted on the older, lower leaves with treatments Lingo and Lingo + Stomp Aqua. However, this did not appear to cause any long lasting effects as the new growth was healthy and the overall vigour was equal to that of the untreated.

At the time of writing only Lingo and Stomp Aqua have an EAMU for use on edible podded peas (sugar snaps), however, this work shows that any of the products tested which have full vining pea registration, have the potential for future EAMU's on edible podded peas.

Overall discussion of individual varieties

The planned drilling date was delayed in line with commercial plantings for 2013 because of cold conditions during early April. Once planted the peas grew away quickly with few losses.

Cascadia the yield standard yielded 9.09t/ha with maturity 1 day later than the vining pea Avola (TR 105). It had a slightly shorter pod length of 70mm, but a higher than average pod

width of 16.1mm. Early vigour was the best in the trial and the determinacy score was average. Haulm length and standing ability were average. Cascadia had moderate susceptibility for downy mildew. Cascadia had good pod finish but a high level of string along the length of the pod.

Norbu matured one day earlier than Cascadia and produced very similar yields. It had a very distinct plant type as it was the only variety in the trial which appeared waxless. Foliage was bright green in colour. Haulm length, standing ability and determinacy were very similar to Cascadia. It had a high level of early vigour with moderate susceptibility for downy mildew. Norbu showed slight sensitivity to Lingo and Lingo + Stomp Aqua early on, but one month post spraying new growth was healthy and the overall vigour was equal to that of the untreated. Norbu produced a stringless pod and had a good pod finish.

Quartz had a similar maturity to Cascadia but only yielded 88% of the Cascadia. Pod length was average and pod width was slightly shorter than average. Standing ability was very good although early vigour was not as good as some. The variety was one of the least determinate. Pods were distorted pods with bumpiness, however Quartz produced a stringless pod. Quartz showed some sensitivity to Lingo shortly after spraying but this had diminished a month after spraying and the overall vigour was equal to that of the untreated.

Sugar Sprint was the earliest maturing variety in the trial, maturing 5 days before Cascadia. Yield was a little higher than Cascadia. Pod length was a little shorter than average with a slightly shorter pod width. It had good early vigour and had the shortest haulm length in the trial. Standing ability was average and it had a moderate determinacy. Sugar Sprint showed a slight sensitivity to Lingo and Lingo + Stomp Aqua early on but one month post spraying new growth was healthy and the overall vigour was equal to that of the untreated. Quality of Sugar Sprint was average and it produced some string along the pod.

Sugar Lady matured one day later than Cascadia with the same yield. Pod length and width were average. It had very good standing ability and was one of the most determinate varieties. Sugar Lady showed a slight sensitivity to Lingo and Lingo + Stomp Aqua early on but one month post spraying new growth was healthy and the overall vigour was equal to that of the untreated. Sugar Lady produced a stringless pod with very good quality.

Delikett matured 3 days earlier than Cascadia with the same yield. Pod length was average but the pod width was the narrowest of the varieties in trial. It had good early vigour and the longest haulm length in trial. It was the least determinate variety in trial but had good standing ability. Delikett was slightly sensitive to Lingo but grew away from any

damage. Delikett produced a slender pod with a good finish although there was good amount of string along the length of the pod. Delikett is susceptible to downy mildew.

Sugar Heart matured a day earlier than Cascadia and had the second highest yield in the trial (121%), significantly out-yielding Cascadia. It had an average pod length and width. Haulm length and determinacy were average but its standing ability was very good. Sugar Heart showed a reasonable tolerance to all the pre-emergence sprays. Sugar Heart produced a good quality stringless pod.

Sugar Lace matured a day later than Cascadia and gave very good yields. Pod length was average, with the width being at the top range of the trial. Early vigour was poor, while haulm length and determinacy was average. Standing ability was good. Not enough seed was available for Sugar Lace to be included in the herbicide tolerance trial, so no data was available. Sugar Lace produced a stringless pod with average quality.

Zuccola was a replacement for Sugar Bro and matured one day earlier than Cascadia. Yields were the highest in the trial (127%), significantly higher than Cascadia. It had average characteristics for pod width and length. Standing ability was good but it scored low for determinacy. Haulm length and early vigour were both average. As the variety was a substitute variety it did not take part in the herbicide tolerance trial, but it was included in the downy mildew trial where it was moderately susceptible. Pods from Zuccola produced the most string of any of the varieties in the trial, but the pod finish was excellent.

Sapphire was one of the latest varieties in the trial, maturing one day later than Cascadia. Yield was higher than Cascadia. The pod length was average and the width was slightly wider than average. Early vigour was good. Standing ability was very good and it was the most determinate variety in the trial. Sapphire was slightly sensitive to Lingo, Lingo + Stomp Aqua and Nirvana + Centium, but grew away from any damage. Sapphire was susceptible to downy mildew. Pods were of average quality and stringless.

Conclusions

Quartz, Sugar Lady and Sugar Lace were semi-leafless types while all the other varieties were conventional leaf types.

Zuccola had the most string, while Delikett, Cascadia and Sugar Sprint had less string. Norbu, Quartz, Sugar Lady, Sugar Heart, Sugar Lace and Sapphire were all stringless.

All of the varieties had very similar pod length except Cascadia and Sugar Sprint which were slightly shorter.

Norbu had the widest pod width and Delikett the narrowest.

Sapphire and Zuccola gave significantly higher yields than Cascadia. No variety gave significantly lower yields than Cascadia. Zuccola gave the highest yields in the trial

Cascadia showed the greatest early vigour with Quartz and Sugar Lace exhibiting the least.

Sapphire was the most determinate variety while Delikett was the least determinate.

Zuccola had the best pod finish in the trial while Quartz gave produce with the lowest quality pod finish.

Delikett had the longest haulm length, while Sugar Sprint had the shortest.

Most of the varieties had good standing ability and were all fairly erect, but Sugar Sprint did not stand as well.

At the time of writing only Lingo and Stomp Aqua have an EAMU for use on edible podded peas (sugar snaps), however, this work shows that any of the products tested which have full vining pea registration, have the potential for future EAMU's on edible podded peas.

Overall in there was little sensitivity to the herbicides tested. Sensitivity was only recorded at the time of the first assessment (14 May).

Varieties were most sensitive to Lingo, either as a standalone treatment or with a partner product. Cascadia and Sugar Heart were the only 2 varieties to have shown tolerance across all the treatments.

On the following two assessments (31 May and 19 June) all varieties were tolerant across all of the treatments. However, there was still some lower leaf chlorosis on varieties treated with Lingo and Lingo + Stomp Aqua. This appeared to be present on older leaves only and all new growth was healthy and symptom free.

Compared to Avola, Delikett Quartz and Sapphire were susceptible to Downy Mildew. Cascadia, Norbu and Sapphire were moderately susceptible to Downy Mildew.

Technology transfer

The variety trial at Thorney was demonstrated at an open day on the 16 of July 2013. This was publicized by HDC and was open to growers and seedsmen.

Results will be presented at a future Vegetable Agronomists Association meeting.

A fact sheet will be published by HDC.

Appendices

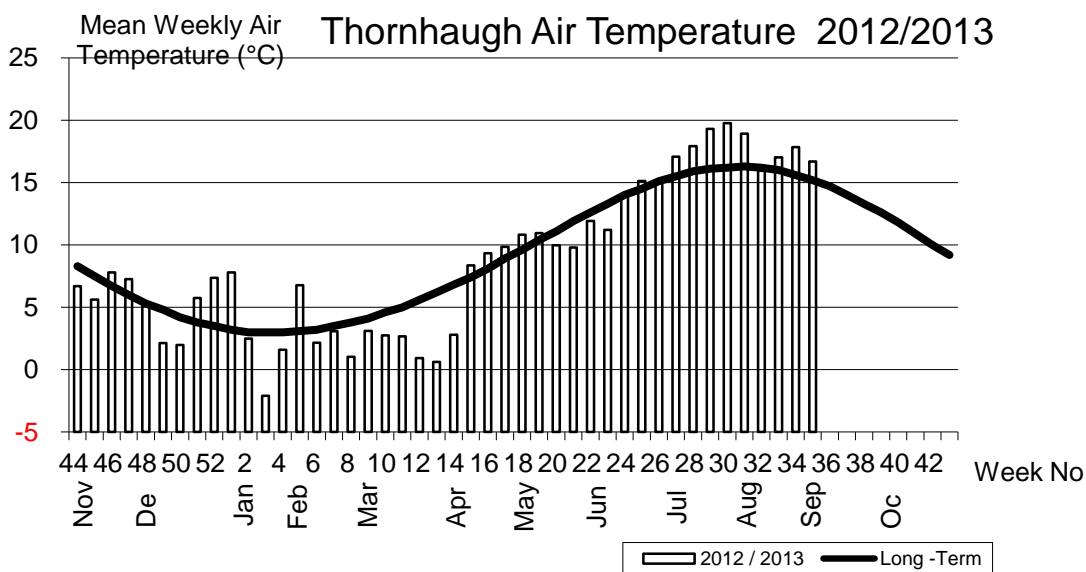
Appendix 1

Key to Source of varieties

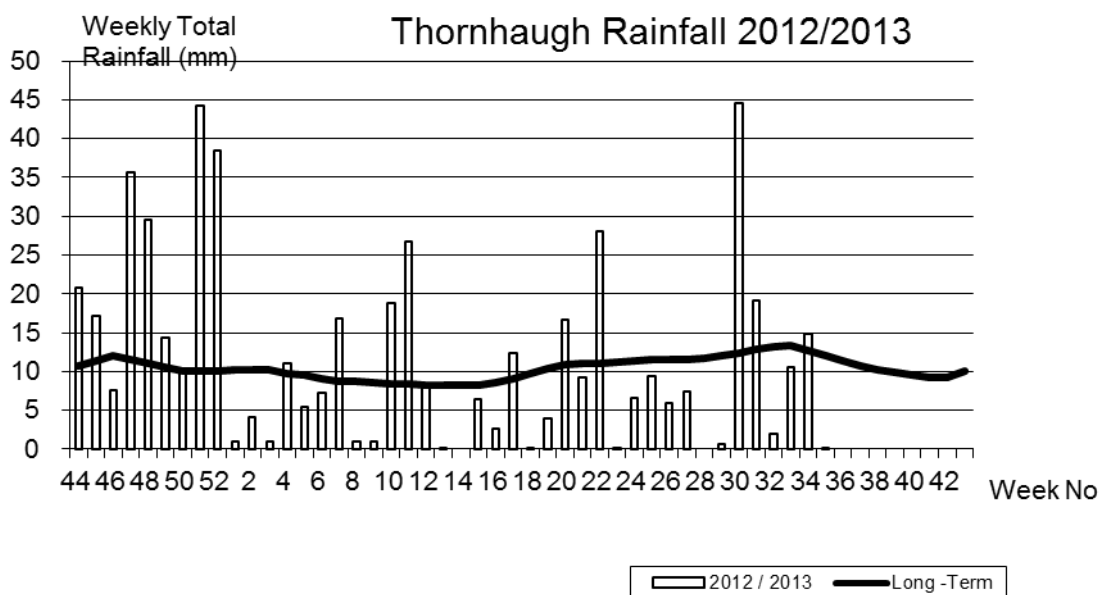
PVS	Proveg Seeds, UK
TS	Tozers Seeds, UK
EL	Elsoms, UK
CS	Crites Seeds Inc, USA (UK agents Elsoms)

METEROLOGICAL DATA - 2012 / 2013 season

Thornhaugh mean weekly air temperatures (°C) 2012/2013



Thornhaugh weekly rainfall totals (mm) 2012/2013



Thornhaugh monthly rainfall totals (mm) and % of the long-term average 2012/2013

Month	2012/2013 Monthly Rainfall (mm)	Long-Term Average Rainfall (mm)	% of Average
November	102.6	51.5	199.2
December	108.2	40.8	265.2
January	22.2	45.3	49.0
February	26.4	35.7	73.9
March	54.2	37.7	143.8
April	21.4	38.9	55.0
May	58.0	42.8	135.5
June	22.2	51.4	43.2
July	58.8	54.1	108.7
August	37.8	57.8	65.4
September		42.3	
October		43.6	

