2021 Vegetable Research Funding

	Title	Researcher	$ Amount Funded
1	Weed Control Evaluations in Lima Beans	D. E. Robinson	
2	Weed Control Evaluations in Snap Beans	D. E. Robinson	
3	Weed Control Evaluations in Carrots	D. E. Robinson	
4	Weed Control Evaluations in Peas	D. E. Robinson	$19,000
5	NYS Processing Snap Bean, English Pea and Sweet Corn Trials	S. Reiners	$5,400 US
6	Processing Pea Cultivar Evaluations	Bonduelle	$5,000

Project Title: Weed Control and Problem Weed Management in Processing Vegetables

Research Agency: Ridgetown Campus, University of Guelph

Lead Investigator: Darren Robinson

Executive Summary:

The purpose of this research was to examine the tolerance and weed control of various herbicides in lima and snap bean, carrots and processing peas.

Lima bean. In trial 1, we observed extensive injury in the pethoxamid treatments, which resulted in a reduction in plant size and yield loss. In addition, we observed injury in the Zidua treatments and a corresponding reduction in dry weight and yield at the 2X rate. In trial 2, plant height, dry weight and yield were similar to the untreated check in all treatments, though some leaf puckering and plant stunting was observed early in the growing season. By crop maturity, lima bean outgrew the injury in trial 2.

Snap bean. In trial 1, though yield was not less than the untreated check in any of the pethoxamid treatments, some injury symptoms (leaf puckering and plant stunting) was observed early in the growing season. Snap bean yield was less than the untreated check in the Shieldex treatments, despite showing little visible injury (ie. 7% or less) and no reduction in plant height. In trial 2, yield was less than the untreated check in the pethoxamid and Zidua treatments, with some extensive injury symptoms (leaf puckering and plant stunting), particularly early in the growing season. Snap bean yield was slightly less than the untreated check in the Shieldex treatments (though not statistically significant, despite showing little visible injury (ie. 7% or less) and no reduction in plant height. Snap bean showed acceptable tolerance to Prowl in both trials.

Carrot. Marketable yield was not reduced at a Zidua® rate of 100 g/ha. A minor use was submitted, requesting a rate of 100 g/ha – additional data have been requested by PMRA on both tolerance and efficacy. Another set of trials is part of a long term study to develop an approach to managing linuron-resistant pigweed. Tank mixes of Dual II Magnum with Nortron (applied PRE) followed by micro-rates of Goal gave the best control of velvetleaf, redroot pigweed, common and crabgrass. Carrot yield was greatest where the two-way tank mix of Dual II Magnum+Nortron (PRE) was followed by Goal micro-rates.

Peas. Visible injury was less than 10% in all pea cultivars at both rates of Zidua, Pea tenderness and yields were all similar to the untreated check. Peas did not show the same level of tolerance to Reflex. Injury, decreased tenderometer readings and a reduction in pea yield were observed at the 0.8 L/ac rate of Reflex in Tyne, Sherwood and Sweet Savour.

Objectives:

Lima bean.

1. To evaluate weed management systems in lima bean to various tank mixes of Sandea, Prowl H20, and Dual II Magnum.

2. To evaluate pethoxamid (CHA-2735) for tolerance in lima beans.

Snap bean.

1. To evaluate weed management systems in snap bean to various tank mixes of Sandea, Prowl H20, and Dual II Magnum.

2. To evaluate pethoxamid (CHA-2735) for tolerance in snap beans.

Carrots.

1. To examine carrot tolerance to pyroxasulfone applied at various POST timings in processing carrot.

2. To evaluate tolerance of carrots to and control of linuron-resistant pigweed by preemergence applications of pyroxasulfone, Nortron, Prowl H20.

3. To examine carrot tolerance to and linuron-resistant pigweed control by micro-rates of Goal, Reflex and Blazer for control of linuron-resistant pigweed in carrot.

Peas.

1) To evaluate Zidua for variety sensitivity and annual broadleaf weed control in peas.

2) To evaluate Reflex for variety sensitivity and annual broadleaf weed control in peas.

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TRIAL 1: TOLERANCE OF LIMA BEAN TO PREEMERGENCE HERBICIDES - I

Materials & Methods:

Crop: Lima bean
Variety: Cypress
Planting rate: 266667 seeds/ha
Row spacing: 75cm
Planting date: May 25/21
Depth: 3.5 cm
Plant spacing: 5 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Field was fertilized on June 2 with 19-19-19 at 38 kg/ha of actual N, P and K.

Soil Description:
Sand: 82%
Silt: 10%
Clay: 8%
OM: 1.3%
pH: 6.0
CEC 6.2

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
Application Date:	May 27-2021
Time of Day:	8:15 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	10 C
% Relative Humidity:	71
Wind Velocity, Unit:	3 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	17 C
Soil Moisture:	MOIST

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: Air Induction
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Results: We observed extensive injury (up to 28%) in the pethoxamid treatments, which resulted in a reduction in plant size (from 40 to 14 g/plant) and yield loss (from 3.0 T/ac to 1.1 T/ac - Table 1.1). In addition, we observed up to 13% injury in the Zidua treatments and a corresponding reduction in dry weight (from 40 TO 18 g/plant) and yield (from 3.0 to2.0 T/ac) at the 2X rate.

Table 1.1. Effect of herbicide treatment on lima bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0A	0B	0C	40A	3.0A
2. pethoxamid	1200 G/HA	1A	1B	0C	40A	3.2A
3. pethoxamid	2400 G/HA	2A	17A	28A	14C	1.1C
4. ZIDUA	47 G/AC	1A	5B	5C	29B	2.7A
5. ZIDUA	94 G/AC	1A	8B	13B	18C	2.0B
6. PROWL H20	0.96 L/AC	2A	2B	4C	38A	3.0A
7. PROWL H20	1.92 L/AC	2A	3B	4C	37A	3.3A
8. SHIELDEX	16.3 G/AC	0A	5B	5C	38A	3.0A
9. SHIELDEX	32.6 G/AC	1A	1B	1C	29B	2.6AB
LSD (P <0.05)		2	8	14	9	0.6

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

Conclusions: This trial was kept weed-free to test for the effect of pethoxamid, a new preemergence herbicide under development for field crops. We also examined the tolerance of lima bean to Zidua, Prowl H20, and Shieldex (tolpyralate). This trial was conducted on a fairly sandy soil with low (1.3%) organic matter. Injury, reductions in plant size and yield loss were observed in both pethoxamid and Zidua treatments. Prowl H2O and Shieldex did not injure lima bean. The results of this trial contrasted with those of Trial 2 (please see below), in which little injury and no yield loss were observed. This is hypothesized to have occurred because Trial 2 was conducted on a heavier soil type, and though some treatments injured lima bean, we did not measure any decreases in plant dry weight or yield.

TRIAL 2: TOLERANCE OF LIMA BEAN TO PREEMERGENCE HERBICIDES - II

Objective: Determine the tolerance of lima bean to PRE applications of new herbicide active ingredients – pethoxamid, Zidua, Shieldex, as well as Prowl H20.

Materials & Methods:

Crop: Lima bean
Variety: Cypress
Planting rate: 266667 seeds/ha
Row spacing: 75cm
Planting date: May 25/21
Depth: 3.5 cm
Plant spacing: 5 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Field was fertilized on June 2 with 19-19-19 at 38 kg/ha of actual N, P and K.

Soil Description:
Sand: 52%
Silt: 24%
Clay:24%
OM: 4.3%
pH: 7.3
CEC 12.3

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
Application Date:	May 27-2021
Time of Day:	9:15 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	14 C
% Relative Humidity:	64
Wind Velocity, Unit:	3 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	18 C
Soil Moisture:	MOIST

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: Air Induction
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Results: Pethoxamid caused up to 9% visual injury to lima bean (Table 2.1), but plant dry weight and yield were similar to the untreated, weed-free check. Injury in the Zidua, Prowl and Shieldex treatments was less than 10% in all cases, and there were no significant reductions in plant dry weight or yield, relative to the untreated, weed-free check.

Table 2.1. Effect of herbicide treatment on lima bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0A	0A	0A	42A	2.5A
2. pethoxamid	1200 G/HA	3A	5A	2A	40A	2.6A
3. pethoxamid	2400 G/HA	4A	9A	5A	46A	2.3A
4. ZIDUA	47 G/AC	1A	3A	2A	49A	2.7A
5. ZIDUA	94 G/AC	1A	5A	4A	48A	2.3A
6. PROWL H20	0.96 L/AC	1A	1A	0A	38A	2.5A
7. PROWL H20	1.92 L/AC	2A	2A	0A	47A	2.6A
8. SHIELDEX	16.3 G/AC	0A	3A	5A	38A	2.4A
9. SHIELDEX	32.6 G/AC	1A	6A	7A	39A	2.6A
LSD (P <0.05)		2	8	6	11	0.3

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

Conclusions: This trial was kept weed-free to test for the effect of pethoxamid, a new preemergence herbicide under development for field crops. We also examined the tolerance of lima bean to Zidua, Prowl H20, and Shieldex (tolpyralate). Though plant height, dry weight and yield was not less than the untreated check in any of the treatments, some injury symptoms (leaf puckering and plant stunting) was observed early in the growing season. By crop maturity, lima bean had outgrown the injury.

TRIAL 3: TOLERANCE OF SNAP BEAN TO PREEMERGENCE HERBICIDES - I

Materials & Methods:

Crop: Snap bean
Variety: Huntington
Planting rate: 374532 seeds/ha
Row spacing: 75cm
Planting date: May 27, 2021
Depth: 2.5 cm
Plant spacing: 3.6 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Field was fertilized on May 25 with 19-19-19 at 38 kg/ha of actual N, P and K.

Soil Description:
Sand: 51%
Silt: 22%
Clay: 26%
OM: 3.8%
pH: 7.3
CEC 13.5

Texture: Sandy Clay Loam
Soil: Watford/Brady series

Application Information:

	A
Application Date:	May 27-2021
Time of Day:	7:45 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	10 C
% Relative Humidity:	71
Wind Velocity, Unit:	4 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	17 C
Soil Moisture:	WET

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: Air Induction
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Results: Snap bean injury, dry weight and yield were similar to the untreated, weed-free check in all treatments (Table 3.1). Injury ranged from 1 to 7% across all treatments, and plant dry weight ranged from 40 g/plant to 45 g/plant. Snap bean yield was less in both Shieldex treatments (from 3.0 to 3.3 T/ac) than the untreated check (4.1 T/ac).

Table 3.1. Effect of herbicide treatment on snap bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0C	0A	0C	40A	4.1A
2. pethoxamid	1200 G/HA	3B	1A	1BC	44A	4.2A
3. pethoxamid	2400 G/HA	3B	5A	4ABC	42A	4.5A
4. ZIDUA	47 G/AC	6A	3A	7A	42A	4.0A
5. ZIDUA	94 G/AC	6A	1A	1C	41A	4.4A
6. PROWL H20	0.96 L/AC	3B	1A	1C	43A	4.2A
7. PROWL H20	1.92 L/AC	5AB	3A	1C	45A	4.1A
8. SHIELDEX	16.3 G/AC	5AB	4A	1C	40A	3.3B
9. SHIELDEX	32.6 G/AC	7A	4A	1C	43A	3.0B
LSD (P <0.05)		2	5	4	12	0.8

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

Conclusions: This trial was kept weed-free to test for the effect of pethoxamid, a new preemergence herbicide under development for field crops. We also examined the tolerance of snap bean to Zidua, Prowl H20, and Shieldex (tolpyralate). Snap bean yield was less than the untreated check in the Shieldex treatments, despite showing little visible injury (ie. 7% or less) and no reduction in plant dry weight. After carefully examining the root systems of snap beans this year (which we did also note in 2020), we observed a reduction in secondary root growth in the Shieldex treatments.

TRIAL 4: TOLERANCE OF SNAP BEAN TO PREEMERGENCE HERBICIDES - II

Materials & Methods:

Crop: Snap bean
Variety: Huntington — Planting date: May 27/21
Planting rate: 374532 seeds/ha — Depth: 2.5 cm
Row spacing: 75cm — Plant spacing: 3.6 cm

Design: Randomized Complete Block Design
Plot width: 1.5m — Plot length: 10m
Reps: 4

Field Preparation: Field was fertilized on May 25 with 19-19-19 at 38 kg/ha of actual N, P and K.

Soil Description:
Sand: 82% — OM: 1.3%
Silt: 10% — pH: 6.0
Clay: 8% — CEC 6.2

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
Application Date:	May 27-2021
Time of Day:	6:45 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	7 C
% Relative Humidity:	84
Wind Velocity, Unit:	4 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	17 C
Soil Moisture:	DAMP

Spray Equipment:

Application Method: CO2 Backpack — Pressure: 207 KPA (30 PSI)
Nozzle Type: Air Induction — Nozzle Size: ULD120-02
Nozzle Spacing: 50 cm (20") — Boom Width: 1.5 m (60")
Spray Volume: 200 L/ha (20 GAL/AC)

Results: Snap bean injury ranged from 1 to 17% in the pethoxamid treatments and from 3 to 21% in the Zidua treatments (Table 4.1). Snap bean injury was less than 10% in all treatments. Plant dry weight was not significantly less than the untreated check in any treatments, but tended to be less in both the pethoxamid and Zidua treatments. Yield decreased to 3.5 and 3.4 T/ac in the pethoxamid and Zidua treatments, respectively, from 5.1 T/ac in the untreated, weed-free check. Snap bean yield was less in both Shieldex treatments (3.0 to 3.3 T/ac) than the untreated check (4.1 T/ac).

Table 4.1. Effect of herbicide treatment on snap bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY 7D	14D	28D	DRY WT G	YIELD T/AC
1. Check (WEEDFREE)		0C	0C	0C	53A	5.1A
2. pethoxamid	1200 G/HA	3BC	1BC	1BC	44A	5.2A
3. pethoxamid	2400 G/HA	3BC	9A	17AB	32A	3.5B
4. ZIDUA	47 G/AC	5AB	3ABC	7A	46A	5.0A
5. ZIDUA	94 G/AC	6AB	11BC	21BC	31A	3.4B
6. PROWL H20	0.96 L/AC	3BC	1BC	1BC	53A	5.2A
7. PROWL H20	1.92 L/AC	5AB	3ABC	7BC	50A	4.5A
8. SHIELDEX	16.3 G/AC	5AB	4AB	1BC	50A	4.7A
9. SHIELDEX	32.6 G/AC	7A	4AB	1BC	50A	4.3A
LSD (P <0.05)		4	3	4	25	1.9

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

Conclusions: This trials was kept weed-free to test for the effect of pethoxamid on snap bean. We also examined the tolerance of snap bean to Zidua, Prowl H20, and Shieldex (tolpyralate). In this trial, yield was less than the untreated check in the pethoxamid treatments, with some extensive injury symptoms (leaf puckering and plant stunting), particularly early in the growing season. Snap bean yield was slightly less than the untreated check in the Shieldex treatments (though not statistically significant, despite showing little visible injury (ie. 7% or less) and no reduction in plant height.

TRIAL 5: TOLERANCE OF CARROT TO POSTEMERGENCE APPLICATIONS OF PYROXASULFONE

Materials & Methods:

Crop: Carrot
Variety: Belgrado
Planting rate: 393750 seeds/ha
Row spacing: 38cm
Planting date: May 12/21
Depth: 1 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Fertilized with 75 kg/ha of 27-0-0 on May 12. Entire trial was kept weed-free by hand.

Soil Description:
Sand: 78%
Silt: 15%
Clay: 7%
OM: 3.5%
pH: 6.2
CEC 6.6
Texture: loamy sand
Soil: Normandale

Application Information:

	A	B
APPLICATION DATE	May 23/21	June 6/21
TIME OF DAY	8:30AM	7:30AM
TIMING	POST1	POST2
AIR TEMP (c)	22	23
RH (%)	74	80
WIND SPEED (KPH)	5	8
SOIL TEMP (c)	20	26
CLOUD COVER (%)	100	0
CROP STAGE	2-3 LF	4-5 LF

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: AIR INDUCTION
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Results:

Carrot injury at 7 days after treatment (DAT) increased from 1 to 16%, and from 3 to 27%, when it was applied postemergence to carrots at the 2-3 and 4-5 leaf stages, respectively (Table 5.1). The level of injury increased to 46% by 28 DAT in the 2-3 leaf application timing, and decreased to 19% by 28 DAT in the 4-5 leaf application timing. Yield was similar to the untreated check in most treatments, with three exceptions. Yield decreased from 26 T/ac to 21 and 9 T/ac when pyroxasulfone was applied at rates of 250 and 500 g/ha at the 2-3 leaf timing. Also, yield decreased to 19 T/ac when pyroxasulfone was applied at a rate of 500 g/ha at the 4-5 leaf timing.

Table 5.1. Effect of herbicide treatment on visual injury (7 and 28 days after treatment) and carrot yield.

HERBICIDE	RATE	TIMING	PERCENT INJURY 7D	PERCENT INJURY 28D	YIELD T/AC
1. UNTREATED					26A
2. PYROXASULFONE	89G/HA	2-3LF	1C	0C	25A
3. PYROXASULFONE	100G/HA	2-3LF	4C	0C	31A
4. PYROXASULFONE	125G/HA	2-3LF	4C	1C	27A
5. PYROXASULFONE	178G/HA	2-3LF	8BC	1C	30A
6. PYROXASULFONE	200G/HA	2-3LF	9B	1C	24A
7. PYROXASULFONE	250G/HA	2-3LF	12B	13B	21B
8. PYROXASULFONE	500G/HA	2-3LF	16A	46A	9C
9. PYROXASULFONE	89G/HA	4-5LF	3B	6C	25A
10. PYROXASULFONE	100G/HA	4-5LF	6B	5C	27A
11. PYROXASULFONE	125G/HA	4-5L	8B	8BC	25A
12. PYROXASULFONE	178G/HA	4-5LF	11B	9BC	26A
13. PYROXASULFONE	200G/HA	4-5LF	14B	9BC	28A
14. PYROXASULFONE	250G/HA	4-5LF	19B	8BC	27A
15. PYROXASULFONE	500G/HA	4-5LF	27A	19B	19B
LSD (P <0.05)			4	9	6

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions: Pyroxasulfone (Zidua®) is an excellent candidate for control of linuron-resistant pigweed; therefore studies were established in mineral and muck soils to determine tolerance of carrot to postemergence applications of pyroxasulfone. As Zidua® rate increased from 100 to 500 g/ha at the early

application timing (ie. 2-3 leaf), injury increased from 1-16%, and 0-46% at 7 and 28 days after herbicide treatment (DAT). Visible injury increased from 3-27% and 6-19% at 7 and 28 days after application at the 4-5 leaf stage of carrot. Despite the levels of injury that were apparent at either application timing, marketable yield was similar to the untreated check at most herbicide rates. Marketable yield was not reduced at a Zidua® rate of 100 g/ha. **A minor use was submitted, requesting a rate of 100 g/ha – additional data have been requested by PMRA on both tolerance and efficacy.**

TRIAL 6: PRE-POST STRATEGIES FOR WEED CONTROL IN CARROT

Materials & Methods:

Crop: Carrot
Variety: Belgrado
Planting rate: 393750 seeds/ha
Row spacing: 38cm
Planting date: May 12/21
Depth: 1 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Fertilized with 75 kg/ha of 27-0-0 on May 12.

Soil Description:
Sand: 78%
Silt: 15%
Clay: 7%
OM: 3.5%
pH: 6.2
CEC 6.6
Texture: loamy sand
Soil: Normandale

Application Information:

	A	B	C	D
APPLICATION DATE	May 11/21	May 21/21	May 28/21	June 5/21
TIME OF DAY	8:00AM	9:00AM	11:00AM	8:30AM
TIMING	PRE	POST1	POST2	POST3
AIR TEMP (c)	10	29	25	25
RH (%)	53	56	54	70
WIND SPEED (KPH)	1	1	4	0
SOIL TEMP (c)	16	30	28	25
CLOUD COVER (%)	50	10	10	30
CROP STAGE	PRE	COT	2 LF	4-5LF
WEED STAGE	PRE	COT-2 LF	COT-2 LF	COT- 2LF

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: AIR INDUCTION
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Results:

Applications of Dual II Magnum, Prowl H2O gave good (81 and 85%) control of crabgrass, but did not control velvetleaf or redroot pigweed (control ranged from 45 to 79%). Nortron alone gave 80% and 75% control of velvetleaf and redroot pigweed, but only 35% control of crabgrass (Table 6.1). The two-way tank-mixes of Dual + Nortron and Prowl + Nortron gave fair to good control of velvetleaf (76%), redroot pigweed (83-84%) and crabgrass (84-87%). The three-way tank-mix of Dual + Prowl + Nortron gave greater than 90% of all weeds in the trial area. The addition of micro-rates of either Goal or Blazer increased the level of control to 96% for all three weeds, for all the different two-way and three-way tank-mixes of preemergence herbicides.

Visual injury in the three-way tank-mix combinations (with or without micro-rates of Goal or Blazer) ranged from 18 to 31% (Table 6.2). This injury was accompanied by yield reductions – relative to the untreated, weed-free check – in all the three-way tank-mix treatments whether they were followed by micro-rates of Blazer and Reflex or not. The tank-mix of Dual + Nortron followed by micro-rates of Goal gave 99% of all three weeds in the trial area (Table 6.1), commercially acceptable injury (3-8% - Table 6.2) and yield was 59 T/ac, which was similar to the yield in the untreated, weed-free check.

Table 6.1. Effect of herbicide treatment on percent control of velvetleaf (ABUTH), pigweed (AMARE), and crabgrass (DIGSS) control 56 days after application.

HERBICIDE	RATE	TIMING	ABUTH %	AMARE %	DIGSS %
1. UNTREATED					
2. DUAL II MAGNUM	0.7 L/AC	PRE	50DE	79B	81A
3. PROWL H20	2.7 L/AC	PRE	45E	70B	86B
4. NORTRON	3.3 L/AC	PRE	80BC	75AB	35D
5. PROWL H2O	2.7 L/AC	PRE	76BC	83AB	84AB
NORTRON	3.3 L/AC	PRE			
6. DUAL II MAGNUM	700 ML/AC	PRE	76BC	84AB	87AB
NORTRON	3.3 L/AC	PRE			
7. DUAL II MAGNUM	700 ML/AC	PRE	96AB	98AB	98A
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
8. GOAL	0.1 L/AC	POST1	99A	99A	61C

GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
9. BLAZER	0.03 L/AC	POST1	95AB	94AB	0D
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
10. DUAL II MAGNUM	700 ML/AC	PRE	99A	98AB	99A
PROWL H20	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
11. DUAL II MAGNUM	700 ML/AC	PRE	96AB	99A	99A
PROWL H20	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
12. DUAL II MAGNUM	700 ML/AC	PRE	99A	99A	99A
NORTRON	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
13. DUAL II MAGNUM	700 ML/AC	PRE	98AB	99A	99A
NORTRON	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
14. DUAL II MAGNUM	700 ML/AC	PRE	99A	99A	99A

PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
15. DUAL II MAGNUM	700 ML/AC	PRE	96AB	99A	99A
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
LSD (P <0.05)			9	17	19

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 6.2. Effect of herbicide treatment on visual injury (7 and 28 days after treatment) and carrot yield.

HERBICIDE	RATE	TIMING	PERCENT INJURY 7D	PERCENT INJURY 28D	YIELD T/AC
1. UNTREATED					54A
2. DUAL II MAGNUM	0.7 L/AC	PRE	0B	0B	54A
3. PROWL H20	2.7 L/AC	PRE	0B	0B	67A
4. NORTRON	3.3 L/AC	PRE	0B	0B	53A
5. DUAL II MAGNUM	700 ML/AC	PRE	0B	0B	52A
PROWL H20	3.3 L/AC	PRE			
6. DUAL II MAGNUM	700 ML/AC	PRE	5B	10A	42AB
NORTRON	3.3 L/AC	PRE			
7. DUAL II MAGNUM	700 ML/AC	PRE	18A	20A	38B
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			

8. GOAL	0.1 L/AC	POST1	0B	0B	55A
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
9. BLAZER	0.03 L/AC	POST1	1B	0B	58A
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
10. DUAL II MAGNUM	700 ML/AC	PRE	0B	0B	38A-E
PROWL H20	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
11. DUAL II MAGNUM	700 ML/AC	PRE	0B	0B	40B
PROWL H20	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
12. DUAL II MAGNUM	700 ML/AC	PRE	3B	8B	59A
NORTRON	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
13. DUAL II MAGNUM	700 ML/AC	PRE	8B	22A	36B
NORTRON	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				

14. DUAL II MAGNUM	700 ML/AC	PRE	10A	31A	33B
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
GOAL	0.1 L/AC	POST1			
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
15. DUAL II MAGNUM	700 ML/AC	PRE	12B	30A	26A
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
BLAZER	0.03 L/AC	POST1			
+ ASSIST	0.5% V/V				
BLAZER	0.03 L/AC	POST2			
+ ASSIST	0.5% V/V				
BLAZER	0.03 l/AC	POST3			
+ ASSIST	0.5% V/V				
LSD (P <0.05)			4	8	13

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions: The results presented are part of a long term study to develop an approach to managing linuron-resistant pigweed. The tank mixes of Dual II Magnum with Nortron or Prowl H20 (applied PRE) followed by micro-rates of Goal gave the best control of redroot pigweed, common lambsquarters and crabgrass. Visual injury was observed in those treatments where Nortron was included in the PRE application with either Goal or Blazer micro-rates at 7 and 28 days after treatment. Carrot yields were less than the untreated check in all treatments where Nortron was included in the PRE application. Carrot yield was greatest where the two-way tank mix of Dual II Magnum+Nortron (PRE) were followed by Goal micro-rates.

TRIAL 7: TOLERANCE OF PROCESSING PEAS TO PRE APPLICATIONS OF ZIDUA

Materials & Methods:

Crop: Pea
Variety: various
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: April 29/21
Depth: 5 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Worked the field with S-tine cultivator prior to planting. Based on soil test recommendations, pea trials were fertilized with 6-24-24 N-P-K to provide 14 kg/ha actual N and 57 kg/ha of actual P and K.

Soil Description:
Sand: 52%
Silt: 24%
Clay: 24%
OM: 4.3%
pH: 7.3
CEC: 12.3
Texture: Sandy Clay Loam
Soil: WATFORD/BRADY

Application Information:

	A
APPLICATION DATE	April-29-2021
TIME OF DAY	9:20AM
TIMING	PRE
AIR TEMP (c)	10
RH (%)	96
WIND SPEED (KPH)	3
SOIL TEMP (c)	15
CROP STAGE	PRE

Spray Equipment:

Application Method: CO2 Backpack
Nozzle Type: AIR INDUCTION
Nozzle Spacing: 50 cm (20")
Spray Volume: 200 L/ha (20 GAL/AC)
Pressure: 207 KPA (30 PSI)
Nozzle Size: ULD120-02
Boom Width: 1.5 m (60")

Table 7.1. Effect of pea cultivar and Zidua rate on pea percent injury 7, 14 and 28 days after application.

CULTIVAR	ZIDUA RATE (ML/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. RICCO	100	1A	1A	0A
	200	0A	1A	0A
2. PAO 826	100	0A	0A	0A
	200	0A	0A	3A
3. LIL MO	100	0A	0A	0A
	200	0A	0A	0A
4. CONCEPT	100	1A	0A	0A
	200	4A	4A	0A
5. TYNE	100	0A	1A	4A
	200	6A	4A	4A
6. SHERWOOD	100	1A	1A	3A
	200	3A	6A	1A
7. RELIANCE	100	0A	0A	2A
	200	2A	3A	4A
8. SWEET SAVOUR	100	1A	1A	3A
	200	2A	5A	4A
LSD (P <0.05)		NS	NS	NS

Note: None of the means were significantly different from one another (P=0.05, LSD).

Table 7.2. Effect of pea cultivar and Zidua rate on pea tenderometer readings (PSI) and marketable yield (T/AC).

CULTIVAR	ZIDUA RATE (L/AC)	TENDEROMETER PSI	YIELD (T/AC)
1. RICCO	0	98	5.6
	100	99	6.2
	200	98	5.7
2. PAO 826	0	103	2.0
	100	101	2.9
	200	105	2.8
3. LIL MO	0	117	2.5
	100	119	3.5
	200	118	3.2
4. CONCEPT	0	103	2.5
	100	108	2.9
	200	101	2.8
5. TYNE	0	104	2.2
	100	108	2.9
	200	98	3.0
6. SHERWOOD	0	102	1.6
	100	108	2.2
	200	105	2.2
7. RELIANCE	0	100	3.4
	100	101	3.7
	200	102	3.9
8. SWEET SAVOUR	0	97	3.4
	100	98	3.9
	200	96	3.7
LSD (P <0.05)		NS	NS

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Results/Conclusions:
This trial was established to test for tolerance of eight pea cultivars ('Ricco', 'PAO 826', 'Lil Mo', 'Concept', 'Tyne', Sherwood', 'Reliance', and 'Sweet Savour') to preemergence applications of Zidua at rates of 100 and 200 ml/acc. Pea tenderness at harvest was rated using a tenderometer and final yield adjusted based on tenderometer readings. In addition, the level of weed control was rated in each treatment.

Visible injury was less than 10% in all pea cultivars at both rates of Zidua at all three rating intervals (7, 14 and 28 days after emergence). Injury symptoms included slight leaf puckering. Pea tenderness ratings were all similar to the untreated check, an indication that pea maturity was not negatively affected. Finally, pea yield in all cultivars was similar to the untreated check. There was a tendency for pea yield to be slightly greater in the plots that had received herbicide treatment, associated with the presence of weeds competing for resources with the crop.

TRIAL 8: TOLERANCE OF PROCESSING PEAS TO PRE APPLICATIONS OF REFLEX

Crop: Pea
Variety: various
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: April 29/21
Depth: 5 cm

Design: Randomized Complete Block Design
Plot width: 1.5m
Reps: 4
Plot length: 10m

Field Preparation: Worked the field with S-tine cultivator prior to planting. Based on soil test recommendations, pea trials were fertilized with 6-24-24 N-P-K to provide 14 kg/ha actual N and 57 kg/ha of actual P and K.

Soil Description:
Sand: 52%
Silt: 24%
Clay: 24%
OM: 4.3%
pH: 7.3
CEC: 12.3
Texture: Sandy Clay Loam
Soil: WATFORD/BRADY

Application Information:

	A
APPLICATION DATE	April-29-2021
TIME OF DAY	9:20AM
TIMING	PRE
AIR TEMP (c)	10
RH (%)	96
WIND SPEED (KPH)	3
SOIL TEMP (c)	15
CROP STAGE	PRE

Table 8.1. Effect of pea cultivar and Reflex rate on pea percent injury 7, 14 and 28 days after application.

CULTIVAR	Reflex RATE (L/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. RICCO	0.4	1B	1B	0B
	0.8	0B	1B	0B
2. PAO 826	0.4	0B	0B	0B
	0.8	0B	0B	3B
3. LIL MO	0.4	0B	0B	0B
	0.8	0B	0B	0B
4. CONCEPT	0.4	1B	0B	0B
	0.8	4A	4A	0B
5. TYNE	0.4	0B	1B	4AB
	0.8	6A	10A	14A
6. SHERWOOD	0.4	1B	1B	6AB
	0.8	5A	6A	17A
7. RELIANCE	0.4	0B	0B	2B
	0.8	2AB	3AB	4AB
8. SWEET SAVOUR	0.4	1B	1B	11A
	0.8	2AB	5A	10A
LSD (P <0.05)		5	5	9

Note: None of the means were significantly different from one another (P=0.05, LSD).

Table 8.2. Effect of pea cultivar and Reflex rate on pea tenderometer readings (PSI) and marketable yield (T/AC).

CULTIVAR	REFLEX RATE (L/AC)	TENDEROMETER PSI	YIELD (T/AC)
1. RICCO	0	96	3.6A
	0.4	92	3.2A
	0.8	98	3.9A
2. PAO 826	0	104	2.4A
	0.4	104	2.5A
	0.8	107	2.8A
3. LIL MO	0	115	2.5A
	0.4	116	3.0A
	0.8	108	3.3A
4. CONCEPT	0	111	2.7A
	0.4	108	2.7A
	0.8	101	2.8A
5. TYNE	0	107A	3.2A
	0.4	105A	2.7AB
	0.8	98B	2.2B
6. SHERWOOD	0	111A	2.6A
	0.4	108A	2.0AB
	0.8	99B	1.7B
7. RELIANCE	0	100A	2.9A
	0.4	101A	3.7A
	0.8	100A	4.0A
8. SWEET SAVOUR	0	94A	3.7A
	0.4	94A	2.7B
	0.8	84B	2.0C
LSD (P <0.05)		3	0.7

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Results/Conclusions:
This trial was established to test for tolerance of eight pea cultivars ('Ricco', 'PAO 826', 'Lil Mo', 'Concept', 'Tyne', Sherwood', 'Reliance', and 'Sweet Savour') to preemergence applications of Reflex® at rates of 47 and 94 g/ac. Pea tenderness at harvest was rated using a tenderometer and final yield adjusted based on tenderometer readings. In addition, the level of weed control was rated in each treatment.

Visible injury was less than 10% in most pea cultivars at both rates of Reflex, except Tyne, Sherwood and Sweet Savour, which showed 14, 17 and 10% visual injury at 28 days after emergence (DAE), respectively. Injury symptoms included leaf puckering and shortened midribs (drawstringing). Along with this injury, pea tenderometer readings decreased relative to the untreated check. This may be an indication that pea maturity is delayed by the herbicide in these cultivars. Finally, pea yield decreased at the 0.8 L/ac rate of Reflex in Tyne, Sherwood and Sweet Savour. This confirms the results from 2020: Reflex may have the potential to injure some pea cultivars.

NEW YORK STATE 2021 PROCESSING PEA CULTIVAR TRIAL REPORT

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We wish to thank the NYS Vegetable Research Council and Association and cooperating seed companies for their financial support of the project. We wish to thank Mr. Buzz Lowe of Farm Fresh First for his assistance in planning the trials. Also, a special thank you to our crew: Kim Day, Carla Yannotti, Jeremy Frere, and Robert Abel, for their assistance in day-to-day operations.

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I would like to dedicate all my work during the 2021 season and beyond, to my late father, Lester W. Fillingham, he was a veteran, volunteer fireman, longtime lineman, proud family man and above all else, the kindest, fairest man I have ever known. May my work be a reflection of your love and guidance.

Procedure & Materials

Location: Cornell AgriTech Farm, Geneva - soil type – silt loam. **Tillage** – Conventional. **Fertilizer:** broadcast 400 lb/A of 8-14-21 and worked in. **Planter** – Modified Hege 80 (cone type). **Planting Date** – 4/28. Harvest started on 6/24 and was finished on 7/13. **Herbicide** – Dual directly after planting. **Plot Size:** 7 rows by 30 ft. **Row Width:** 6 inches, Row length: 30 ft. **In-row Spacing:** All cultivars were adjusted (seed planted) to 100% germination. Our processor has asked us to approximate 600,000 plants per acre for early, 570,000 for second early and 550,000 plants per acre for the rest. **Insecticide** – none. **Experimental Design** – Randomized split block design, 4 replications (3 replications were harvested, and another was left for demonstration). **Model TG4EI Integrating Texturegage** – measure for maturity.

The objective of this trial was to compare several normal leaf and afila type pea varieties for yield and other quality characteristics. This was accomplished in cooperation with the pea processor in New York and seed companies, in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions. Evaluation of processed products is scheduled to be held on 11/04/21 for processing and seed company representatives.

Yield of seven rows by 5 feet per replication (35 Row feet) was obtained by pulling the plants and hand picking the pods. Two harvests were taken, if possible, to plot yield increase and also tenderometer reading increase. A target tenderometer value of 110 was used for the final harvest. A stationary sheller was used to remove berries from the harvested pods. Tenderometer readings were taken on each replication and averaged for the report. Pea berries were hand sieved with Seedburo hand testing screens. See following table for details.

Table 1. Sieve size diameters.

Sieve Size	Diameter of circular Opening in MM (inches) Will not pass through	Will pass through
1	6.35 (16/64)	7.1 (18/64)
2	7.1 (18/64)	7.9 (20/64)
3	7.9 (20/64)	8.7 (22/64)
4	8.7 (22/64)	9.5 (24/64)
5	9.5 (24/64)	10.3 (26/64)
6	10.3 (26/64)	11.1 (28/64)

Temperature and Moisture Conditions

This spring was abnormally dry, and fields were workable earlier than usual. Field conditions were decent at planting. The day after planting, we received about 0.5 inches of rain, and cool, slightly wet conditions persisted for about two weeks. There were several instances in May and June where hot dry periods were followed by cool periods and rains. Supplemental irrigation was not provided as rainfall provided adequate. For the months of May and June, 2.2 and 2.8 inches of rain fell, respectively. Then, in the first 13 days of July, Geneva received 3.30 inches of rain. Overall, pea season was mostly mild, with both dry and wet periods. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season.

Table 2 - Cultivar List and Maturity From Seed Sources

Cultivar	GDD (40F)	Seed Source	Leaf Type	Seed Treatment	Seed Count/lb	Germ. %	Sieve Index	Node to blossom
Spring	1100	Pure Line	normal leaf	LSV + Cruiser 0.75	2961	95	4.1	9 to 10
Eldorado	1100	Pure Line	normal leaf	LSV + Cruiser 0.75	2586	95	3.8	9 to 10
Sherwood	1160	Seminis	normal leaf	allegiance, captan, cruiser	2400	99	3.3	9 to 10
SVS795QE	1170	Seminis	normal leaf	allegiance, captan, cruiser	/	95	/	10
SV3628QH	1205	Seminis	normal leaf	allegiance, captan, cruiser	2619	95	/	10 to 11
EXP461	1216	Brotherton	afila	allegiance, captan, cruiser	2413	95	3.2	9 to 10
DGL0027	1250	Pure Line	afila	LSV + Cruiser 0.75	3328	95	3.5	12
PLS-M14	1250	Pure Line	normal leaf	LSV + Cruiser 0.75	2290	95	4	9 to 10
CS455AF	1355	Crites	afila	maxim, Apron, Cruiser	2100	99	3.7	10
Saltingo	1300	Pure Line	afila	LSV + Cruiser 0.75	2213	95	3.5	11
Portage	1305	Crites	afila	allegiance, captan, cruiser	2032	99	3.8	8 to 11
BSC905	1332	Brotherton	normal leaf	allegiance, captan, cruiser	4725	99	1.4	11 to 12
EXP125	1332	Brotherton	afila	allegiance, captan, cruiser	2548	99	3.1	14
EXP773	1332	Brotherton	normal leaf	allegiance, captan, cruiser	2592	95	3.4	13
SV0969QH	1360	Seminis	normal leaf	allegiance, captan, cruiser	3340	98	3.1	/
Nitro	1370	Seminis	normal leaf	/	4800	/	2	13 to 14
518	1410	GVS	afila	maxim/Apron XL	2400	96	3.8	11
BSC712	1422	Brotherton	afila	allegiance, captan, cruiser	1786	99	3.8	14
PLS 586	1430	Pure Line	afila	LSV + Cruiser 0.75	1991	95	4	12 to 13
CS494DAF	1470	Crites	Det afila	maxim, Apron, Cruiser	2800	97	3.1	12 to 13
SV3290QF	1450	Seminis	normal leaf	allegiance, captan, cruiser	2518	90	/	14 to 15
PLS 576	1450	Pure Line	afila	LSV + Cruiser 0.75	2424	95	3.6	12 to 13
BSC599	1469	Brotherton	afila	allegiance, captan, cruiser	2268	95	3.8	15
Da1470	1470	Seminis	Det afila	/	2683	/	/	/
PLS 602	1470	Pure Line	afila	LSV + Cruiser 0.75	2414	95	3.1	15 to 16
SV1231QF	1480	Seminis	afila	/	2900	/	3.2	15
Boogie	1490	Brotherton	afila	allegiance, captan, cruiser	2075	99	4.3	14
828	1500	GVS	afila	/	2300	98	3.8	14 to 15
SV0823QG	1525	Seminis	afila	/	2669	/	3.3	17
Ricco	1530	GVS	afila	/	2375	/	3.7	15 to 16
CS464AF	1565	Crites	afila	maxim, Apron, Cruiser	2400	99	3.7	15
SV6844QG	1600	Seminis	afila	/	2500	/	3.6	17
PLS196	1600	Pure Line	afila	LSV + Cruiser 0.75	2307	95	4	16
SV5685QG	1750	Seminis	normal leaf	/	2347	/	3.4	20

Table 3. Plant Characteristics

Cultivar	GDD to full flower	Plant Stand Rating	Trial Root Rot Rating	Root Rot Trial*	Plant Habit Rating (Harvest)	Overall Rating
Sherwood	725	2.75	5.0	3.00	3.00	3.4
Eldorado	725	2.75	5.0	3.00	2.50	3.3
Spring	799	2.50	5.0	2.75	2.50	3.2
SV3628QH	861	3.25	5.0	3.50	3.50	3.8
SVS795QE	861	2.75	5.0	3.00	3.00	3.4
PLSM14	861	3.25	5.0	3.50	3.50	3.8
CS455AF	861	3.50	5.0	3.00	3.00	3.6
EXP461	889	3.50	5.0	3.50	3.50	3.9
Portage	918	3.25	5.0	3.00	3.00	3.6
EXP773	918	3.25	5.0	3.50	3.50	3.8
BSC905	948	3.00	5.0	3.25	3.50	3.7
518	948	3.25	5.0	3.50	3.75	3.9
DGL0027	918	3.25	5.0	3.75	3.75	3.9
Nitro	975	3.00	5.0	3.50	3.75	3.8
EXP125	975	3.00	5.0	4.00	3.75	3.9
BSC599	975	4.00	5.0	3.00	3.25	3.8
Saltingo	948	3.50	5.0	3.25	3.50	3.8
SV0969QH	975	3.00	5.0	3.75	3.75	3.9
SV3290QF	1020	3.50	5.0	3.00	3.75	3.8
828	1000	3.75	5.0	3.50	3.75	4.0
CS494DAF	1000	2.75	5.0	3.00	4.00	3.7
PLS586	1000	3.25	5.0	3.25	3.50	3.8
Ricco	1000	3.50	5.0	3.50	3.00	3.8
CS464AF	1020	3.25	5.0	3.50	3.50	3.8
PLS576	1000	3.25	5.0	3.50	3.75	3.9
BSC712	1020	3.75	5.0	3.25	3.50	3.9
DA1470	1020	3.00	5.0	2.75	3.00	3.4
Boogie	1000	3.25	5.0	4.00	4.00	4.1
PLS602	1044	3.50	5.0	3.00	3.25	3.7
SV1231QF	1072	3.50	5.0	4.25	4.00	4.2
SV0823QG	1107	4.00	5.0	3.25	4.00	4.1
PLS196	1107	3.00	5.0	3.00	4.25	3.8
SV6844QG	1138	2.50	5.0	3.50	4.50	3.9
SV5685QG	1310	3.75	5.0	3.50	3.50	3.9

Explanations for Headings in Table 3:

GDD to Full Flower – Monitored peas to identify full flower date and used base 40F for growing degree days.

Plant Stand Rating – About three weeks after planting, a visual evaluation of the plant stand is made, using a scale of 1 to 5. 1 – Few plants, extremely patchy, 5 – full stand, no empty patches.

Trial Root Rot Rating – Root rot is scouted for in the harvested reps of the variety trial and rated on a scale of 1 to 5. 1 – completely dead, 5 – no visual symptoms.

***Root Rot Trial** - A field at the research farm was converted to a root rot nursery. We plant peas annually to encourage inoculum and plant all the varieties in the variety trial into that field and rate for root rot damage using a scale of 1 to 5. 1 – completely dead, 5 – no visual symptoms.

Plant Habit Rating – Each varieties habit is visually measured at the time of harvest closest to a 110 TU reading. 1 - totally recumbent, 5 - completely erect.

rOverall Rating – An average of plant stand rating, plant habit rating, and both root rot ratings.

Table 4. Maturity Sieve Distribution and Yield - (in order of maturity)

Cultivar	Days to harv.	GDDr	% Sieve >1	% Sieve 1	% Sieve 2	% Sieve 3	% Sieve 4	% Sieve 5	% Sieve 6	% 6> Sieve	Sieve size index	Ten.	Berries (lbs/A)	Tons/Acre	Adj. Yield Based on 110 TU*	Adj. Tons/Acre*	Plants per Acre (1000)
Sherwood	54	1175	0	1	5	22	42	28	2	0	4.0	91	5741	2.87	7923	3.96	546
Sherwood	55	1192	0	1	3	13	37	41	5	0	4.3	102	6189	3.09	6746	3.37	499
Sherwood	56	1213	0	0	1	10	34	45	10	0	4.5	110	5932	2.96	5932	2.96	471
Eldorado	54	1175	0	1	5	20	37	35	2	0	4.1	93	5650	2.80	7402	3.70	547
Eldorado	55	1192	0	1	2	10	33	47	7	0	4.4	103	6621	3.30	7084	3.54	499
Eldorado	56	1213	0	0	1	8	21	42	28	0	4.9	103	6177	3.08	6609	3.30	471
Spring	54	1175	1	7	5	21	30	31	5	0	3.9	83	3683	1.84	-	-	444
Spring	55	1192	12	11	17	5	15	28	7	5	3.6	93	3721	1.86	4875	2.43	454
Spring	57	1239	0	1	2	6	19	36	33	3	4.9	102	5028	2.50	5481	2.51	407
SV3628QH	55	1192	0	2	11	39	38	10	0	0	3.4	81	5210	2.60	-	-	531
SV3628QH	57	1239	0	1	3	16	43	34	3	0	4.2	97	6413	3.20	7631	3.81	550
SV3628QH	58	1271	0	1	2	11	31	48	7	0	4.4	109	7060	3.50	7131	3.56	519
SVS795QE	57	1239	1	3	10	38	38	9	1	0	3.4	86	4775	2.39	-	-	486
SVS795QE	58	1271	1	2	8	31	43	15	0	0	3.6	95	5032	2.50	6290	3.14	412
SVS795QE	59	1310	0	1	4	24	49	20	2	0	3.9	108	5720	2.86	5834	2.91	459
PLSM-14	57	1239	0	1	4	21	31	41	2	0	4.1	83	6168	3.08	-	-	469
PLSM-14	58	1271	1	1	1	11	41	42	3	0	4.3	97	8081	4.04	9616	4.80	574
PLSM-14	59	1310	0	1	2	10	40	43	4	0	4.3	104	6807	3.40	7215	3.60	424
CS455AF	60	1352	0	0	2	11	35	44	8	0	4.5	114	8363	4.18	8028	4.01	532
CS455AF	61	1396	0	0	1	7	33	47	12	0	4.6	143	8882	4.44	7550	3.77	456
EXP461	58	1271	2	7	17	35	30	9	0	0	3.2	81	5082	2.54	-	-	562
EXP461	60	1352	0	2	6	25	39	26	2	0	3.9	108	6716	3.36	6850	3.42	502
Portage	60	1352	0	0	4	14	31	42	9	0	4.4	99	7587	3.79	8725	4.36	518
Portage	61	1396	0	0	1	9	30	50	10	0	4.6	124	8077	4.03	7350	3.67	502
EXP773	60	1352	0	0	3	13	33	45	6	0	4.4	94	7276	3.64	9313	4.65	543
EXP773	61	1396	0	0	2	10	28	47	13	0	4.6	124	8276	4.14	7531	3.75	504
BSC905	61	1396	4	12	34	37	12	1	0	0	2.5	110	6139	3.06	6139	3.06	543
BSC905	62	1439	2	14	46	35	3	0	0	0	2.3	122	6392	3.20	5881	2.94	542

Table 4. Maturity Sieve Distribution and Yield - (in order of maturity) Cont.

Cultivar	Days to harv.	GDDr	% Sieve >1	% Sieve 1	% Sieve 2	% Sieve 3	% Sieve 4	% Sieve 5	% Sieve 6	% 6> Sieve	Sieve size index	Ten.	Berries (lbs/A)	Tons/Acre	Adj. Yield Based on 110 TU*	Adj. Tons/Acre*	Plants per Acre (1000)
518	63	1476	0	1	2	7	31	50	9	0	4.5	131	8405	4.20	7396	3.69	523
DGL0027	60	1352	0	1	7	27	44	21	0	0	3.8	85	5791	2.90	-	-	552
DGL0027	61	1396	0	1	3	17	44	35	0	0	4.1	94	5633	2.81	7210	3.60	472
DGL0027	62	1439	0	0	2	8	35	51	4	0	4.5	118	7388	3.70	6945	3.47	403
Nitro	62	1439	3	15	41	39	2	0	0	0	2.3	105	5621	2.81	5902	2.95	546
Nitro	63	1476	2	10	32	52	4	0	0	0	2.5	122	5413	2.70	4980	2.49	461
EXP125	63	1476	0	1	5	27	56	11	0	0	3.7	134	6077	3.03	5287	2.64	505
BSC599	63	1476	0	0	1	6	26	58	9	0	4.7	125	8579	4.29	7807	3.90	556
Saltingo	61	1396	0	1	6	21	47	25	0	0	3.9	93	7446	3.72	9754	4.87	543
Saltingo	62	1439	0	0	4	19	45	30	2	0	4.1	101	8243	4.12	9150	4.57	558
Saltingo	63	1476	0	0	2	14	50	33	1	0	4.2	118	8483	4.24	7974	3.98	462
SV0969QH	62	1439	2	4	15	37	36	6	0	0	3.3	97	5546	2.77	6600	3.30	451
SV0969QH	63	1476	1	3	10	32	44	10	0	0	3.5	116	7160	3.58	6802	3.40	460
SV3290QF	63	1476	0	3	10	24	56	7	0	0	3.5	104	7035	3.50	7457	3.72	583
828	64	1505	2	2	4	19	54	18	1	0	3.9	156	8641	4.30	7172	3.58	563
CS494DAF	64	1505	2	2	5	26	38	22	5	0	3.9	132	5397	2.70	4749	2.37	489
CS494DAF	65	1530	0	1	8	25	42	21	3	0	3.8	158	6745	3.37	5598	2.79	514
PLS586	64	1505	1	2	2	14	52	26	3	0	4.1	129	8753	4.38	7790	3.89	554
PLS586	65	1530	0	0	1	5	41	47	6	0	4.5	158	8857	4.40	7351	3.67	480
Ricco	64	1505	0	1	2	7	22	57	11	0	4.7	124	9454	4.73	8603	4.30	486
CS464AF	64	1505	0	0	3	19	51	26	1	0	4.0	119	8894	4.45	8360	4.18	553
CS464AF	66	1556	0	0	3	16	48	30	3	0	4.1	130	8732	4.40	7771	3.88	462
PLS576	64	1505	1	1	2	9	42	40	5	0	4.3	118	9143	4.60	8594	4.29	558
PLS576	65	1530	0	0	1	6	39	46	8	0	4.5	144	9014	4.50	7662	3.83	513
BSC712	64	1505	1	1	3	17	40	35	3	0	4.2	114	9396	4.70	9020	4.51	541
BSC712	65	1530	0	0	1	9	34	45	11	0	4.6	138	9674	4.84	8320	4.16	487
DA1470	64	1505	1	2	4	22	48	21	2	0	3.9	112	6372	3.20	6245	3.12	463

Table 4. Maturity Sieve Distribution and Yield - (in order of maturity) Cont.

Cultivar	Days to harv.	GDDr	% Sieve >1	% Sieve 1	% Sieve 2	% Sieve 3	% Sieve 4	% Sieve 5	% Sieve 6	% 6> Sieve	Sieve size index	Ten.	Berries (lbs/A)	Tons/Acre	Adj. Yield Based on 110 TU*	Adj. Tons/Acre*	Plants per Acre (1000)
Boogie	65	1530	0	0	1	5	18	50	25	1	4.9	129	8247	4.12	7340	3.67	540
PLS602	65	1530	1	4	12	44	37	3	0	0	3.2	112	7322	3.66	7176	3.58	475
PLS602	66	1556	0	2	6	30	54	7	0	0	3.6	119	7413	3.70	6968	3.48	424
SV1231QF	65	1530	0	2	4	18	45	29	2	0	4.0	108	6135	3.07	6258	3.12	540
SV1231QF	66	1556	0	1	4	16	45	32	2	0	4.1	118	6990	3.50	6571	3.28	530
SV0823QG	64	1505	1	4	8	33	44	10	0	0	3.5	99	5816	2.90	6688	3.34	472
SV0823QG	66	1556	0	5	8	26	42	19	0	0	3.6	103	6235	3.12	6671	3.33	432
SV0823QG	68	1614	0	0	4	16	37	37	6	0	4.3	132	7015	3.50	6173	3.08	373
PLS196	68	1614	0	2	3	7	26	53	9	0	4.5	106	8483	4.24	8822	4.41	487
PLS196	69	1654	0	0	2	5	17	55	21	0	4.9	119	9433	4.70	8867	4.43	424
SV6844QG	68	1614	0	2	6	19	24	35	14	0	4.3	87	4555	2.30	-	-	316
SV6844QG	69	1654	0	1	4	12	27	43	13	0	4.5	93	5368	2.70	7032	3.51	286
SV6844QG	70	1683	0	1	2	8	25	39	23	2	4.7	105	6260	3.13	6573	3.28	263
SV5685QG	72	1744	0	2	6	18	32	34	8	0	4.1	76	6451	3.23	-	-	506
SV5685QG	75	1824	0	0	4	11	19	34	28	4	4.7	99	9840	4.90	11316	5.65	448
SV5685QG	76	1861	0	0	3	10	19	35	27	6	4.8	103	10147	5.07	10857	5.42	427

^ Font in bold represents harvests that were closest to a 110 TU reading

*The formula for adjusted yield is most accurate when TU readings are closest to 110 (see factors on table 7)

r Growing Degree days base 40F

-Column explanations page 9

Explanation for Headings in Table 4:

Days to Harvest - Number of days from planting until day of harvest.

Growing Degree Days (GDD) - Accumulation of heat units (base 40-degree F.) from planting until harvest.

Average sieve percentage - Berries were hand sieved with Seedburo screens. The table on the title page describes the size of the various sieves.

Sieve Size index - Sieve size index reflects the mean sieve size of the variety at harvest.

Tenderometer measurement - A model TG4EI Integrating Texturegage was used to determine the tenderometer units of each harvested plot. The average of the three harvested plots per cultivar was listed.

Yield lbs/A - Pounds per acre was determined by extrapolating the total weight of the berries per plot to obtain lbs per acre. Harvest plot was 7 rows by 5 ft in length or 35 row feet. (43560 sq ft/A/.5 ft = 87,120 row ft per acre. 87120 row ft /A divided by 35 harvested row ft gives a factor of 2489. This factor was multiplied by total berry weight harvested per plot to obtain lbs per acre.

Yield - Tons per acre - The weight of the harvested berries was extrapolated to tons per acre.

Adjusted Yield lbs/acre – A correlation factor was used to adjust yield based on a tenderometer reading of 110. For example, if a sample read 90 Tenderometer Units, we would then multiple the yield by a correlation factor of 1.42. Please see correlation factors in Table 7.

Plant population per acre - An extrapolation of the number of harvested plants to plants per acre.

Table 5. Plant and Pod Characteristics (In order of maturity)

Cultivar	Node to first flower (avg.)	Vine length (in) (avg.)	Ht. at harvest (in)	Pods per plant (avg.)	Avg. # nodes w/ pods/ plt.	# of Single pods/ node	# of Double pods/ node	# Triple pods/ node	# Quad. pods/ node	% of Single pods/ node	% of Double pods/ node	% of Triple pods/ node	% of Quad. pods/ node	Berries per pod (avg.)	Pod length (in) (avg.)
Sherwood	9	14	10 to 11	2.80	2.20	1.50	0.67	0.00	0.00	69	31	0	0	5.8	2.5
Eldorado	10	21	10 to 11	4.00	3.60	3.10	0.43	0.00	0.00	88	12	0	0	6.0	2.7
Spring	9	18	11 to 12	2.80	2.30	1.76	0.53	0.00	0.00	77	23	0	0	5.4	2.9
SV3628QH	11	16	10	3.10	1.90	0.73	1.10	0.03	0.00	39	60	1	0	7.6	2.8
SVS795QE	9	14	11	3.70	2.50	1.30	1.20	0.00	0.00	51	49	0	0	6.7	2.6
PLSM14	8	17	10 to 11	3.60	2.20	0.67	1.50	0.00	0.00	31	69	0	0	7.1	2.7
CS455AF	9	15	10 to 12	3.6	2.10	0.83	1.10	0.16	0.00	39	53	8	0	6.7	2.8
EXP461	11	15	10 to 12	4.9	3.10	1.40	1.70	0.03	0.00	44	55	1	0	6.4	2.8
Portage	11	17	9 to 11	4.0	2.30	0.83	1.20	0.23	0.00	36	54	10	0	5.6	2.6
EXP773	10	18	10 to 12	4.3	2.70	1.10	1.50	0.07	0.00	42	56	2	0	6.1	2.7
BSC905	10	18	11 to 13	5.8	3.40	1.40	1.60	0.36	0.00	41	48	11	0	7.9	2.7
518	10	16	10 to 13	3.6	3.30	3.00	0.30	0.00	0.00	91	9	0	0	7.6	3.7
DGL0027	10	20	11 to 13	3.2	2.30	1.43	0.90	0.00	0.00	61	39	0	0	7.4	3.6
Nitro	12	16	10 to 13	5.4	2.93	1.03	1.30	0.60	0.00	35	44	21	0	8.2	4.7
EXP125	12	17	11 to 13	3.3	1.96	0.83	0.96	0.20	0.00	42	49	9	0	6.9	3.0
BSC599	14	24	11 to 13	4.8	3.26	1.73	1.53	0.00	0.00	53	47	0	0	8.0	3.5
Saltingo	11	20	11 to 13	3.9	2.50	1.10	1.40	0.00	0.00	43	57	0	0	7.7	3.4
SV0969QH	11	17	10 to 12	4.4	2.50	0.86	1.23	0.36	0.00	35	50	15	0	7.1	3.1
SV3290QF	12	18	11 to 14	5.9	3.03	1.16	1.06	0.63	0.16	38	35	21	6	6.4	3.5
828	12	18	10 to 13	4.00	2.20	0.63	1.36	0.20	0.00	29	62	9	0	6.9	2.8
CS494DAF	10	15	10 to 13	2.70	2.13	1.60	0.53	0.00	0.00	75	25	0	0	7.4	3.2
PLS586	11	15	10 to 12	3.2	2.13	1.23	0.70	0.20	0.00	58	33	9	0	7.4	3.2

Table 5. Plant and Pod Characteristics (In order of maturity) Cont.

Cultivar	Node to first flower (avg.)	Vine length (in) (avg.)	Ht. at harvest (in)	Pods per plant (avg.)	Avg. # nodes w/ pods/plt.	# of Single pods/ node	# of Double pods/ node	# Triple pods/ node	# Quad. pods/ node	% of Single pods/ node	% of Double pods/ node	% of Triple pods/ node	% of Quad. pods/ node	Berries per pod (avg.)	Pod length (in) (avg.)
CS464AF	13	20	11 to 13	4.70	2.90	1.36	1.26	0.26	0.00	47	44	9	0	6.5	3.0
PLS576	11	18	11 to 13	4.10	2.93	1.83	1.03	0.06	0.00	63	35	2	0	8.2	3.3
BSC712	12	20	11 to 14	3.5	2.20	1.06	0.96	0.16	0.00	48	44	8	0	6.7	2.6
DA1470	10	16	11 to 13	3.10	2.16	1.26	0.90	0.00	0.00	58	42	0	0	5.7	2.9
Boogie	12	15	10 to 13	3.90	2.46	1.16	1.20	0.10	0.00	47	49	4	0	6.2	2.9
PLS602	13	20	11 to 13	5.20	3.16	1.16	2.00	0.00	0.00	37	63	0	0	7.8	3.1
SV1231QF	14	20	12 to 15	4.60	2.63	1.06	1.06	0.43	0.06	41	41	16	2	7.8	2.9
SV0823QG	13	21	11 to 15	5.60	2.86	0.76	1.46	0.63	0.00	27	51	22	0	6.8	3.2
PLS196	12	17	11 to 13	3.70	2.36	1.10	1.23	0.03	0.00	47	52	1	0	8.4	3.5
SV6844QG	14	21	12 to 15	4.30	3.26	2.26	0.96	0.03	0.00	69	30	1	0	8.3	3.1
SV5685QG	20	25	11 to 16	5.20	3.20	1.40	1.56	0.23	0.00	44	49	7	0	8.8	3.7

Explanation for Table 5:

This data was derived from 30 plants harvested the same day as our yield harvest that was closest to our objective of 110 tenderometer unit reading. Example – Variety X was harvested twice at tenderometer readings of 99 and 116. The afternoon of the second harvest (116 units), 30 plants were harvested from the back of the plot, weighed and pods were hand stripped and berries were hand shelled.

Node to first flower - The average number of nodes on the stem until the first flower (included that one or two at the soil line or below).

Height at Harvest – Height was measured day of optimal harvest.

Pods per plant - The total number of pods was divided by 30 (number of plants) to determine average pods per plant.

Average Number of nodes with pods per plant - The number of nodes that had pods were counted and recorded.

Number and percentage of single pods, double pods or triple pods per node - The number of pods per node were hand counted and the number of single pods, double pods and triple pods were recorded. This was changed to a percentage.

Berries per pod – Ten uniform pods were selected and opened. The average of berries per pod in this group was listed.

Pod length - 10 pods were lined up and measured in inches and an average reported.

Table 6. Maturity

Cultivar	Day 54 1175 6/21	Day 55 1192 6/22	Day 56 1213 6/23	Day 57 1239 6/24	Day 58 1271 6/25	Day 59 1310 6/26	Day 60 1352 6/27	Day 61 1396 6/28	Day 62 1439 6/29	Day 63 1476 6/30	Day 64 1505 7/01	Day 65 1530 7/02	Day 66 1556 7/03	Day 67 1582 7/04	Day 68 1614 7/05	Day 69 1654 7/06	Day 70 1683 7/07	Day 71 1713 7/08	Day 72 1744 7/09	Day 73 1771 7/10	Day 74 1796 7/11	Day 75 1824 7/12	Day 76 1861 7/13
Sherwood	92	102	110																				
Eldorado	93	103	103																				
Spring	83	93		102																			
SV3628QH		81		97	109																		
SVS795QE				86	95	108																	
PLSM14				83	97	104																	
CS455AF							114	143															
EXP461					81		108																
Portage							99	124															
EXP773							94	124															
BSC905								110	122														
S18									119	131													
DGL0027							85	94	118														
Nitro									105	122													
EXP125										134													
BSC599										125													
Saltingo								93	101	118													
SV0969QH									97	116													
SV3290QF										104													
828											156												
CS494DAF											132	158											
PLS586											129	158											
Ricco											124												
CS464AF											119	130											
PLS576											118	144											
BSC712											114	138											
DA1470											112												
Boogie											110	129											
PLS602												112	119										
SV1231QF												108	118										
SV0823QG											99		103		132								
PLS196															106	119							
SV6844QG															87	93	105						
SVS685QG																			76			99	103

*Growing Degree Days (GDD) base 40F

Table 7. Weather Summary and 110 tenderometer chart										
Date	day	Mean Temp.	Min. Temp.	Max. Temp.	Precip.	Acc Precip.	Degree days base (40F)	acc dd units base 40	Ten. Units	Correlation factor for Yield
4/28/21	0	59.5	49.5	70.5	0.05	0.05	0	0	80	2.33
4/29/21	1	49.4	46.4	51.6	0.52	0.57	9	9	81	2.18
4/30/21	2	45.7	33.6	50.2	0.02	0.59	2	11	82	2.05
Total Precipitation April ----->						**0.59 in**		**11 GDD**		

Table 7. Weather Summary and 110 tenderometer chart cont.										
Date	day	Mean Temp.	Min. Temp.	Max. Temp.	Precip.	Acc Precip.	Degree days base (40F)	acc dd units base 40	Ten. Units	Correlation factor for Yield
5/1/21	3	44.0	33.4	56.8	0.01	0.01	5	16	83	1.93
5/2/21	4	56.3	49.3	63.7	0.02	0.03	17	33	84	1.82
5/3/21	5	56.7	49.3	66.6	0.13	0.16	18	51	85	1.72
5/4/21	6	61.3	51.8	73.6	0.08	0.24	23	74	86	1.64
5/5/21	7	52.4	46.9	58.5	0.07	0.31	12	86	87	1.57
5/6/21	8	47.2	39.9	54.9	0.00	0.31	7	93	88	1.51
5/7/21	9	42.1	34.0	49.8	0.32	0.63	2	95	89	1.46
5/8/21	10	45.0	39.6	52.9	0.33	0.96	6	101	90	1.42
5/9/21	11	45.8	40.3	54.0	0.31	1.27	7	108	91	1.38
5/10/21	12	48.4	41.4	57.4	0.05	1.32	9	117	92	1.34
5/11/21	13	45.9	38.3	52.5	0.00	1.32	5	122	93	1.31
5/12/21	14	51.1	40.6	61.5	0.00	1.32	11	133	94	1.28
5/13/21	15	55.9	45.9	66.0	0.00	1.32	16	149	95	1.25
5/14/21	16	58.7	48.6	70.2	0.00	1.32	19	168	96	1.22
5/15/21	17	59.0	43.0	72.3	0.00	1.32	18	186	97	1.19
5/16/21	18	58.1	43.2	71.1	0.00	1.32	17	203	98	1.17
5/17/21	19	61.6	48.0	74.1	0.00	1.32	21	224	99	1.15
5/18/21	20	65.3	48.4	78.6	0.00	1.32	24	248	100	1.13
5/19/21	21	69.3	53.6	83.7	0.00	1.32	29	277	101	1.11
5/20/21	22	70.8	55.8	87.4	0.00	1.32	32	309	102	1.09
5/21/21	23	74.9	61.0	90.3	0.00	1.32	36	345	103	1.07
5/22/21	24	73.3	66.2	81.5	0.00	1.32	34	379	104	1.06
5/23/21	25	66.3	55.0	78.3	0.00	1.32	26	405	105	1.05
5/24/21	26	61.1	44.8	75.2	0.00	1.32	20	425	106	1.04
5/25/21	27	70.0	58.8	88.5	0.07	1.39	34	459	107	1.03
5/26/21	28	72.7	64.2	85.3	0.18	1.57	34	493	108	1.02
5/27/21	29	56.8	45.7	63.3	0.00	1.57	15	508	109	1.01
5/28/21	30	44.2	41.5	46.6	0.58	2.15	4	512	110	1.00
5/29/21	31	48.9	41.9	56.8	0.04	2.19	9	521	111	0.99
5/30/21	32	50.7	41.4	58.6	0.00	2.19	10	531	112	0.98
5/31/21	33	58.7	42.1	71.6	0.00	2.19	17	548	113	0.97
Total Precipitation May ----->						**2.19 in**		**548 GDD**		

Table 7. Weather Summary and 110 tenderometer chart cont.										
Date	day	Mean Temp.	Min. Temp.	Max. Temp.	Precip.	Acc Precip.	Degree days base (40F)	acc dd units base 40	Ten. Units	Correlation factor for Yield
6/1/21	34	63.3	52.5	74.5	0.00	0.00	24	572	114	0.96
6/2/21	35	62.7	48.9	73.0	0.00	0.00	21	593	115	0.96
6/3/21	36	66.1	60.8	75.4	0.34	0.34	28	621	116	0.95
6/4/21	37	70.7	59.7	81.0	0.00	0.34	30	651	117	0.95
6/5/21	38	77.1	66.2	87.3	0.00	0.34	37	688	118	0.94
6/6/21	39	78.3	64.6	89.8	0.00	0.34	37	725	119	0.94
6/7/21	40	78.3	65.3	89.8	0.06	0.40	38	763	120	0.93
6/8/21	41	74.6	69.3	83.1	0.31	0.71	36	799	121	0.93
6/9/21	42	74.5	66.9	79.9	0.00	0.71	32	831	122	0.92
6/10/21	43	69.2	58.3	80.8	0.00	0.71	30	861	123	0.92
6/11/21	44	68.2	54.7	82.2	0.00	0.71	28	889	124	0.91
6/12/21	45	68.1	60.6	79.2	0.00	0.71	29	918	125	0.91
6/13/21	46	71.8	56.5	83.8	0.00	0.71	30	948	126	0.90
6/14/21	47	67.5	59.7	74.5	0.49	1.20	27	975	127	0.90
6/15/21	48	62.6	59.2	70.3	0.01	1.21	25	1000	128	0.89
6/16/21	49	60.6	51.8	68.9	0.01	1.22	20	1020	129	0.89
6/17/21	50	63.9	52.7	75.4	0.00	1.22	24	1044	130	0.89
6/18/21	51	68.3	54.9	79.2	0.01	1.23	28	1072	131	0.88
6/19/21	52	74.7	63.7	85.5	0.20	1.43	35	1107	132	0.88
6/20/21	53	71.2	58.1	84.2	0.00	1.43	31	1138	133	0.88
6/21/21	54	75.0	66.4	89.1	0.81	2.24	37	1175	134	0.87
6/22/21	55	58.2	52.7	64.4	0.00	2.24	17	1192	135	0.87
6/23/21	56	60.6	48.6	73.9	0.00	2.24	21	1213	136	0.87
6/24/21	57	67.4	52.9	78.4	0.00	2.24	26	1239	137	0.86
6/25/21	58	72.2	61.9	82.9	0.00	2.24	32	1271	138	0.86
6/26/21	59	77.3	68.2	88.9	0.00	2.24	39	1310	139	0.86
6/27/21	60	81.9	71.6	92.3	0.00	2.24	42	1352	140	0.86
6/28/21	61	83.8	75.7	93.0	0.00	2.24	44	1396	141	0.85
6/29/21	62	79.8	70.5	95.4	0.24	2.48	43	1439	142	0.85
6/30/21	63	76.3	70.7	83.5	0.12	2.60	37	1476	143	0.85
Total Precipitation June				**---->**		**2.60 in**		**1476 GDD**		

Table 7. Weather Summary and 110 tenderometer chart cont.										
Date	day	Mean Temp.	Min. Temp.	Max. Temp.	Precip.	Acc Precip.	Degree days base (40F)	acc dd units base 40	Ten. Units	Correlation factor for Yield
7/1/21	64	70.5	64.8	75	0.00	0.00	29	1505	144	0.85
7/2/21	65	63.5	58.8	70.3	0.80	0.80	25	1530	145	0.85
7/3/21	66	65.1	60.3	72.5	0.07	0.87	26	1556	146	0.84
7/4/21	67	67.0	59.2	74.3	0.00	0.87	26	1582	147	0.84
7/5/21	68	72.2	55.0	89.1	0.00	0.87	32	1614	148	0.84
7/6/21	69	79.8	73.6	85.6	0.00	0.87	40	1654	149	0.84
7/7/21	70	70.3	61.0	76.6	0.84	1.71	29	1683	150	0.84
7/8/21	71	68.5	61.2	77.5	0.38	2.09	30	1713	151	0.83
7/9/21	72	69.0	63.9	77.9	0.40	2.49	31	1744	152	0.83
7/10/21	73	67.2	61.5	74.1	0.01	2.50	27	1771	153	0.83
7/11/21	74	64.5	59.4	70.9	0.28	2.78	25	1796	154	0.83
7/12/21	75	67.0	61.7	74.5	0.39	3.17	28	1824	155	0.83
7/13/21	76	75.5	68.0	85.3	0.13	3.30	37	1861	156	0.83
Total Precipitation July ----->						**3.30 in**		**1861 GDD**		

*Growing degree days (GDD) base 40F

Descriptions Provided by the Seed Source:

Spring - Pure Line, normal leaf, 1100 heat units, 4.5 average sieve size, 9 nodes to flower, 1-2 pods per plant, 6-7 berries per pod, 16-inch plant height, resistance to Fusarium wilt race 1.

Eldorado – Pure Line, normal leaf type, 3.8 sieve size, -1 days to maturity relative to Spring, 1100 heat units, resistant to Fusarium race 1 and powdery mildew.

Sherwood - Seminis, normal leaf, 1160 heat units, 3.3 sieve size, IR: PV, HR: BYMV/FOP:1

SVS795QE - Seminis, normal leaf, 1170 GDD base 40F. 10 nodes to blossom.

SV3628QH - Seminis, normal leaf, 1205 GDD base 40F. 10-11 nodes to blossom.

EXP 461 – Brotherton, afila leaf type, 1216 heat units, 59 days to maturity, 3.2 average sieve size.

DGL0027 - Pure Line, afila leaf type, 1250 GDD base 40F. 3.5 sieve index and 12 nodes to flower.

PLSM14 - Pure Line, normal leaf type, +4 days to maturity relative to Spring, 1250 heat units, 3.8 sieve size, resistance to Fusarium Wilt race1.

CS-455AF - Crites, 1355 heat units to maturity, aflia leaf type, disease resistance: Fop 1, Pv+, 2 days earlier than Portage, good root system.

Saltingo - Pure Line, afila leaf type, 3.5 sieve size, +4 days to maturity relative to Spring, 1300 heat units, resistant to Fusarium Wilt race 1 and powdery mildew, tolerant to downy mildew and pea enation mosaic virus.

Portage – Crites, midseason maturity, 60 days to maturity or approximately 1305 heat units (+ 2 days relative to Tomahawk), afila leaf type, 18 inch plant height, 10 nodes to first bloom, 2-3 pods per node, 7-8 peas per pod, 3.7 sieve size index, resistant to fusarium wilt race 1.

BSC905 – Brotherton, normal leaf, 1332 Heat Units, 65 days to maturity, 1.4 sieve index.

EXP125 - Brotherton, afila leaf type, 1332 heat units. 65 days to maturity, 3.1 average sieve size.

EXP773 - Brotherton, normal leaf, 1332 GDD base 40F. 3.4 sieve index and 13 nodes to blossom.

SV0969QH - Seminis, normal leaf, 1360 GDD base 40F. 3.1 sieve index.

Nitro – Seminis, 1370 heat units, normal leaf, 2 sieve size, HR: BYMV/FOP.

GVS 518 – Gallatin Valley, Mid-season Afila type, 67 days to maturity, 1410 heat units, 12-13 nodes to first flower, plant height 25", avg. 2 pods per node, avg. sieve size is 3.8, pointed pod shape.

BSC712 – Brotherton, 1422 heat units, afila leaf type, 68 days to maturity, 3.8 average sieve size. 14 nodes to blossom.

PLS586 – Pure Line, afila leaf type, 1430 GDD base 40F. 4.0 sieve index and 12-13 nodes to flower.

Descriptions Provided by the Seed Source Continued:

CS494DAF – Crites, afila leaf type, 1470 heat units, 71 days to maturity, 2.8 average sieve size, small sieve size class.

SV3290QF – Seminis, normal leaf, 1450 GDD base 40F. 14-15 nodes to blossom.

PLS576 – Pure Line, afila leaf type, 1450 GDD base 40F. 3.6 sieve index and 12-13 nodes to flower.

BSC599 – Brotherton, afila leaf type, 1469 heat units, 3.8 average sieve size. 15 nodes to blossom.

DA1470 (EX08540794) – Seminis, 1470 heat units, determinate afila type, 3.2 average sieve size, 2-3 pods per node, 8-9 berries per pod, 18 inch plant height, HR for Fusarium R1 and bean yellow mosaic virus. Sweet savor gene which slows conversion of sugar to starch, true determinate plant type which allows for improved sieve distribution and less waste at harvest from immature fruit.

PLS602 – Pure Line, afila leaf type, +11 days to maturity relative to Spring, 1470 heat units, 3.1 sieve size, resistance to FWr1,r2, Fus.RR, PM.

SV1231QF – Seminis, 1480 heat units, afila sweet savor, 15 nodes to first flower, 2-3 pods per node, 7-8 berries per pod, IR for Downy Mildew, HR for Powdery Mildew, Fusarium R1&R2, pea enation mosaic virus and bean yellow mosaic virus

Boogie – Brotherton, afila, 1490 HU or 68 days to maturity. 4.3 sieve and 14-15 nodes to first flower. Resistance to PM and tolerance to DM.

828 - Gallatin Valley, afila leaf type, 14 nodes to bloom, 1500 heat units, 3.8 sieve.

SV0823QG – Seminis, 1525 heat units, afila plant type, 3.3 average sieve size, 17 nodes to first flower, 2-3 pods per node, 8-9 berries per pod, 45 cm plant height, 2600 seeds per pound, Ir for Downy Mildew and HR for Powdery Mildew, Fusarium R1 and Pea Enation mosaic virus.

Ricco – Gallatin Valley, Main season variety 1530 heat units, afila leaf type, 16 nodes to first flower, 26 inch plant height, 2 pods per node, 3.7 average sieve size, 8-9 berries per pod, pointed pod shape, HR for Fusarium wilt race 1 and IR for race 2, HR for Bean Leaf Roll Virus and Powdery Mildew race 1, dark green foliage, excellent disease package including root rot tolerance, superior yield, medium size berry, uniform berry color, widely adapted.

CS-464AF – Crites, 1565 heat units to maturity, disease resistance: Fop 1&2, Ep, PEMV, afila type leaf, triple pods, main-season, disease package.

SV6844QG - Seminis, 1600 heat units, afila, Fasc; sweet savor, 3.6 sieve size, 17 nodes to first flower, 2-3 pods per node, 7-8 berries per pod, IR for Downy Mildew, HR for Powdery Mildew, Fusarium R1 &R2, Pea Enation Mosaic Virus and Bean yellow mosaic virus.

PLS196 – Pure Line, afila, +13 days to maturity relative to Spring, 1600 heat units, 4.0 sieve, resistance to FWr1,2, Fus.RR, PM, tolerant: Downy Mildew.

SV5685QG – Seminis, 1750 heat units, normal leaf.

- 2021 Annual Cutting -

A socially distanced, vegetable "cutting", is planned for November 4th, where frozen peas, snap beans, and sweet corn will be put on display for processors and seed companies to evaluate. Large and 3-4 sieve snap beans were canned and will also be put on display. Our vegetable cutting is the final step of our program's evaluation. We evaluate the horticultural characteristics in the field and in raw products, but our vegetable cutting takes us all the way to quality evaluation on the plate.


Bonduelle
PEA VARIETY TRIAL 2021

In collaboration with:

Ontario Processing Vegetable Growers

Brotherton Seed

PureLine Seeds, Inc

Storm Seeds
passion for leguminose

Seminis

Gallatin Valley Seed Company

Vilmorin
SEED GENERATION

Summary

The plot was located just North of Belmont, Ontario.
Thirty-eight unique varieties were planted on May 10, 2021.
There was no second planting.

The plot was visited weekly prior to bloom, twice or three times weekly post-bloom and pre-podset, and daily from podset to harvest.

The trial received adequate rainfall and heat during germination and from VE-V6
Mid June saw a short period of drought, but no impact was seen on the trial.

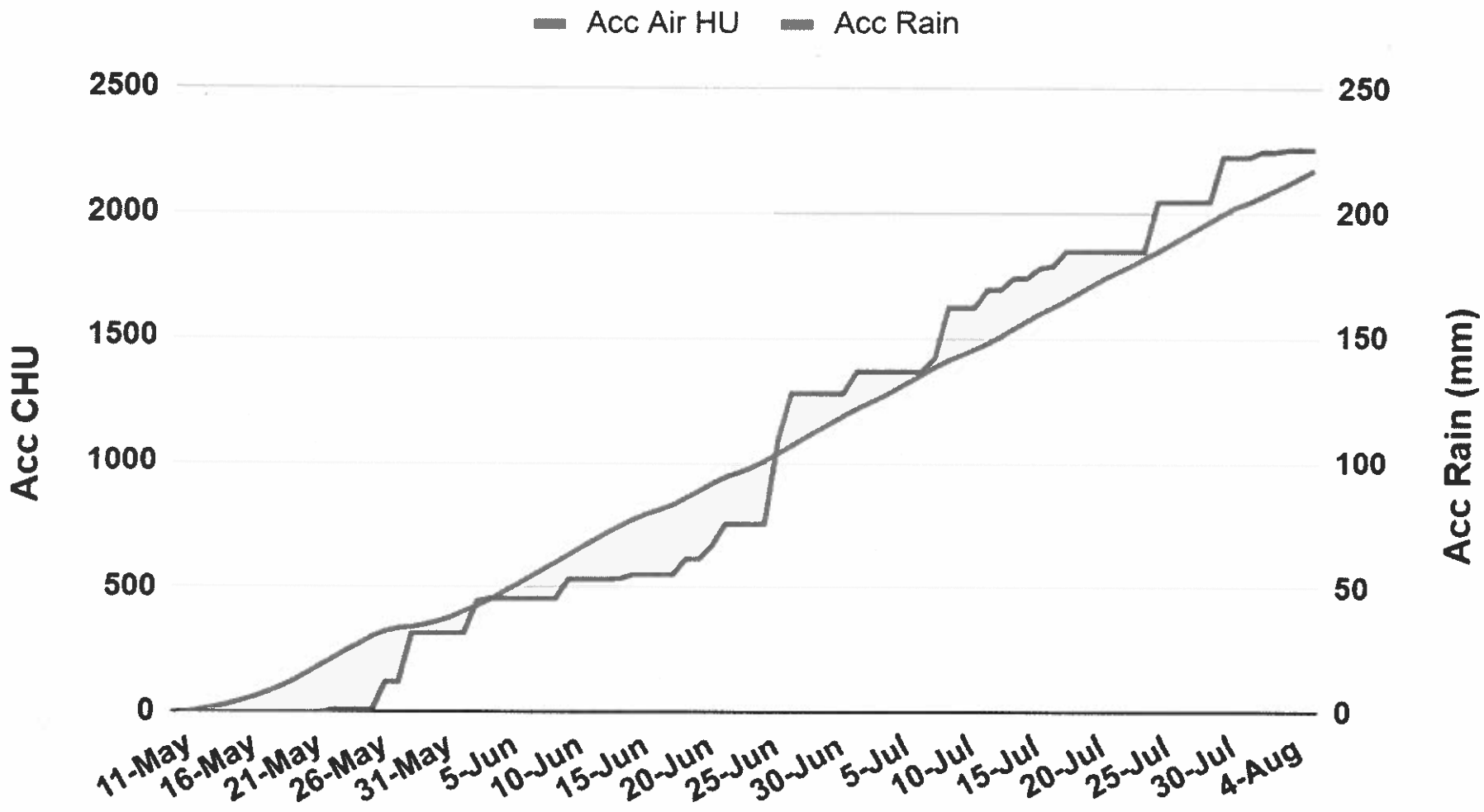
Some varieties experienced severe herbicide damage around V5. Some recovered very well and others were not harvested.

Some varieties experienced stress due to aphid pressure. This did not have an impact on results.

Reported yields are in tons per acre and adjusted to 110 TD.

SEASON WEATHER

Crop Heat Units and Rainfall For The 2021 Crop Season



DATA SUMMARY

Date	Variety	Sieve Size						AVG TD	Yield (Tons/Acre)	Adjusted Yield	HU
		1	2	3	4	5	Avg.				
6-Jul	Lil Mo	0.99%	23.15%	67.98%	7.88%	0.00%	2.83	173	3.93	3.26	1354
10-Jul	Lil Mo	37.97%	50.00%	11.39%	0.63%	0.00%	1.75	153	3.06	2.54	1455
6-Jul	BSC 489	53.26%	29.35%	17.39%	0.00%	0.00%	1.64	98	1.78	2.08	1354
7-Jul	BSC 489	35.88%	32.82%	30.53%	0.76%	0.00%	1.96	112	2.54	2.51	1384
10-Jul	BSC 489	21.17%	46.85%	31.08%	0.90%	0.00%	2.12	167	4.30	3.57	1455
6-Jul	Nitro	72.26%	18.25%	8.76%	0.73%	0.00%	1.38	104	2.65	2.84	1354
7-Jul	Nitro	45.45%	27.27%	22.73%	4.55%	0.00%	1.86	91	0.43	0.59	1384
10-Jul	Nitro	17.68%	44.51%	34.15%	3.05%	0.61%	2.24	164	3.18	2.64	1455
6-Jul	BSC 481	21.83%	46.48%	5.63%	26.06%	0.00%	2.36	129	2.75	2.45	1354
10-Jul	813	100.00%	0.00%	0.00%	0.00%	0.00%	1.00	80	0.54	1.26	1455
13-Jul	813	100.00%	0.00%	0.00%	0.00%	0.00%	1.00	79	0.95		1537
15-Jul	813	64.04%	23.60%	12.36%	0.00%	0.00%	1.48	93	1.72	2.26	1597
16-Jul	813	75.31%	20.99%	2.47%	1.23%	0.00%	1.30	98	1.57	1.83	1622
18-Jul	813	56.58%	38.79%	4.27%	0.36%	0.00%	1.48	129	5.44	4.84	1679
10-Jul	CS-439	100.00%	0.00%	0.00%	0.00%	0.00%	1.00	83	1.24	2.39	1455
12-Jul	CS-439	39.08%	41.38%	18.39%	1.15%	0.00%	1.82	99	1.68	1.94	1507
13-Jul	CS-439	27.16%	46.30%	21.60%	4.94%	0.00%	2.04	101	3.14	3.48	1537
15-Jul	CS-439	9.82%	42.94%	33.74%	7.36%	6.13%	2.57	131	3.16	2.78	1597
17-Jul	Zonvert	81.82%	15.91%	2.27%	0.00%	0.00%	1.20	76	0.85		1649
18-Jul	Zonvert	69.23%	23.93%	5.98%	0.85%	0.00%	1.38	95	2.27	2.83	1679
19-Jul	Zonvert	50.00%	46.67%	3.33%	0.00%	0.00%	1.53	95	0.58	0.73	1709
20-Jul	Zonvert	55.92%	33.55%	9.21%	1.32%	0.00%	1.56	108	2.94	3.00	1739
15-Jul	SV 7441 QC	52.21%	24.26%	10.29%	6.62%	6.62%	1.91	105	2.63	2.79	1597
16-Jul	SV 7441 QC	67.44%	30.23%	1.16%	1.16%	0.00%	1.36	110	1.66	1.66	1622
17-Jul	SV 7441 QC	50.98%	37.91%	11.11%	0.00%	0.00%	1.60	139	2.96	2.55	1649
6-Jul	534	100.00%	0.00%	0.00%	0.00%	0.00%	1.00	141	0.56	0.48	1354
6-Jul	SV 6485 QH	4.26%	10.64%	59.57%	19.15%	6.38%	3.13	113	0.91	0.88	1354
16-Jul	ASR 3221	4.42%	6.08%	34.81%	37.02%	17.68%	3.57	223	3.50	2.91	1622
6-Jul	Portage	3.66%	1.22%	23.17%	32.93%	39.02%	4.02	121	1.59	1.48	1354
6-Jul	Saltingo	18.75%	3.75%	30.00%	32.50%	15.00%	3.21	114	1.55	1.50	1354
7-Jul	Saltingo	1.02%	4.08%	33.67%	35.71%	25.51%	3.81	128	1.90	1.69	1384
6-Jul	Ambler	0.00%	0.00%	13.61%	41.42%	44.97%	4.31	161	3.27	2.72	1354
6-Jul	EXP 125	0.00%	0.00%	0.00%	0.00%	100.00%	5.00	101	0.89	0.99	1354
7-Jul	EXP 125	1.92%	5.77%	42.31%	30.77%	19.23%	3.60	115	1.01	0.97	1384

DATA SUMMARY - CONTINUED

Date	Variety	Sieve Size						AVG TD	Yield (Tons/Acre)	Adjusted Yield	HU
		1	2	3	4	5	Avg.				
6-Jul	Reliance	25.00%	26.79%	41.96%	5.36%	0.89%	2.30	100	2.17	2.45	1354
7-Jul	Reliance	10.34%	21.38%	56.55%	11.03%	0.69%	2.70	108	2.81	2.89	1384
7-Jul	CS-494DAF	33.33%	20.51%	44.87%	1.28%	0.00%	2.14	92	1.51	2.08	1384
10-Jul	CS-494DAF	5.63%	20.19%	58.69%	15.02%	0.47%	2.85	134	4.12	3.59	1455
10-Jul	Amalfi	13.64%	29.55%	44.70%	10.61%	1.52%	2.57	154	2.56	2.12	1455
10-Jul	PLS 602	25.20%	32.28%	37.80%	4.72%	0.00%	2.22	99	2.46	2.83	1455
12-Jul	PLS 602	5.61%	24.30%	62.62%	6.54%	0.93%	2.73	113	2.07	2.01	1507
12-Jul	SV 0823 QG	16.42%	29.85%	40.30%	8.96%	4.48%	2.55	95	1.30	1.62	1507
13-Jul	SV 0823 QG	14.07%	19.26%	37.78%	21.48%	7.41%	2.89	104	2.61	2.80	1537
15-Jul	SV 0823 QG	6.69%	9.51%	36.27%	32.75%	14.79%	3.39	138	5.50	4.73	1597
15-Jul	BSC 691	9.50%	13.41%	23.46%	25.14%	28.49%	3.50	113	3.47	3.40	1597
15-Jul	Welland	11.76%	21.93%	40.11%	18.18%	8.02%	2.89	161	3.62	3.00	1597
13-Jul	Tyne	18.67%	8.00%	20.00%	18.67%	34.67%	3.43	98	1.45	1.70	1537
15-Jul	Tyne	11.60%	13.81%	33.70%	27.07%	13.81%	3.18	135	3.50	3.05	1597
12-Jul	CS-498	19.50%	34.59%	38.99%	6.92%	0.00%	2.33	120	3.08	2.86	1507
15-Jul	Concept	13.16%	15.13%	36.18%	3.95%	31.58%	3.26	118	2.94	2.80	1597
19-Jul	Ballade	33.33%	30.00%	26.67%	6.67%	3.33%	2.17	78	0.58		1709
20-Jul	Ballade	17.39%	19.57%	35.87%	20.65%	6.52%	2.79	87	1.78	2.80	1739
23-Jul	Ballade	13.18%	13.18%	33.33%	29.46%	10.85%	3.12	117	2.50	2.37	1816
15-Jul	Valkon	7.51%	11.56%	30.06%	35.84%	15.03%	3.39	97	3.35	3.99	1597
16-Jul	Valkon	6.25%	4.69%	10.94%	37.50%	40.63%	4.02	104	2.48	2.63	1622
17-Jul	Valkon	0.00%	3.54%	17.70%	30.09%	48.67%	4.24	120	2.19	2.03	1649
17-Jul	SV 5685 QG	10.11%	13.48%	28.09%	26.97%	21.35%	3.36	83	1.72	3.33	1649
18-Jul	SV 5685 QG	5.83%	9.17%	22.50%	26.67%	35.83%	3.78	91	2.32	3.21	1679
19-Jul	SV 5685 QG	5.52%	4.83%	20.69%	24.14%	44.83%	3.98	106	2.81	2.92	1709
20-Jul	SV 5685 QG	0.48%	3.38%	13.04%	23.19%	59.90%	4.39	120	4.01	3.77	1739