2019 Vegetable Research Reports

	Title	Researcher
1	Weed Control Evaluations in Peas	D. E. Robinson
2	Weed Control Evaluations in Carrots	D. E. Robinson
3	Weed Control Evaluations in Pumpkins and Squash	D. E. Robinson
4	Weed Control Evaluations in Snap and Lima Bean	D. E. Robinson
5	NYS Processing Snap Bean and Sweet Corn Evaluations	J. Ballerstein
6	Neonicotinoid alternatives for management of cucumber beetle in cucumber and squash*	C. Truemen
7	2019 Processing pea cultivar evaluation	Bonduelle
8	Using Genetic Tests to Confirm Herbicide Resistant Weeds in Horticulture Crops	K. Obeid

* This funding is split 50/50 between Vegetable Research and Cucumber Research Committees

RESEARCH SUMMARY

WEED CONTROL IN PROCESSING VEGETABLES (2019)

BY:DARREN ROBINSON–UNIVERSITY OF GUELPH–RIDGETOWN CAMPUS

Tolerance of Lima Bean to Herbicides.
Two trials were 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) was observed early in the growing season. By crop maturity, lima bean had outgrown the injury.

Tolerance of Snap Bean to Herbicides.
Two trials were 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). Though yield was not less than the untreated check in any of the pethoxamid treatments, some injury symptoms (leaf puckering) 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.

Herbicide Tolerance in Carrots
Two trials were established to develop management strategies for control of linuron-resistant pigweed in carrot.

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 125 to 500 g/ha at the early application timing (ie. 2-3 leaf), injury increased from 2-39%, and 1-49% at 7 and 28 days after herbicide treatment (DAT). Visible injury increased from 3-37% and 8-19% 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.**

A second trial was established to determine the tolerance of carrot to preemergence and early postemergence (2-3 leaf stage of carrot) herbicides for control of linuron-resistant pigweed in carrot, as well as Canada fleabane and other weeds present in the trial.

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 Canada fleabane, redroot pigweed 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+Prowl H20 (PRE) were followed by Blazer micro-rates.

Tolerance of Processing Peas to PRE applications of Zidua
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 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 7% in all pea cultivars at both rates of pyroxasulfone (Zidua®), at 7, 14 and 28 days after emergence (DAE), respectively. Injury symptoms included leaf puckering and shortened midribs (drawstringing). Despite the injury in these two cultivars, 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.

BASF has been approached to support a minor use for Zidua in pea – the herbicide offers residual control of Group 2 resistant eastern black nightshade, which would be a useful tool for pea growers.

Effect of Application Timing, Rate and Soil Type on Pea Tolerance To Flumioxazin
Three trials were established to determine pea tolerance to PPI and PRE applications of flumioxazin (Valtera) on sand, loam and clay loam soils. Valtera is a PPI or PRE herbicide with efficacy on Group 2 resistant black nightshade and common ragweed, and would be an excellent tank mix partner with Dual II Magnum. Though it is a residual herbicide, it does not have the same potential to carryover to vegetable crops as Pursuit. Valtera did not cause significant visual injury to pea, nor did it negatively impact pea maturity or yield.

Data were provided to PMRA to support the UMRULE submission for Valtera in peas that was initially submitted in 2015.

WEED CONTROL IN PROCESSING VEGETABLES

RESEARCH RESULTS – 2019

PREPARED BY DARREN ROBINSON,
RIDGETOWN CAMPUS

FOR THE ONTARIO PROCESSING VEGETABLE GROWERS

NOVEMBER 1, 2019

ACKNOWLEDGEMENTS

Purpose Of This Report
This report is a summary of results and conclusions of the 2019 processing vegetable weed control research. The experiments outlined in this booklet are located at Ridgetown Campus. We appreciate the funding, cooperation and assistance provided by the Ontario Processing Vegetable Growers and the Ontario Food Processors Association. As well, we would like to thank the OMAFRA-UG Alliance, chemical companies and their representatives, agextension personnel, and other research scientists for their ideas, plant material and herbicide samples that were used in these trials. Funding for the 2019 research program was provided by:

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We trust that the information provided by this research will further the science of weed control by assisting with the registration of herbicides through the minor use system. We also hope this information will be of use in the extension of proper herbicide recommendations, thereby enabling growers to achieve consistent, broad spectrum weed control with a minimum of crop damage.

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Trial 1: Tolerance of Lima Bean to Preemergence Herbicides - I

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
Cultivar: Improved Kingston — Planting date: June 3/19
Planting rate: 266667 seeds/ha — Depth: 3.5 cm
Row spacing: 75cm — Plant spacing: 5 cm

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

Field Preparation: Field was fertilized on June 2 with 19-19-19 at 20 kg/ha of actual N, P and K.

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

Texture: Sandy Clay Loam
Soil: Watford/Brady series

Application Information:

	A
Application Date:	June 4-2019
Time of Day:	8:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	24 C
% Relative Humidity:	60
Wind Velocity, Unit:	3 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	21 C
Soil Moisture:	WET

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)

Trial 1: Tolerance of Lima Bean to Preemergence Herbicides - I

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
Cultivar: Improved Kingston — Planting date: June 3/19
Planting rate: 266667 seeds/ha — Depth: 3.5 cm
Row spacing: 75cm — Plant spacing: 5 cm

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

Field Preparation: Field was fertilized on June 2 with 19-19-19 at 20 kg/ha of actual N, P and K.

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

Texture: Sandy Clay Loam
Soil: Watford/Brady series

Application Information:

	A
Application Date:	June 4-2019
Time of Day:	8:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	24 C
% Relative Humidity:	60
Wind Velocity, Unit:	3 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	21 C
Soil Moisture:	WET

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)

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	0A	0A	30A	2.0A
2. pethoxamid	1200 G/HA	1A	1A	0A	30A	2.2A
3. pethoxamid	2400 G/HA	2A	7A	8A	26A	1.6A
4. ZIDUA	47 G/AC	1A	5A	5A	29A	1.7A
5. ZIDUA	94 G/AC	1A	3A	3A	28A	2.0A
6. PROWL H20	0.96 L/AC	2A	2A	4A	28A	2.0A
7. PROWL H20	1.92 L/AC	2A	3A	4A	27A	2.3A
8. SHIELDEX	16.3 G/AC	0A	5A	5A	28A	2.0A
9. SHIELDEX	32.6 G/AC	1A	1A	1A	29A	2.6A
LSD (P <0.05)		2	4	4	3	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). 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 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
Cultivar: Improved Kingston — Planting date: June 3/19
Planting rate: 266667 seeds/ha — Depth: 3.5 cm
Row spacing: 75cm — Plant spacing: 5 cm

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

Field Preparation: Field was fertilized on June 2 with 19-19-19 at 40 kg/ha of actual N, P and K.

Soil Description:
Sand: 82% — OM: 3.3%
Silt: 10% — pH: 6.0
Clay: 8% — CEC 6.2

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
Application Date:	June 4-2019
Time of Day:	10:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	26 C
% Relative Humidity:	30
Wind Velocity, Unit:	7 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	22 C
Soil Moisture:	MOIST

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)

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

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

Materials & Methods:

Crop: Snap bean
Cultivar: Matador
Planting date: June 9/19
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 June 8 with 19-19-19 at 20 kg/ha of actual N, P and K.

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

Texture: Sandy Clay Loam
Soil: Watford/Brady series

Application Information:

	A
Application Date:	June 10-2019
Time of Day:	8:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	19 C
% Relative Humidity:	75
Wind Velocity, Unit:	4 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	26 C
Soil Moisture:	WET

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)

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 7D	14D	28D	DRY WT G	YIELD 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: Two trials were 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). 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.

Trial 4: Tolerance of Snap Bean to Preemergence Herbicides - II

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

Materials & Methods:

Crop: Snap bean
Cultivar: Matador — Planting date: June 11/19
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 June 8 with 19-19-19 at 40 kg/ha of actual N, P and K.

Soil Description:
Sand: 82% — OM: 3.3%
Silt: 10% — pH: 6.0
Clay: 8% — CEC 6.2

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
Application Date:	June 12-2019
Time of Day:	8:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	25 C
% Relative Humidity:	60
Wind Velocity, Unit:	3 KPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	25 C
Soil Moisture:	MOIST

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)

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			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0B	0B	0B	52A	5.1A
2. pethoxamid	1200 G/HA	1B	1B	1B	54A	5.2A
3. pethoxamid	2400 G/HA	2AB	3A	2B	53A	4.5A
4. ZIDUA	47 G/AC	5AB	3A	7A	50A	5.0A
5. ZIDUA	94 G/AC	6A	1B	1B	49A	4.4A
6. PROWL H20	0.96 L/AC	2AB	1B	1B	51A	5.2A
7. PROWL H20	1.92 L/AC	3AB	3A	1B	54A	4.5A
8. SHIELDEX	16.3 G/AC	5AB	4A	1B	42A	3.7B
9. SHIELDEX	32.6 G/AC	7A	4A	1B	36A	3.3B
LSD (P <0.05)		4	1	4	20	1.9

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

Conclusions:

Conclusions: Two trials were 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). 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.

Trial 5: Tolerance of Carrot to Postemergence Applications of Pyroxasulfone

Objective: Determine carrot tolerance to POST applications of pyroxasulfone to support potential minor use submission.

Materials & Methods:

Crop: Carrot
Cultivar: Belgrado — Planting date: May 17/19
Planting rate: 393750 seeds/ha — Depth: 1 cm
Row spacing: 38cm

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

Field Preparation: Fertilized with 400 hg/ha of 27-0-0 on May 15. Entire trial was kept weed-free by hand.

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

Application Information:

	A	B	C
APPLICATION DATE	May 28/19	June 13/19	June 21/19
TIME OF DAY	8:00AM	8:00AM	8:00AM
TIMING	POST1	POST2	POST3
AIR TEMP (c)	21	22	24
RH (%)	77	80	76
WIND SPEED (KPH)	4	3	7
SOIL TEMP (c)	20	26	29
CLOUD COVER (%)	100	0	0
CROP STAGE	2-3 LF	4-5 LF	6-7 LF

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)

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					29A
2. PYROXASULFONE	89G/HA	2-3LF	0C	0C	29A
3. PYROXASULFONE	100G/HA	2-3LF	0C	0C	28A
4. PYROXASULFONE	125G/HA	2-3LF	2C	1C	27A
5. PYROXASULFONE	178G/HA	2-3LF	4BC	1C	32A
6. PYROXASULFONE	200G/HA	2-3LF	8BC	1C	26A
7. PYROXASULFONE	250G/HA	2-3LF	10B	15B	19B
8. PYROXASULFONE	500G/HA	2-3LF	39B	49A	7C
9. PYROXASULFONE	89G/HA	4-5LF	0C	3C	28A
10. PYROXASULFONE	100G/HA	4-5LF	0C	7C	31A
11. PYROXASULFONE	125G/HA	4-5L	3C	8C	27A
12. PYROXASULFONE	178G/HA	4-5LF	9BC	9BC	30A
13. PYROXASULFONE	200G/HA	4-5LF	12B	9BC	31A
14. PYROXASULFONE	250G/HA	4-5LF	13B	8C	24A
15. PYROXASULFONE	500G/HA	4-5LF	37A	19B	19B
15. PYROXASULFONE	500G/HA	6-7LF	15B	18B	22B
LSD (P <0.05)			6	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 125 to 500 g/ha at the early application timing (ie. 2-3 leaf), injury increased from 2-39%, and 1-49% at 7 and 28 days after herbicide treatment (DAT). Visible injury increased from 3-37% and 8-19% 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

Objective: Develop weed control strategies to control weeds in carrot without linuron.

Materials & Methods:

Crop: Carrot
Cultivar: Belgrado — Planting date: May 17/19
Planting rate: 393750 seeds/ha — Depth: 1 cm
Row spacing: 38cm

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

Field Preparation: Fertilized with 400 hg/ha of 27-0-0 on May 15. Entire trial was kept weed-free by hand.

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

Application Information:

	A	B	C	D
APPLICATION DATE	May 16/19	May 28/19	June 18/19	June 27/19
TIME OF DAY	8:00AM	9:00AM	11:00AM	11:00AM
TIMING	PRE	POST1	POST2	POST3
AIR TEMP (c)	14	27	25	25
RH (%)	73	56	54	60
WIND SPEED (KPH)	4	7	8	4
SOIL TEMP (c)	16	28	30	32
CLOUD COVER (%)	50	40	0	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 — 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)

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

HERBICIDE	RATE	TIMING	ERICA %	AMARE %	DIGSS %
1. UNTREATED					
2. DUAL II MAGNUM	0.7 L/AC	PRE	40D	82B	86A
3. PROWL H20	2.7 L/AC	PRE	35E	76B	86B
4. NORTRON	3.3 L/AC	PRE	67B	81AB	65C
5. DUAL II MAGNUM	700 ML/AC	PRE	56C	83B	94A
PROWL H20	3.3 L/AC	PRE			
6. DUAL II MAGNUM	700 ML/AC	PRE	76B	91A	97A
NORTRON	3.3 L/AC	PRE			
7. DUAL II MAGNUM	700 ML/AC	PRE	86A	98A	98A
PROWL H20	2.7 L/AC	PRE			
NORTRON	3.3 L/AC	PRE			
8. GOAL	0.1 L/AC	POST1	79A	79A	0D
GOAL	0.1 L/AC	POST2			
GOAL	0.1 L/AC	POST3			
9. BLAZER	0.03 L/AC	POST1	75B	71B	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	89A	88AB	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	81A	92A	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	93A	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	92A	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	94A	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	96A	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	49A
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 tank mixes of Dual II Magnum with Nortron or Prowl H20 (applied PRE) followed by micro-rates of Goal gave the best control of Canada fleabane, redroot pigweed 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+Prowl H20 (PRE) were followed by Blazer micro-rates.

Trial 7: **Tolerance of Processing Peas to PRE Applications of Zidua - I**

Objective: Determine weed control and tolerance of eight processing pea cultivars to PRE applications of Zidua.

Materials & Methods:

Crop: Pea
Cultivar: various
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 1/19
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: 50%
Silt: 28%
Clay: 22%
OM: 4.1%
pH: 6.2
CEC: 12.4
Texture: Loam
Soil: WATFORD/BRADY

Application Information:

	A
APPLICATION DATE	May-3-2019
TIME OF DAY	8 00AM
TIMING	PRE
AIR TEMP (c)	13
RH (%)	88
WIND SPEED (KPH)	1
SOIL TEMP (c)	12
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 (G/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. RICCO	47	1A	1A	0B
	94	0A	1A	0B
2. PAO 826	47	0A	0A	0B
	94	0A	0A	3B
3. LIL MO	47	0A	0A	0B
	94	0A	0A	0B
4. CONCEPT	47	1A	0A	0B
	94	1A	4A	0B
5. TYNE	47	0A	1A	4AB
	94	1A	0A	14A
6. SHERWOOD	47	1A	1A	6AB
	94	2A	2A	17A
7. RELIANCE	47	0A	0	2B
	94	2A	3A	4AB
8. SWEET SAVOUR	47	1A	1A	11A
	94	2A	2A	10A
LSD (P <0.05)		2	3	9

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 (G/AC)	TENDEROMETER PSI	YIELD (T/AC)
1. RICCO	0	96	5.6
	47	92	6.2
	94	98	5.9
2. PAO 826	0	104	2.0
	47	104	2.5
	94	107	2.8
3. LIL MO	0	115	2.5
	47	116	3.0
	94	108	3.3
4. CONCEPT	0	111	2.2
	47	108	2.7
	94	101	2.8
5. TYNE	0	107	2.2
	47	115	2.7
	94	98	3.0
6. SHERWOOD	0	111	1.6
	47	118	2.0
	94	109	2.0
7. RELIANCE	0	100	2.9
	47	95	3.7
	94	100	4.0
8. SWEET SAVOUR	0	94	3.7
	47	94	3.7
	94	90	4.0
LSD (P <0.05)		NS	NS

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

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 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 5% in most all cultivars at both rates of pyroxasulfone (Zidua®), at 7, 14 and 28 days after emergence (DAE). 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.

BASF will be approached to support a minor use for Zidua in pea – the herbicide offers residual control of Group 2 resistant eastern black nightshade, which would be a useful tool for pea growers.

Trial 8: **Tolerance of Processing Peas to PRE Applications of Zidua - II**

Objective: Determine weed control and tolerance of eight processing pea cultivars to PRE applications of Zidua.

Materials & Methods:

Crop: Pea
Cultivar: various Planting date: May 1/19
Planting raCultivar: 300 kg/ha Depth: 5 cm
Row spacing: 18cm

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

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: 82% OM: 3.3%
Silt: 10% pH: 6.0
Clay: 8% CEC: 6.2

Texture: Loamy Sand
Soil: Watford/Brady series

Application Information:

	A
APPLICATION DATE	May-3-2019
TIME OF DAY	11:00AM
TIMING	PRE
AIR TEMP (c)	16
RH (%)	60
WIND SPEED (KPH)	7
SOIL TEMP (c)	16
CROP STAGE	PRE

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)

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

CULTIVAR	ZIDUA RATE (G/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. RICCO	47	1B	1A	0A
	94	0B	1A	0A
2. PAO 826	47	0B	0A	0A
	94	0B	0A	3A
3. LIL MO	47	0B	0A	0A
	94	0B	0A	0A
4. CONCEPT	47	1B	0A	0A
	94	4AB	4A	0A
5. TYNE	47	0B	1A	0A
	94	6A	1A	1A
6. SHERWOOD	47	1B	1A	2A
	94	5AB	3A	3A
7. RELIANCE	47	0B	0A	2A
	94	2B	3A	4A
8. SWEET SAVOUR	47	1B	1A	1A
	94	2B	5A	1A
LSD (P <0.05)		3	5	3

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

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

CULTIVAR	ZIDUA RATE (G/AC)	TENDEROMETER PSI	YIELD (T/AC)
1. RICCO	0	96	5.6
	47	92	6.2
	94	98	5.9
2. PAO 826	0	104	2.0
	47	104	2.5
	94	107	2.8
3. LIL MO	0	115	2.5
	47	116	3.0
	94	108	3.3
4. CONCEPT	0	111	2.2
	47	108	2.7
	94	101	2.8
5. TYNE	0	107	2.2
	47	115	2.7
	94	98	3.0
6. SHERWOOD	0	111	1.6
	47	118	2.0
	94	109	2.0
7. RELIANCE	0	100	2.9
	47	95	3.7
	94	100	4.0
8. SWEET SAVOUR	0	94	3.7
	47	94	3.7
	94	90	4.0
LSD (P <0.05)		NS	NS

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

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 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 7% in all pea cultivars at both rates of pyroxasulfone (Zidua®), at 7, 14 and 28 days after emergence (DAE), respectively. Injury symptoms included leaf puckering and shortened midribs (drawstringing). Despite the injury in these two cultivars, 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.

BASF has been approached to support a minor use for Zidua in pea – the herbicide offers residual control of Group 2 resistant eastern black nightshade, which would be a useful tool for pea growers.

Trial 9. Effect of Application Timing, Rate and Soil Type on Pea Tolerance To Valtera – I – 70% Sand

Objectives: Determine the tolerance of peas to Valtera applied PPI and PRE on soil type with 70% sand.

Materials & Methods:

Crop: Pea
Cultivar: Tyne
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 2/19
Depth: 5 cm

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

Field Preparation: Worked the field twice with S-tine cultivator prior to planting. Based on P and K values, no fertilizer was required to meet OMAFRA fertilization recommendations for processing pea.

Soil Description:
Sand: 82%
Silt: 10%
Clay: 8%
OM: 3.3%
pH: 6.0
CEC: 6.2

Application Information:

	A	B
APPLICATION DATE	Apr-29-2018	May-3-2019
TIME OF DAY	8:00AM	2:00PM
TIMING	PPI	PRE
AIR TEMP (c)	11	17
RH (%)	66	50
WIND SPEED (KPH)	1	9
SOIL TEMP (c)	14	16
CROP STAGE	PPI	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 9.1. Effect of Valtera timing and rate on percent injury 7 and 42 days after emergence, pea tenderness and yield.

TIMING	RATE	INJURY		TENDERNESS	YIELD
		7D	42D	PSI	T/AC
1. UNTREATED CHECK				105A	2.5A
2. PPI	55 G/AC	0A	0A	103A	2.7A
3. PPI	110 G/AC	0A	0A	102A	2.8A
4. PRE	55 G/AC	0A	0A	99A	3.1A
5. PRE	110 G/AC	0A	0A	100A	2.6A
LSD (P <0.05)		0	0	8	0.7

Conclusions:

This trial was established to determine tolerance of processing pea to PPI and PRE applications of Valtera on a soil type with at least 70% sand. None of the treatments caused significant visual injury to pea, nor did they influence pea maturity or yield.

Trial 10: Effect of Application Timing, Rate and Soil Type on Pea Tolerance To Valtera – II – 40% Sand

Objectives: Determine the tolerance of peas to Valtera applied PPI and PRE on soil type with approximately 40% sand.

Materials & Methods:

Crop: Pea
Cultivar: Tyne
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 2/19
Depth: 5 cm

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

Field Preparation: Worked the field twice with S-tine cultivator prior to planting. Based on P and K values, no fertilizer was required to meet OMAFRA fertilization recommendations for processing pea.

Soil Description:
Sand: 50%
Silt: 28%
Clay: 22%
OM: 4.1%
pH: 6.2
CEC: 12.4
Texture: Loam
Soil: WATFORD/BRADY

Application Information:

	A	B
APPLICATION DATE	Apr-29-2018	May-3-2019
TIME OF DAY	9:00AM	3:00PM
TIMING	PPI	PRE
AIR TEMP (c)	13	15
RH (%)	66	50
WIND SPEED (KPH)	1	6
SOIL TEMP (c)	14	18
CROP STAGE	PPI	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 10.1. Effect of Valtera timing and rate on percent injury 7 and 42 days after emergence, pea tenderness and yield.

TIMING	RATE	INJURY		TENDERNESS	YIELD
		7D	42D	PSI	T/AC
1. UNTREATED CHECK				102A	2.4A
2. PPI	55 G/AC	0A	0A	103A	2.4A
3. PPI	110 G/AC	0A	0A	106A	2.3A
4. PRE	55 G/AC	0A	0A	109A	2.4A
5. PRE	110 G/AC	0A	0A	104A	2.5A
LSD (P <0.05)		0	0	11	0.4

Conclusions:

This trial was established to determine tolerance of processing pea to PPI and PRE applications of Valtera on a soil type with at least 40% sand. None of the treatments caused significant visual injury to pea, nor did they influence pea maturity or yield.

Trial 11: Effect of Application Timing, Rate and Soil Type on Pea Tolerance To Valtera – III – 20% Sand

Objectives: Determine the tolerance of peas to Valtera applied PPI and PRE on soil type with approximately 20% sand.

Materials & Methods:

Crop: Pea
Cultivar: Tyne
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 2/19
Depth: 5 cm

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

Field Preparation: Worked the field twice with S-tine cultivator prior to planting. Based on P and K values, no fertilizer was required to meet OMAFRA fertilization recommendations for processing pea.

Soil Description:
Sand: 23%
Silt: 50%
Clay: 27%
OM: 3.0%
pH: 6.9
CEC 18
Texture: Silt loam
Soil: WATFORD/BRADY

Application Information:

	A	B
APPLICATION DATE	Apr-29-2018	May-3-2019
TIME OF DAY	10:00AM	4:00PM
TIMING	PPI	PRE
AIR TEMP (c)	13	14
RH (%)	66	60
WIND SPEED (KPH)	1	9
SOIL TEMP (c)	14	16
CROP STAGE	PPI	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 11.1. Effect of Valtera timing and rate on percent injury 7 and 42 days after emergence, pea tenderness and yield.

TIMING	RATE	INJURY		TENDERNESS	YIELD
		7D	42D	PSI	T/AC
1. UNTREATED CHECK				99A	3.3A
2. PPI	55 G/AC	0A	0A	102A	3.4A
3. PPI	110 G/AC	0A	0A	101A	3.1A
4. PRE	55 G/AC	0A	1A	105A	3.6A
5. PRE	110 G/AC	0A	3A	100A	3.0A
LSD (P <0.05)		0	3	7	0.7

Conclusions:

This trial was established to determine tolerance of processing pea to PPI and PRE applications of Valtera on a soil type with at least 20% sand. None of the treatments caused significant visual injury to pea, nor did they influence pea maturity or yield.

NEW YORK STATE 2019 PROCESSING PEA CULTIVAR TRIAL REPORT

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New York State Agricultural Experiment Station - Cornell University, Geneva, New York

PROCEDURE AND MATERIALS

Location: NYS Agricultural Research 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** – 5/8. Picking started on 7/3 and we finished on 7/22. **Herbicide** – Raptor, Thistrol, Assure and Basagran mix post plant 4/28. **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 shoot for 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 a number of 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 in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions. Evaluation of processed product was held on 11/5 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 made 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

Soil conditions were good at planting. Cool temperatures after planting delayed emergence but it was uniform. We had adequate rainfall throughout the season. Temperatures were high for a few days during harvest but one of the best harvests we have ever had. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season. Please direct any questions to the following mailing address, phone number or email address.

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Table 2 - Cultivar List and Maturity From Seed Source

Cultivar	HU	Seed Source	Leaf Type	Seed Treatment	Seed Count/lb	Germ. %	Sieve index	Node to blossom
Eldorado	1130	Syngenta/Pure Li	normal	Maxim,Apron&Cruiser	2306	80	3.8	
Spring (std)	1150	Pureline	normal	Maxim,Apron&Cruiser	?	?	4.3	
EXP461	1180	Brotherton	afila	ptan, allegiance&cruis	2536	98	3.5	
2269	1190	GV	afila	Maxim,Apron&Cruiser	2111	96		
435	1200	GV	afila	Maxim,Apron&Cruiser	2534	94		
PLS M-14	1240	Pureline	normal	Maxim,Apron&Cruiser	?	?	4	
SP45	1240	Pureline	normal	Maxim,Apron&Cruiser	2002	90	4	
Austin	1250	GV	afila	Maxim,Apron&Cruiser	2416	97		
Saltingo	1250	Syngenta/Pure Li	afila	Maxim,Apron&Cruiser	2190	87	3.5	
CS-455AF	1270	Crites	afila	Maxim,Apron&Cruiser	2154	97	3.7	
8035	1250	GV	afila	Maxim,Apron&Cruiser	?	?	3.8	10 to 11
11P42	1275	Pureline	af	Maxim,Apron&Cruiser	?	?	4.4	
Idalgo	1275	Syngenta/Pure Li	af	Maxim,Apron&Cruiser	2284	91	3.5	
Portage (std)	1305	Crites	afila	Maxim,Apron&Cruiser	2032	98	3.8	
BSC3129	1320	Brotherton	normal	ptan, allegiance&cruis	2112	89	3.6	
1607	1320	GV	afila	Maxim,Apron&Cruiser	?	?	3.8	11 to 12
CS-476AF	1330	Crites	afila	Maxim,Apron&Cruiser	2490	96	3.6	
SV 7401	1340	Seminis	det afila	egiance, captan & cruis	3246	92		
GV518	1350	GV	afila	Maxim,Apron&Cruiser	2502	96		
EXP125	1370	Brotherton	afila	ptan, allegiance&cruis	2550	99	3.4	
389	1380	GV	afila	Maxim,Apron&Cruiser	?	?	2.7	12 to 13
98-261	1400	Syngenta/PL	N	Maxim,Apron&Cruiser	?	?	3.2	
671	1410	Pureline	af	Maxim,Apron&Cruiser	?	?	3.3	
5602	1430	Pureline	af	Maxim,Apron&Cruiser	?	98	3.5	
EXP064	1430	Brotherton	normal	ptan, allegiance&cruis	4408	99	2.3	
SV 8112QH	1430	Seminis	Det afila	egiance, captan & cruis	2770	99		
Spartan	1450	Brotherton	afila	ptan, allegiance&cruis	2236	95	3.8	12 to 14
828	1450	GV	afila	Maxim,Apron&Cruiser	2466	98	3.8	14
503	1460	Pureline	N	Maxim,Apron&Cruiser	?	?	3.3	
Da 1470(std)	1470	Seminis	det afila	egiance, captan & cruis	2683	92		
CS-464AF	1475	Crites	afila	Maxim,Apron&Cruiser	2122	99	3.5	
SV1231QF	1480	Seminis	afila	egiance, captan & cruis	2900	90		
SV0371QF	1480	Seminis	afila	egiance, captan & cruis	2793	94		

Table 2 - Cultivar List continued:

12P93	1490	Pureline	af	Maxim,Apron&Cruiser	2622	91	3.2	
179	1500	Pureline	af	Maxim,Apron&Cruiser	?	?	4.0	
196	1500	Pureline	af	Maxim,Apron&Cruiser	2302	93	4.0	
BSC7120	1500	Brotherton	afila	ptan, allegiance&cruis	2248	97	4.2	
5602	1500	GV	afila	Maxim,Apron&Cruiser	?	?	3	14 to 15
8069	1500	GV	afila	Maxim,Apron&Cruiser	?	?	3.2	14 to 15
5525	1500	GV	afila	Maxim,Apron&Cruiser	?	?	3	14 to 15
2278	1500	GV	afila	Maxim,Apron&Cruiser	2592	93	3.6	
5903	1500	GV	afila	Maxim,Apron&Cruiser			3	14
SV 0823QG	1525	Seminis	afila	egiance, captan & cruis	2669	94	3.3	17
Ricco (std)	1530	GV	afila	Maxim,Apron&Cruiser	?	?		
183	1540	Pureline	af	Maxim,Apron&Cruiser	?	?	4.2	
CS-461AF	1540	Crites	afila	Maxim,Apron&Cruiser	3397	97	2.4	
Dancer	1550	Pureline	af	Maxim,Apron&Cruiser	2819	94	3.5	
522	1560	GV	afila	Maxim,Apron&Cruiser	2268	95		
494 (EXP070)	1590	Brotherton	afila	ptan, allegiance&cruis	3603	99	2.8	
8137	1600	GV	normal	Maxim,Apron&Cruiser	?	?	2	15
8154	1600	GV	normal	Maxim,Apron&Cruiser	?	90	3.8	14 to 15
98-326	1600	Syngenta/PL	af	Maxim,Apron&Cruiser	3065		2.8	
Corus	late	Syngenta	normal		5740	92	small	
SV 6844QG	1600	Seminis	afila, fasc	egiance, captan & cruis	2501	95		
BSC5991	1630	Brotherton	afila	ptan, allegiance&cruis	2594	97	4.1	
98W-370	1650	Syngenta/PL	normal	Maxim,Apron&Cruiser	2048	93	3.8	
98W-399	1650	Syngenta/PL	normal	Maxim,Apron&Cruiser	?	?	3.3	
SV5685QG	1750	Seminis	normal	egiance, captan & cruis	2347	95		

Table 3. Plant Characteristics

Cultivar	Plant Stand Rating 6/1	Plant Stand Rating 6/17	Heat Units to full flower	Root Rot Rating[1]	Root Rot Rating[2]	Plant Habit Rating (at Harvest) 1-5 (best)	Overall Rating
Eldorado	3.8	3.0	683	4	5.0	3	3
2269	4.8	4.0	707	4	5.0	2	3.5
Spring (std)	4.0	3.1	707	3.5	5.0	2.5	3
Austin	4.0	3.6	801	2	5.0	4	3.5
435	3.8	3.8	770	3	5.0	3	3.5
CS-455AF	3.8	4.0	770	3	5.0	3.5	3.75
8035	3.8	3.9	770	2.5	5.0	3.5	3.75
11P42	4.3	3.9	801	1.5	5.0	3	3.5
EXP461	4.3	3.9	824	2.5	5.0	3.5	3.5
PLS M-14	4.3	4.0	721	3.5	5.0	2.5	3.5
SP45	4.0	3.4	743	3.5	5.0	3	3.5
Portage (std)	4.5	4.0	770	3	5.0	4	4
SV 7401	3.8	3.3	873	6	5.0	3	4
BSC3129	4.5	3.8	873	2	5.0	2.5	4
CS-476AF	3.8	3.6	873	2	5.0	2.5	3.5
GV518	3.8	3.8	899	6	5.0	3	4
EXP125	3.5	3.3	899	3	5.0	4	3.75
389	3.8	3.9	899	6.5	5.0	4	4
Spartan	4.0	3.6	873	4	5.0	4	4
Saltingo	3.5	3.8	899	2.5	5.0	3.5	3.75
SV 8112QH	4.3	3.5	899	1	5.0	5	4
Idalgo	3.5	3.8	873	2.5	5.0	4	3.75
1607	3.5	3.6	873	3	5.0	3.5	3.5
EXP064	4.0	3.1	899	2	5.0	2	3.5
SV0371QF	4.0	3.8	989	5	5.0	5	4.25
Ricco (std)	4.5	4.0	957	7	5.0	3	4
BSC5991	4.0	3.9	957	3.5	5.0	3	3.75
828	4.0	4.0	899	5.5	5.0	4	4.5
BSC7120	4.3	3.8	1020	6	5.0	3	4.25
494 (EXP070)	4.0	3.8	1020	5.5	5.0	3.5	4.25
Da 1470(std)	4.0	3.6	957	2	5.0	5	4
522	4.0	3.8	1056	7.5	5.0	3.5	4.25
CS-464AF	4.3	3.8	957	1.5	5.0	2	4
SV1231QF	4.0	3.4	989	6.5	5.0	3	4

Table 3. Plant Characteristics continued:

Cultivar	Plant Stand Rating 6/1	Plant Stand Rating 6/17	Heat Units to full flower	Root Rot Rating[1]	Root Rot Rating[2]	Plant Habit Rating (at Harvest) 1-5 (best)	Overall Rating
2278	3.5	3.1	1056	5	5	3	4
12P93	3.3	3.4	989	4	5.0	2.5	3.75
5525	4.8	4.0	1020	6.5	5.0	3	4.25
5602	3.3	3.3	989	4	5.0	3.5	4
98-326	3.8	3.8	1056	4.5	5.0	3	3.75
SV 0823QG	3.8	3.6	1056	3	5.0	3.5	4
602	4.3	3.6	957	2	5.0	4	3.5
Corus	3.5	3.4	1056	1.5	5	3	3.5
8069	3.8	3.6	989	5	5.0	2.5	4
5903	3.8	3.4	1088	5.5	5	3	4
98-261	4.0	3.4	989	7	5.0	2.5	3.5
8154	3.8	3.5	1056	7.5	5.0	2.5	4.25
671	3.8	3.8	1020	5.5	5.0	5	4.5
SV 6844QG	4.0	3.6	1088	4	5.0	4	4.25
179	4.0	4.0	989	3.5	5.0	3	4
196	4.0	3.9	1020	4	5.0	3.5	4
98W-370	4.0	4.0	1056	1.5	5.0	2.5	3.5
8137	3.0	2.9	1110	4	5.0	3.5	4
Dancer	3.8	4.0	1088	6.5	5.0	3.5	4.5
503	3.3	3.1	928	1.5	5.0	3	3.75
183	3.8	3.5	1088	2.5	5.0	3.5	4
98W-399	3.8	3.6	1110	4.5	5.0	3	3.75
CS-461AF	3.8	3.6	1110	7	5.0	5	4.25
SV5685QG	4.0	3.8	1279	3.5	4.0	4	4

1 This was in a separate field known for its root rot. It was not in the evaluation trial. 0=all plants completely dead. 9=all plants completely healthy.

2 This root rot rating was made on the harvest plot. This ground has not had peas on it for at least thirty years. O plants dead, 5 plants completely healthy.

Overall rating includes plant habit, yield potential and general plant health.

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

Cultivar	Days to harv.	Heat Units to Harv.	Adjusted HU (110)	Sieve 1 %	Sieve 2 %	Sieve 3 %	Sieve 4 %	Sieve 5%	Sieve 6%	Sieve size index	Ten.	T/A	#/A	Adjusted Yield Based on 110 TU	Plants per A (1000)	Plts. per foot
El Dorado	56	1140	1160	2	5	15	42	34	2	4.1	100	2.7	5489	6202	436	5.0
El Dorado	57	1169	1169	4	2	11	24	46	12	4.4	110	2.8	5663	5663	441	5.1
El Dorado	58	1202	1158	1	2	7	27	50	14	4.7	132	2.9	5844	5142	407	4.7
2269	56	1140	1160	1	2	12	38	41	5	4.3	100	4.0	8026	9069	601	6.9
2269	57	1169	1167	0	1	6	27	53	11	4.7	111	4.0	7913	7834	597	6.9
2269	58	1202	1144	0	0	3	24	57	16	4.9	139	4.4	8748	7523	572	6.6
Spring (std)	56	1140	1176	1	3	16	38	37	3	4.2	92	2.4	4846	6494	486	5.6
Spring (std)	57	1169	1181	0	1	6	25	52	14	4.7	104	2.8	5627	5965	489	5.6
Spring (std)	58	1202	1184	0	1	5	20	55	19	4.9	119	2.7	5481	5152	479	5.5
Austin	58	1202	1204	0	0	5	29	60	6	4.7	109	3.8	7623	7699	665	7.6
Austin	59	1241	1211	0	1	2	19	64	15	4.9	125	4.0	8095	7366	562	6.4
435	57	1169	1211	2	6	22	42	26	2	3.9	89	3.7	7333	na	593	6.8
435	58	1202	1212	1	2	14	37	42	4	4.3	105	3.6	7115	7471	486	5.6
435	59	1241	1219	0	1	7	28	52	12	4.7	121	3.9	7768	7224	476	5.5
CS-455AF	59	1241	1231	0	1	8	31	53	7	4.6	115	3.9	7841	7527	607	7.0
CS-455AF	60	1279	1241	0	3	3	18	66	10	4.8	129	4.6	9293	8270	550	6.3
8035	58	1202	1220	1	3	12	33	46	4	4.3	101	3.5	7006	7777	595	6.8
8035	59	1241	1247	0	2	11	33	45	9	4.5	107	3.6	7100	7313	534	6.1
8035	60	1279	1239	0	1	5	20	57	17	4.8	130	4.2	8458	7528	502	5.8
11P42	59	1241	1247	1	2	16	46	31	4	4.2	107	4.6	9184	9460	603	6.9
11P42	60	1279	1255	0	4	12	44	38	2	4.2	122	4.7	9438	8683	532	6.1
EXP461	59	1241	1247	1	6	7	42	35	8	4.3	107	3.5	7006	7216	650	7.5
EXP461	60	1279	1251	2	3	14	34	42	5	4.2	124	3.9	7877	7168	607	7.0
PLS M-14	59	1241	1253	1	3	17	41	35	3	4.1	104	4.4	8785	9312	724	8.3
PLS M-14	60	1279	1265	0	0	10	42	43	4	4.4	117	4.5	8966	8518	520	6.0
SP45	59	1241	1261	2	4	12	26	50	5	4.4	100	3.2	6498	7343	529	6.1
SP45	60	1279	1253	1	1	6	17	63	12	4.7	123	4.1	8276	7614	460	5.3
Portage (std)	59	1241	1261	1	2	11	30	48	7	4.5	100	4.5	8930	10091	596	6.8
Portage (std)	61	1311	1271	0	1	4	19	57	19	4.9	130	4.3	8531	7593	551	6.3
SV 7401	61	1311	1283	1	5	37	46	9	2	3.6	124	3.3	6607	6012	602	6.9
SV 7401	62	1336	1284	1	4	29	45	18	3	3.9	136	3.9	7877	6853	576	6.6

Cultivar	Days to harv	Heat Units to Harv.	Adjusted HU (110)	Sieve 1 %	a sieve 2 %	Sieve 3 %	Sieve 4 %	Sieve 5%	Sieve 6 %	sieve size index	ten.	T/A	#/A	Adjusted Yield Based on 110 TU	Plants per A (1000)	Plts. per foot
BSC3129	59	1241	1277	1	5	24	47	22	1	3.9	92	3.8	7659	10263	671	7.7
BSC3129	60	1279	1295	0	2	14	40	37	6	4.3	102	4.3	8676	9457	530	6.1
BSC3129	61	1311	1301	0	1	11	32	45	10	4.5	115	4.5	8966	8607	525	6.0
BSC3129	62	1336	1292	0	1	9	35	42	11	4.5	132	4.6	9257	8146	545	6.3
CS-476AF	61	1311	1299	0	2	9	34	48	6	4.5	116	4.0	8095	7690	590	6.8
CS-476AF	62	1336	1292	0	1	6	26	51	15	4.7	132	5.0	10055	8848	582	6.7
GV518	60	1279	1299	1	5	20	43	26	4	4.0	100	3.3	6534	7383	543	6.2
GV518	61	1311	1309	0	2	10	37	44	5	4.4	111	4.2	8313	8230	620	7.1
GV518	62	1336	1314	0	1	8	30	49	11	4.6	122	4.4	8712	8015	549	6.3
EXP125	61	1311	1309	1	5	23	48	19	3	3.9	111	3.3	6643	6577	645	7.4
EXP125	62	1336	1308	1	2	15	47	31	4	4.2	124	3.4	6861	6244	612	7.0
389	62	1336	1318	2	7	31	48	10	1	3.6	119	3.5	7079	6654	578	6.6
389	63	1361	1313	1	5	25	53	14	1	3.8	134	4.0	7913	6884	585	6.7
Spartan	62	1336	1318	1	4	17	33	37	7	4.2	119	3.4	6716	5805	595	6.8
Spartan	63	1361	1343	0	2	10	28	46	13	4.6	119	3.9	7841	7370	587	6.7
Spartan	64	1391	1327	0	2	7	23	55	12	4.7	142	3.5	7042	5986	460	5.3
Saltingo	60	1279	1313	1	3	15	38	37	5	4.2	93	3.5	7079	9273	538	6.2
Saltingo	61	1311	1321	0	2	9	25	54	8	4.6	105	3.8	7696	8081	538	6.2
Saltingo	62	1336	1320	0	1	7	20	55	15	4.7	118	4.2	8494	7984	483	5.5
SV 8112QH	61	1311	1327	2	11	40	38	8	0	3.4	102	2.7	5372	5855	599	6.9
SV 8112QH	62	1336	1322	1	4	24	52	18	1	3.9	117	3.1	6244	5932	537	6.2
Idalgo	61	1311	1333	0	2	15	28	49	4	4.4	99	4.0	7950	9143	598	6.9
Idalgo	62	1336	1324	0	2	10	23	57	7	4.6	116	3.6	7296	6931	527	6.0
1607	62	1336	1332	2	2	8	24	54	10	4.6	112	3.7	7442	7293	582	6.7
1607	63	1361	1331	1	2	7	22	54	13	4.7	125	3.7	7442	6772	592	6.8
EXP064	62	1336	1332	5	22	65	6	1	0	2.8	112	3.4	6716	6582	553	6.4
EXP064	63	1361	1343	5	21	62	10	1	0	2.8	119	3.5	7006	6586	568	6.5
SV0371QF	63	1361	1361	2	7	25	47	17	2	3.8	110	3.9	7841	7841	665	7.6
SV0371QF	64	1391	1365	2	7	27	45	18	1	3.8	123	4.1	8240	7581	586	6.7
Ricco (std)	64	1391	1345	0	0	2	11	46	39	5.2	133	4.6	9257	8146	741	8.5
BSC5991	64	1391	1345	0	1	3	12	53	31	5.1	133	4.0	8095	7124	660	7.6
828	61	1311	1347	3	9	36	41	10	2	3.5	92	3.7	7369	9874	722	8.3
828	62	1336	1356	1	5	22	37	30	5	4.0	100	3.6	7187	8121	597	6.9
828	63	1361	1369	0	4	16	37	37	5	4.2	106	3.8	7696	8004	534	6.1
828	64	1391	1341	0	1	6	21	54	17	4.8	135	4.6	9111	7927	552	6.3

Cultivar	Days to harv	Heat Units to Harv.	Adjusted HU (110)	Sieve 1 %	a sieve 2 %	Sieve 3 %	Sieve 4 %	Sieve 5%	Sieve 6 %	sieve size index	ten.	T/A	#/A	Adjusted Yield Based on 110 TU	Plants per A (1000)	Plts. per foot
BSC7120	63	1361	1387	0	2	12	34	39	13	4.5	97	4.3	8676	10324	597	6.8
BSC7120	64	1391	1373	0	1	7	25	52	14	4.7	119	4.6	9111	8564	632	7.3
494 (EXP070)	63	1361	1375	7	19	41	26	5	0	3.0	103	2.6	5227	5593	685	7.9
494 (EXP070)	64	1391	1383	4	14	46	28	6	0	3.2	114	3.9	7877	7562	607	7.0
Da 1470(std)	64	1391	1387	0	2	10	38	48	2	4.4	112	4.1	8168	8005	703	8.1
Da 1470(std)	65	1429	1413	2	5	15	39	38	1	4.1	118	3.8	7659	7199	587	6.7
522	63	1361	1399	2	7	20	35	28	7	4.0	91	3.0	5917	8165	670	7.7
522	64	1391	1393	0	3	13	24	48	10	4.5	109	3.6	7115	7186	562	6.4
CS-464AF	63	1361	1391	2	7	23	39	23	6	3.9	95	4.1	8240	10300	731	8.4
CS-464AF	64	1391	1395	1	4	14	30	45	6	4.3	108	4.3	8531	8702	582	6.7
SV1231QF	64	1391	1395	1	7	19	41	26	4	3.9	108	3.7	7478	7628	675	7.8
SV1231QF	65	1429	1421	1	6	22	40	27	3	4.0	114	3.9	7877	7562	546	6.3
2278	65	1429	1405	1	1	8	28	55	6	4.5	122	3.7	7333	6746	560	6.4
12P93	66	1461	1407	0	1	5	21	60	13	4.8	137	3.8	7659	6587	512	5.9
12P93	67	1493	1389	0	1	3	21	62	13	4.8	162	3.8	7623	na	411	4.7
5525	64	1391	1397	2	9	30	52	6	0	3.5	107	3.9	7768	8001	801	9.2
5525	65	1429	1391	1	5	25	58	11	0	3.7	129	4.8	9620	8562	783	9.0
5602	63	1361	1397	10	21	42	19	2	0	2.8	92	3.0	6098	8171	616	7.1
5602	64	1391	1403	6	17	39	33	3	0	3.1	104	3.5	6970	7388	578	6.6
5602	65	1429	1415	2	6	22	33	34	2	4.0	117	3.8	7550	7173	577	6.6
98-326	64	1391	1405	3	14	46	34	3	0	3.2	103	3.7	7333	7846	746	8.6
98-326	65	1429	1403	1	10	39	45	4	0	3.4	123	3.1	6244	5744	650	7.5
SV 0823QG	65	1429	1415	1	4	17	34	42	3	4.2	117	4.1	8204	7794	648	7.4
SV 0823QG	66	1461	1421	1	4	24	41	30	1	4.0	130	3.4	6861	6106	562	6.4
602	63	1361	1403	5	15	39	34	5	0	3.2	89	3.6	7115	na	724	8.3
602	65	1429	1421	2	7	25	45	19	1	3.8	114	3.6	7151	6865	486	5.6
Corus	65	1429	1427	9	25	54	6	4	0	2.7	111	2.7	5372	5318	485	5.6
Corus	66	1461	1453	10	34	51	3	0	0	2.5	114	2.9	5808	5576	429	4.9
8069	63	1361	1375	2	8	30	46	11	2	3.6	103	3.3	6607	7069	668	7.7
8069	64	1391	1411	1	6	28	57	8	1	3.7	100	3.5	7042	7957	633	7.3
8069	65	1429	1429	1	3	17	67	12	0	3.9	110	4.3	8531	8531	566	6.5
5903	65	1429	1431	1	5	18	33	31	11	4.2	109	3.0	6098	6159	554	6.4
5903	66	1461	1441	1	3	13	35	42	6	4.3	120	3.3	6534	6077	539	6.2
98-261	63	1361	1309	1	4	13	30	44	7	4.3	84	2.3	4683	na	540	6.2
98-261	65	1429	1433	0	1	5	15	53	26	5.0	108	2.5	4937	5035	457	5.2

Cultivar	Days to harv	Heat Units to Harv.	Adjusted HU (110)	Sieve 1 %	a sieve 2 %	Sieve 3 %	Sieve 4 %	Sieve 5%	Sieve 6 %	sieve size index	ten.	T/A	#/A	Adjusted Yield Based on 110 TU	Plants per A (1000)	Plts. per foot
8154	65	1429	1435	0	2	11	27	54	5	4.5	107	4.2	8385	8637	653	7.5
8154	66	1461	1425	0	1	8	26	57	7	4.6	128	3.7	7442	6623	485	5.6
671	63	1361	1403	4	11	25	40	17	1	3.6	89	3.5	7079	10335	699	8.0
671	65	1429	1439	2	7	26	44	21	1	3.8	105	3.8	7550	7928	555	6.4
SV 6844QG	65	1429	1473	2	7	21	44	24	2	3.9	88	3.5	7006	na	585	6.7
SV 6844QG	66	1461	1459	0	3	10	29	43	13	4.5	111	4.2	8313	8230	456	5.2
179	66	1461	1465	0	1	6	23	58	12	4.7	108	4.8	9620	9445	636	7.3
179	67	1493	1471	0	1	6	30	53	9	4.6	121	4.4	8748	8136	499	5.7
196	67	1493	1471	0	2	8	27	54	10	4.6	121	4.7	9402	8744	539	6.2
196	68	1528	1468	0	1	5	17	58	18	4.9	140	4.9	9728	8366	519	6.0
98W-370	66	1461	1493	0	2	10	25	48	14	4.6	94	3.3	6534	8364	538	6.2
98W-370	67	1493	1481	0	1	6	20	53	19	4.8	116	3.9	7732	7345	455	5.2
98W-370	68	1528	1448	0	1	4	16	52	25	5.0	150	4.1	8276	na	464	5.3
8137	66	1461	1491	20	44	20	1	1	0	2.0	95	2.1	4283	5354	435	5.0
8137	67	1493	1493	23	45	17	1	0	0	2.0	110	2.4	4755	4755	388	4.5
8137	68	1528	1490	18	41	31	1	0	0	2.2	129	2.5	5082	4523	393	4.5
Dancer	66	1461	1491	1	5	27	52	14	0	3.7	95	4.9	9837	12296	689	7.9
Dancer	67	1493	1499	1	3	20	54	21	0	3.9	107	5.1	10200	10506	567	6.5
Dancer	68	1528	1486	0	2	14	44	37	2	4.2	132	5.2	10454	9199	587	6.7
503	66	1461	1503	2	7	17	26	39	8	4.2	89	3.0	5917	na	399	4.6
503	67	1493	1511	1	4	16	33	38	7	4.2	101	3.7	7478	8301	443	5.1
503	68	1528	1508	1	4	14	28	43	9	4.3	120	3.6	7151	6650	388	4.5
183	67	1493	1513	1	2	5	23	48	22	4.8	100	4.0	8059	9107	521	6.0
183	68	1528	1494	0	1	4	11	45	38	5.2	127	4.4	8748	7873	509	5.8
98W-399	66	1461	1507	5	15	42	29	7	0	3.2	87	2.9	5735	na	597	6.9
98W-399	67	1493	1523	4	11	39	39	6	0	3.3	95	3.1	6135	7669	509	5.8
98W-399	68	1528	1508	3	10	33	43	9	1	3.5	120	2.9	5808	5401	431	5.0
CS-461AF	66	1461	1411	13	29	49	6	1	0	2.5	85	2.8	5699	na	670	7.7
CS-461AF	67	1493	1525	10	24	54	9	1	0	2.7	94	3.4	6824	8735	495	5.7
CS-461AF	68	1528	1514	6	20	53	18	2	0	2.9	117	3.2	6353	6035	468	5.4
SV5685QG	71	1624	1582	1	2	10	28	50	9	4.1	89	4.4	8766	na	629	7.2
SV5685QG	72	1656	1658	0	1	6	22	55	14	4.5	109	4.8	9529	9695	546	6.3
SV5685QG	75	1773	1693	0	1	6	18	33	14	4.6	150	3.5	9329	na	529	4.6

Headings explained page 11.

Explanation for Headings in Table 4.

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

Heat Units to Harvest - Accumulation of heat units (base 40 degree F.) from planting until harvest.
Adjusted heat units base 40 - Adjusted to 110 tenderometer reading. Two heat units were added for each unit below 110 and two units were subtracted for each unit above 110.

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 - Tons per acre - The weight of the harvested berries was extrapolated to tons per acre.
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.
Adjusted Yield lbs/acre - 28 pounds was added for each tenderometer unit reading below 100. 28 pounds was subtracted for each tenderometer unit reading above 100.
Plants/foot - Total number of plants harvested was divided by the 35 row feet harvested to arrive at plants per foot.
Plant population per acre - An extrapolation of the number of harvested plants to plants per acre.

Explanation for Headings in Table 5.

This data was from 30 plants harvested the same day as our yield harvest that was closest to our objective of 100 tenderometer unit reading. Example – Variety A was harvested twice at tenderometer readings of 99 and 116. The afternoon of the first harvest (99 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).
Average Number of nodes with pods per plant - The number of nodes that had pods were counted and recorded.
Weight of the 30 plant sample - The weight of the sample (plants and pods) was recorded in pounds.
Weight of the plants - After the pods were taken off and weighed, the calculation was made of the plant weight.
Weight of the pods - After the pods were hand picked from the plant, total weight of the pods was recorded in pounds.
Weight of the berries - The berries were hand shelled from pods, counted and weighed in pounds.
Pods per plant - The total number of pods was divided by 30 (number of plants) to determine average pods per plant.
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.
Pod length - An average of 10 pods were lined up and measured in inches. If they were very uniform, a single number was listed, if not a range was listed.
Berries per pod – Ten uniform pods were selected and opened. The range of berries per pod in this group was listed.

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

Cultivar	Node to first flower	Vine length (inches)	Ht at harvest (in)	Pods per plant	# Nodes with Pods/plt.	# of Single pods/ node	# of Double pods/ node	# Triple pods/ node	# of Quad. Pods /node	% of Single pods/ node	% of Double pods/ node	% of Triple pods/ node	% of Quad. pods/ node	Berries per pod	Pod length (in)
Eldorado	7 - 9	19	10	3.6	3.4	3.2	0.2	0.0	0.0	91	9	0	0	5.9	2.5-3
2269	8 - 9	22	8	4.1	3.0	1.9	1.1	0.0	0.0	46	54	0	0	6.2	2.5-3
Spring (std)	8 - 9	24	9	3.7	3.5	3.2	0.3	0.0	0.0	86	14	0	0	5.8	2.5-3.5
Austin	8 - 9	22	16	4.0	2.6	1.2	1.4	0.0	0.0	29	71	0	0	6.8	3.0-3.5
435	10 - 11	22	13	4.8	3.1	1.4	1.7	0.0	0.0	28	72	0	0	7.6	3.0-4
CS-455AF	8 - 10	24	15	5.9	2.9	0.7	1.6	0.7	0.0	11	55	34	0	6.1	2.5-3
8035	7 - 9	22	15	5.4	2.8	0.7	1.6	0.5	0.0	13	58	29	0	6.0	2.5-3.5
11P42	8 - 10	26	14	4.8	3.0	1.2	1.8	0.0	0.0	24	76	0	0	7.9	2.5-3
EXP461	9 - 12	21	14	4.5	2.6	0.8	1.8	0.0	0.0	18	82	0	0	6.2	2.0-3
PLS M-14	8 - 9	30	9	4.8	2.7	0.9	1.4	0.3	0.0	19	60	21	0	7.1	2.5-3
SP45	7 - 9	33	13	7.1	4.6	2.1	2.5	0.0	0.0	30	70	0	0	5.5	2.5-3
Portage (std)	8 - 10	25	17	7.3	3.5	1.1	1.3	1.1	0.1	15	36	44	6	5.5	2.5-3
SV 7401	9 - 10	20	12	5.6	3.1	1.1	1.5	0.5	0.0	20	55	25	0	7.2	2.0-3
BSC3129	9 - 12	29	11	5.2	3.0	0.9	2 1	0.0	0.0	17	82	2	0	7.1	3.0-3.5
CS-476AF	9 - 11	24	12	5.2	3.0	0.9	1.9	0.1	0.0	18	74	8	0	7.6	3.0-3.5
GV518	9 - 11	24	13	4.1	2.8	1.6	1.2	0.0	0.0	39	61	0	0	6.6	3.5-4
EXP125	10 - 12	18	18	4.3	2.3	0.7	1.2	0.4	0.0	17	57	26	0	6.5	2.5-3
389	10 - 11	22	18	4.7	2.9	1.1	1.7	0.1	0.0	23	72	4	0	5.6	2.0-2.5
Spartan	10 - 12	26	17	4.6	2.5	0.5	2.0	0.0	0.0	12	86	2	0	6.7	2.5-3.5
Saltingo	9 - 11	30	19	6.3	3.4	0.5	2.9	0.0	0.0	8	92	0	0	7.5	3.0-4
SV 8112QH	9 - 11	23	20	4.7	2.6	0.8	1.6	0.2	0.0	16	69	15	0	7.9	2.5-3
Idalgo	7 - 9	28	15	5.1	2.9	0.7	2.2	0.0	0.0	14	86	0	0	7.9	3.0-4
1607	10 - 11	30	18	4.2	2.9	1.6	1.3	0.0	0.0	39	61	0	0	6.5	3.5-4
EXP064	11 - 13	22	12	6.9	2.8	0.3	1.1	1.4	0.1	4	31	59	6	8.0	2.0-2.5
SV0371QF	10 - 12	28	19	4.9	2.4	0.4	1.5	0.5	0.0	7	62	30	0	8.3	2.5-3
Ricco (std)	12 - 14	28	10	3.1	1.8	0.5	1.3	0.0	0.0	15	85	0	0	7.2	3.0-3.5
BSC5991	12 - 15	29	13	4.2	2.4	0.7	1.6	0.1	0.0	17	76	7	0	7.6	3.0-3.5
828	10 - 13	27	19	4.9	2.4	0.6	0.9	0.8	0.0	13	36	51	0	6.5	2.0-3

Cultivar	Node to first flower	Vine length (inches)	Ht at harvest (in)	Pods per plant	# Nodes with Pods/plt.	# of Single pods/ node	# of Double pods/ node	# Triple pods/ node	# of Quad. Pods /node	% of Single pods/ node	% of Double pods/ node	% of Triple pods/ node	% of Quad. pods/ node	Berries per pod	Pod length (in)
BSC7120	10 - 13	29	11	3.7	2.0	0.8	0.7	0.5	0.0	23	40	38	0	8.6	2.5-3
494 (EXP070)	12 - 14	19	13	5.8	2.3	0.3	0.5	1.5	0.0	5	18	77	0	6.1	2.0-2.5
Da 1470(std)	9 - 11	28	21	5.3	2.7	0.6	1.6	0.5	0.0	11	59	28	2	6.3	2.5-3
522	10 - 14	23	13	4.9	2.4	0.5	1.3	0.6	0.0	10	52	35	2	8.1	3.0-3.5
CS-464AF	10 - 12	25	8	3.3	1.9	0.8	0.8	0.3	0.0	25	51	24	0	7.3	3.0-3.5
SV1231QF	12 - 14	28	13	3.8	1.9	0.7	0.5	0.7	0.0	19	28	53	0	7.4	2.5-3
2278	11 - 13	19	14	4.0	2.4	0.8	1.6	0.0	0.0	21	79	0	0	7.3	2.5-3.5
5525	12 - 13	20	10	5.4	2.4	0.5	1.0	1.0	0.0	9	37	54	0	6.2	2.5-3
12P93	10 - 12	29	10	5.9	2.8	0.7	1.1	1.0	0.0	12	36	51	0	10.5	3.0-4
5602	11 - 13	23	16	5.3	2.5	0.5	1.2	0.8	0.0	9	44	47	0	7.5	2.5-3
98-326	12 - 15	27	11	5.5	2.7	0.8	0.9	0.9	0.0	15	33	51	0	7.9	2.5-3
SV 0823QG	10 - 13	25	14	6.1	3.4	1.2	1.7	0.5	0.0	20	55	25	0	7.3	3.0-3.5
602	13 - 15	28	12	4.9	2.6	0.5	1.9	0.2	0.0	11	77	12	0	6.8	3.0-3.5
Corus	11 - 13	21	13	7	0.7	1.0	1.2	0.2	0.3	15	34	10	19	7.0	2.5-3
8069	12 - 13	24	9	5.9	2.9	0.7	1.3	0.8	0.0	12	45	42	0	7.4	3.0-3.5
5903	10 - 11	22	12	7.4	1.1	1.2	1.0	0.3	0.0	17	27	14	0	7.2	3.0-3.5
98-261	9 - 11	25	12	3.4	2.3	1.2	1.0	0.0	0.0	36	61	3	0	6.9	3.5-4
8154	10 - 13	22	9	4.6	2.6	0.6	2.0	0.1	0.0	12	86	4	0	8.3	2.5-4
671	10 - 12	27	19	4.8	2.3	0.6	0.8	0.9	0.0	12	34	54	0	7.3	3.0-3.5
SV 6844QG	12 - 15	26	18	6.6	3.8	1.4	2.2	0.3	0.0	21	66	14	0	7.8	2.5-3.5
179	12 - 15	33	12	4.5	2.7	0.9	1.7	0.0	0.0	21	77	2	0	7.3	3.0-4
196	11 - 14	27	14	4.3	2.4	0.7	1.5	0.2	0.0	16	68	16	0	9.0	3.0-4
98W-370	10 - 12	22	9	5.6	2.7	0.6	1.4	0.7	0.0	11	50	37	2	6.9	2.5-3.5
8137	12 - 15	22	16	10.4	4.2	0.4	1.5	2.4	0.0	4	28	68	0	9.2	2.5-3
Dancer	11 - 15	26	13	4.6	2.2	0.5	0.9	0.7	0.0	12	41	48	0	7.7	3.0-3.5
503	11 - 13	28	15	5.1	3.1	1.2	2.0	0.0	0.0	23	77	0	0	8.4	3.0-4
183	12 - 15	24	16	5.0	2.6	0.8	1.4	0.5	0.0	15	56	28	0	7.8	3.0-3.5
98W-399	10 - 13	27	11	7.1	3.4	0.8	1.5	1.1	0.0	11	41	48	0	8.8	2.5-3
CS-461AF	12 - 15	27	22	8.1	3.9	0.6	2.5	0.9	0.0	7	61	32	0	8.3	2.0-3
SV5685QG	11 - 15	34	14	5.1	2.7	0.9	1.3	0.5	0.0	18	51	29	3	8.0	3.5-4.5

Column explanations page 11.

Table 6. Maturity

Tenderometer unit measurement (Days after planting - gray area indicates harvest dates)

Cultivar	Day 54 22 HU 7/1	Day 55 30 HU 7/2	Day 56 36 HU 7/3	Day 57 21 HU 7/4	Day 58 25 HU 7/5	Day 59 18 HU 7/6	Day 60 25 HU 7/7	Day 61 28 HU 7/8	Day 62 21 HU 7/9	Day 63 18 HU 7/10	Day 64 29 HU 7/11	Day65 25 HU 7/12	Day 66 32 HU 7/13
Eldorado	81		100	110	132								
2269		91	100	111	139								
Spring (std)		82	92	104	119								
Austin		69		86	109	125							
435			81	89	105	121							
CS-455AF				82	98	115	129						
8035				90	101	107	130						
11P42				83	95	107	122						
EXP461					104	107	124						
PLS M-14			77		98	104	117						
SP45				82		100	123						
Portage (std)					98	100		130					
SV 7401							117	124	136				
BSC3129						100	102	115	132				
CS-476AF							115	116	132				
GV518						91	100	111	122				
EXP125							102	111	124				
389								106	119	134			
Spartan									119	119	142		
Saltingo					78		93	105	118				
SV 8112QH							96	102	117				
Idalgo						85		99	116				
1607								99	112	125			
EXP064								101	112	119			
SV0371QF							82	88		110	123		
Ricco (std)								87			133		
BSC5991										106	131		
828							98	92	100	106	135		
BSC7120								79		67	119		

Table 6. Maturity

Tenderometer unit measurement (Days after planting - gray area indicates harvest dates)

Cultivar	Day 61 28 HU 7/8	Day 62 21 HU 7/9	Day 63 18 HU 7/10	Day 64 29 HU 7/11	Day65 25 HU 7/12	Day 66 32 HU 7/13	Day 67 33 HU 7/14	Day 68 39 HU 7/15	Day 69 42 HU 7/16	Day 70 42 HU 7/17	Day 71 33 HU 7/18	Day 72 33 HU 7/19	Day 75 33 HU 7/22
494 (EXP070)		94	103	114									
Da 1470(std)	84			112	118								
522		90	91	109									
CS-464AF		96	95	108									
SV1231QF		80		108	114								
2278			100		122								
5525	76			107	129								
12P93			89			137	162						
5602		92	92	104	117								
98-326		84		103	123								
SV 0823QG			76		117	130							
602		86	89		114								
Corus			85		111	114							
8069		90	103	100	110								
5903			88		109	120							
98-261	76		84		108								
8154			84		107	128							
671	76		89		105								
SV 6844QG			68		88	111							
179				83		108	121						
196				78			121	140					
98W-370					104	94	116	150					
8137			79			95	110	129					
Dancer			72			95	107	132					
503				76		89	101	120					
183				75			100	127					
98W-399			80			87	95	120					
CS-461AF					94	85	94	117					
SVS685QG											89	109	200

Additional Comments:

General comments: Overall score based on visual observation and notes for all four replicates (5-best, 1 poorest). **This rating takes into account root rot, plant type, berry type and yield** – if plant and pods looked good and yield was average, it still got a higher rating. * Indicates a 4.0 or better. **Varieties in order of maturity.**

Eldorado – normal leaf, bit earlier than Spring, germ was only 80% and so stands were a bit thinner than optimum, decent yield, overall rating 3.

FP2269 – afila, good plant stand, early, came in a day sooner than Spring, good yield, overall rating 3.5.

Spring – normal leaf, early standard, lower plant stand than optimum, large sieve, decent yield, overall rating 3.

Austin (FP 2311) – very good plant habit, good plant stand, good yield, overall rating 3.5.

GV435 – afila, high berries per pod, good yield, last two harvests lower plant stand than optimum, overall rating 3.5.

CS-455AF – afila, very good yield, overall rating 3.75.

8035 – afila, good yield, overall rating 3.75.

11P42 – afila, vine length in excess of 25 inches, high berries per pod, very good yield, overall rating 3.5.

EXP 461 – afila, good yield,overall rating 3.5.

PLSM-14 – normal leaf, vine length in excess of 25 inches, very good yield, overall rating 3.5.

SP-45 – normal leaf, vine length in excess of 25 inches, six or better pods per plant, good yield, overall rating 3.5.

***Portage** – afila, very good plant habit, six or better pods per plant, excellent yield, overall rating 4.

***SV7401QH** – determinate afila, good yield, good root rot tolerance in the disease evaluation, overall rating 4.

***BSC3129** – normal leaf, vine length in excess of 25 inches, very good yield, overall rating 4.

CS-476AF – afila, high berries per pod, very good yield, overall rating 3.5.

***GVS 518** – afila, longer pods, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.

EXP125 – afila, very good plant habit, good yield, overall rating 3.75.

***389** – afila, very good plant habit, short pods, good yield, good root rot tolerance in the disease evaluation, overall rating 4.

***Spartan** – afila, very good plant habit, vine length in excess of 25 inches, good yield, overall rating 4.

Additional comments continued:

Saltingo – afila, vine length in excess of 25 inches, longer pods, six or better pods per plant, high berries per pod, very good yield, overall rating 3.75.

***SV8112QH** – determinate afila, high berries per pod, good yield, best plant habit of the trial, overall rating 4.

Idalgo – afila, very good plant habit, vine length in excess of 25 inches, high berries per pod, good to very good yield, overall rating 3.75.

1607 – afila, vine length in excess of 25 inches, longer pods, good to very good yield, overall rating 3.5.

EXP064 – normal leaf, smaller sieve, six or better pods per plant, high berries per pod, short pods, high percentage of triple pods, good yield, overall rating 3.5.

***SV0371QF** – afila, very good plant habit, vine length in excess of 25 inches, high berries per pod, very good yield, overall rating 4.25.

***Ricco** – afila, vine length in excess of 25 inches, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.

BSC5991 – afila, vine length in excess of 25 inches, high berries per pod, good yield, overall rating 3.75.

***828** – afila, very good plant habit, vine length in excess of 25 inches, high percentage of triple pods, slow to size up, very good to excellent yield, overall rating 4.5.

***BSC7120** – afila, vine length in excess of 25 inches, high berries per pod, very good to excellent yield, good root rot tolerance in the disease evaluation, overall rating 4.25.

494 (EXP070) – afila, smaller sieve, short pods, high percentage of triple pods, good yield, overall rating 3.

***DA 1470 (EX08540794)** – determinate afila, vine length in excess of 25 inches, good plant habit, very good yield, overall rating 4.

***522** – afila, high berries per pod, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.25.

***CS-464AF** – afila, excellent yield, overall rating 4.

***SV1231QF** – afila, vine length in excess of 25 inches, high percentage of triple pods, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.

***FP2278** – afila, good to very good yield, overall rating 4.

12P93 – afila, vine length in excess of 25 inches, highest number of berries per pod, thinner plant stand than optimum, high percentage of triple pods, very good yield, overall rating 3.75.

***5525** – afila, high percentage of triple pods, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.25.

Additional comments continued:

***5602** – afila, high berries per pod, very good yield, overall rating 4.

98-326 – afila, vine length in excess of 25 inches, smaller sieve, high berries per pod, high percentage of triple pods, good to very good yield, overall rating 3.75.

***SV0823QG** – afila, six or better pods per plant, good to very good yield, overall rating 4.

602 – afila, very good plant habit, vine length in excess of 25 inches, good to very good yield, overall rating 3.5.

Corus – normal leaf, lower plant stand than optimum (very small seeds), six or better pods per plant, small sieve, decent yield, overall rating 3.5.

***8069** – afila, good to very good yield, overall rating 4.

***5903** – afila, six or better pods per plant, good yield, overall rating 4.

98-261 – normal leaf, longer pods, decent yield, good root rot tolerance in the disease evaluation, overall rating 3.5.

***8154** – normal leaf, high berries per pod, very good yield, good root rot tolerance in the disease evaluation, overall rating 4.25.

***671** – afila, very good plant habit, vine length in excess of 25 inches, high percentage of triple pods, very good to excellent yield, overall rating 4.5.

***SV6844QG** – afila, very good plant habit, vine length in excess of 25 inches, six or better pods per plant, high berries per pod, very good yield, overall rating 4.25.

***PLS179** – afila, vine length in excess of 25 inches, longer pods, very good to excellent yield, overall rating 4.

***PLS196** – afila, vine length in excess of 25 inches, longer pods, high berries per pod, very good yield, overall rating 4.

98W-370 – normal leaf, lower plant stands than optimum, very good yield, overall rating 3.5.

***8137** – normal leaf, lower plant stands than optimum, very small sieve, high berries per pod, high percentage of triple pods, highest pods per plant, decent yield, overall rating 4.

***Dancer** – afila, vine length in excess of 25 inches, high berries per pod, excellent yield, good root rot tolerance in the disease evaluation, overall rating 4.5.

503 – normal leaf, vine length in excess of 25 inches, lower plant stands than optimum, longer pods, high berries per pod, very good yield, overall rating 3.75.

***PLS183** – afila, high berries per pod, very good to excellent yield, overall rating 4.

98W-399 – normal leaf, vine length in excess of 25 inches, lower plant stands than optimum, six or better pods per plant, smaller sieve, high berries per pod, decent yield, overall rating 3.75.

***CS461AF** – afila, very good plant habit, vine length in excess of 25 inches, last two harvests lower plant stand than optimum, smaller sieve, six or better pods per plant, high berries per pod, good to very good yield, good root rot tolerance in the disease evaluation, overall rating 4.25.

***SV5685QG** – normal leaf, vine length in excess of 25 inches, long pods, high berries per pod, very good to excellent yield, overall rating 4.

Descriptions Provided by the Seed Source

Eldorado *– Pure Line, normal leaf type, 3.8 sieve size, -1 days to maturity relative to Spring, 1130 heat units, resistant to Fusarium race 1 and powdery mildew.*

FP2269 *– Gallatin Valley, Early afila leaf type with great emergence in cool soils. 57 days to maturity, Maturity near 1200 heat units, 10 nodes to first flower, 24" plant height, avg. 2 pods per node, 7-8 berries per pod, pod shape is blunt, 3.9 average sieve size. Fusarium (Fop) – HR (1), Powdery Mildew (PM) – HR(1). Good yield.*

Spring *– Seminis, normal leaf, 1050 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.*

Austin (FP 2311) *– Gallatin Valley, Second early afila leaf type with good plant vigor. Maturity is considered 60 days or near 1280 heat units. Good plant type, avg. – 12 nodes at first bloom, plant height – 22, avg. pods per node – 2, avg. sieve size – 3.2, avg. berries per pod – 7-8, Fusarium (fop) – HR (1,2), Powdery Mildew (PM) HR(1).*

GV435 *– Gallatin Valley, First early afila type, have little or no root rot resistance, 57 days to maturity, 1200 avg. heat units, 10 nodes to first flower, 22" avg. plant height, avg. 2 pods per node, avg. sieve size 3.5, 8-9 berries per pod.*

CS-455AF *– Crites, 1270 heat units to maturity, aflia leaf type, disease resistance: Fop 1, Pv+, 2 days earlier than Portage, good root system.*

8035 *– Gallatin Valley, aflia leaf type, 10-11 node bloom, 1250 heat units, 3.8 sieve.*

11P42 *– Pure Line, afila leaf type, +5 days to maturity relative to Spring, 1275 heat units, 4.4 sieve size, resistance to Fusarium wilt race 1, tolerant to powdery mildew.*

EXP 461 *– Brotherton, afila leaf type, 1180 heat units, 59 days to maturity, 3.5 average sieve size.*

PLSM-14 *– Pure Line, normal leaf type, +4 days to maturity relative to Spring, 1240 heat units, 3.8 sieve size, resistance to Fusarium Wilt race1.*

SP-45 *– Pure Line, normal leaf, +4 days to maturity relative to Spring, 1240 heat units, 4.0 sieve size, resistant to Fusarium wilt race 1.*

Portage *– Crites, midseason maturity, 60 days to maturity or approximately 1325 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.*

SV7401QH *– Seminis, heat units 1340, unique determinate, normal leaf with sweet savor trait, sieve size is 3.2, 14 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; unique Det, Normal.*

BSC3129 *– Brotherton, normal leaf type, 1320 heat units, 63 days to maturity, 3.6 average sieve size.*

Descriptions provided by the seed source continued:

CS-476AF *– Crites, 1330 heat units to maturity, disease resistance: Fop 1, afila type leaf, 2 days later than Portage, better sieve size.*

GVS 518 *– Gallatin Valley, Mid season Afila type, 67 days to maturity, 1350 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.*

EXP125 *– Brotherton, afila leaf type, 1370 heat units. 65 days to maturity, 3.4 average sieve size.*

389 *– Gallatin Valley, afila leaf type, 12-13 node bloom, 1380 heat units, 2.7 sieve.*

Spartan *– Pure Line, afila, 1450 heat units*

Saltingo *– Pure Line, afila leaf type, 3.5 sieve size, +4 days to maturity relative to Spring, 1250 heat units, resistant to Fusarium Wilt race 1 and powdery mildew, tolerant to downy mildew and pea enation mosaic virus.*

SV8112QH *– Seminis, Sweet Savor gene type, Determinate afila leaf type, Sweet Savor gene type, 1430 heat units, Similar maturity as Reliance but Reliance not sweet savor, 3.1 average sieve size, good disease package.*

Idalgo *– Pure Line, afila leaf type, 3.5 sieve size, +5 days to maturity relative to Spring, 1275 heat units, resistant to Fusarium wilt race 1 and powdery mildew, tolerant to downy mildew and pea enation mosaic virus.*

1607 *– Gallatin Valley, afila leaf type, 11-12 node bloom, 1320 heat units, 3.8 sieve.*

EXP064 *– Brotherton, normal leaf type, 1430 heat units, 66 days to maturity, 2.3 average sieve size, petite sieve size class.*

SV0371QF *– Seminis, 1480 heat units, afila, 3.15 sieve size, 15 nodes to first flower, 2-3 pods per node, 7-8 berries per pod, HR for Powdery Mildew, Fusarium R1&R2, pea enation mosaic virus and bean yellow mosaic virus; 3rd best root rot tolerance.*

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.*

BSC5991 *– Brotherton, afila leaf type, 1630 heat units, 73 days to maturity, 4.1 average sieve size.*

828 *– Gallatin Valley, afila leaf type, 14 node bloom, 1450 heat units, 3.8 sieve.*

BSC7120 *– Brotherton, 1500 heat units, afila leaf type, 68 days to maturity, 4.2 average sieve size.*

494 *– Brotherton, afila leaf type, 1590 heat units, 71 days to maturity, 2.8 average sieve size, small sieve size class.*

DA 1470 (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.*

Descriptions provided by the seed source continued:

522 *– Gallatin Valley, Mid-Season Afila type, 69 days to maturity, 1560 heat units, 14-15 nodes to first flower, plant height 25", avg. 3 pods per node, avg. sieve size is 4, 7-8 berries per pod, blunt pod shape, HR (1) to Powdery Mildew (PM).*

CS-464AF *– Crites, 1475 heat units to maturity, disease resistance: Fop 1&2, Ep, PEMV, afila type leaf, triple pods, main-season, disease package.*

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*

FP2278 *– Gallatin Valley, Mid-Season Afila type, 69 days to maturity, 1500 heat units, 15 nodes to first flower, plant height 26", avg. 2 pods per node, avg. sieve size is 3.6, 7-9 berries per pod, blunt pod shape, Fusarium (fop) – HR(1,2), Powdery Mildew (PM) – HR (1).*

12P93 *– Pure Line, afila leaf type, 3.2 soeve size, +13 days to maturity relative to Spring, 1490 heat units, tolerant to Fusarium wilt race 2.*

5525 *– Gallatin Valley, afila leaf type, 14-15 node bloom, 1500 heat units, 3.0 sieve.*

5602 *– Gallatin Valley, afila leaf type, 14-15 node bloom, 1500 heat units, 3.0 sieve.*

98-326 *– Pure Line, afila leaf type, 2.8 sieve size, +16 days to maturity relative to Spring, 1600 heat units, resistant to Fusarium wilt race 1, powdery mildew, and pea enation mosaic virus.*

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..*

602 *– Pure Line, afila leaf type, +11 days to maturity relative to Spring, 1430 heat units, 3.5 sieve size, resistance to FWr1,r2, Fus.RR, PM.*

Corus *– Syngenta, late, normal leaf, small sieve.*

8069 *– Gallatin Valley, afila leaf type, 14-15 node bloom, 1450 heat units, 3.2 sieve.*

5903 *– Gallatin Valley, 1500 heat units, first flowering node is 14th node, afila leaf type, 3.0 sieve.*

98-261 *– Pure Line, normal leaf type, 3.2 sieve size, +10 days to maturity relative to Spring, 1400 heat units, resistant to Fusarium wilt race 1 and powdery mildew.*

8154 *– Gallatin Valley, leaf type, 14-15 node bloom, 1600 heat units, 3.8 sieve.*

671 *– Pure Line, afila leaf type, 3.3 sieve size, +11 days to maturity relative to Spring, 1410 heat units, resistant to Fusarium wilt race 1 and powdery mildew.*

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.*

Descriptions provided by the seed source continued:

PLS179 *– Pure Line, afila leaf type, +13 days to maturity relative to Spring, 1500 heat units, 4.0 sieve, resistance to FWr1, BLRV, PM.*

PLS196 *– Pure Line, afila, +13 days to maturity relative to Spring, 1500 heat units, 4.0 sieve, resistance to FWr1,2, Fus.RR, PM, tolerant: Downy Mildew.*

98-370 *– Pure Line, normal leaf type, 3.8 sieve size, +18 days to maturity relative to Spring, 1650 heat units, resistant to Fusarium wilt race 1 and powdery mildew.*

8137 *– Gallatin Valley, leaf type, 15 node bloom, 1600 heat units, 2.0 sieve.*

Dancer *– Pure Line, afila leaf type, +14 days to maturity relative to Spring, 1550 heat units, 3.5 sieve size, resistance to FWr1, PM, and PEMV, tolerant to DM.*

503 *– Pure Line, normal leaf type, 3.3 sieve size, +12 days to maturity relative to Spring, 1460 heat units, resistant to Fusarium wilt race 1 and 2 and pea enation mosaic virus, tolerant to powdery mildew.*

PLS183 *– Pure Line, afila type, +14 days to maturity relative to Spring, 1540 heat units, 4.2 sieve, resistance to FWr1, tolerant: FWrace2, Blackroot, Fus.RR, Aphanomyces.*

98-399 *– Pure Line, normal leaf type, 3.3 sieve size, +18 days to maturity relative to Spring, 1650 heat units, resistant to Fusarium wilt race 1 and powdery mildew.*

CS461AF *– Crites, afila, 1540 HU, small sieve size, 2.6 average sieve size, Wilt 1 & 2, Ep, PM resistance, full season, stands well, triple pods.*

SV5685QG *– Seminis, 1750 heat units, normal leaf.*

A cutting was held on November 7th where frozen peas were warmed and evaluated by a number of processing (Seneca Foods, Bonduelle/Farm Fresh, Furman Foods, Hanover Foods and Pictsweet) and seed company (10 companies) representatives. Evaluations were done only by seed company and industry representatives.

Table 7. Weather Summary and 110 tenderometer chart

Day	Day from planting	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree days base 40	acc dd units base 40	Ten. Units	Corrigation factor for Yield
5/8/19	1	54	40	47	0.21	0.21	7	7	80	2.33
5/9/19	2	53	40	46.5	0	0.21	6.5	13.5	81	2.18
5/10/19	3	66	44	55	0.44	0.65	15	28.5	82	2.05
5/11/19	4	71	40	55.5	0.24	0.89	15.5	44	83	1.93
5/12/19	5	55	42	48.5	0.09	0.98	8.5	52.5	84	1.82
5/13/19	6	43	40	41.5	0.62	1.6	1.5	54	85	1.72
5/14/19	7	44	40	42	0.52	2.12	2	56	86	1.64
5/15/19	8	46	39	42.5	0.1	2.22	2.5	58.5	87	1.57
5/16/19	9	67	43	55	0.08	2.3	15	73.5	88	1.51
5/17/19	10	63	47	55	0.02	2.32	15	88.5	89	1.46
5/18/19	11	69	43	56	0	2.32	16	104.5	90	1.42
5/19/19	12	65	50	57.5	0.28	2.6	17.5	122	91	1.38
5/20/19	13	85	61	73	0.17	2.77	33	155	92	1.34
5/21/19	14	71	42	56.5	0.04	2.81	16.5	171.5	93	1.31
5/22/19	15	61	44	52.5	0	2.81	12.5	184	94	1.28
5/23/19	16	65	50	57.5	0.01	2.82	17.5	201.5	95	1.25
5/24/19	17	78	53	65.5	0	2.82	25.5	227	96	1.22
5/25/19	18	65	46	55.5	0	2.82	15.5	242.5	97	1.19
5/26/19	19	76	52	64	0.79	3.61	24	266.5	98	1.17
5/27/19	20	78	53	65.5	0	3.61	25.5	292	99	1.15
5/28/19	21	73	54	63.5	0.04	3.65	23.5	315.5	100	1.13
5/29/19	22	68	49	58.5	0.22	3.87	18.5	334	101	1.11
5/30/19	23	59	50	54.5	0.02	3.89	14.5	348.5	102	1.09
5/31/19	24	68	53	60.5	0.54	4.43	20.5	369	103	1.07
6/1/19	25	69	52	60.5	0	4.43	20.5	389.5	104	1.06
6/2/19	26	78	56	67	0.14	4.57	27	416.5	105	1.05
6/3/19	27	64	45	54.5	0.04	4.61	14.5	431	106	1.04
6/4/19	28	61	45	53	0	4.61	13	444	107	1.03
6/5/19	29	67	53	60	0	4.61	20	464	108	1.02
6/6/19	30	77	55	66	0.36	4.97	26	490	109	1.01
6/7/19	31	70	48	59	0	4.97	19	509	110	1.00
6/8/19	32	75	49	62	0	4.97	22	531	111	0.99
6/9/19	33	76	52	64	0	4.97	24	555	112	0.98
6/10/19	34	80	52	66	0	4.97	26	581	113	0.97
6/11/19	35	69	54	61.5	0.61	5.58	21.5	602.5	114	0.96
6/12/19	36	69	45	57	0	5.58	17	619.5	115	0.96
6/13/19	37	73	58	65.5	0	5.58	25.5	645	116	0.95
6/14/19	38	62	52	57	0.47	6.05	17	662	117	0.95
6/15/19	39	68	53	60.5	0	6.05	20.5	682.5	118	0.94
6/16/19	40	73	56	64.5	0.33	6.38	24.5	707	119	0.94
6/17/19	41	59	48	53.5	0.34	6.72	13.5	720.5	120	0.93

6/18/19	42	71	53	62	0	6.72	22	742.5	121	0.93
6/19/19	43	77	57	67	0	6.72	27	769.5	122	0.92
6/20/19	44	80	63	71.5	0.58	7.3	31.5	801	123	0.92
6/21/19	45	68	57	62.5	0.91	8.21	22.5	823.5	124	0.91
6/22/19	46	72	55	63.5	0.01	8.22	23.5	847	125	0.91
6/23/19	47	73	58	65.5	0	8.22	25.5	872.5	126	0.90
6/24/19	48	78	55	66.5	0	8.22	26.5	899	127	0.90
6/25/19	49	76	62	69	0.67	8.89	29	928	128	0.89
6/26/19	50	79	58	68.5	0	8.89	28.5	956.5	129	0.89
6/27/19	51	83	62	72.5	0	8.89	32.5	989	130	0.89
6/28/19	52	82	60	71	0	8.89	31	1020	131	0.88
6/29/19	53	85	66	75.5	0	8.89	35.5	1055.5	132	0.88
6/30/19	54	81	63	72	0	8.89	32	1087.5	133	0.88
7/1/19	55	70	54	62	0	8.89	22	1109.5	134	0.87
7/2/19	56	79	61	70	0	8.89	30	1139.5	135	0.87
7/3/19	57	77	62	69.5	0	8.89	29.5	1169	136	0.87
7/4/19	58	83	62	72.5	0	8.89	32.5	1201.5	137	0.86
7/5/19	59	88	70	79	0	8.89	39	1240.5	138	0.86
7/6/19	60	88	68	78	0.75	9.64	38	1278.5	139	0.86
7/7/19	61	82	63	72.5	0.5	10.14	32.5	1311	140	0.86
7/8/19	62	74	55	64.5	0.06	10.2	24.5	1335.5	141	0.85
7/9/19	63	77	53	65	0	10.2	25	1360.5	142	0.85
7/10/19	64	80	60	70	0	10.2	30	1390.5	143	0.85
7/11/19	65	87	69	78	0	10.2	38	1428.5	144	0.85
7/12/19	66	83	62	72.5	0	10.2	32.5	1461	145	0.85
7/13/19	67	83	60	71.5	0	10.2	31.5	1492.5	146	0.84
7/14/19	68	84	66	75	0	10.2	35	1527.5	147	0.84
7/15/19	69	77	61	69	0	10.2	29	1556.5	148	0.84
7/16/19	70	80	63	71.5	0	10.2	31.5	1588	149	0.84
7/17/19	71	89	64	76.5	0.1	10.3	36.5	1624.5	150	0.84
7/18/19	72	76	66	71	0.27	10.57	31	1655.5	151-160	0.83
7/19/19	73	83	66	74.5	0	10.57	34.5	1690		
7/20/19	74	88	73	80.5	0	10.57	40.5	1730.5		
7/21/19	75	91	74	82.5	0	10.57	42.5	1773		

At, NEW YORK STATE 2019 PROCESSING SNAP BEAN CULTIVAR TRIAL REPORT
Large Sieve Bean – 3-4 Sieve Bean – Whole Bean

James Ballerstein - Research Support Specialist, Horticulture Section
New York State Agricultural Experiment Station - Cornell University, Geneva, New York

Stephen Reiners – Professor and Chair, Horticulture Section
New York State Agricultural Experiment Station - Cornell University, Geneva, New York

PROCEDURE AND MATERIALS

Location: NYS Agricultural Research Farm – field 60, Geneva - soil type - Honeoye silt loam
Planting Dates: Large Sieve – 6/5, 3-4 sieve beans – 6/19, Whole type – 7/10
Row Width: 30 inches, Row length: 30 ft. **In-row Spacing**: 1 5/8 inches (6-8 plants/ft.)
Conventional Tillage **Fertilizer**: 300#/A of 15-5-10 with Zn and Mn
Herbicide: Dual post plant, Basagran, Reflex and Raptor post emergence
Planter - Two Row Monosem Vacuum Planter
Plot Size: 1 row - 4 replications (Replicated entries), 1 row – two replications (Observation entries).

The objective of this trial was to compare a number of green and wax snap bean varieties for yield and other quality characteristics. This was accomplished in cooperation with the snap bean processors in New York and Ontario Canada in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions. We did not have a field day this past season due to the weather difficulties.

For both replicated and observation entries, yield of five feet per replication was obtained by pulling the plants and hand picking them. Multiple harvests were made to plot yield increase and also seed size increase. An FMC snipper and grader were used to snip and grade the harvested pods. Each replicated entry was processed (canned and frozen) for later evaluation by the processors and seedsmen. Comments from this cutting are not included in the report.

Cold and wet was the norm for planting season 2019. All plantings were delayed. The large sieve trial was poor due to cold and wet. The 3-4 sieve and whole bean trial were much better and did well. We did have a dry period but moisture was adequate and irrigation was not needed. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season.

A cutting was held for industry on November 8th.

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Table 1 - Processing Snap Bean Cultivar List

Large Sieve			**3-4 Sieve Continued**	
Venture(std)	Syngenta		Outlaw	Syngenta
CR1218	Crites		SB4738	Syngenta
Bridger	HM		SB4773	Syngenta
Jackson	Brotherton		SB4748	Syngenta
PV857	Crites		Annihilator	PureLine
Colter	HM		Dominator	PureLine
Chisolm	HM		Wav 74	PureLine
SFC-01 (B17)	Seneca/GV		Wav 56	PureLine
BEX069	Brotherton		Antigua	PureLine
Huntington (std)	Syngenta		***Wax***	
BBL156 std	PureLine		Castore	PureLine
Pismo	Syngenta		PLS 4247	PureLine
SB4707	Syngenta		Goldrush	PureLine
Silverado	Crites		DM 08-52	PureLine
524	PureLine		***Whole***	
BA1001	Seminis		Flavor Sweet (std)	HM
UW#4	PureLine		Walker	Vilmorin
Cosmo	Brotherton		Oreo (wax)	Vilmorin
3-4 Sieve			SV1286GW	Seminis
Camero	Crites		Weston	HM
BEX057	Brotherton		BSC934 (Dawson)	Brotherton
Sahara	HM		Enclave (BEX034)	Brotherton
BSC897	Brotherton		Schubert	PureLine
HMX 0164423	HM		BB 7396	PureLine
HMX0175756	HM		BB 0553	PureLine
Cabot (std)	HM		*Extra Fine*	
Colter	HM		Denver (std)	Vilmorin
Sybaris	Seminis		Surfer	Vilmorin
Affirmed (SV0579G	Seminis		Vezer	Vilmorin
Jaguar	Crites		Astute (SVGN6196)	Seminis
Venice	Crites		Loriot (SVGN1386) (wax)	Seminis
Echo	Brotherton		DX170	Brotherton

Table 2. Yield Characteristics (large bean planting date 6/5)

Cultivar	Days to Harv.	Heat units to harv.	% 2 sieve	% 3 sieve	% 4 sieve	% 5 sieve	%6 sieve	% 2-4 sieve	4 sieve sd lgth (mm)	5 sieve sd lgth (mm)	T/A	Plants per foot
Venture	56	1042	2	2	23	36	28	28	89	97	4.1	6.0
CR1218	56	1042	3	10	57	30	4	70	98	113	3.5	6.9
CR1218	58	1087	4	7	48	31	9	59	95	118	3.3	6.5
Bridger	56	1042	6	8	57	23	5	71	91	90	2.6	6.6
Bridger	58	1087	4	7	39	34	6	49	92	100	3.0	6.1
Bridger	59	1102	3	19	24	36	7	47	98	98	3.1	6.1
UW#4	56	1042	3	9	52	27	2	64	95	100	4.2	5.8
UW#4	58	1087	4	11	55	22	4	70	94	104	4.5	6.3
Jackson	56	1042	11	27	54	3	1	93	75	81	2.6	6.0
Jackson	58	1087	9	33	50	5	0	92	80	100	1.7	6.4
Jackson	59	1102	6	18	72	8	1	96	83	98	2.6	7.1
PV857	56	1042	6	12	61	18	1	79	93	93	4.6	6.1
PV857	58	1087	5	7	61	23	2	72	88	95	3.6	5.9
PV857	59	1102	4	7	59	29	2	70	93	110	4.2	5.7
Colter	56	1042	9	16	68	4	0	93	87	97	2.5	6.6
Colter	58	1087	5	7	71	14	1	82	93	106	2.9	7.1
524	57	1066	5	14	67	19	2	86	82	97	2.9	6.3
524	59	1102	4	6	61	25	7	71	95	112	4.1	6.9
524	61	1144	5	6	60	31	1	71	101	119	3.7	7.4
Chisolm	57	1066	9	13	28	19	15	50	80	80	1.7	6.2
Chisolm	60	1122	6	7	31	31	10	44	87	91	2.7	6.3
BEX069	56	1042	4	16	49	21	2	69	85	85	2.7	4.4
BEX069	58	1087	6	7	55	25	2	68	91	113	2.8	5.5
Huntington	56	1042	5	6	54	29	3	64	88	94	4.1	7.0
Huntington	58	1087	2	4	49	34	2	55	93	103	3.9	7.2
Huntington	60	1122	3	5	45	37	8	54	93	104	4.6	7.1

Table 2. Yield Characteristics continued:

Cultivar	Days to Harv.	units to harv.	% 2 sieve	% 3 sieve	% 4 sieve	% 5 sieve	%6 sieve	% 2-4 sieve	4 sieve sd lgth (mm)	5 sieve sd lgth (mm)	T/A	Plants per foot
BBL156	57	1066	7	8	48	26	3	63	82	88	2.6	6.5
BBL156	60	1122	8	5	34	41	10	47	94	99	4.8	6.2
Pismo	57	1066	11	14	60	12	0	85	92	93	3.1	7.2
Pismo	59	1102	10	10	56	23	5	75	93	110	3.3	6.7
Pismo	61	1144	6	7	50	28	1	64	108	107	4.2	6.2
SB4707	57	1066	6	9	52	30	3	67	84	97	4.7	7.6
SB4707	60	1122	5	7	49	33	6	61	94	108	4.3	7.1
SFC-01	56	1042	8	10	53	20	3	70	69	81	2.7	6.7
SFC-01	58	1087	5	7	39	34	8	52	76	92	3.0	5.2
SFC-01	60	1122	6	5	44	36	10	55	87	96	3.5	5.6
Cosmo	56	1042	7	7	38	34	7	52	83	92	2.4	5.7
Cosmo	58	1087	8	8	48	22	7	64	87	93	2.4	6.2
Cosmo	60	1122	6	7	38	40	6	51	100	110	3.3	5.9
Silverado	57	1066	23	17	44	14	2	84	74	83	2.7	6.6
Silverado	60	1122	11	18	45	19	1	73	77	85	3.1	7.0
Silverado	62	1157	8	11	54	20	2	73	83	89	3.2	6.1
BA1001	57	1066	13	19	34	40	5	66	77	87	2.7	5.4
BA1001	60	1122	7	11	43	36	2	61	68	89	2.9	7.1
BA1001	62	1157	6	6	32	51	14	43	81	94	2.7	5.9

Heading explanations page 6

Column Descriptions for Tables 2, 4, and 6.

Cultivar *– Data is based on four replications for entries in the replicated study and two plots for observation entries. Harvest sample was from five feet of row.*

Seed Source *–Brotherton=Brotherton Seed Co.; Crites M.=Crites Moscow Growers; HM=Harris Moran; Pure Line Seeds; Rogers=Syngenta Seeds; Seminis=Seminis Vegetable Seeds-Processor Division; Vil. - Vilmorin*

Days to Harvest *– The number of days from planting until harvest. Multiple harvests were made.*

Degree Day Units Base 50 Degrees F. *– The number of heat degree day units from planting until harvest.*

Percentage 2 sieve *– Pods were snipped and graded after harvest. This was the percentage of 2 sieve pods.*

Percentage 3 sieve *- Pods were snipped and graded after harvest. This was the percentage of 3 sieve pods.*

Percentage 4 sieve *- Pods were snipped and graded after harvest. This was the percentage of 4 sieve pods.*

Percentage 5 sieve *- Pods were snipped and graded after harvest. This was the percentage of 5 sieve pods.*

Percentage 6 sieve *- Pods were snipped and graded after harvest. This was the percentage of 6 sieve pods.*

Percentage 2-4 sieve *– This was the sum of the 2-4 sieve percentages.*

Seed Size of the 2 sieve pods *– One seed from ten 2 sieve pods were collectively measured in millimeters as a maturity index.*

Seed Size of the 3 sieve pods *– One seed from ten 3 sieve pods were collectively measured in millimeters as a maturity index.*

Seed Size of the 4 sieve pods *– One seed from ten 4 sieve pods were collectively measured in millimeters as a maturity index.*

Seed Size of the 5 sieve pods *– One seed from ten 5 sieve pods were collectively measured in millimeters as a maturity index.*

Plant Population listed as plants per foot *– Desired population was 6-7 plants per foot.*

Yield listed as tons per acre *– The yield from the harvest sample (prior to being snipped) extrapolated to a per acre basis.*

Table 3. Plant and Pod Characteristics (Large Sieve Beans)

Cultivar	Plt Ht. (in.)	Plt. Width (in.)	Pod Color (raw) Rating	Unsnipped Pod Length (in.)	Pod Shape Rating	Pod Locatio n Rating	Pod Straight. Rating	Plant Habit Rating
Venture(std)	12	14	LG	4-6.5	R-CR	M	3	3.0
CR1218	14	13	MG	4.5-6	R	M-H	4	3.5
Bridger	13	15	MG	4.5-5.5	R	M-H	3.5	3.5
UW#4	14	19	L-MG	4.5-5.5	R	M-H	3.5	3.0
Jackson	13	12	DG	4.5-5	R	M-H	3.5	4.0
PV857	14	12	MG	4-5.5	R	M-H	3	4.0
Colter	13	13	DG	4.5-5.5	R	M-H	4	4.0
524	15	13	MG	4.0-5.0	R	M-H	4	4.0
Chisolm	14	14	MG	4.0-5.0	R-CR	M-H	2	3.5
BEX069	13	16	L-MG	4.5-5	R-CR	M-H	3.5	3.0
Huntington	15	15	L-MG	4.0-5.0	R-CR	M-H	3.5	3.0
BBL156 std	15	14	L-MG	4.5-5	R	M-H	3.5	3.5
Pismo	14	14	MG	4.5-5	R	M-H	3.5	3.5
SB4707	13	13	MG	4-5.5	R-CR	M-H	3	3.5
SFC-01	15	17	L-MG	3.5-5	R-CR	M-H	3	4.0
Cosmo	16	16	L-MG	5.0-6.0	R	M-H	3.5	3.5
Silverado	15	16	M-DG	4.5-5.5	R-CR	M-H	2.5	3.5
BA1001	16	17	MG	4.5-5	R	M-H	3.5	3.0

Column Descriptions

Average plant height - The average plant height at harvest in inches.

Average plant canopy width - The average plant width at harvest in inches.

Pod Color Rating - DG=dark green, MG=medium green, LG=light green. (uncooked)

Unsnipped pod length - The average length of the largest pods in inches.

Pod Shape Rating - R=round, CR=creased, O=oval

Pod Location Rating - H= pods high on the plant, M=pods located in the center of the plant canopy, L=pods touching the ground

Pod Straightness Rating - 5=very straight, 3= acceptable, 1=very curved or twisted

Plant Habit Rating - 5=very erect plant, 3= acceptable, 1=totally recumbent plant

Additional Comments - Large Sieve Beans

This planting was not very uniform and results quite variable.

Venture – Old, early, large sieve standard, rough pods, good set, creased, light green, long pods, a few necks, decent yield.

CR1218 – Very similar maturity to Venture but less of the very large sieve pods, decent plant habit, round, medium green, straight pods, hint of fiber, yield on the low side.

Bridger – Some replications very poor; decent plant habit, medium green, round pods, yield not the best.

UW#4 – Acceptable plant habit, light to medium green, round pods, decent yield.

Jackson – Dark green round pods, some replications quite poor, lower yield.

PV857 – Good plant habit, medium green, round pods, nicest pod package, some insect injury, decent yield.

Colter – Also planted in the 3-4 sieve planting, good plant habit, dark green, round, straight pods, pods with aborted seeds, mottled leaf symptoms, lower yield.

524 – Good plant habit, round, straight, medium green pods, decent yield.

Chisolm – Curved medium green pods with low yield (seed size indicated harvested young but little movement after three days).

BEX069 – Lower plant population, light to medium green pods, yield on the low side.

Huntington – Industry mainseason standard, light to medium green pods, decent yield.

BBL156 – Industry standard, strings were found in several pods, decent yield.

Pismo – Medium green, round pods; decent yield.

SB4707 – Medium green, round pods; best yield in this planting.

SFC-01 – Good plant habit, light to medium green, round to creased pods; seed size at harvests indicated might have been immature, decent yield.

Silverado – Slow seed size up, curved pods, some necks, lower yield.

BA1001 – Round, medium green pods; lower yield.

Cosmo – Old variety, light to medium green, round, long pods; some necks, lower yield.

Yield looked much better for all in the field day planting but time constraints did not allow harvest.

Snap Bean Descriptions Provided by the Seed Source (Large Beans)

Venture *– Syngenta, early large sieve.*

CR1218 *– Crites, early (52 days) 5 sv, huge yield potential, long (5.5 in) straight pods medium green uniform color, moderate plant habit. 15% 3 sv, 45% 4 sv and 40%5 sv. IR for Pss.*

Bridger (HMX 4104) *– Harris Moran, 52 days to maturity, 65 % four sieve, 30% five sieve, good quality pod interiors, good yields, medium dark green, uniform, medium long, straight pods, HR for BCMV, Curly Top and Bacterial Brown spot; IR for Halo Blight.*

UW#4 *– Pure Line, five sieve, 60 day, 10% three sieve, 40% four sieve, 40% five sieve, 10% six sieve, HR for BCMV, Aph RR; Tolerant: BBS, Curly Top, WI root rot.*

Jackson *– Brotherton, 4-5 sieve size, 13.5-16.0cm bean length.*

PV 857 *– Crites, mid early (54 days) 4-5 sieve with pods sitting high on the plant. Erect plant habit. Very good heat tolerance and concentrated setting. 60% 4 sv, 40% 5 sv, 5.5 in pods, dark green. HR for BCMV/Cl; IR for Pss/Ua*

Colter *– Harris Moran; 55 days to maturity; 20% 3 sieve size, 60% 4 sieve size, 20% 5 sieve size; HR for BCMV, BCTV and Ua, IR for Pss.*

524 *– Pure Line, 57 days to maturity, 5 sieve, 20% 3 sv, 50% 4 sv and 30% 5 sv.*

Chisholm *– Harris Moran, 55 days, straight, smooth pods; medium dark green; slow seed development; upright plant, mid high pod position; 5.9 inch pod length; 20% three sieve, 45% four sieve and 35 % five sieve; HR for Bean Common Mosaic and Curly Top; IR for Halo Blight and Bacterial Brown Spot.*

BEX069 *– Brotherton, 4-5 sieve size, 14.0-15.2cm bean length.*

Huntington *– Syngenta, 56 day 5 sieve Blue Lake type, smooth straight pods, very erect plant with beans off the ground, good yielder which has demonstrated tolerance to the Midwest virus complex, IR to Bacterial Brown Spot, HR to Bean Common Mosaic, picks very clean with a good percentage of the beans without stems, leaves tend to show some bronzing at maturity with no affect to yield.*

BBL156 *– Pure Line, 56 days to maturity, 5 sieve, 10% 3 sv, 50% 4 sv and 40% 5 sv; resistant to BCMV.*

Pismo *– Syngenta, Huntington type with potentially a higher distribution of 4 sieves. Excellent yield potential and pod placement (1-2 " higher than Huntington in most environments.*

SB4707 *– Syngenta.*

Silverado *– Crites, mid-early; 57 days to maturity (Koala +1); 4-5 sieve with 70% 4 sv and 30% 5 sieve; long, straight pods that are 5.8" medium high pod placement, dark green pod color, erect plant, sets well in the heat but also seems to do well in cooler weather; HR for CL/BCMV; IR for Pss; good level of BBS resistance.*

BA1001 *– Seminis, 58 days to maturity, 20% three sieve, 30% four sieve, 50% five sieve, 5.9 inch pod length, fresh color 7; blanched color 4; plant type 5, 90% clean yield, 60% easy harvest wo ped., 5% clusters, 0% strings; S for Psp2, Xap, CO2, Ua38, Ua90, BCTV, CYVV and BGYMV; R for Ae, BCMV.*

Cosmo *– Brotherton, Large Bean, early-midseason, very long and large mid-dark pods with very slow seed development, very good pod quality and good flavor, good standing ability, 20% 4's, 50% 5's, 30% 6's, 6-7 inch pods, R for BCMV, R for CT, T for heat.*

Seminis disease descriptions – Psp=Halo Blight, Xap=Common Blight; Pss=Bacterial brown Spot, Ae=Aphanomyces, Co2=Anthracnose; Se=White Mold; Ua=Rust; Pmy=Aerial Pythium; BCMV=Bean Common Mosaic; BCTV=Beat Curly Top; BGYMV=Bean Golden Yellow Mosaic; CYVV=Clover Yellow Vein

Table 4. Yield Characteristics (3-4 sieve trial planted 6/19)

In order of maturity.

Cultivar	Days to harv.	Heat units to harv.	% 2 sieve	% 3 sieve	% 4 sieve	% 5 sieve	% 2-4 sieve	3 sieve sd length (mm)	4 sieve sd length (mm)	Plants per foot	T/A
SB4738	51	1062	44	28	25	3	97	53	69	5.7	2.9
SB4738	53	1099	29	31	37	3	97	66	76	6.0	3.0
SB4738	55	1131	21	27	45	7	93	65	91	6.1	5.5
SB4738	57	1174	12	17	60	11	89	66	87	6.9	7.4
Colter	51	1062	27	24	41	8	92	58	73	6.2	3.6
Colter	53	1099	17	26	45	12	88	68	77	5.6	4.4
Colter	55	1131	17	15	42	26	74	70	89	5.3	5.0
Colter	57	1174	7	7	53	33	67	70	90	6.1	7.4
Outlaw	51	1062	12	23	55	10	90	54	63	5.1	3.3
Outlaw	52	1099	15	19	61	5	95	65	75	5.4	3.7
Outlaw	55	1131	12	12	56	19	81	63	88	5.3	6.1
Outlaw	57	1174	6	9	56	30	70	61	86	6.2	6.9
SB4773	52	1082	23	31	41	5	95	67	81	6.4	5.0
SB4773	55	1131	16	24	52	8	92	74	92	6.5	7.1
SB4773	57	1174	13	23	57	6	94	65	81	6.0	7.0
SB4748	52	1082	26	29	42	3	93	61	74	5.6	4.0
SB4748	55	1131	25	21	46	7	93	65	85	6.4	5.7
SB4748	57	1174	15	19	56	10	90	63	86	6.4	6.9
Annihilator	51	1062	19	26	32	23	67	62	67	3.3	2.1
Annihilator	52	1099	16	8	36	40	60	61	95	4.6	4.0
Annihilator	55	1131	14	10	38	38	53	62	81	4.1	6.5
Annihilator	57	1174	16	14	41	29	71	67	81	4.1	5.7
Dominator	51	1062	17	12	60	12	88	67	79	4.2	2.4
Dominator	52	1099	12	10	41	37	63	68	79	4.8	3.7
Dominator	55	1131	10	8	36	47	53	70	96	5.4	6.4
Dominator	57	1174	9	10	38	43	57	65	88	4.7	6.6
Camero	54	1114	13	15	55	17	83	64	78	6.0	5.2
Camero	56	1155	15	13	44	28	72	65	77	6.9	6.6
Camero	58	1190	15	14	42	29	71	59	76	6.3	6.3
Echo	54	1114	28	42	30	0	100	65	76	6.1	4.9
Echo	56	1155	21	35	38	6	94	66	86	7.2	6.4
Echo	58	1190	21	29	42	7	93	66	84	5.9	5.4
Sahara	54	1114	21	28	47	4	96	66	71	5.5	4.6
Sahara	56	1155	13	19	56	13	87	69	79	6.2	6.1
Sahara	58	1190	7	18	62	13	87	74	84	6.0	6.3
HMX0175756	54	1114	16	14	43	27	73	60	80	5.8	4.5
HMX0175756	56	1155	19	13	42	26	74	56	77	5.4	4.6
HMX0175756	58	1190	8	11	40	41	59	60	76	6.2	7.7
Sybaris	55	1131	12	16	40	31	69	65	73	6.0	3.9
Sybaris	57	1174	19	11	47	23	77	61	78	5.7	4.8
Sybaris	60	1229	12	14	41	33	67	61	80	5.7	8.1
Jaguar	55	1131	21	26	41	12	88	78	90	5.8	4.6
Jaguar	57	1174	21	28	43	8	92	75	87	6.3	5.0
Jaguar	60	1229	6	15	53	26	74	90	101	6.0	7.3

Table 4. Yield Characteristics (3-4 sieve) continued:

Cultivar	Days to harv.	Heat units to harv.	%2 sieve	%3 sieve	%4 sieve	%5 sieve	%2-4 sieve	3 sieve sd length (mm)	4 sieve sd length (mm)	Plants per foot	T/A
BSC897	56	1155	29	25	39	7	93	62	78	5.4	4.9
BSC897	58	1190	35	24	34	7	93	60	81	5.2	6.1
BSC897	60	1229	20	29	42	10	90	72	101	5.4	7.9
HMX0164423	55	1131	26	25	41	8	92	70	74	5.4	4.5
HMX0164423	57	1174	25	23	46	6	94	61	79	5.7	4.7
HMX0164423	60	1229	7	12	44	36	64	59	84	5.2	8.8
Cabot	56	1155	25	21	48	5	95	64	77	6.1	5.2
Cabot	58	1190	14	20	54	12	88	65	83	6.5	6.2
Cabot	60	1229	6	13	65	16	84	70	87	6.6	7.8
Affirmed	56	1155	33	28	33	6	94	63	72	5.8	5.0
Affirmed	58	1190	14	27	51	9	91	210	73	6.5	7.2
Affirmed	60	1229	5	13	64	17	83	68	83	6.1	9.2
Wav 74	56	1155	35	22	39	4	96	54	72	5.3	3.6
Wav 74	58	1190	30	24	38	7	93	58	69	6.4	5.0
Wav 74	60	1229	25	32	38	5	95	55	76	6.6	6.3
Wav 56	56	1155	50	36	9	4	96	69	84	5.2	4.1
Wav 56	58	1190	43	42	13	1	99	71	93	7.0	5.3
Wav 56	60	1229	26	48	23	3	97	94	109	7.3	6.5
Antigua	56	1155	33	20	40	7	93	57	79	5.7	3.4
Antigua	58	1190	25	29	40	7	93	60	81	6.2	4.7
Antigua	60	1229	13	25	50	13	87	61	79	6.6	6.9
BEX057	55	1131	39	26	34	1	99	67	69	5.7	3.0
BEX057	57	1174	33	33	31	3	97	61	76	5.4	3.3
BEX057	60	1229	16	23	49	12	88	60	81	6.1	6.3
BEX057	63	1292	19	24	46	11	89	68	79	6.3	7.2
BEX057	65	1340	9	19	58	14	86	72	107	6.3	7.5
Venice	58	1190	61	24	13	2	98	61	87	6.2	2.6
Venice	61	1248	50	36	13	1	99	71	85	6.5	4.9
Venice	63	1292	39	38	20	3	97	64	86	7.0	6.9
Venice	65	1340	31	41	25	4	96	83	96	6.8	7.6
Wax											
Castore	52	1082	26	41	27	5	95	79	85	5.6	3.9
Castore	55	1131	28	36	30	5	95	82	94	6.3	5.9
Castore	57	1174	27	38	30	5	95	75	88	5.9	6.6
PLS 4247	52	1082	28	31	36	5	95	58	71	5.0	2.4
PLS4247	55	1131	15	15	63	6	94	69	79	5.7	3.4
PLS4247	57	1174	14	14	59	13	87	58	81	7.0	5.8
Goldrush	52	1082	26	30	41	3	97	64	80	5.8	4.3
Goldrush	55	1131	15	18	55	11	89	75	83	7.2	6.5
Goldrush	57	1174	8	15	64	13	87	71	91	6.3	8.3
DM 08-52	55	1131	23	15	29	32	68	73	88	3.7	3.3
DM 08-52	57	1174	15	10	38	37	63	66	88	5.7	6.2

Table 5. Plant and Pod Characteristics - 3-4 sieve type

Cultivar	Plant Ht. (in.)	Plant Width (in.)	Plant Habit Rating	Pod Color (raw) Rating	Unsnipped Pod Lgth (in.)	Pod Shape Rating	Pod Location Rating	Pod Straight. Rating
SB4738	14	17	3.5	MG	5 to 6	R	M-H	3.5
Colter	15	17	3.5	MG	5.5-6	R	M-H	4.5
Outlaw	15	16	4	MG	5-5.5	R	H	4
SB4773	19	15	3	LG	4.5-5.5	R	M-H	4
SB4748	15	19	3.5	MG	5-6	R	M-H	3
Annihilator	15	19	3.5	MG	6-6.5	R	M-H	3.5
Dominator	13	21	2.5	MG	5-5.5	R	M-H	3.5
Camero	17	20	3.5	MG	5-6	R	M-H	4
Echo	14	17	3.5	LG	5.5-6	R-O	M-H	4.5
Sahara	16	18	3.5	DG	5-6	R	M-H	3
HMX0175756	16	21	3.5	MG	5.5-6	R	H	4
Sybaris	16	22	3.5	DG	5.5-6	R	M-H	3.5
Jaguar	14	15	3	DG	5.5-6	R	M-H	4
BSC897	15	17	3.5	MG	5.5-6.5	R	M-H	4
HMX 0164423	17	21	3	DG	5.5-6	R	H	4
Cabot (std)	14	17	3	MG	5-5.5	R	M-H	3.5
Affirmed	14	22	3	DG	5-5.5	R	M-H	4
Wav 74	18	20	4	LG	4.5-5.5	R	M-H	4
Wav 56	15	20	3.5	MG	4.5-5	R	M-H	4
Antigua	17	20	3.5	MG	4.5-5	R	M-H	4
BEX057	16	20	3.5	MG	5-5.5	R	H	4.5
Venice	17	21	3.5	MG	5-5.5	R	M-H	4
Wax								
Castore	14	19	3	Yellow	4-5	O	M-H	3.5
PLS 4247	16	23	3	Gold	4-5	R	M-H	3
Goldrush	17	20	3.5	Yellow	5-6	O	M-H	4
DM 08-52	18	22	3.5	Pale yellow	5.5-6	O	M-H	3

Column Descriptions

Average plant height - The average plant height at harvest in inches.

Average plant canopy width - The average plant width at harvest in inches.

Plant Habit Rating - 5=very erect plant, 3= acceptable, 1=totally recumbent plant

Pod Color Rating - D=dark green, M=medium green, L=light green. (uncooked)

Unsnipped pod length - The average length of the largest pods in inches.

Pod Shape Rating - R=round, CR=creased, O=oval

Pod Location Rating - H= pods high on the plant, M=pods located in the center of the plant canopy, L=pods touching the ground

Pod Straightness Rating - 5=very straight, 3= acceptable, 1=very curved or twisted

Additional Comments (3-4 sieve)

SB4738 – Medium green, round, long pods; very good yield.

Colter – Medium green, round, long, very straight pods; very good yield.

Outlaw – Very good plant habit, medium green, round, straight pods, high on the plant; good yield.

SB4773 – Light green, round, shorter, straight pods; very good yield.

SB4748 – Medium green, round, long pods; good yield.

Annihilator – Plant population on the lower side, medium green, very long, round pods; good yield.

Dominator – Plant population on the lower side, recumbent plant habit, medium green, round pods; good yield.

Camaro – Medium green, long, straight, round pods; good yield.

Echo – Light green, long, round to oval, very straight pods; good yield.

Sahara – Dark green, long, round pods; good yield.

HMX 0175756 – Medium green, long, round, straight pods high on the plant; very good yield.

Sybaris – Dark green, long, round pods; excellent yield.

Jaguar – Dark green, long, round, straight pods; very good yield.

BSC0897 – Medium green, long, round, straight pods; very good yield.

HMX 0164423– Dark green, long, round, straight pods high on the plant, excellent yield.

Cabot – Medium green, round pods; very good yield.

Affirmed – Dark green, round, straight pods; excellent yield.

Wav 74 – Very good plant habit, light green, round, shorter, straight pods; good yield.

Wav 56 – Medium green, round, shorter, straight pods; good yield.

Antigua – Medium green, shorter, round, straight pods; good yield.

BEX057 – Medium green, round, very straight pods high on the plant; very good yield.

Venice – Late season, medium green, round, straight pods; very good yield.

Wax

Castore – Shorter, oval, nice yellow color pods; very good yield.

PLS 4247 – Shorter, round, golden yellow pods; good yield.

Goldrush – Long, yellow, oval pods; excellent yield.

DM 08-52 – Long oval, pale yellow pods; very good yield, still young and could have been harvested later.

Snap Bean Descriptions Provided by Seed Source (3-4 Sieve type)

SB4738 *– Syngenta.*

Colter *– Harris Moran; 55 days to maturity; 20% 3 sieve size, 60% 4 sieve size, 20% 5 sieve size; HR for BCMV, BCTV and Ua, IR for Pss.*

Outlaw *– Syngenta.*

SB4773 *– Syngenta.*

SB4748 *– Syngenta.*

Annihilator *– Pure Line, 3-4 sieve, 5% 3 sv, 75% 4 sv, 20% 5 sv; resistant to BCMV and BCTV.*

Dominator *– Pure Line, 3-4 sieve, 15% 3 sv, 70% 4 sv, 15% 5 sv; resistant to BCMV and BCTV.*

Camaro PV-891 *– Crites, 53 day estimate, erect large plant habit, 4 sv (10% 3 sv, 85% 4 sv and 5% 5 sv), medium green, 5.75 inch pods, high pod placement. HR for BCMV and Cl.*

Echo (BEX138) *– Brotherton, 3-4 sieve, 14-16.5 cm pod length.*

Sahara *– Harris Moran, green bush type, early maturity (54 days), upright plant habit, mid high pod position, 5.5 inch pods, medium dark green color, 40% 3 sieve, 60% 4 sieve; HR for bean common mosaic, curly top, anthracnose, halo blight, and bacterial brown spot.*

HMX 0175756 *– Harris Moran, green bush type, early maturity (54 days), upright plant habit, mid pod position, 5.5 inch pods, medium dark green pod color, 10% 3 sieve, 70% 4 sieve, 20% 5 sieve, HR for bean common mosaic, HR for curly top, HR for halo blight,*

Sybaris – *Seminis, 57 days to maturity, 10% 2sv, 30% 3 sv, 50% 4 sv, 10% 5sv; 5.7 inch pod length, fresh color – 3, Blanched color – 3, plant type 5; 100% clean yield, 50% easy harvest wo ped., 1% clusters, 5% strings; S for Psp2, Xap, CO2, Ae, CYVV and BGYMV; IR for Ua90; R for Ua38, BCTV and BCMV.*

Jaguar (PV-905) *– Crites, 57-58days, very erect plant habit, 4 sieve, 15% 3 sv, 80% 4 sv and 5% 5 sv, dark green, 6 inch pods. HR for BCMV and CL; IR for Rust. Pods pick very easy and clean.*

BSC897 *– Brotherton, midseason maturity, 21 inch plant height; dark green, 4-6 inch pods; 20% 3 sieve, 60% 4 sieve and 20% 5 sieve; R for BCMV and AN; T for BBS and heat.*

HMX 0164494 *– Harris Moran, early maturity (54 days), medium upright plant type, mid high pod position, 14 cm pod length, medium dark pod color, 5% 3 sv, 50% 4 sv, 45% 5 sv; HR for BCMV and Psp; IR for Cl, Pss and Xap, quality pod interiors for processing, good heat set, good yields.*

Cabot *– Harris Moran, attractive, round, straight pods; high quality end product, consistent performance, 55 days to maturity, upright plant, pod position mid high, 5.5 inch pods, 25% three sieve, 60% four sieve, 15% five sieve, medium dark green color, HR for Bean common mosaic, rust and common blight; IR for Curly top, Halo Blight and Bacterial Brown Spot.*

Affirmed *– Seminis, 56 days, (10% 2 sv, 30% 3 sv, 50% 4 sv and 10% 5sv), 5.8 inch pod length, 100% clean yield, 55% without ped., 1% clusters, 0% strings, S for Xap, Ua38, Ua90, Ae, CYVV and BGYMV; R for Psp2, CO2, BCTV and BCMV; improved plant, pod quality and product homogeneity.*

Snap Bean Descriptions Provided by Seed Source (3-4 Sieve type) continued:

Wav 74 *– Pure Line*

Wav 56 *– Pure Line*

Antigua *– Pure Line*

BEX057 *– Brotherton, An early 3/4 sieve with more 4's, BEX 057 has excellent yield potential, upright plant structure, and disease package, 12.5-14.4cm bean length.*

Venice *– Crites, A medium late variety with a very upright solid plant. The pods are very straight, 30% 2 sieve and 70% 3sieve; 12 cm long (-5.3 inch) and have nice very dark green color; HR for Psp, BCMV and Antracnose.*

Wax

Castore *– Pure Line*

PLS 4247 *– Pure Line*

Goldrush *– Pure Line*

DM 08-52 *– Pure Line*

Table 6. Yield Characteristics Whole Bean (Planting date 7/10)

Cultivar	Days to Harv.	Heat Units to Harv.	% 2 sieve	% 3 sieve	% 4 sieve	2 Sieve Seed Length (mm)	3 sieve seed length (mm)	Plants per Foot	T/A Harvest
Whole Beans									
Walker	57	1111	100	0	0	67		6.3	4.6
Walker	60	1145	100	0	0	87		6.8	6.0
Walker	63	1167	100	0	0	89		7.0	6.7
Flavor Sweet	58	1124	100	0	0	65		7.4	3.5
Flavor Sweet	61	1155	66	33	1	66	76	7.6	4.9
Flavor Sweet	64	1183	28	55	16	76	85	7.2	5.7
SV1286GW	58	1124	100	0	0	63		7.7	5.0
SV1286GW	61	1155	100	0	0	58		8.0	5.9
SV1286GW	64	1183	100	0	0	81		8.0	6.4
Weston	58	1124	100	0	0	77		7.4	5.2
Weston	61	1155	100	0	0	72		7.4	5.2
Weston	64	1183	100	0	0	88		8.1	5.8
BSC934 (Dawson)	58	1124	100	0	0	51		6.2	3.4
BSC934 (Dawson)	61	1155	100	0	0	52		6.5	4.9
BSC934 (Dawson)	64	1183	100	0	0	73		6.9	5.9
BB 0553	58	1124	100	0	0	62		5.9	3.8
BB 0553	61	1155	100	0	0	63		5.7	5.4
BB 0553	64	1183	100	0	0	82		6.4	6.2
Schubert	58	1124	100	0	0	65		6.8	4.5
Schubert	61	1155	100	0	0	60		6.8	5.8
Schubert	64	1183	100	0	0	86		7.3	6.6
BB 7396	58	1124	100	0	0	68		6.8	3.9
BB 7396	61	1155	100	0	0	66		7.2	4.6
BB 7396	64	1183	100	0	0	85		7.6	5.0
Enclave (BEX034)	60	1145	100	0	0	69		6.2	4.5
Enclave (BEX034)	63	1167	100	0	0	86		6.0	5.1
Enclave (BEX034)	65	1203	100	0	0	69		7.1	6.6
wax									
Oreo (wax)	57	1111	100	0	0	54		7.2	4.0
Oreo (wax)	60	1145	100	0	0	81		6.5	4.3
Oreo (wax)	63	1167	100	0	0	101		7.3	4.8

Table 6. Yield Characteristics continued:								
Cultivar	Days to Harv.	Heat Units to Harv.	% 2 sieve	% 3 sieve	% 4 sieve	2 Sieve Seed Length (mm)	Plants per Foot	T/A Harvest
Extra Fine								
DX170	57	1111	100	0	0	60	5.7	2.6
DX170	60	1145	100	0	0	65	6.7	4.2
DX170	63	1167	100	0	0	78	6.2	3.1
Denver (std)	58	1124	100	0	0	48	6.1	3.6
Denver (std)	61	1155	100	0	0	54	6.4	4.3
Denver (std)	64	1183	100	0	0	64	6.5	4.9
Surfer	58	1124	100	0	0	52	6.1	3.6
Surfer	61	1155	100	0	0	66	6.3	3.7
Surfer	64	1183	100	0	0	69	6.3	4.4
Vezer	58	1124	100	0	0	52	5.8	3.2
Vezer	61	1155	100	0	0	54	6.9	4.3
Vezer	64	1183	100	0	0	68	6.0	4.2
Astute (SVGN6196)	58	1124	100	0	0	50	6.1	3.0
Astute (SVGN6196)	61	1155	100	0	0	52	7.0	2.9
Astute (SVGN6196)	64	1183	100	0	0	67	7.2	4.6
wax								
Loriot (SVGN1386)	58	1124	100	0	0	53	5.2	2.3
Loriot (SVGN1386)	61	1155	100	0	0	57	6.3	3.5
Loriot (SVGN1386) (	64	1183	100	0	0	67	5.5	3.4

Our smallest grader is a 2 sieve. These extra fines were mostly one sieve.

Table 7. Plant and Pod Characteristics - Whole bean & Extra fine

Cultivar	Plant Ht. (in.)	Plant Width (in.)	Plant Habit Rating	Pod Color (raw) rating	Unsnipped Pod Length (in.)	Pod Shape Rating	Pod Location Rating	Pod Straight. Rating
Whole								
Walker	15	16	4	MG	5-5.5	R	H	5
Flavor Sweet	17	16	4.5	MG	4.25-4.75	R	M-H	4.5
SV1286GW	12	14	4	MG	5.25-5.75	R-O	M-H	4
Weston	19	16	4.5	M-DG	4.5-5	R	H	4.5
BSC934	21	16	5	M-DG	4.5-5	R	H	4.5
BB 0553	18	17	4.5	M-DG	4.75-5.25	R-O	H	5
Schubert	17	15	4.5	M-DG	5.5-6.5	R	H	4.5
BB 7396	18	18	4	DG	4.75-5.25	R-O	H	5
Enclave	15	14	4	M-DG	4.5-5.25	R	H	4.5
Oreo (wax)	16	16	4	GY	4-4.5	R	H	4.5
Extra Fine								
DX170	17	16	4.5	MG	4.75-5.25	R	M-H	4
Denver	17	15	5	M-DG	4.25-4.75	R	H	4.5
Surfer	15	14	5	MG	4.5-5	R-O	H	4
Vezer	17	16	4.5	MG	4.5-5	R	M-H	4.5
Astute	18	16	4.5	MG	4.75-5	R	H	4.5
Loriot (wax)	13	14	4	Y	4.75-5.5	R-O	M-H	4.5

Column Descriptions

Average plant height - The average plant height at harvest in inches.

Average plant canopy width - The average plant width at harvest in inches.

Plant Habit Rating - 5=very erect plant, 3= acceptable, 1=totally recumbent plant Habit was done one week after harvest.)

Pod Color Rating - DG=dark green, MG=medium green, LG=light green. (uncooked) ght yellow, Y=Yellow, GY=golden yellow

Unsnipped pod length - The average length of the largest pods in inches.

Pod Shape Rating - R=round, CR=creased, O=oval

Pod Location Rating - H= pods high on the plant, M=pods located in the center of the plant canopy, L=pods touching the ground

Pod Straightness Rating - 5=very straight, 3= acceptable, 1=very curved or twisted

Additional Comments - Whole Bean

Walker – Very good plant habit; medium green, round, long, very straight pods high on the plant; excellent yield.

Flavor Sweet – Very good to excellent plant habit; medium green, round, very straight pods; very good yield.

SV1286GW – Very good plant habit; medium green, long, round, straight pods; excellent yield.

Weston – Very good to excellent plant habit; medium to dark green, round, very straight pods high on the plant; very good yield.

BSC934 – Excellent plant habit; medium to dark green, round, very straight pods high on the plant; very good yield.

BB 0553 – Very good to excellent plant habit; medium to dark green, round to oval, very straight pods high on the plant; excellent yield.

Schubert – Very good to excellent plant habit; medium to dark green, long, round, very straight pods high on the plant; excellent yield.

BB 7396 – Very good plant habit; dark green, round to oval, very straight pods high on the plant; good yield.

Enclave (BEX034) – Very good plant habit; medium to dark green, round, very straight pods high on the plant; excellent yield.

Oreo (wax) – Very good plant habit; golden yellow, round to oval, very straight pods high on the plant; good yield.

Extra Fine

DX170 – Very good to excellent plant habit; medium green, round, straight pods; decent yield.

Denver – Excellent plant habit; medium to dark green, round, very straight pods high on the plant; good yield.

Surfer – Excellent plant habit; medium green, round to oval, straight pods high on the plant; good yield.

Vezer – Very good to excellent plant habit; medium green, round, very straight pods; good yield.

Astute (SVGN6196) – Very good to excellent plant habit; medium green, round, very straight pods high on the plant; good yield.

Loriot (SVGN1386) (wax) – Very good plant habit; short plants; yellow, round, straight pods; decent yield.

Descriptions Provided by the Seed Source - Whole Beans

Walker *– Vilmorin.*

Flavor Sweet *– Harris Moran, 55 days to maturity, upright plant, strong emergence vigor, pod position – mid high, 5 inch pod length, 85% 3 sieve, 15% 4 sieve, medium green pod color, good plant vigor, good quality straight pods, HR for BCMV 1, Cl and Psp.*

SV1286GF *– Seminis, 57 days, (70% 2 sv, 30% 3 sv), 4.8 inch pod length, fresh color – 4; blanched color – 5, plant type 2; 100% clean yield, 65% without ped., 1% clusters, 0% strings, S for Xap, Ua90, Ae, CYVV and BGYMV; R for Psp2, Ua38, CO2 and BCMV; improved plant type, very flexible, smaller sieve size than Cadillac.*

Weston (HMX4129) *– Harris Moran, 58 days to maturity, whole bean type, 80 % sieve 3, good quality pod interiors, medium green color, uniform, medium long, straight pods 13.5 cm long, HR for BCMV, Curly Top, Halo Blight and Common Blight; IR for anthracnose.*

BSC934 *– Brotherton, 1-2 sieve size, 11.0-11.5cm bean length.*

BB 0553 *– Pure Line.*

Schubert *– Pure Line.*

BB 7396 *– Pure Line.*

Enclave (BEX034) *– Brotherton, 2-3 sieve size, 11.3-12.0cm bean length.*

Oreo *– Vilmorin, wax.*

Extra Fine

DX170 *– Brotherton, DX 170 is an early mid season, 2 sieve, extra fine bean. DX 170 has a good disease package and shows tolerance to BCMV. A recent introduction from Brotherton Seed, DX 170 is high yielding and a good fit in the extra fine segment.*

Denver *- Vilmorin, semi early, 10.5-11 cm pod length, whole bean sieve 1-2, very productive and excellent pod quality, upright vigorous plant, HR for BCMV, Psp, Xap and Anthracnose.*

Surfer *– Vilmorin, semi early, 11.5 cm pod length, whole bean sieve 1-2 with dominant sieve 1, very productive, upright habit, HR for BCMV, Psp and Anthracnose; Ir for Xap.*

Vezer *– Vilmorin.*

Astute (SVGN6196) *– Seminis, 55 days, (70% 1 sv, 30% 2 sv), 4.8 inch pod length, fresh color – 6; blanched color – 4; 100% clean yield; 65% without ped., 1% clusters, 0 % strings; S for Xap, Ua90, Ae, CYVV and BGYMV; R for Ua38, Psp2, CO2, BCTV and BCMV; improved plant type, more suitable for clay soils.*

Loriot (SVGN1386) *– Seminis.*

Table 8. 2019 Weather summary for Geneva NY.

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
5/8/19	54	40	47	0.21	0.21	0	0
5/9/19	53	40	46.5	0	0.21	0	0
5/10/19	66	44	55	0.44	0.65	5	5
5/11/19	71	40	55.5	0.24	0.89	5.5	10.5
5/12/19	55	42	48.5	0.09	0.98	0	10.5
5/13/19	43	40	41.5	0.62	1.6	0	10.5
5/14/19	44	40	42	0.52	2.12	0	10.5
5/15/19	46	39	42.5	0.1	2.22	0	10.5
5/16/19	67	43	55	0.08	2.3	5	15.5
5/17/19	63	47	55	0.02	2.32	5	20.5
5/18/19	69	43	56	0	2.32	6	26.5
5/19/19	65	50	57.5	0.28	2.6	7.5	34
5/20/19	85	61	73	0.17	2.77	23	57
5/21/19	71	42	56.5	0.04	2.81	6.5	63.5
5/22/19	61	44	52.5	0	2.81	2.5	66
5/23/19	65	50	57.5	0.01	2.82	7.5	73.5
5/24/19	78	53	65.5	0	2.82	15.5	89
5/25/19	65	46	55.5	0	2.82	5.5	94.5
5/26/19	76	52	64	0.79	3.61	14	108.5
5/27/19	78	53	65.5	0	3.61	15.5	124
5/28/19	73	54	63.5	0.04	3.65	13.5	137.5
5/29/19	68	49	58.5	0.22	3.87	8.5	146
5/30/19	59	50	54.5	0.02	3.89	4.5	150.5
5/31/19	68	53	60.5	0.54	4.43	10.5	161
6/1/19	69	52	60.5	0	4.43	10.5	171.5
6/2/19	78	56	67	0.14	4.57	17	188.5
6/3/19	64	45	54.5	0.04	4.61	4.5	193
6/4/19	61	45	53	0	4.61	3	196
6/5/19	67	53	60	0	4.61	10	206
6/6/19	77	55	66	0.36	4.97	16	222
6/7/19	70	48	59	0	4.97	9	231
6/8/19	75	49	62	0	4.97	12	243
6/9/19	76	52	64	0	4.97	14	257
6/10/19	80	52	66	0	4.97	16	273
6/11/19	69	54	61.5	0.61	5.58	11.5	284.5
6/12/19	69	45	57	0	5.58	7	291.5
6/13/19	73	58	65.5	0	5.58	15.5	307
6/14/19	62	52	57	0.47	6.05	7	314
6/15/19	68	53	60.5	0	6.05	10.5	324.5
6/16/19	73	56	64.5	0.33	6.38	14.5	339
6/17/19	59	48	53.5	0.34	6.72	3.5	342.5
6/18/19	71	53	62	0	6.72	12	354.5
6/19/19	77	57	67	0	6.72	17	371.5
6/20/19	80	63	71.5	0.58	7.3	21.5	393
6/21/19	68	57	62.5	0.91	8.21	12.5	405.5

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
6/22/19	72	55	63.5	0.01	8.22	13.5	419
6/23/19	73	58	65.5	0	8.22	15.5	434.5
6/24/19	78	55	66.5	0	8.22	16.5	451
6/25/19	76	62	69	0.67	8.89	19	470
6/26/19	79	58	68.5	0	8.89	18.5	488.5
6/27/19	83	62	72.5	0	8.89	22.5	511
6/28/19	82	60	71	0	8.89	21	532
6/29/19	85	66	75.5	0	8.89	25.5	557.5
6/30/19	81	63	72	0	8.89	22	579.5
7/1/19	70	54	62	0	8.89	12	591.5
7/2/19	79	61	70	0	8.89	20	611.5
7/3/19	77	62	69.5	0	8.89	19.5	631
7/4/19	83	62	72.5	0	8.89	22.5	653.5
7/5/19	88	70	79	0	8.89	29	682.5
7/6/19	88	68	78	0.75	9.64	28	710.5
7/7/19	82	63	72.5	0.5	10.14	22.5	733
7/8/19	74	55	64.5	0.06	10.2	14.5	747.5
7/9/19	77	53	65	0	10.2	15	762.5
7/10/19	80	60	70	0	10.2	20	782.5
7/11/19	87	69	78	0	10.2	28	810.5
7/12/19	83	62	72.5	0	10.2	22.5	833
7/13/19	83	60	71.5	0	10.2	21.5	854.5
7/14/19	84	66	75	0	10.2	25	879.5
7/15/19	77	61	69	0	10.2	19	898.5
7/16/19	80	63	71.5	0	10.2	21.5	920
7/17/19	89	64	76.5	0.1	10.3	26.5	946.5
7/18/19	76	66	71	0.27	10.57	21	967.5
7/19/19	83	66	74.5	0	10.57	24.5	992
7/20/19	88	73	80.5	0	10.57	30.5	1022.5
7/21/19	91	74	82.5	0	10.57	32.5	1055
7/22/19	82	64	73	0	10.57	23	1078
7/23/19	66	61	63.5	0.9	11.47	13.5	1091.5
7/24/19	75	59	67	0.02	11.49	17	1108.5
7/25/19	74	58	66	0.03	11.52	16	1124.5
7/26/19	79	58	68.5	0	11.52	18.5	1143
7/27/19	82	61	71.5	0	11.52	21.5	1164.5
7/28/19	85	66	75.5	0	11.52	25.5	1190
7/29/19	81	63	72	0	11.52	22	1212
7/30/19	88	64	76	0	11.52	26	1238
7/31/19	84	64	74	0.24	11.76	24	1262
8/1/19	80	61	70.5	0	11.76	20.5	1282.5
8/2/19	78	53	65.5	0	11.76	15.5	1298
8/3/19	80	60	70	0	11.76	20	1318
8/4/19	82	62	72	0	11.76	22	1340
8/5/19	75	51	63	0	11.76	13	1353
8/6/19	80	59	69.5	0	11.76	19.5	1372.5

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
8/7/19	87	65	76	0.4	12.16	26	1398.5
8/8/19	73	63	68	0.52	12.68	18	1416.5
8/9/19	80	60	70	0.36	13.04	20	1436.5
8/10/19	75	59	67	0	13.04	17	1453.5
8/11/19	73	56	64.5	0	13.04	14.5	1468
8/12/19	77	58	67.5	0	13.04	17.5	1485.5
8/13/19	81	66	73.5	0.18	13.22	23.5	1509
8/14/19	79	60	69.5	0.22	13.44	19.5	1528.5
8/15/19	76	56	66	0.03	13.47	16	1544.5
8/16/19	76	61	68.5	0.02	13.49	18.5	1563
8/17/19	80	61	70.5	0.5	13.99	20.5	1583.5
8/18/19	76	61	68.5	1.23	15.22	18.5	1602
8/19/19	82	65	73.5	1.76	16.98	23.5	1625.5
8/20/19	81	61	71	0	16.98	21	1646.5
8/21/19	81	66	73.5	0.2	17.18	23.5	1670
8/22/19	82	66	74	0.05	17.23	24	1694
8/23/19	72	56	64	0	17.23	14	1708
8/24/19	70	52	61	0	17.23	11	1719
8/25/19	64	51	57.5	0.01	17.24	7.5	1726.5
8/26/19	73	54	63.5	0.01	17.25	13.5	1740
8/27/19	72	58	65	0	17.25	15	1755
8/28/19	73	61	67	0.22	17.47	17	1772
8/29/19	73	55	64	0.11	17.58	14	1786
8/30/19	73	56	64.5	0	17.58	14.5	1800.5
8/31/19	75	52	63.5	0	17.58	13.5	1814
9/1/19	69	51	60	0	17.58	10	1824
9/2/19	74	58	66	0.7	18.28	16	1840
9/3/19	71	59	65	0.13	18.41	15	1855
9/4/19	75	61	68	0.25	18.66	18	1873
9/5/19	75	52	63.5	0.01	18.67	13.5	1886.5
9/6/19	70	49	59.5	0.01	18.68	9.5	1896
9/7/19	71	51	61	0.03	18.71	11	1907
9/8/19	67	54	60.5	0.11	18.82	10.5	1917.5
9/9/19	66	46	56	0.02	18.84	6	1923.5
9/10/19	65	47	56	0.02	18.86	6	1929.5
9/11/19	81	50	65.5	0.21	19.07	15.5	1945
9/12/19	82	58	70	0.05	19.12	20	1965
9/13/19	63	50	56.5	0	19.12	6.5	1971.5
9/14/19	66	51	58.5	0.15	19.27	8.5	1980
9/15/19	75	53	64	0.01	19.28	14	1994
9/16/19	73	57	65	0.17	19.45	15	2009
9/17/19	68	47	57.5	0	19.45	7.5	2016.5
9/18/19	69	45	57	0	19.45	7	2023.5
9/19/19	69	46	57.5	0	19.45	7.5	2031
9/20/19	69	48	58.5	0	19.45	8.5	2039.5

N. Y. S. 2019 PROCESSING SWEET CORN VARIETY REPLICATED AND OBSERVATION (su and supersweet type) TRIAL SUMMARY

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The trial was located at the Vegetable Research Farm in Geneva, NY. The objective was to harvest su gene type at 72-75% moisture and the supersweet type at 75-78% moisture. Plot size for the replicated entries was 2 rows, 40 feet in length, and 30 inches between the rows. An early planting of su cultivars was planted on 5/12 and followed by another planting on 5/25. A single planting of the yellow supersweet type (four replications) was planted on 6/17. A single planting of white supersweets was planted on 6/22. A disease trial was planted on 7/10 and evaluated in early October. Yield data were taken from a single harvest of a 20 feet section of each of the two rows (40 row feet total). A subsample of 15 ears was used for ear data.

Observation entry plot size was also 2 rows, 40 feet in length, and 30 inches between the rows. There were two plots of each cultivar at each planting. Planting dates were the same as the replicated plots. All plantings were sowed with a Monosem vacuum planter with double disc openers. The fertilizer used was a 15-5-10 (with Mn and Zn) at a rate of 350 lbs. per acre. Fertilizer was banded two inches below and two inches to the side of the seeds at planting. Bicep Lite (at the labeled rate) was applied post emergence for weed control. Desired population was 19,000 plants per acre (11 inches in row spacing). One cultivation was made to enhance weed control and to sidedress N (was done roughly 30 days from planting (400 pounds of 22-0-0 per acre)). The varieties GH4927 and GH6462 from Syngenta Seeds were used as standards for the su type. Overland, from Syngenta Seeds, was used as the supersweet standard.

Spring rainfall was overly plentiful delaying planting of all but the earliest su trial. We had one dry period in July but irrigation was not needed. Both of the su and also the supersweet planting had good emergence. Heat units over the entire growing season were probably average although it was cool in May and June. See Weather Summary table. The bacterial disease Stewarts Wilt was minimal to nonexistent. Common Smut was minimal. Common Rust infection was also minimal to nonexistent. NCLB was again evident although it probably did not affect yield. This disease seems to be more common and a bit more severe the past few years. A late season disease trial was not planted due to weather constraints that delayed the evaluation trials.

We wish to thank the NYS Vegetable Research Association, Ontario Processing Vegetable Growers and cooperating seed companies for their financial support of this project. We also wish to thank Mr. Michael Gardinier and Mr. Steve Lashbrook of FarmFreshFirst for their assistance in planning the trials. Special thanks to Wayne Hansen, Allison Maloney, Noah and Luke Czadzeck, Floyd Baker and Kim Day for their assistance in day to day operations. Please address any questions to me at the address below.

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Table 1. Cultivar List

Su Type	Seed Source
SC1263	Seminis
HMX 89SU716	HM
Cash	Crites
Gh 4927std	Syngenta
Azlan (HMX 5389)	HM
Grampian	Crites
GH 6462 (std)	Syngenta
ZUY1317	Crites
CSUP14-879	Crookham
CSYYP15-988	Crookham

Supersweet (yellow)

1972 XR	IFDS
SVSK5678	Seminis
Harvest Gold	GV
Pronghorn (5854)	Seminis
SVSK6774	Seminis
HMX59YS718	HM
XTH1679	IFDS
SVSK0762	Seminis
CSAYF13-697	Crookham
GSS3071	Syngenta

Supersweet Yellow cont:	Seed Source
HMX59YS825	HM
Moonshine	GV
SVSK6143	Seminis
SVSK1859	Seminis
HMX59YS823	HM
HMX 59YS614	HM
SVSK5780	Seminis
SV1339SK	Seminis
GSS3951	Syngenta
4182 MXR	IFDS
GSS 1453	Syngenta
HardiGI5	Crookham
Overland (std)	Syngenta
ZHY 1455	Crites
Messinger	Seminis
Talladega	Crookham

White Supersweet

ZHY5055	Crites
3879 XR	IFDS
Devotion	Seminos
CSHWP14-757	Crookham

Table 2. su planting date 5/9

Cultivar	Days to Silk	Heat Units to Silk	Days to Harv.	Heat Units to Harvest	Moist. %	*Source Maturity*
SC1263	71	947	98	1509	69.3	73
HMX 89SU716	71	947	98	1509	70.8	75
Cash	76	1078	103	1602	71.0	74
Gh 4927std	76	1078	99	1529	71.2	75
Azlan (5389)	74	1023	99	1529	72.7	75
Grampian	76	1078	103	1529	69.8	81
GH 6462 (std)	80	1143	105	1646	71.6	83
ZUY1317	80	1143	106	1670	71.2	83
CSUP14-879	81	1165	106	1670	71.9	84
CSYYP15-988	81	1165	106	1670	71.7	na

Table 2A. Su planting date 6/8

Cultivar	Days to Silk	Heat Units to Silk	Days to Harv.	Heat Units to Harvest	Moist. %	*Source Maturity*
SC1263	55	1052	80	1509	74.3	73
HMX 89SU716	55	1052	80	1509	74.4	75
Cash	57	1087	87	1609	72.1	74
Gh 4927std	56	1067	83	1555	75.5	75
Aslan (5389)	56	1067	83	1555	75.9	75
Grampian	60	1142	87	1609	70.9	81
GH 6462 (std)	60	1142	90	1656	72.8	83
ZUY1317	62	1186	90	1656	73.9	83
CSUP14-879	62	1186	93	1687	71.1	84
CSYYP15-988	62	1186	93	1687	72.1	na

Days to silk - The number of days from planting until plots had 50% of plants showing silks.

Heat Units to Silk -Growing Degree Day Units Base 50 Degrees F. - The accumulation of degree day units from planting until silk.

Days to harvest - The number of days from planting until harvest.

Heat Units to Harvest - Growing Degree Day Units Base 50 Degrees F. The accumulation of degree day units from planting until harvest.

% Moisture at Harvest - Percent Moisture of the harvest sample - A slurry of cut kernels was dried to determine the percent moisture.

Seed Source Maturity - Maturity in days provided by the seed source.

Table 3. Ear and Kernel Ratings - Su planting dates 5/9 & 6/8

Cultivar	Ear Unif. Rating	Ear Shape Rating	Oval / Round Rating	Kernel Rowing Rating	Kernel size Rating	Kernel Depth Rating	Kernel Row Range	Pericarp Rating	Flavor Rating	Plt. Ht. (in)	Ear Ht. (in)
SC1263	G-VG	SL T	SL O	SL IRR	M	D	16-20	S	OK	na	na
	VG	SL T	R	SL IRR	M	M	16 to 20	S-OK	OK-G	76	14
HMX 89SU716	G-VG	SL T	R	SL IRR	M	M	16-20	OK	OK	na	na
	VG	SL T	R	SL IRR	M	M-D	16 to 20	OK-T	BL-OK	73	15
Cash	VG	CY-SL T	R	ST-SL IRR	S-M	M-D	18-20	OK-T	OK	na	na
	G	CY	R	ST-SL IRR	M	M	16 to 22	OK	OK	83	14
Gh 4927std	G-VG	CY-SL T	R	SL IRR	M	M-D	14-18	OK	OK	na	na
	VG	CY-SL T	R	ST-SL IRR	M	M-D	16 to 18	OK	OK	78	18
Azlan (5389)	G-VG	CY	R	SL IRR	M	D	16-18	OK-T	OK	na	na
	VG	CY-SL T	R	SL IRR	M	D	16 to 20	OK-T	BL-OK	76	14
Grampian	VG	CY-SL T	R	ST-SL IRR	S-M	M-D	16-20	OK-T	BL-OK	na	na
	G-VG	CY-SL T	R	ST-SL IRR	M	M	18 to 20	OK	OK	85	15
GH 6462 (std)	VG	SL T	R	ST-SL IRR	M	M-D	18-22	OK	OK	na	na
	G-VG	CY-SL T	R	ST-SL IRR	M	M-D	16 to 22	OK	OK	92	15
ZUY1317	VG	CY	R	ST-SL IRR	S-M	M	20-24	OK	OK	na	na
	VG	CY	R	ST-SL IRR	M	M	16 to 22	OK	OK	90	12
CSUP14-879	VG	CY	R	ST-SL IRR	M	M	18-22	OK	OK	na	na
	VG-EX	CY-SL T	R	ST-SL IRR	M	D	18 to 22	OK-T	OK	92	14
CSYYP15-988	VG-EX	SL T	R	ST	M	M	16-20	OK-T	BL-OK	na	na
	VG	SL T-T	R	ST	M	M	16 to 18	OK	OK	90	8

Row one is 5/9 planting and row two 6/8 planting.

Ear Uniformity (Rating) - Ex=excellent (entire sample was the same length, diameter and uniform tip fill); VG=very good; G=good; F=fair; P=poor

Ear Shape Rating - CY=cylindrical; Sl T=slightly tapered; T=tapered.

Oval/round (Rating) - R=round; Sl O=slightly oval; O=oval.

Kernel Rowing (Rating) - (The straightness of the rows of kernels.) St=straight; SL I=slightly irregular; IRR=quite irregular.

Kernel Size Rating - S=small, M=medium, L=large

Kernel Depth (Rating) - S=shallow, M=moderate, D=deep

Row # - The number of rows around an ear listed as a range.

Pericarp (Rating) - S=soft, OK=acceptable, T=tough

Flavor (Rating) - Bl=Blah, OK=acceptable, Good=better than acceptable, SW=sweet

Plant Heights – The measurement of the plant in inches from the base of the stalk to the top of the tassel.
Ear Heights – The measurement from the base of the stalk to the node at the base of the primary ear.

Column Descriptions for Tables 4 and 8.

Husk Extension - The measurement in inches of the distance from the tip of the cob to where the husk opens. A negative measurement indicates exposed kernels. Exposed kernels can make the ear more susceptible to insect or bird feeding.

Ear Length - The measurement in inches of the husked ear butt to tip.

Ear Diameter - The measurement in inches of the diameter of the middle of the ear.

Kernel Row Range – The range of the number of rows counted on the ear sample.

Unfilled Tip - The measurement in inches of the tip of the ear that had not formed kernels.

Weight. per Unhusked Ear - The weight in pounds of an unhusked ear. (Total yield weight divided by total number of ears harvested.) Comparing (weight per unhusked ear from total harvest) to the sample unhusked weight per ear indicates how valid the sampling technique is.

Sample Wt. per Unhusked Ear - The weight in pounds of an unhusked ear based on the sample 15 ears brought in from the field.

Sample Husked ear weight – The weight in pounds of a husked ear based on the sample.

Sample Kernel Weight per ear – The weight in pounds of the kernels cut from the ear.

Plants per acre – Plant Population per acre of the harvested plot (multiply number in the column by 1000). Harvest plot was two rows by 20 ft per replication.

Ears per plant – The number of ears harvested divided by the number of plants in the harvest area.

Moisture percentage – Percent Moisture of the harvest sample - A slurry of cut kernels was dried to determine the percent moisture.

Tons per Acre - The extrapolated yield of the plot listed as tons per acre. Harvest plot was two rows by 20 ft (40 row feet) per replication.

Table 4. Ear and Yield Data - su planting date 5/9 &6/8

Cultivar	Husk Ext. (in)	Ear Length (in)	Ear Diam. (in)	Unfill Tip (in)	Wt. Per Ear Unhusked (lbs)	(Sample) Unhusked Wt. Per Ear (lb)	(Sample) Husked Ear Wt. Per Ear (lb)	Kernel Weight Per Ear (lb)	Plants per acre (1000)	Ears per Plt.	Moist. %	Tons Per Acre	Rec. %	Overall ear eval.
SC1263	-0.2	8.2	2.1	0.1	0.95	1.0	0.8	0.59	16.3	0.89	69.3	6.9	58.8	2.5
	0.0	8.5	2.0	0.2	0.94	0.97	0.71	0.49	18.8	0.96	74.3	8.5	50.8	3.75
HMX 89SU716	0.5	7.9	2.0	0.2	0.82	0.9	0.7	0.50	16.8	0.92	70.8	6.3	54.4	3
	1.4	8.1	1.9	0.4	0.89	0.86	0.63	0.45	19.5	0.97	74.4	8.4	52.4	4
Cash	0.5	7.7	2.0	0.3	0.94	0.9	0.7	0.51	18.1	1.00	71.0	8.5	55.1	3.75
	0.9	8.1	2.0	0.3	0.91	0.97	0.73	0.50	19.9	0.97	72.1	8.8	52.5	3.75
Gh 4927std	0.2	7.8	1.9	0.0	0.88	0.9	0.6	0.41	17.4	0.96	71.2	7.4	48	3.5
	0.4	8.1	1.8	0.0	0.88	0.92	0.65	0.43	19.9	0.96	75.5	8.4	47.2	4.25
Azlan (5389)	0.3	8.0	2.0	0.4	0.90	0.9	0.7	0.52	19.5	0.96	72.7	8.4	60	3.75
	-0.2	8.5	2.0	0.3	0.92	0.96	0.77	0.58	19.8	0.99	75.9	9.1	59.7	4.25
Grampian	0.7	7.8	2.0	0.1	0.94	0.9	0.7	0.51	15.5	0.99	69.8	7.2	56	4
	0.2	8.4	2.1	0.1	0.97	1.00	0.73	0.52	19.5	0.98	70.9	9.3	51.7	4
GH 6462 (std	1.9	7.9	2.0	0.1	0.92	0.9	0.7	0.50	18.3	0.98	71.6	8.3	52.5	4.25
	1.0	8.1	2.0	0.1	0.98	0.95	0.73	0.52	17.6	0.96	72.8	8.3	54.6	4
ZUY1317	0.7	8.2	1.9	0.1	1.01	1.0	0.7	0.50	17.9	0.99	71.2	9.0	48.2	3.75
	0.5	8.4	1.9	0.0	0.97	0.99	0.74	0.50	19.2	0.98	73.9	9.2	50.1	4
CSUP14-879	1.1	7.9	2.1	0.1	1.10	1.0	0.8	0.54	16.7	0.99	71.9	9.0	51.5	4
	1.0	7.8	2.2	0.0	1.12	1.16	0.86	0.62	19.5	0.98	71.1	10.6	53.7	4.5
CSYYP15-988	0.5	8.2	1.9	0.1	0.95	0.9	0.7	0.46	17.9	1.00	71.7	8.5	48.4	4
	0.9	8.2	2.0	0.1	0.97	0.96	0.69	0.46	19.7	0.97	72.1	9.3	48.2	4

Headings explained on page 8

Line one is from the 5/9 planting and line two from 6/8 planting

Additional Comments SU Type

The early planting went into cooler soil and emerged later than expected. Populations were decent. Although we put two fences up (wire mesh and an electric outside that), we did have raccoon damage especially with the earlier cultivars.

SC 1263 – Early, lots of bird damage (first planting) and raccoon damage in both plantings (protected by wire mesh and electric fence), a bit oval, exposed ear tips, good kernel depth, good recovery, ear uniformity and yield better in the second planting, overall ear rating 2.5 and 3.75.

HMX 89SU716 – Early, nice plant, some raccoon damage, a few ears broke when cutting kernels, ear uniformity and yield better in the second planting, good recovery both plantings, overall ear rating 3 and 4.

Cash – Early to midseason, ear uniformity a bit less in second planting, very good yield and recovery both plantings, 3.75 overall ear rating both plantings.

GH4927 – Early standard, slender ears, recovery lower than most others, excellent tip fill, good yield, moderate NCLB symptoms, overall ear rating 3.5 and 4.25.

Azlan – On the early side, solid plant, husk extension minimal to exposed, deep kernels which resulted in excellent recovery in both plantings, kernel texture a bit tough, very good yield, overall ear rating 3.75 and 4.25.

Grampian – Midseason, very good tip fill, very good yield and recovery, moderate NCLB symptoms, overall ear rating 4 and 4.

GH 6462 – Late standard, very good husk extension and tip fill, very uniform yield across both plantings, very good recovery, overall ear rating 4.25 and 4.

ZUY 1317 – Mainseason, big ears, good husk extension and very good tip fill, uniform, excellent yield; recovery a bit lower than most others, overall ear rating 3.75 and 4.

CSUP13-879 – Mainseason, big ears, good husk extension and very good tip fill, very good ear uniformity, excellent yield and good recovery, overall ear rating 4 and 4.5 (new one that shows very good potential).

CSYYP15-988 – Mainseason, good husk extension and very good tip fill, good yield but recovery lower than most, overall ear rating 4 and 4.

Cultivar Descriptions Provided by the Seed Source (SU Type)

SC 1263 *– Seminis, yellow se, early season maturity (73 days or 1530 heat units), 74 inch plant height, 22 inch ear height, 8.0 inch ear length, 2.0 inch ear diameter, average row count is 18, HR for common rust (RpD+RpG), IR MDMV.*

HMX 89SU716 *– Harris Moran, 74 days to maturity, 7.8 inch ear length, 2.1 inch diameter, row count 16-18, IR for Northern corn leaf blight.*

Cash *– Crites, 78 day maturity (1640 heat units), su yellow processor, 7.7 inch ear, 2.2 inch cob, average row number 18, plant and ear height medium, IR for common rust, Su for NCLB, IR for SW and Southern Leaf Blight, tolerant to Accent herbicide, high quality petite kernels.*

GH4927 *– Syngenta, 75 days to maturity, stout plant, Rpli gene for rust resistance, Poast herbicide tolerance.*

HMX 5389 *– Harris Moran, 75 days, 18 rows, 8 inch ear with 2.0 inch ear diameter, superior yield and recovery, intermediate resistance to both NCLB & MDMV, Rp1-i rust resistance.*

Grampian *– Crites.*

GH6462 *– Syngenta; 83 days to maturity; double rust genes d, g – some NCLB, SCLB, MDMV and Stewarts tolerance; great % recovery and good finished quality and color.*

ZUY 1317 *– Crites, 83 days to maturity, 8.3 inch cob length, 2.1 inch cob width, ave 20 rows, HIR for common rust AVIR (+D), HR for common rust D-VIR and G-VIR (+D), Su for NCLB, IR for Stewarts Wilt, Southern Leaf Blight and Gosses Wilt, Su for MDMV, excellent vigor, cold start ability, good yield potential, freezes as both cob and kernel, small core, late harvest will improve recovery and yield without significant quality loss, can be planted throughout the season.*

CSUP14-879 *– Crookham,* Goal – Replace GH6462; *85-88 days to maturity, a little later than GH6462 based on silking dates, Very good yield and recovery; Ears taken back to the facility to test theoretical recovery numbers; High consistent productivity, perfect tip fill, and consistent shape are the hallmark features of this variety; Similar ear style as Daytona and CSAYF13-697(this is a sh2, but the ear style is similar); HR-Rust / IR-NCLB & MDMV; Cob diameter – 2", Plant height – 7', Ear Height – 30", Ear length – 8", Full husk protection, 18-22 row count; Its very consistent tip fill will work well for natural cobs/cobettes and the consistent ear shape will help run smoothly through the plant.*

CSYYP15-988 *– Crookham.*

Table 5. Maturity (Supersweet gene type planting date 6/19)

Cultivar	Days To Silk	Heat units to silk	Days to Harv.	Heat units to harv.	% Moist	*Seed Company Maturity*
Yellow						
1972 XR	54	1114	85	1591	76.1	72
SVSK5678	54	1114	85	1591	79.6	73
Harvest Gold	54	1114	85	1591	76.3	74
Pronghorn (5854)	56	1155	89	1640	79.6	74
SVSK6774	57	1174	90	1655	81.1	74
HMX59YS718	57	1174	90	1655	77.8	75
XTH1679	58	1190	92	1669	77.7	77
SVSK0762	56	1155	89	1640	78.5	77
CSAYF13-697	59	1208	93	1677	77.8	early to mid
GSS3071	60	1229	96	1714	77.5	78
HMX59YS825	57	1174	90	1655	78.0	78
Moonshine	58	1190	92	1669	79.5	78
SVSK6143	56	1155	89	1640	78.9	79
SVSK1859	60	1229	96	1714	79.0	79
HMX59YS823	58	1190	92	1669	79.1	80
HMX 59YS614	58	1190	92	1669	77.9	81
SVSK5780	59	1209	93	1677	79.2	81
SV1339SK	59	1209	93	1677	76.5	83
GSS3951	59	1209	93	1677	76.9	82
4182 MXR	60	1229	96	1714	77.4	82
GSS 1453	61	1248	97	1740	76.5	83
HardiGI5	61	1248	97	1740	74.6	83
Overland (std)	60	1229	96	1714	77.8	84
ZHY 1455	59	1209	93	1677	77.0	86
Messinger	60	1209	97	1740	78.5	87
Talladega	58	1190	92	1669	76.0	late season
White ss						
ZHY5055	57	1174	90	1655	75.7	81
3879 XR	57	1174	90	1655	77.9	81
Devotion	58	1190	92	1669	77.2	82
CSHWP14-757	58	1190	93	1677	75.2	86

See Table 2 for heading descriptions.

Table 6. Ear and Kernel Ratings

Cultivar	Ear Unif. Rating	Ear Shape Rating	Oval / Round Rating	Kernel Rowing Rating	Kernel Size Rating	Kernel Depth Rating	Kernel Row Range	Pericarp Rating	Flavor Rating	Plt Ht (in)	Ear ht. (in)
Yellow											
1972 XR	G	CY-SL T	R-SL O	ST-SL IRR	M	M	14 to 18	OK	OK	73	17
SVSK5678	VG-EX	CY	R	ST	M	M	14 to 18	OK	OK-G	78	17
Harvest Gold	G	SL T	R	ST-SL IRR	M	SH-M	16 to 20	OK	OK-G	77	22
Pronghorn	VG	SL T	R	ST-SL IRR	M	D	16 to 18	OK-T	OK-G	78	19
SVSK6774	VG	SL T	R	ST-SL IRR	M	M	16 to 20	OK	OK	81	22
HMX59YS718	VG	SL T	R	ST-SL IRR	M	M	16 to 18	OK-T	OK	79	20
XTH1679	VG	CY-SL T	R	ST-SL IRR	M	M-D	16 to 18	OK-T	OK	77	17
SVSK0762	VG	CY	R	ST-SL IRR	M	M-D	16 to 20	OK-T	OK-G	78	19
CSAYF13-697	G-VG	CY	R	ST-SL IRR	M	M-D	14 to 18	OK	OK	76	20
GSS3071	VG-EX	CY	R	ST-SL IRR	M	M-D	16 to 18	OK	G	84	21
HMX59YS825	G-VG	SL T	R	SL IRR	M	M-D	16 to 18	OK-T	OK	83	19
Moonshine	VG	CY	R	ST	M	M-D	14to 18	OK	OK-G	81	21
SVSK6143	VG	CY-SL T	R	ST-SL IRR	M	M	18 to 20	OK-T	OK	80	20
SVSK1859	VG	CY	R	ST-SL IRR	M	D	16 to 20	OK-T	OK-G	77	21
HMX59YS823	G-VG	CY-SL T	R	ST-SL IRR	M	M	16 to 18	OK	OK	79	20
HMX 59YS614	VG	CY	R	SL IRR	M	D	16 to 18	OK-T	OK-G	76	18
SVSK5780	G	CY-SL T	R	ST-SL IRR	M	M	16 to 20	OK	OK	73	20
SV1339SK	VG	CY-SL T	R	ST-SL IRR	M	M	18 to 20	OK	OK-G	86	21
GSS3951	G-VG	CY-SL T	R	ST-SL IRR	S-M	M	18 to 20	OK	OK-G	84	24
4182 MXR	VG	CY	R	SL IRR	M	M-D	16 to 18	OK	OK-G	87	20
GSS 1453	VG	CY-SL T	R	ST-SL IRR	M	M-D	16 to 20	OK	G	84	20
HardiGI5	VG-EX	CY	R	ST-SL IRR	M	M	16 to 18	OK-T	G	86	21
Overland (std)	G-VG	CY-SL T	R	ST-SL IRR	M	M	18 to 20	OK-T	OK-G	81	22
ZHY 1455	G-VG	CY-SL T	R	ST-SL IRR	M	M	16 to 20	OK	OK-G	87	23
Messinger	VG	CY-SL T	R	ST	M	M-D	18 to 20	OK	OK-G	84	22
Talladega	VG	SL T	R	ST	S-M	SH-M	14 to 18	OK	OK-G	86	20
Whites											
ZHY5055	G	SL T	R	ST-SL IRR	M	SH-M	16 to 20	OK	OK-G	78	17
3879 XR	VG-EX	SL T	R	ST-SL IRR	M	M	16 to 20	OK	OK-G	78	16
Devotion	VG	SL T	R	ST-SL IRR	M	M	16 to 18	OK	G	86	20
CSHWP14-757	G-VG	CY	R	ST-SL IRR	M	M	16 to 18	O	G	79	19

See Table 3 for heading explanations.

Table 7 Ear and Yield Data supersweets

Cultivar	Husk Ext. (in)	Ear Length (in)	Ear Diam. (in)	Unfill. Tip (in)	Wt. Per Ear Unhusked (lbs)	unhusked wt per ear (lb.)	Sample husked wt per ear (lb.)	Sample kernel wt per ear (lb.)	Per Acre (1000)	Ears per plant	% Moist	Tons per acre	Recov. %	Overall Ear Eval.
1972 XR	1.3	8.0	2.1	0.5	0.91	0.85	0.71	0.50	17.6	0.93	76.1	7.9	59.2	3.0
SVSK5678	3.3	7.3	2.0	0.0	0.79	0.90	0.66	0.46	17.4	0.95	79.6	6.9	50.7	4.0
Harvest Gold	0.5	8.8	2.1	0.5	0.94	0.97	0.76	0.53	19.2	0.94	76.3	8.5	55.0	2.8
Pronghorn	1.1	8.0	2.1	0.1	0.96	0.98	0.78	0.57	19.5	0.99	79.6	9.3	58.5	4.0
SVSK6774	0.9	8.1	2.0	0.1	0.91	0.92	0.54	0.52	19.3	0.96	81.1	8.4	56.8	4.0
HMX59YS718	1.5	7.6	2.1	0.2	0.92	0.89	0.71	0.51	18.7	1.00	77.8	6.6	58.1	4.0
XTH1679	1.5	8.0	2.1	0.1	0.96	0.97	0.73	0.54	19.0	0.95	77.7	8.7	55.2	4.0
SVSK0762	1.3	8.3	2.0	0.0	0.88	0.87	0.66	0.47	18.3	1.00	78.5	7.9	53.8	4.0
CSAYF13-697	0.8	8.0	2.1	0.0	0.91	0.91	0.74	0.54	18.0	0.97	77.8	7.9	59.6	3.5
GSS3071	0.7	8.1	2.1	0.1	0.91	0.90	0.74	0.56	18.3	1.00	77.5	8.3	62.3	4.3
HMX59YS825	1.1	8.2	2.1	0.1	0.94	1.01	0.74	0.53	19.5	0.99	78.0	9.1	52.3	3.8
Moonshine	1.0	7.9	2.0	0.0	0.89	0.86	0.52	0.49	19.7	0.99	79.5	8.7	57.2	4.3
SVSK6143	1.4	8.0	2.1	0.1	0.94	1.01	0.77	0.54	19.9	0.98	78.9	9.2	53.6	4
SVSK1859	0.1	8.0	2.2	0.1	1.03	1.07	0.86	0.63	14.1	1.06	79.0	7.9	59.1	4.3
HMX59YS823	0.2	8.8	2.1	0.4	1.03	0.99	0.74	0.53	19.0	0.99	79.1	9.6	53.5	4
HMX 59YS614	1.4	8.6	2.2	0.2	1.05	1.08	0.86	0.59	18.1	1.00	77.9	9.5	54.3	4.0
SVSK5780	0.9	8.4	2.1	0.3	1.01	0.99	0.76	0.55	18.7	0.99	79.2	9.3	55.0	3.5
SV1339SK	0.6	8.7	2.2	0.6	1.05	1.09	0.88	0.62	17.3	0.97	76.5	8.7	57.1	4.0
GSS3951	0.5	8.5	2.1	0.2	0.95	0.95	0.76	0.56	19.6	0.99	76.9	9.2	58.6	3.8
4182 MXR	1.3	7.7	2.1	0.2	0.91	0.89	0.69	0.57	18.7	0.98	77.4	8.3	64.5	4.0
GSS 1453	-0.9	8.5	2.1	0.3	0.88	0.90	0.76	0.57	20.0	1.00	76.5	8.8	63.2	4.3
HardiGI5	0.9	8.7	2.0	0.2	0.96	0.94	0.76	0.55	17.3	1.03	74.6	8.5	59.1	4.0
Overland (std)	-0.4	8.3	2.1	0.4	0.92	0.96	0.77	0.57	19.3	0.99	77.8	8.8	60.0	3.8
ZHY 1455	0.2	8.7	2.0	0.6	0.94	0.95	0.76	0.55	18.6	0.95	77.0	8.3	57.2	2.8
Messinger	1.3	8.8	2.1	0.2	1.02	1.04	0.75	0.55	19.0	1.03	78.5	9.9	52.8	4.3
Talladega	0.3	8.7	2.0	0.7	0.89	0.91	0.70	0.50	19.5	0.95	76.0	8.2	54.1	3.8
ZHY5055	1.9	7.9	2.0	0.0	0.89	0.89	0.66	0.45	19.8	0.93	75.7	8.2	50.8	3.5
3879 XR	1.6	7.7	2.0	0.1	0.84	0.84	0.63	0.43	19.5	0.98	77.9	8.0	51.3	4
Devotion	1.3	7.8	2.0	0.2	0.94	0.93	0.69	0.49	19.1	1.01	77.2	9.0	52.3	3.8
CSHWP14-757	1.1	8.6	2.1	0.2	0.94	0.96	0.78	0.57	18.6	0.92	75.2	8.1	59.3	3.8

Additional Comments Supersweets

This trial was planted later than normal and matured in September when heat units were lower per day. It was more difficult to judge proper maturity and many were harvested on the young side based on moisture percentage.

Yellow

1972XR – Early, short plants but decent ear height, very good husk extension, raccoons liked it, a few ears with a bit of oval, minimally acceptable overall ear rating of 3.

SVSK5678 – Short ears, very good husk extension, very good to excellent ear uniformity, excellent tip fill, straight rowing, harvested on the young side based on moisture %, overall ear rating of 4.

Harvest Gold – Very good yield, overall ear rating was unacceptable at 2.5 due to curved ears and lower ear uniformity rating.

Pronghorn (SVSK5854) – Very good husk extension, very good tip fill, deep kernels, excellent yield, harvested on the young side based on moisture %, overall ear rating of 4.

SVSK6774 – Very good husk extension, very good tip fill, harvested on the young side based on moisture %, overall ear rating of 4.

HMX59YS718 – Shorter ears, very good husk extension, very good tip fill, overall ear rating of 4.

XTH1679 – Very good husk extension, very good tip fill, medium to deep kernels, very good yield, overall ear rating of 4.

SVSK0762 – Very good husk extension, excellent tip fill, medium to deep kernels, harvested on the young side based on moisture %, overall ear rating of 4.

CSAYF13-697 – Excellent tip fill, medium to deep kernels, overall ear rating of 3.5.

GSS3071 – Very good to excellent ear uniformity, very good tip fill, medium to deep kernels, very good yield, excellent recovery, overall ear rating of 4.3.

HMX59YS825 – Very good husk extension, very good tip fill, medium to deep kernels, excellent yield, overall ear rating of 3.8.

Moonshine – Very good husk extension, excellent tip fill, straight rowing, medium to deep kernels, harvested on the young side based on moisture %, very good yield, overall ear rating of 4.3.

SVSK6143 – Very good husk extension, very good tip fill, harvested on the young side based on moisture %, excellent yield, overall ear rating of 4.

SVSK1859 – Big ear diameter, minimal husk extension or exposed ears, very good tip fill, deep kernels, harvested on the young side based on moisture %, overall ear rating of 4.25.

Additional comments continued:
HMX59YS823 – Long ears, minimal husk extension or exposed ears, harvested on the young side based on moisture %, excellent yield, overall ear rating of 4.

HMX59YS614 – Long ears, big ear diameter, very good husk extension, very good tip fill, deep kernels, excellent yield, overall ear rating of 4.

SVSK5780 – Very good husk extension, harvested on the young side based on moisture %, excellent yield, overall ear rating of 3.5.

SV1339SK – Long ears, big ear diameter, very good yield, overall ear rating of 4.

GSS3951 – Long ears, very good tip fill, excellent yield, overall ear rating of 3.8.

4182MXR – Shorter ears, very good husk extension, very good tip fill, medium to deep kernels, very good yield, excellent recovery, overall ear rating of 4.

GSS1453 – Long ears, minimal husk extension or exposed ears, medium to deep kernels, very good yield, excellent recovery, overall ear rating of 4.3.

Hardi – Very good to excellent ear uniformity, very good husk extension, very good tip fill, long ears, very good yield, overall ear rating of 4.

Overland – Bushy plants, minimal husk extension or exposed ears, very good yield, excellent recovery, overall ear rating of 3.75

ZHY1455 – Long ears, minimal husk extension or exposed ears, very good yield, overall ear rating of 2.8.

Messinger (SVSK1899) – Long ears, very good husk extension, very good tip fill, harvested on the young side based on moisture %, straight rowing, medium to deep kernels, excellent yield, overall ear rating of 4.25.

Talladega – Long ears, minimal husk extension or exposed ears, straight rowing, very good yield, overall ear rating of 3.8.

White

ZHW5055 – Very good husk extension, excellent tip fill, very good yield, overall ear rating of 3.5.

3879XR – Very good to excellent ear uniformity, very good husk extension, very good tip fill, shorter ears, very good yield, overall ear rating of 4.

Devotion – Very good husk extension, very good tip fill, excellent yield, overall ear rating of 3.75.

CSHWP14-757 – Long ears, very good husk extension, very good tip fill, very good yield, overall ear rating of 3.75

Descriptions Provided by the Seed Source (Supersweets)

Yellow

1972XR *- IFSI; 72 days to maturity; G for rust resistance, MS for NCLB, early processor with very strong yield and recovery data.*

SVSK5678 *- Seminis, not commercial, 73 Day (1530 h.u.), Plant Ht. 71 inches, Ear Ht. 13 inches, ear length 7.9 inches, ear diameter 2.0, kernel row number = 16, Disease Resistance: HR: Rust - RpG. Intermediate Resistance: MDMV, SCMV.*

Harvest Gold *- GV.*

Pronghorn (SVSK5854) *- Seminis, advanced to commercial with limited seed in 2019, early hybrid, 74 days, good seed vigor, 85 inch plant height, 26 inch ear height; nice flavor and tenderness, uniform ears, 8.5 inch ear length and 2.05 inch ear diameter; deep kernels; 18 row count; HR for RpG.*

SVSK6774 *- Seminis, 74 day maturity, 1554 heat units, 83 inch plant height, 28 inch ear height, 8.4 inch ear length, 2.1 inch ear diameter, 18 row count, disease resistance pending.*

HMX59YS718 *- Harris Moran, 75 days to maturity, early to main season variety with excellent yield and recovery; girthy ear, HR for Ps and IR for Et.*

XTH1679 *- IFSI, 77 days to maturity (midseason to full season), 85 inch plant height, 29 inch ear height, 8-8.5 inch ear length, 2.0 inch ear diameter, 16-20 average kernel rows, medium to bright yellow kernel color, good tip fill, productive and strong hybrid with excellent resistance to MDMV and new rust (GI alleles) MR for NCLB.*

SVSK0762 *- Seminis, 77 day maturity, 1620 heat units, 89 inch plant height, 24 inch ear height, 8.5 inch ear length, 2.0 inch ear diameter, 18 row count, disease resistance pending.*

CSAYF13-697 *- Crookham.*

GSS3071 - Syngenta; 78 – 79 days to maturity; d and I rust genes; good tolerance to NCLB and expected tolerance to Pst.

HMX59YS825 *- Harris Moran, 78 days to maturity, 8.25 inch ear length, 2.1 inch ear diameter, row count 18, IR for Northern corn leaf blight, HR for maize dwarf mosaic, IR for common rust.*

Moonshine *- Gallatin Valley, 78 day maturity, Rp1D.*

SVSK6143 *- Seminis, 80 days to maturity, 1680 heat units, 8.3 inch ear length, 2.1 inch ear diameter, 18-20 rows, HR for RpG5, IR for NCLB.*

SVSK1859 *- Seminis, 79 day maturity, 1660 heat units, 85 inch plant height, 34 inch ear height, 8.3 inch ear length, 2.1 inch ear diameter, 18 row count, disease resistance pending.*

Descriptions provided by the Seed Source continued:

HMX59YS823 *– Harris Moran, 80 days to maturity, 8-9 inch ear length, 2.1 inch ear diameter, row count 16-18, HR for maize dwarf mosaic, HR for common rust.*

HMX59YS614 *– Harris Moran, 81 days to maturity, late season variety bringing yield, ear size and recovery; HR for Ps (Rp1-e) and MDMV; IR for Et.*

SVSK5780 *– Seminis, 81 day maturity, 1700 heat units, 75 inch plant height, 25 inch ear height, 8.8 inch ear length, 2.1 inch ear diameter, 18 row count, disease resistance pending.*

SV1339SK *– Seminis, yellow sh2, 83 days (1740hu), 80 inch plant height, 28 inch ear height, 9-10 inch ear length, 2.1 inch ear diameter, 18-20 average row count, HR for Rust Rp1l and Rp1D; IR for MDMV, SCMV and NCLB.*

GSS3951 *– Syngenta; 82 days to maturity; 8.3 inch ear with 18-20 rows, bright color when cooked, sturdy plant that has shown to take stress and high populations better than most, d and l rust genes; good tolerance to NCLB and expected tol. to Pst.*

4182MXR *– – IFSI, 82 days to maturity, excellent resistance to MDMV and new rust (GI alleles) MR for NCLB.*

GSS1453 *– Syngenta, 84 days to maturity, strong yielding variety with long, quality supersweet ears, 8.5 inch ear length, 2 inch ear diameter, 18 row count, HR for Et/Ps (Rp1-dgi genes) and Pst; IR for Bm/Ps.*

Hardi *– Crookham; 82 days to maturity; old rust resistance; moderate MDMV resistance; good kernel.*

Overland *– Syngenta; 84 days to maturity (1768 heat units), 7 ft plant height, 28 inch ear height, 9-10 inch ear length, 1.85 inch ear diameter, 18-20 rows, 12 mm kernel depth, Rp1i gene for rust resistance, resistance to NCLB, tolerance to MDMV and SW.*

ZHY1455 *– Crites, 86 days to maturity, medium plant height, 8.5 inch cob length, 2.2 inch cob width, ave 18 rows, HR for common rust AVIR (+D), common rust D-VIR and G-VIR (+D); IR for NCLB, HR for MDMV, very good tip fill and harvest window, very good yield and recovery potential, suits freezing and canning, excellent agronomic package, can be planted throughout the season.*

Messinger (SVSK1899) *– Seminis, commercial with limited seed in 2019, 87 days, excellent husk cover, late maturing with notable standability for easy harvesting; 92 inch plant height; ear height 34 inches, 8.9 inch length and 2 inch diameter ear with excellent kernel depth, suitable for cut kernel and/or corn on the cob packs; uniform ears with consistent taper, great tip fill; deep yellow kernel color, HR for RpG5; IR for MDMV/SCMV/Et.*

Talladega *– Crookham.*

Descriptions provided by the Seed Source continued:

White

ZHW5055 *- Crites, 81 days, medium plant height, 7.7 inch cob length, 2.0 inch cob width, ave 18 rows, IR for common rust AVIR (+D), common rust D-VIR, G-VIR (+D) and NCLB, Su for MDMV, clean, bright color, suits freezing and canning, lovely cooked color, avoid planting if MDMV is and issue, plant early to mid season.*

3879XR *- IFSI, 81 days to maturity, genes G, D and J for rust resistance, M for NCLB.*

Devotion *- Seminis; white; 82 days to maturity; 1720 heat units, 8" ear length; 1.9" ear diameter; 18 row count; high quality white sh2 with superb eating quality; IR for Stewarts wilt. SV1580SK*

CSHWP14-757 *- Crookham, GOAL: Replace Devotion and any other commercial main season white sh2; Silk/pollen 62/59 days in Hancock, WI; Ear diameter - 2", Row count - 18, Ear length 9-9.5", plant height - 7'; CSHWP14-757 is better than the competitive varieties in yield and recovery; Productive and high yielding; Strong emergence. Excellent disease package. Excellent husk coverage with flag leaves for husking.*

Northern Corn Leaf Blight – Et or NCLB, (Exserohilum turcicum), Maize dwarf mosaic –MDMV (Maize dwarf mosaic virus)
Common Rust – Ps (Puccinia sorghi) , Stewarts wilt – Pst (Pantoea stewartii (ex. Erwinia stewartii)
Southern corn leaf blight – Bm (Bipolaris maydis(=Helminthosporium maydis))

A cutting was held on 11/7 for industry.

Epilogue - I began with processing sweet corn trials 1986 with Bob Becker. I have worked with a number of crops over the years but sweet corn remained one of my favorites. Genes for rust resistance started in the early 80s. We saw Stewarts wilt knock Jubilee off, but breeders responded very quickly with disease tolerance. I want to thank Dr. Helene Dilliard for teaching me a great deal in that time period. The supersweets made huge strides in agronomic traits. For all of you that I worked with along the way, its been a great career!

Respectfully,
Jim

Table 8. Weather Summary 2019

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
5/8/19	54	40	47	0.21	0.21	0	0
5/9/19	53	40	46.5	0	0.21	0	0
5/10/19	66	44	55	0.44	0.65	5	5
5/11/19	71	40	55.5	0.24	0.89	5.5	10.5
5/12/19	55	42	48.5	0.09	0.98	0	10.5
5/13/19	43	40	41.5	0.62	1.6	0	10.5
5/14/19	44	40	42	0.52	2.12	0	10.5
5/15/19	46	39	42.5	0.1	2.22	0	10.5
5/16/19	67	43	55	0.08	2.3	5	15.5
5/17/19	63	47	55	0.02	2.32	5	20.5
5/18/19	69	43	56	0	2.32	6	26.5
5/19/19	65	50	57.5	0.28	2.6	7.5	34
5/20/19	85	61	73	0.17	2.77	23	57
5/21/19	71	42	56.5	0.04	2.81	6.5	63.5
5/22/19	61	44	52.5	0	2.81	2.5	66
5/23/19	65	50	57.5	0.01	2.82	7.5	73.5
5/24/19	78	53	65.5	0	2.82	15.5	89
5/25/19	65	46	55.5	0	2.82	5.5	94.5
5/26/19	76	52	64	0.79	3.61	14	108.5
5/27/19	78	53	65.5	0	3.61	15.5	124
5/28/19	73	54	63.5	0.04	3.65	13.5	137.5
5/29/19	68	49	58.5	0.22	3.87	8.5	146
5/30/19	59	50	54.5	0.02	3.89	4.5	150.5
5/31/19	68	53	60.5	0.54	4.43	10.5	161
6/1/19	69	52	60.5	0	4.43	10.5	171.5
6/2/19	78	56	67	0.14	4.57	17	188.5
6/3/19	64	45	54.5	0.04	4.61	4.5	193
6/4/19	61	45	53	0	4.61	3	196
6/5/19	67	53	60	0	4.61	10	206
6/6/19	77	55	66	0.36	4.97	16	222
6/7/19	70	48	59	0	4.97	9	231
6/8/19	75	49	62	0	4.97	12	243
6/9/19	76	52	64	0	4.97	14	257
6/10/19	80	52	66	0	4.97	16	273
6/11/19	69	54	61.5	0.61	5.58	11.5	284.5
6/12/19	69	45	57	0	5.58	7	291.5
6/13/19	73	58	65.5	0	5.58	15.5	307
6/14/19	62	52	57	0.47	6.05	7	314
6/15/19	68	53	60.5	0	6.05	10.5	324.5
6/16/19	73	56	64.5	0.33	6.38	14.5	339
6/17/19	59	48	53.5	0.34	6.72	3.5	342.5
6/18/19	71	53	62	0	6.72	12	354.5
6/19/19	77	57	67	0	6.72	17	371.5
6/20/19	80	63	71.5	0.58	7.3	21.5	393

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
6/21/19	68	57	62.5	0.91	8.21	12.5	405.5
6/22/19	72	55	63.5	0.01	8.22	13.5	419
6/23/19	73	58	65.5	0	8.22	15.5	434.5
6/24/19	78	55	66.5	0	8.22	16.5	451
6/25/19	76	62	69	0.67	8.89	19	470
6/26/19	79	58	68.5	0	8.89	18.5	488.5
6/27/19	83	62	72.5	0	8.89	22.5	511
6/28/19	82	60	71	0	8.89	21	532
6/29/19	85	66	75.5	0	8.89	25.5	557.5
6/30/19	81	63	72	0	8.89	22	579.5
7/1/19	70	54	62	0	8.89	12	591.5
7/2/19	79	61	70	0	8.89	20	611.5
7/3/19	77	62	69.5	0	8.89	19.5	631
7/4/19	83	62	72.5	0	8.89	22.5	653.5
7/5/19	88	70	79	0	8.89	29	682.5
7/6/19	88	68	78	0.75	9.64	28	710.5
7/7/19	82	63	72.5	0.5	10.14	22.5	733
7/8/19	74	55	64.5	0.06	10.2	14.5	747.5
7/9/19	77	53	65	0	10.2	15	762.5
7/10/19	80	60	70	0	10.2	20	782.5
7/11/19	87	69	78	0	10.2	28	810.5
7/12/19	83	62	72.5	0	10.2	22.5	833
7/13/19	83	60	71.5	0	10.2	21.5	854.5
7/14/19	84	66	75	0	10.2	25	879.5
7/15/19	77	61	69	0	10.2	19	898.5
7/16/19	80	63	71.5	0	10.2	21.5	920
7/17/19	89	64	76.5	0.1	10.3	26.5	946.5
7/18/19	76	66	71	0.27	10.57	21	967.5
7/19/19	83	66	74.5	0	10.57	24.5	992
7/20/19	88	73	80.5	0	10.57	30.5	1022.5
7/21/19	91	74	82.5	0	10.57	32.5	1055
7/22/19	82	64	73	0	10.57	23	1078
7/23/19	66	61	63.5	0.9	11.47	13.5	1091.5
7/24/19	75	59	67	0.02	11.49	17	1108.5
7/25/19	74	58	66	0.03	11.52	16	1124.5
7/26/19	79	58	68.5	0	11.52	18.5	1143
7/27/19	82	61	71.5	0	11.52	21.5	1164.5
7/28/19	85	66	75.5	0	11.52	25.5	1190
7/29/19	81	63	72	0	11.52	22	1212
7/30/19	88	64	76	0	11.52	26	1238
7/31/19	84	64	74	0.24	11.76	24	1262
8/1/19	80	61	70.5	0	11.76	20.5	1282.5
8/2/19	78	53	65.5	0	11.76	15.5	1298
8/3/19	80	60	70	0	11.76	20	1318
8/4/19	82	62	72	0	11.76	22	1340
8/5/19	75	51	63	0	11.76	13	1353

Day	Max. Temp.	Min. Temp.	Mean Temp.	Precip.	Acc Precip.	Degree Days Base 50	acc dd units base 50
8/6/19	80	59	69.5	0	11.76	19.5	1372.5
8/7/19	87	65	76	0.4	12.16	26	1398.5
8/8/19	73	63	68	0.52	12.68	18	1416.5
8/9/19	80	60	70	0.36	13.04	20	1436.5
8/10/19	75	59	67	0	13.04	17	1453.5
8/11/19	73	56	64.5	0	13.04	14.5	1468
8/12/19	77	58	67.5	0	13.04	17.5	1485.5
8/13/19	81	66	73.5	0.18	13.22	23.5	1509
8/14/19	79	60	69.5	0.22	13.44	19.5	1528.5
8/15/19	76	56	66	0.03	13.47	16	1544.5
8/16/19	76	61	68.5	0.02	13.49	18.5	1563
8/17/19	80	61	70.5	0.5	13.99	20.5	1583.5
8/18/19	76	61	68.5	1.23	15.22	18.5	1602
8/19/19	82	65	73.5	1.76	16.98	23.5	1625.5
8/20/19	81	61	71	0	16.98	21	1646.5
8/21/19	81	66	73.5	0.2	17.18	23.5	1670
8/22/19	82	66	74	0.05	17.23	24	1694
8/23/19	72	56	64	0	17.23	14	1708
8/24/19	70	52	61	0	17.23	11	1719
8/25/19	64	51	57.5	0.01	17.24	7.5	1726.5
8/26/19	73	54	63.5	0.01	17.25	13.5	1740
8/27/19	72	58	65	0	17.25	15	1755
8/28/19	73	61	67	0.22	17.47	17	1772
8/29/19	73	55	64	0.11	17.58	14	1786
8/30/19	73	56	64.5	0	17.58	14.5	1800.5
8/31/19	75	52	63.5	0	17.58	13.5	1814
9/1/19	69	51	60	0	17.58	10	1824
9/2/19	74	58	66	0.7	18.28	16	1840
9/3/19	71	59	65	0.13	18.41	15	1855
9/4/19	75	61	68	0.25	18.66	18	1873
9/5/19	75	52	63.5	0.01	18.67	13.5	1886.5
9/6/19	70	49	59.5	0.01	18.68	9.5	1896
9/7/19	71	51	61	0.03	18.71	11	1907
9/8/19	67	54	60.5	0.11	18.82	10.5	1917.5
9/9/19	66	46	56	0.02	18.84	6	1923.5
9/10/19	65	47	56	0.02	18.86	6	1929.5
9/11/19	81	50	65.5	0.21	19.07	15.5	1945
9/12/19	82	58	70	0.05	19.12	20	1965
9/13/19	63	50	56.5	0	19.12	6.5	1971.5
9/14/19	66	51	58.5	0.15	19.27	8.5	1980
9/15/19	75	53	64	0.01	19.28	14	1994
9/16/19	73	57	65	0.17	19.45	15	2009
9/17/19	68	47	57.5	0	19.45	7.5	2016.5
9/18/19	69	45	57	0	19.45	7	2023.5
9/19/19	69	46	57.5	0	19.45	7.5	2031
9/20/19	69	48	58.5	0	19.45	8.5	2039.5

2019 Research Report

Neonicotinoid alternatives for management of cucumber beetle

Prepared for the Ontario Processing Vegetable Growers (OPVG) and the Ontario Cucumber Research Committee (OCRC)
November 21, 2019

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Squash	

Research Team:

- PI: Cheryl Trueman, Ph.D., Assistant Professor, Dept of Plant Ag, University of Guelph – Ridgetown Campus
- Collaborator: Elaine Roddy, OMAFRA

Highlights/Summary:

- The objective was to obtain efficacy data on neonicotinoid alternatives for cucumber beetle using in-furrow and foliar insecticides. In consultation with crop protection companies, the Group 28 diamide insecticides Coragen (chlorantraniliprole), Exirel (cyantraniliprole, foliar formulation), and Verimark (cyantraniliprole, soil formulation) were identified as potential solutions.
- *Foliar insecticides*: Untreated seed of the cucumber beetle attractive buttercup squash 'Burgess' was used. Insecticides were applied according to scouting thresholds of 0.5-1 beetle per plant. Despite having adjusted the planting dates to target peak beetle activity and completing the assessments early in the morning when beetle activity is highest, cucumber beetle populations in the trial were low again in 2019. There were no significant differences between any of the treatments and the control for the number of beetles, percent feeding injury or yield.
- *In-furrow insecticides*: Untreated seed of the cucumber beetle attractive buttercup squash 'Burgess' was used. Treatments were applied in-furrow at the time of planting. Whole plots were monitored from emergence until August 6th (6 weeks). No differences in beetle populations or feeding damage were observed among treatments, except on August 6th when the population for Admire was lower than the high rate of Verimark. The reason for this difference is unknown. Despite having adjusted the planting dates to target peak beetle activity and completing the assessments early in the morning when beetle activity is highest, cucumber beetle populations in the trial were low again in 2019.

Funding: Ontario Cucumber Research Committee, Ontario Processing Vegetable Growers, Ontario Ministry of Agriculture, Food, and Rural Affairs

TITLE: Foliar insecticides for the control of cucumber beetles in squash

PEST(S): Striped cucumber beetle (*Acalymma vittatum*), spotted cucumber beetle (*Diabrotica undecimpunctata howardi*)

MATERIALS: Matador 120 EC (lambda-cyhalothrin 120 g/L), Coragen (chlorantraniliprole 200 g/L), Exirel (cyantraniliprole 100 g/L)

METHODS: One trial was completed at Ridgetown Campus, University of Guelph. Buttercup squash 'Burgess Buttercup', which is highly attractive to cucumber beetle, was seeded with a cone seeder on June 27 at a rate of 4 seeds per meter. A late June planting date was chosen to improve the likelihood that peak beetle populations would be present during crop establishment. Seed was not treated with any insecticides. Rows were spaced 4 m apart. Each treatment plot was 7 m long. Trials were setup as a randomized complete block design with four replications per treatment. Treatments were applied using a hand-held CO_2 2.0 m. Water volume of 300 L Ha^{-1} was used to apply the treatments. Preventative fungicide applications for powdery mildew and downy mildew were made on August 2 (Fontelis (1.25 L/ha) + Zampro (1 L/ha)) and Aug 15 (Quintec (440 mL/ha) and Torrent (200 mL/ha)).

Whole plots were monitored for cucumber beetles every 3-5 days at 7:00 am, to align with peak beetle activity. Assessments were made on July 5, 8, 11, 16th with no beetles recorded. The spray threshold of 0.5-1 beetles per plant was met on July 20th, at which time foliar feeding assessments were taken (% leaf area affected on 5% incremental scale).

Foliar insecticide applications were applied on July 22nd. Insect counts, foliar feeding and blossom feeding assessments were also taken at 3, 5 and 10 days after application (July 25, July 27 and August 1st, respectively).

Statistical analysis was conducted using ARM 2019.3 (Gylling Data Management, Brookings, SD). Data were tested for normality using Bartlett's homogeneity of variance test. Data which were not normal ($P \leq 0.05$) were transformed using an arsine, log, or square root transformation. Analysis of variance was conducted using Tukey's HSD and means comparisons were performed when $P \leq 0.05$.

RESULTS & CONCLUSIONS: Cucumber beetle populations were generally low throughout the season. None of the insecticide treatments reduced cucumber beetle populations or feeding injury compared to the nontreated control (Table 1 and Table 2). Flower feeding was not identified on any of the assessment dates. No symptoms of bacterial wilt were observed. There were no differences among treatments for squash yield (*data not shown*).

Table 1. Number of striped cucumber beetles on foliage in butternut squash 'Burgess' treated with foliar insecticides, Ridgetown, ON, 2019.

Treatment (rate per Ha) [a]	Population (number of live beetles per plot) [b]							
	July 5	July 8	July 11	July 16	July 20	July 25	July 27	Aug 1
Control	0	0	0	0	0.8a [c]	1.3a	2.3a	0.8a
Matador @ 210 mL	0	0	0	0	1.5a	0.3a	0.3a	0.5a
Coragen @ 375 mL	0	0	0	0	1.0a	0.3a	1.3a	0.0a
Exirel @ 1000 mL	0	0	0	0	1.5a	0.3a	2.3a	0.8a

[a] Foliar insecticide applied on July 22.

[b] Striped cucumber beetles were the dominant type observed.

[c] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

Table 2. Leaf area with cucumber beetle feeding damage on foliage in butternut squash 'Burgess' treated with foliar insecticides, Ridgetown, ON, 2019.

Treatment (rate per Ha) [a]	% Foliar Feeding Damage							
	July 5	July 8	July 11	July 16	July 20	July 25	July 27	August 1
Control	0	0	0	0	0.20a [b]	1.75a	2.88a	1.25a
Matador @ 210 mL	0	0	0	0	0.20a	0.30a	0.90a	0.53a
Coragen @ 375 mL	0	0	0	0	0.30a	0.55a	0.88a	1.05a
Exirel @ 1000 mL	0	0	0	0	0.68a	0.40a	0.88a	0.20a

[a] Foliar insecticide applied on July 22.

[b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

Table 3. Squash yield in butternut squash 'Burgess' treated with foliar insecticides, Ridgetown, ON, 2019.

Treatment (mL per 100 m of row) [a]	Yield (#/plot)			Yield (kg/plot)		
	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total
Control	24.8a [b]	3.2a	28.0a	27.055a	0.875a	27.930a
Matador @ 210 mL	24.3a	9a	33.3a	26.300a	1.82a	28.120a
Coragen @ 375 mL	27.3a	5.2a	32.5a	30.350a	0.83a	31.180a
Exirel @ 1000 mL	25.5a	5a	30.5a	29.190a	1.14a	30.330a

[a] Foliar insecticide applied on July 22.

[b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

TITLE: In-furrow insecticides for the control of cucumber beetles in squash

PEST(S): striped cucumber beetle (*Acalymma albidovittata*), spotted cucumber beetle (*Diabrotica undecimpunctata howardi*)

MATERIALS: Admire (imidacloprid 240 g/L), Verimark (cyantraniliprole 200 g/L)

METHODS: One trial was completed at Ridgetown Campus, University of Guelph. Buttercup squash 'Burgess', which is highly attractive to cucumber beetle, was seeded with a cone seeder on June 28 at a rate of 4 seeds per meter. Seed was not treated with any insecticides. Rows were spaced 4 m apart. Each treatment plot was 7 m long. Trials were setup as a randomized complete block design with four replications per treatment. Treatments were applied in-furrow behind the shoe. A spray nozzle was placed through the spring for the press wheels and secured using cable ties. It was connected with tubing to the CO_2 sprayer. The insecticide solution was allowed to fill the tube leading to the shoe before starting to plant. The system was flushed with clean water after treatment application and before a new treatment was applied. Applications were made using pressure of 30 psi with Lurmark 015-F110 nozzles. The band width was 7 cm and application volume 40.8 L/Ha. Preventative fungicide applications for powdery mildew and downy mildew were made on August 2 (Fontelis 1.23 L/ha and Zampro 1 L/ha)) and August 15 (Quintec 400 mL/ha and Torrent 200 mL/ha).

Squash were monitored two times per week for six weeks, except for the week of August 29th, due to standing water in the field. Insect assessments were taken at 7:00 am to align with the daily period of peak beetle activity. There was no presence of insects for the first three evaluations on July 5, 9 and 11. Insect counts and foliar feeding damage (% leaf area affected on 5% incremental scale) were evaluated in the whole plots on July 15, 19, 23, and 26, August 1 and 6. Ratings were concluded after six weeks due to overall low pest pressure. Squash were harvested on September 17 and the number and weight of marketable and unmarketable fruit was recorded.

Statistical analysis was conducted using ARM 2019.3 (Gylling Data Management, Brookings, SD). Data were tested for normality using Bartlett's homogeneity of variance test. Data which were not normal ($P \leq 0.05$) were transformed using an arsine, log, or square root transformation. Analysis of variance was conducted using Tukey's HSD and means comparisons were performed when $P \leq 0.05$.

RESULTS & CONCLUSIONS: On August 6, there was a significant difference between the number of cucumber beetles in the Admire and the Verimark (40 mL) treatments. The reason for this difference is not clear. There were no differences among treatments for cucumber beetle foliar feeding (Table 2) or yield (Table 4). No bacterial wilt was observed in the trial. Cucumber beetle populations in the trial were low in the weeks following seeding.

Table 1. Number of striped cucumber beetles on foliage in squash treated with insecticides in-furrow, Ridgetown, ON, 2019.

Treatment (mL per 100 m of row) [a]	Population (number of live beetles per plot) [b]					
	July 15	July 19	July 23	July 26	August 1	August 6
Control	0.8a	3.5a	2.5a	10.3a	2.3a	6.8ab
Admire @ 18 mL	0.5a	4.3a	2.5a	4.5a	0.8a	3.3b
Verimark @ 30 mL	2.0a	4.3a	2.0a	3.0a	2.0a	3.5ab
Verimark @ 40 mL	2.0a	4.5a	5.0a	16.5a	2.3a	7.3a

[a] In-furrow treatments were applied June 28.

[b] Striped cucumber beetles were the dominate type observed.

[c] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

Table 2. Leaf area (%) with cucumber beetle feeding damage in squash treated with insecticides in-furrow, Ridgetown, ON, 2019.

Treatment (mL per 100 m of row) [a]	Leaf Area Damaged (%) [b]					
	July 15	July 19	July 23	July 26	August 1	August 6
Control	0.0a	3.9a	5.8a	5.5a	3.0a	1.3a
Admire @ 18 mL	0.0a	0.7a	3.3a	2.0a	1.5a	0.2a
Verimark @ 30 mL	0.0a	1.5a	2.5a	3.3a	3.5a	0.3a
Verimark @ 40 mL	0.0a	2.0a	5.5a	4.5a	3.3a	2.8a

[a] In-furrow treatments were applied June 28.

[b] Striped cucumber beetles were the dominate type observed.

[c] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

Table 3. Squash yield in plots treated with insecticides in-furrow for management of cucumber beetle, Ridgetown, ON, 2019.

Treatment (mL per 100 m of row) [a]	Yield (#/plot)			Yield (kg/plot)		
	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total
Control	22.5a	5.0a	27.5a	23.58a	0.91a	24.49a
Admire @ 18 mL	26.3a	5.1a	31.4a	27.78a	1.10a	28.88a
Verimark @ 30 mL	22.3a	3.3a	25.6a	21.64a	1.00a	22.75a
Verimark @ 40 mL	22.3a	5.0a	27.3a	22.72a	0.46a	23.18a

[a] In-furrow treatments were applied June 13.

[b] Numbers in a column followed by the same letter are not significantly different at $P \leq 0.05$, Tukey's HSD.

2019 Processing pea cultivar evalutation

Bonduelle

Team: Ontario Agriculture - Ingersoll, Strathroy, Tecumseh
Assistance: Ian Burtwistle, Katherine Teeter, Mackensee Gould, Murranda McCallum
Partners: Ecologistics Research Services, OPVG, Sleegerdale Farms

Location: North of Belmont, Onta / GPS: 42.93277, -81.09837
Details: 2 planting date: May 18th & June 4th
54 varieties planted: 10 Standard
44 New breeding varieties

Ontario Processing Vegetable Growers

																	4 repetitions	10 repetitions		
Supplier	**Variety**		**Type**	**Planting Date**	**Obs Date**	**Growing Days**	**HU**	**Leaf Type**	**Sieve 1 (lbs)**	**Sieve 2 (lbs)**	**Sieve 3 (lbs)**	**Sieve 4 (lbs)**	**Sieve 5 (lbs)**	**Average Sieve**	**Expected Sieve**	**Yield (Tons/acre)**	**Average TD (spl)**	**Avg Nodes with Pods**	**Avg Pods/ Plant**	**Average Berries/ Pod**	**Berries/ Plant**
Columbia Seeds	Avocette	new	mini	May-18	Jul-12	55	1319	Normal	0.52	0.86	3.74	0.76	0.44	2.96	1.40	3.16	119.25	3.20	5.50	5.13	28.20
Brotherton Seed	*905*	*standard*	*mini*	*May-18*	*Jul-14*	*57*	*1377*	*Normal*	*1.22*	*1.88*	*1.32*	*0.04*	*0.02*	*2.05*	*1.80*	*2.24*	*118.75*	*3.00*	*4.90*	*6.05*	*29.65*
Brotherton Seed	EXP 098	new	mini	May-18	Jul-14	57	1377	Normal	0.76	1.06	3.38	0.60	0.02	2.67	1.80	2.91	118.50	2.50	5.00	6.37	31.86
Semmis	*Nitro*	*standard*	*mini*	*May-18*	*Jul-14*	*57*	*1377*	*Normal*	*1.14*	*1.48*	*2.82*	*0.06*	*0.00*	*2.33*	*2.00*	*2.75*	*110.00*	*2.10*	*4.30*	*6.57*	*28.23*
Brotherton Seed	BSC 489	new	mini	May-18	Jul-15	58	1402	Alfa	1.08	1.54	1.74	0.06	0.00	2.18	2.00	2.21	107.00	2.50	5.50	6.31	34.69
Brotherton Seed	Judith	new	mini	May-18	Jul-18	61	1496	Normal	2.90	2.38	0.32	0.00	0.00	1.54	1.30	2.80	117.25	3.70	9.90	6.35	62.83
Brotherton Seed	Louise	new	mini	May-18	Jul-18	61	1496	Normal	1.36	2.46	0.64	0.00	0.00	1.84	1.30	2.23	116.00	2.50	8.20	7.93	65.00
PureLine Seeds, Inc	Rhianna	new	mini	May-18	Jul-19	62	1533	Normal	1.20	2.06	0.90	0.02	0.00	1.94	1.80	2.09	117.75				
Semmis	SV7441QC	new	mini	May-18	Jul-19	62	1533	Normal	0.96	1.66	0.90	0.04	0.00	2.01	1.70	1.78	126.50	2.90	7.30	6.42	46.89
PureLine Seeds, Inc	Wav 282	new	mini	May-18	Jul-19	62	1533	Alfa	0.28	1.50	2.22	0.14	0.00	2.54	1.80	2.07	109.75	2.70	6.20	6.60	40.90
Syngenta	Cours	new	mini	Jun-4	Jul-31	57	1610	Normal	0.76	0.76	0.40	0.00	0.00	1.81		1.70	127.00				
Semmis	SV0962QB	new	mini	Jun-4	Jul-31	57	1610	Normal	0.94	1.06	0.86	0.02	0.00	1.99	2.00	2.54	114.50				
Gallatin Valley Seed Company	8137	new	mini	Jun-4	Aug-1	58	1637	Normal	1.50	0.66	0.36	0.02	0.00	1.57	2.00	2.22	119.00				
Brotherton Seed	EXP566	new	mini	Jun-4	Aug-2	59	1663	Alfa	1.36	1.00	0.44	0.02	0.00	1.69	1.40	2.47	112.50				
Syngenta	Festivert	new	mini	Jun-4	Aug-4	61	1720	Alfa	0.68	1.40	0.40	0.04	0.00	1.92		2.21	117.75				
Syngenta	Zonvert	new	mini	Jun-4	Aug-4	61	1720	Normal	0.50	0.28	0.10	0.00	0.00	1.55		0.77	98.50				
Semmis	*Sherwood*	*standard*	*regular*	*May-18*	*Jul-8*	*51*	*1149*	*Normal*	*0.04*	*0.14*	*1.14*	*1.22*	*1.04*	*3.86*	*3.30*	*1.79*	*104.50*	*3.30*	*4.50*	*5.55*	*24.98*
Columbia Seeds	Linnet	new	regular	May-18	Jul-11	54	1285	Normal	0.28	0.38	3.44	0.14	0.00	2.81	2.90	2.12	103.50	3.90	7.40	4.41	32.67
Crites Seed, Inc	CS-455AF	new	regular	May-18	Jul-12	55	1319	Alfa	0.32	0.46	1.00	2.04	3.64	4.10	3.70	3.73	128.00	2.30	3.80	4.71	17.88
Crites Seed, Inc	*Portage*	*standard*	*regular*	*May-18*	*Jul-12*	*55*	*1319*	*Alfa*	*0.20*	*0.48*	*1.16*	*2.18*	*3.14*	*4.06*	*3.80*	*3.58*	*110.25*				
Gallatin Valley Seed Company	518	new	regular	May-18	Jul-13	56	1345	Alfa	0.12	0.24	1.10	0.92	0.68	3.59	3.80	1.53	94.00				
Crites Seed, Inc	CS-476AF	new	regular	May-18	Jul-13	56	1345	Alfa	0.00	0.06	0.76	1.74	2.14	4.27	3.60	2.35	110.00	2.60	4.40	7.41	32.61
Semmis	*Lil Mo*	*standard*	*regular*	*May-18*	*Jul-14*	*57*	*1377*	*Normal*	*0.50*	*0.58*	*2.74*	*1.60*	*0.26*	*3.13*	*2.60*	*2.94*	*124.75*	*4.50*	*8.60*	*6.70*	*57.62*
Semmis	SV7491QH	new	regular	May-18	Jul-14	57	1377	Normal	0.22	0.30	2.76	1.94	0.46	3.37	3.20	2.84	112.00	2.50	5.50	6.22	34.21
Storm Seeds	ASR 221	new	regular	May-18	Jul-15	58	1402	Alfa	0.20	0.38	1.32	1.24	0.44	3.37	3.60	1.79	97.00	3.00	5.60	6.23	35.15
Semmis	*Reliance*	*standard*	*regular*	*May-18*	*Jul-15*	*58*	*1402*	*Alfa*	*0.12*	*0.38*	*1.20*	*2.38*	*1.22*	*3.79*	*3.20*	*2.65*	*110.25*	*2.10*	*4.20*	*6.00*	*25.19*
Gallatin Valley Seed Company	389	new	regular	May-18	Jul-16	59	1428	Alfa	0.22	0.54	2.48	1.80	0.24	3.25	2.60	2.63	115.50	3.60	7.40	5.78	42.76
Semmis	*DA1470*	*standard*	*regular*	*May-18*	*Jul-16*	*59*	*1428*	*Alfa*	*0.06*	*0.14*	*1.52*	*2.88*	*1.66*	*3.85*	*3.20*	*3.13*	*104.25*	*2.80*	*7.60*	*5.43*	*41.24*
PureLine Seeds, Inc	167	new	regular	May-18	Jul-17	60	1462	Alfa	0.18	0.60	1.56	1.52	0.18	3.23	3.00	2.02	112.75	4.10	8.40	7.50	63.00
Gallatin Valley Seed Company	828	new	regular	May-18	Jul-17	60	1462	Alfa	0.00	0.16	0.78	1.72	1.62	4.12	3.80	2.14	123.50	2.60	5.50	6.62	36.38
PureLine Seeds, Inc	Novella II	new	regular	May-18	Jul-17	60	1462	Alfa	0.00	0.10	0.74	2.10	3.90	4.43	3.80	3.42	110.50	2.60	5.00	6.10	30.48
Brotherton Seed	BSC 599	new	regular	Jun-4	Jul-27	53	1476	Alfa	0.06	0.60	0.44	1.70	1.76	3.99	4.10	3.99	128.50				
PureLine Seeds, Inc	98-326	new	regular	May-18	Jul-18	61	1488	Alfa	0.20	0.50	2.26	0.60	0.02	2.93	2.80	1.79	116.00				
Crites Seed, Inc	CS-464AF	new	regular	May-18	Jul-18	61	1488	Alfa	0.08	0.22	1.00	2.90	1.74	4.01	3.50	2.97	113.00	3.00	5.60	5.85	32.77
Gallatin Valley Seed Company	5602	new	regular	Jun-4	Jul-28	54	1506	Alfa	0.66	0.70	1.40	0.12	0.00	2.34	3.00	2.02	105.75				
Gallatin Valley Seed Company	8069	new	regular	Jun-4	Jul-28	54	1506	Alfa	0.10	0.28	1.64	0.64	0.10	3.13	unk	1.93	115.00				
Columbia Seeds	BL403	new	regular	May-18	Jul-19	62	1533	Normal	0.14	0.38	1.12	1.90	1.16	3.76	4.70	2.35	106.50				
Columbia Seeds	BL415	new	regular	May-18	Jul-19	62	1533	Normal	0.16	0.50	1.44	2.28	1.32	3.72	4.30	2.85	108.00	3.10	6.78	6.17	41.84
PureLine Seeds, Inc	Dancer	new	regular	May-18	Jul-19	62	1533	Alfa	0.04	0.18	0.96	1.92	0.58	3.77	3.50	1.84	108.75	2.20	5.00	7.16	35.82
Semmis	SV3946QB	new	regular	May-18	Jul-19	62	1533	Normal	0.42	1.24	2.38	0.30	0.00	2.59	2.30	2.16	124.25	3.90	10.30	6.18	63.69
Crites Seed, Inc	*Welland*	*standard*	*regular*	*May-18*	*Jul-19*	*62*	*1533*	*Alfa*	*0.24*	*0.64*	*1.80*	*0.99*	*0.16*	*3.05*	*2.70*	*1.92*	*119.00*	*2.80*	*6.50*	*6.41*	*41.64*
Storm Seeds	ASR 336	new	regular	May-18	Jul-20	63	1573	Alfa	1.18	1.52	0.98	0.00	0.00	1.95	3.40	2.58	123.00	4.40	10.20	6.43	65.56
Storm Seeds	ASR153	new	regular	May-18	Jul-20	63	1573	Normal	0.47	0.58	2.62	0.96	0.10	2.91	3.00	2.89	113.00	4.00	9.30	8.03	74.71
Brotherton Seed	*Concept*	*standard*	*regular*	*May-18*	*Jul-20*	*63*	*1573*	*Alfa*	*0.14*	*0.28*	*1.10*	*2.34*	*2.06*	*4.00*	*3.70*	*2.95*	*120.25*	*3.40*	*6.90*	*5.45*	*37.63*
Crites Seed, Inc	CS-461AF	new	regular	May-18	Jul-20	63	1573	Alfa	0.54	0.82	1.82	1.19	0.08	2.88	2.40	3.12	117.25				
Brotherton Seed	BSC 494	new	regular	Jun-4	Jul-30	56	1578	Alfa	0.20	0.34	0.92	0.24	0.04	2.76	2.80	1.52	116.25				
Crites Seed, Inc	*Tyne*	*standard*	*regular*	*Jun-4*	*Jul-31*	*57*	*1610*	*Alfa*	*0.12*	*0.22*	*0.70*	*0.50*	*0.24*	*3.29*	*3.30*	*1.56*	*105.75*				
PureLine Seeds, Inc	98W-370	new	regular	May-18	Jul-21	64	1613	Normal	0.04	0.14	0.64	0.96	2.20	4.29	3.80	2.79	121.00	3.30	6.00	4.76	28.55
Columbia Seeds	Monarque	new	regular	Jun-4	Aug-1	58	1637	Alfa	0.18	0.34	1.16	1.14	0.72	3.53	4.30	3.10	108.75				
Syngenta	PN 063	new	regular	Jun-4	Aug-1	58	1637	Normal	0.14	0.28	0.82	0.10	0.00	2.66	#N/A	1.17	124.67				
Syngenta	PN 103	new	regular	Jun-4	Aug-1	58	1637	Normal	0.32	0.40	0.74	0.08	0.00	2.38	#N/A	1.35	104.00				
Storm Seeds	ASR 183	new	regular	May-18	Jul-22	65	1646	Alfa	0.06	0.12	1.02	0.52	0.48	3.54	3.40	2.59	103.50	3.20	7.70	6.79	52.32
Storm Seeds	ASR 511	new	regular	Jun-4	Aug-2	59	1663	Alfa	0.14	0.20	0.26	0.02	0.00	2.26	2.50	0.54	99.00				
Semmis	SV5685QG	new	regular	May-18	Jul-29	72	1851	Normal	0.00	0.02	0.34	0.34	0.94	4.34	3.40	1.44	111.50				

Project Report: Using Genetic Tests to Confirm Herbicide Resistant Weeds in Ontario Horticulture Crops
Kristen Obeid, OMAFRA Weed Management Specialist - Horticulture

Horticulture cropping systems throughout Ontario have been surveyed to better characterize the occurrence and distribution of herbicide resistant weeds. Herbicide resistant weed populations must be detected and managed rapidly because, depending on species, they may quickly spread within the same field and to adjacent fields or farms. Additionally, because fewer herbicides are available for use in horticulture crops, resistance management can result in costly weeding practices such as hoeing and/or mowing.

Since 2016, this project has developed 16 (5 more in progress) genetic quick tests to assist in identifying herbicide resistance in 12 weed species. Some of these tests were implemented from scientific literature. Two are new discoveries. These tests deliver a diagnostic and a recommendation to the grower within the same growing season. Traditional resistance testing in the greenhouse can take from three months to a year to get results back to growers. Now, leaf tissue instead of seed is collected. DNA is extracted from the leaf tissue to determine if there is a change in the sequencing resulting in a mutation conferring resistance.

Tests have also been developed to differentiate between *Brassica* and *Amaranthus* (pigweed) species. Tests differentiating pigweed species have been instrumental in confirming new cases of waterhemp in Ontario, Manitoba and Quebec. Once confirmed, the waterhemp was tested for Groups 2, 5, 9 and 14 resistances.

Table 1. Genetic Tests Developed to Date*

Weed Species	Herbicide Group	Resistance & Tests
Large crabgrass	1	Target-site: ACCase gene amplification
Common chickweed	2	Target-site (P197Q & unpublished)
Common ragweed	2	Target-site (W574L)
Eastern black nightshade	2	Target-site (A205V)
Green pigweed	2	Target-site (S653N & W574L)
Giant foxtail	2	Target-site (unpublished)
Redroot pigweed	2	Target-site (S653N & W574L)
Waterhemp	2	Target-site (S653N & W574L)
Common ragweed	5&7	Target-site (V219I)
Green pigweed	5&7	Target-site (A251V, S264G**, V219I & F274L)
Lamb's-quarters	5	Target-site (S264G)
Redroot pigweed	5&7	Target-site (A251V, S264G**, V219I & F274L)
Waterhemp	5&7	Target-site (A251V, S264G**, V219I & F274L)
Brassica spp.	9	Presence of transgene
Canada fleabane	9	Target-site (P106S)
Waterhemp	9	Target-site: EPSPS gene amplification
Waterhemp	14	Target-site (ΔG210 in PPX2L)
Amaranthus spp.	-	Species identification
Brassica spp.	-	Species identification

**Several of these tests were developed by other researchers (Francois Tardif) and reproduced from the scientific literature.*
***S264G mutation only induces resistance to Group 5 herbicides, not Group 7*

Since 2018, the protocols for these tests have been shared with the Pest Diagnostic Lab of the Quebec Ministry of Agriculture, Fisheries and Food (MAPAQ) and the weeds lab of AAFC's Harrow Research and Development Centre as a pilot project and made available to extension personal in Ontario and Quebec to submit samples, providing the diagnostic service to growers.

Results

Table 2. 2019 Results to Date in Ontario (Samples are still being tested)

Crop	Weed	Herbicide Group	Total Fields	Positive Tests	%
Asparagus	Large crabgrass	G1	3	3	100%
Asparagus	Waterhemp	G2	1	1	100%
Asparagus	Waterhemp	G9	1	1	100%
Carrot	Redroot pigweed	G5/7	1	1	100%
Carrot	Canada fleabane	G9	1	1	100%
Celery	Lamb's-quarters	G5	1	0	0%
Celery	Large crabgrass	G1	1	0	0%
Celery	Redroot pigweed	G5/7	1	1	100%
Grape	Canada fleabane	G9	7	7	100%
Onion	Large crabgrass	G1	2	2	100%
Onion	Canada fleabane	G9	1	1	100%
Onion	Redroot pigweed	G2	1	0	0%
Onion	Redroot pigweed	G5/7	1	0	0%
Onion	Green pigweed	G2	1	0	0%
Onion	Green pigweed	G5/7	1	1	100%
Pepper	Waterhemp	G2	1	1	100%
Strawberry	Lamb's-quarters	G5	1	0	0%
Strawberry	Common ragweed	G2	1	0	0%
Strawberry	Common ragweed	G5/7	1	0	0%
Tomato	Common ragweed	G2	3	3	100%
Tomato	Green pigweed	G2	3	3	100%
Tomato	Green pigweed	G5	3	3	100%
TOTAL			**37**	**29**	**78%**

- Since 2016 a total of 76 cases of herbicide resistance have been confirmed in horticulture crops.
- A total of 16 genetic tests have been developed (five additional tests are in progress), as well as, 2 genetic tests for species identification (*Amaranthus* and *Brassica* spp.).
- Surveys revealed the presence of biotypes with non-target site linuron resistance in common ragweed (*Ambrosia artemisiifolia*) and target gene duplication in large crabgrass (*Digitaria sanguinalis*) resistant to ACCase-inhibitor herbicides.
- In 2019, these tests detected multiple resistance cases (ALS + Photosystem II inhibitors) in green pigweed (*Amaranthus powelii*) in three tomato fields. Different common ragweed (*Ambrosia artemisiifolia*) plants in the same carrot field were also resistant to either ALS or Photosystem II inhibitors.
- In 2019, 78% of the weed biotypes surveyed tested positive for genetic mutations conferring resistance.

- The differentiation of *Amaranthus* species test was instrumental in confirming waterhemp populations in Ontario, Manitoba and Quebec. Waterhemp has now been confirmed in vegetable fields in Elgin and Norfolk counties.

Species/collections under review

1. **Eastern black nightshade** – suspected resistance to group 15 herbicides. Genetic tests do not exist for group 15 resistance in Eastern black nightshade. Traditional dose responses will be performed.
2. **Tumble pigweed** – suspected resistance to groups 5 and 7 herbicides. A mutation for group 7 resistance was found looking at the plants' genome. Traditional dose responses will be performed
3. **Canada fleabane** – suspected resistance to groups 2, 5, 7, and 14. There were no known target site mutations found to groups 5 or 7. Traditional dose responses will be performed.
4. **Velvetleaf** – suspected resistance to groups 2 and 5 herbicides. There is currently no published ALS sequence (group 2) for velvetleaf. There were no known mutations found for group 5 and/or 7. Traditional dose responses will be performed.
5. **Giant Ragweed** – suspected resistance to groups 2 and 5 herbicides. No known target site mutations were identified in psbA for group 5. There were no known target site mutations identified in ALS/AHAS for group 2. Traditional dose responses will be performed.
6. **Large Crabgrass** – suspected resistance to groups 5 and 7 herbicides. This population is known to be resistant to group 1 herbicides.
7. **Green Pigweed** – confirmed resistance to group 2 – testing difference among three group 2 herbicide families will be conduted through dose response experiments.

Summary

Early detection and rapid confirmation of resistant weeds has helped growers:

- Confirm both single and multiple herbicide resistant weed species.
- Develop management programs that work.
- Alleviate the risk of spreading herbicide resistant weeds by managing them in season.
- Provide proof that resistant weeds are present to obtain new minor use priorities and support from crop protection companies for new product registrations.

Collaborators:

- Ontario Ministry of Agriculture Food and Rural Affairs: Ms. Kristen Obeid
- Saint-Jean-sur-Richelieu Research and Development Centre: Dr. Marie Josée Simard, Dr. Martin Laforest
- Harrow Research and Development Centre: Dr. Robert Nurse, Dr. Eric Page
- Pest Management Centre: Dr. Cezarina Kora
- Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ) Pest Diagnostic Lab: David Miville
- Since September 2019: Ontario Fruit and Vegetable Growers Association, Ontario Apple Growers, Fresh Vegetable Growers of Ontario, Ontario Processing Vegetable Growers and FMC.

This project was partly funded through the Pest Management Centre's Pesticide Risk Reduction Program.

Project duration: Sept 3, 2019 – March 31, 2020

Background: FMC, Ontario Apple Growers, Ontario Fresh Fruit and Vegetable Growers, and the Ontario Processing Vegetable Growers (administered by OF&VGA) provided $15,000 in addition to funding that was already provided by the Pest Management Centre of Canada to fund the research. The additional money is

being used to support a University of Waterloo co-op student to help with processing of samples on a currently funded AAFC project.