# 2022 Vegetable Research Funding

| | Title | Researcher | $ Amount Funded |
|---|---|---|---|
| 1 | Weed Control Evaluations in Lima Beans | D. E. Robinson | $19,000 |
| 2 | Weed Control Evaluations in Snap Beans | D. E. Robinson | |
| 3 | Weed Control Evaluations in Carrots | D. E. Robinson | |
| 4 | Weed Control Evaluations in Peas | D. E. Robinson | |
| 5 | Determining the Potential Impact of Tar Spot in Sweet Corn | C. Trueman/E. Roddy | $2,500 |
| 6 | Discovery phase to investigate potential research methodologies for soybean cyst nematode in snap beans | C. Trueman/E. Roddy | $1,000 |
| 7 | Processing Pea Cultivar Evaluations | Bonduelle | $5,000 |
| 8 | NYS Processing Snap Bean, English Pea and Sweet Corn Trials | S. Reiners | $5,400 US |
| 9 | Pea Yield Response to Seeding Rate | Bonduelle | $3,387.50 |
| 10 | Pea Seed Treatment Evaluations | Bonduelle | $3,000 |
| 11 | Optimizing Weed Control in Lima Beans | Bonduelle | $2,500 |
| 12 | Lima Bean Nitrogen Application Strategies | Bonduelle | $2,305 |
| 13 | Sweet Corn Hybrid Tolerance to Tar Spot | Bonduelle | $600 |

**Project Title:** Weed Control and Problem Weed Management in Processing Vegetables – Research Report for 2022 Trials

**Research Agency:** Ridgetown Campus, University of Guelph

**Lead Investigator:** Darren Robinson

**Executive Summary:**

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

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

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

**Carrot.** Marketable yield was not reduced at a Zidua® rate of 100 g/ha. A minor use was submitted, requesting a rate of 100 g/ha – additional data have been requested by PMRA on both tolerance and efficacy. Another trial was conducted to determine the tolerance and efficacy of PRE tank mixes for control of linuron-resistant pigweed. Though tank mixes of Nortron + Zidua and Nortron + Prowl H20 + Zidua gave 90% control of linuron-resistant redroot pigweed, they caused significant stand and yield loss in carrot. This was in contrast to tank mixes of Nortron + Dual II Magnum and Nortron + Prowl H20 + Dual II Magnum, which did not negatively impact carrot stand or yield relative to the untreated, weedfree check.

**Peas.** Visible injury was less than 10% in all pea cultivars at both rates of Zidua, Pea tenderness and yields were all similar to the untreated check. Peas did not

show the same level of tolerance to Reflex. Injury, decreased tenderometer readings and a reduction in pea yield were observed at the 0.8 L/ac rate of Reflex in Tyne, Sherwood and Sweet Savour.

**Objectives:**

**Lima bean.**

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

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

**Snap bean.**

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

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

**Carrots.**

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

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

**Peas.**

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

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

3) To evaluate PRE applications of Zidua alone, and with Pursuit, Dual and Sandea for tolerance in peas.

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

### Materials & Methods:

***Crop***: Lima bean

| | |
|---|---|
| Variety: Cypress | Planting date: May 25/22 |
| 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 38 kg/ha of actual N, P and K.

***Soil Description:***

| | |
|---|---|
| Sand: 82% | OM: 1.3% |
| Silt: 10% | pH: 6.0 |
| Clay: 8% | CEC 6.2 |

Texture: Loamy Sand
Soil: Watford/Brady series

***Application Information:***

| | A |
|---|---|
| **Application Date:** | May 27-2022 |
| **Time of Day:** | 7:15 AM |
| **Application Method:** | CO2 SPRAY |
| **Application Timing:** | PRE |
| **Application Placement:** | SOIL |
| **Air Temperature, Unit:** | 11 C |
| **% Relative Humidity:** | 71 |
| **Wind Velocity, Unit:** | 3 KPH |
| **Wind Direction:** | NE |
| **Dew Presence (Y/N):** | N |
| **Soil Temperature, Unit:** | 17 C |
| **Soil Moisture:** | MOIST |

***Spray Equipment:***

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

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

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

| HERBICIDE | RATE | PERCENT INJURY | | | DRY WT | YIELD |
|---|---|---|---|---|---|---|
| | | 7D | 14D | 28D | G | T/AC |
| 1. Check (WEEDFREE) | | 0A | 0B | 0C | 40A | 3.4A |
| 2. pethoxamid | 1200 G/HA | 1A | 1B | 0C | 40A | 3.2A |
| 3. pethoxamid | 2400 G/HA | 4A | 16A | 24A | 16C | 1.7C |
| 4. ZIDUA | 47 G/AC | 1A | 5B | 5C | 27B | 3.7A |
| 5. ZIDUA | 94 G/AC | 1A | 8B | 13B | 18C | 2.0B |
| 6. PROWL H20 | 0.96 L/AC | 2A | 2B | 4C | 39A | 3.1A |
| 7. PROWL H20 | 1.92 L/AC | 2A | 3B | 3C | 41A | 3.2A |
| 8. SHIELDEX | 16.3 G/AC | 0A | 5B | 3C | 32A | 2.7AB |
| 9. SHIELDEX | 32.6 G/AC | 1A | 1B | 1C | 29B | 2.2AB |
| LSD (P <0.05) | | 2 | 8 | 14 | 9 | 0.7 |

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

**Conclusions:**

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

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

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

**Materials & Methods:**

***Crop***: Lima bean
Variety: Cypress
Planting rate: 266667 seeds/ha
Row spacing: 75cm
Planting date: May 25/22
Depth: 3.5 cm
Plant spacing: 5 cm

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

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

***Soil Description:***
Sand: 52%
Silt: 24%
Clay:24%
OM: 3.3%
pH: 7.3
CEC 12.3

Texture: Loamy Sand
Soil: Watford/Brady series

***Application Information:***

| | A |
|---|---|
| **Application Date:** | May 27-2022 |
| **Time of Day:** | 8:15 AM |
| **Application Method:** | CO2 SPRAY |
| **Application Timing:** | PRE |
| **Application Placement:** | SOIL |
| **Air Temperature, Unit:** | 14 C |
| **% Relative Humidity:** | 64 |
| **Wind Velocity, Unit:** | 3 KPH |
| **Wind Direction:** | NE |
| **Dew Presence (Y/N):** | N |
| **Soil Temperature, Unit:** | 16 C |
| **Soil Moisture:** | MOIST |

***Spray Equipment:***

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

**Results**: Pethoxamid caused up to 9% visual injury to lima bean (Table 2.1), but plant dry weight and yield were similar to the untreated, weed-free check. Injury in the Zidua, Prowl and Shieldex treatments was less than 10% in all but one case. Yield was lower than the untreated check where the high rate of Zidua had been applied. There were no significant reductions in plant dry weight or yield, relative to the untreated, weed-free check – though, the dry weight in the high rate of Zidua was numerically lower than in the other treatments.

**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 | 2.8A |
| 2. pethoxamid | 1200 G/HA | 3A | 5A | 2A | 40A | 2.7A |
| 3. pethoxamid | 2400 G/HA | 4A | 9A | 5A | 46A | 2.3A |
| 4. ZIDUA | 47 G/AC | 1A | 3A | 2A | 49A | 2.9A |
| 5. ZIDUA | 94 G/AC | 1A | 5A | 9A | 48A | 1.8B |
| 6. PROWL H20 | 0.96 L/AC | 1A | 1A | 0A | 31A | 2.7A |
| 7. PROWL H20 | 1.92 L/AC | 2A | 2A | 0A | 47A | 2.8A |
| 8. SHIELDEX | 16.3 G/AC | 0A | 3A | 5A | 38A | 2.4A |
| 9. SHIELDEX | 32.6 G/AC | 1A | 6A | 7A | 39A | 2.2A |
| 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 and dry weight was not less than the untreated check in the high rate of Zidua, yield was lower than in any of the other treatments. Some injury symptoms (leaf puckering and plant stunting) was observed – and progressed from 7 to 28days in the high rate of Zidua.

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

### Materials & Methods:

***Crop***: Snap bean

| | |
|---|---|
| Variety: Huntington | Planting date: May 25, 2022 |
| Planting rate: 374532 seeds/ha | Depth: 2.5 cm |
| Row spacing: 75cm | Plant spacing: 3.6 cm |

***Design:*** Randomized Complete Block Design

| | |
|---|---|
| Plot width: 1.5m | Plot length: 10m |
| Reps: 4 | |

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

***Soil Description:***

| | |
|---|---|
| Sand: 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:** | May 27-2022 |
| **Time of Day:** | 7:45 AM |
| **Application Method:** | CO2 SPRAY |
| **Application Timing:** | PRE |
| **Application Placement:** | SOIL |
| **Air Temperature, Unit:** | 10 C |
| **% Relative Humidity:** | 71 |
| **Wind Velocity, Unit:** | 4 KPH |
| **Wind Direction:** | NE |
| **Dew Presence (Y/N):** | N |
| **Soil Temperature, Unit:** | 17 C |
| **Soil Moisture:** | WET |

***Spray Equipment:***

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

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

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

| HERBICIDE | RATE | PERCENT INJURY 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 | 3.5AB |
| 4. ZIDUA | 47 G/AC | 6A | 3A | 7A | 42A | 4.0A |
| 5. ZIDUA | 94 G/AC | 6A | 1A | 1C | 41A | 3.4ABC |
| 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 | 5AB | 37A | 2.8C |
| 9. SHIELDEX | 32.6 G/AC | 7A | 4A | 7A | 36A | 2.0C |
| LSD (P <0.05) | | 2 | 5 | 4 | 12 | 0.8 |

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

**Conclusions:**

Conclusions: This trial was kept weed-free to test for the effect of pethoxamid, a new preemergence herbicide under development for field crops. We also examined the tolerance of snap bean to Zidua, Prowl H20, and Shieldex (tolpyralate). Snap bean yield was less than the untreated check at the high rates of pethoxamid and Zidua, as well as in both Shieldex treatments. The latter observation has been consistent; this is despite showing little visible injury above ground (ie. 7% or less) and no reduction in plant dry weight. As in previous years, examination of the snap bean root systems showed a visible reduction in secondary root growth in the Shieldex treatments.

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

### Materials & Methods:

***Crop***: Snap bean

| | |
|---|---|
| Variety: Huntington | Planting date: May 25/22 |
| Planting rate: 374532 seeds/ha | Depth: 2.5 cm |
| Row spacing: 75cm | Plant spacing: 3.6 cm |

***Design:*** Randomized Complete Block Design

| | |
|---|---|
| Plot width: 1.5m | Plot length: 10m |
| Reps: 4 | |

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

***Soil Description:***

| | |
|---|---|
| Sand: 82% | OM: 1.3% |
| Silt: 10% | pH: 6.0 |
| Clay: 8% | CEC 6.2 |

Texture: Loamy Sand
Soil: Watford/Brady series

***Application Information:***

| | A |
|---|---|
| **Application Date:** | May 27-2022 |
| **Time of Day:** | 6:45 AM |
| **Application Method:** | CO2 SPRAY |
| **Application Timing:** | PRE |
| **Application Placement:** | SOIL |
| **Air Temperature, Unit:** | 7 C |
| **% Relative Humidity:** | 84 |
| **Wind Velocity, Unit:** | 4 KPH |
| **Wind Direction:** | NE |
| **Dew Presence (Y/N):** | N |
| **Soil Temperature, Unit:** | 17 C |
| **Soil Moisture:** | DAMP |

***Spray Equipment:***

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

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

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

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

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

## Conclusions:

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

# TRIAL 5: TOLERANCE OF CARROT TO POSTEMERGENCE APPLICATIONS OF PYROXASULFONE (Zidua)

**Materials & Methods:**

***Crop***: Carrot
Variety: Belgrado — Planting date: May 30/22
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 75 kg/ha of 27-0-0 on May 30. Entire trial was kept weed-free by hand.

***Soil Description:***
Sand: 78% — OM: 4.3% — Texture: loamy sand
Silt: 13% — pH: 7.0 — Soil: Normandale
Clay: 9% — CEC 9.9

***Application Information:***

| | A | B |
|---|---|---|
| APPLICATION DATE | June 3/22 | June 13/22 |
| TIME OF DAY | 8:30AM | 7:30AM |
| TIMING | POST1 | POST2 |
| AIR TEMP (c) | 22 | 23 |
| RH (%) | 74 | 80 |
| WIND SPEED (KPH) | 5 | 8 |
| SOIL TEMP (c) | 20 | 26 |
| CLOUD COVER (%) | 100 | 0 |
| CROP STAGE | 2-3 LF | 4-5 LF |

***Spray Equipment:***

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

**Results:**

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

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

| HERBICIDE | RATE | TIMING | PERCENT INJURY 7D | 28D | YIELD T/AC |
|---|---|---|---|---|---|
| 1. UNTREATED | | | | | 19A |
| 2. PYROXASULFONE | 89G/HA | 2-3LF | 1C | 0C | 18A |
| 3. PYROXASULFONE | 100G/HA | 2-3LF | 4C | 0C | 17A |
| 4. PYROXASULFONE | 125G/HA | 2-3LF | 4C | 1C | 18A |
| 5. PYROXASULFONE | 178G/HA | 2-3LF | 8BC | 1C | 19A |
| 6. PYROXASULFONE | 200G/HA | 2-3LF | 9B | 1C | 17A |
| 7. PYROXASULFONE | 250G/HA | 2-3LF | 22B | 13B | 14B |
| 8. PYROXASULFONE | 500G/HA | 2-3LF | 26A | 46A | 6C |
| 9. PYROXASULFONE | 89G/HA | 4-5LF | 2B | 5C | 19A |
| 10. PYROXASULFONE | 100G/HA | 4-5LF | 4B | 4C | 17A |
| 11. PYROXASULFONE | 125G/HA | 4-5L | 7B | 7BC | 18A |
| 12. PYROXASULFONE | 178G/HA | 4-5LF | 14B | 9BC | 16A |
| 13. PYROXASULFONE | 200G/HA | 4-5LF | 14B | 7BC | 18A |
| 14. PYROXASULFONE | 250G/HA | 4-5LF | 19B | 11BC | 17A |
| 15. PYROXASULFONE | 500G/HA | 4-5LF | 27A | 29B | 9C |
| LSD (P <0.05) | | | 4 | 9 | 6 |

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

**Conclusions:** Pyroxasulfone (Zidua®) is an excellent candidate for control of linuron-resistant pigweed; therefore studies were established in mineral and muck soils to determine tolerance of carrot to postemergence applications of pyroxasulfone. As Zidua® rate increased from 100 to 500 g/ha at the early application timing (ie. 2-3 leaf), injury increased from 1-16%, and 0-46% at 7 and 28 days after herbicide treatment (DAT). Visible injury increased from 3-27% and 6-19% at 7 and 28 days after application at the 4-5 leaf stage of carrot. Despite the levels of injury that were apparent at either application timing, marketable yield was similar to the untreated check at most herbicide rates. Marketable yield was not reduced at a Zidua® rate of 100 g/ha. **Data will be used to support a minor use submission from last year, requesting a rate of 100 g/ha – additional data have been requested by PMRA on both tolerance and efficacy.**

## TRIAL 6: PREEMERGENCE TANK MIXES FOR CONTROL OF LINURON-RESISTANT PIGWEED IN CARROT

### Materials & Methods:

***Crop***: Carrot
Variety: Belgrado
Planting date: May 30/22
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 75 kg/ha of 27-0-0 on May 30.

***Soil Description:***
Sand: 78%
Silt: 13%
Clay: 9%
OM: 4.3%
pH: 7.0
CEC 9.9
Texture: loamy sand
Soil: Normandale

***Application Information:***

| | A |
|---|---|
| APPLICATION DATE | May 30/22 |
| TIME OF DAY | 8:00AM |
| TIMING | PRE |
| AIR TEMP (c) | 10 |
| RH (%) | 53 |
| WIND SPEED (KPH) | 1 |
| SOIL TEMP (c) | 16 |
| CLOUD COVER (%) | 50 |
| CROP STAGE | PRE |
| WEED 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")

**Results:**

Applications of Nortron + Zidua and Nortron + Prowl H20 + Zidua gave 90% control of linuron-resistant pigweed, but also caused significant reductions in carrot stand and yield (63-87%). The tank mix of Nortron + Dual II Magnum gave fair control (73%) of linuron-resistant pigweed, and did not negatively impact carrot stand or yield relative to the untreated weed-free check. Though the tank mix of Nortron + Prowl H20 + Dual II Magnum gave good control (85%) of linuron-resistant pigweed, there was a 13% reduction in carrot stand and yield.

**Table 6.1. Effect of herbicide treatment on percent control of pigweed (AMARE) and carrot stand 56 days after application, and carrot yield.**

| HERBICIDE | RATE | AMARE % | CARROT STAND (PL/M2) | YIELD T/ac |
|---|---|---|---|---|
| 1. UNTREATED | | 0C | 38A | 19A |
| 2. NORTRON | 3.3 L/AC | 29B | 36AB | 18A |
| 3. NORTRON | 3.3 L/AC | 49B | 33AB | 16A |
| PROWL H20 | 2.7 L/AC | | | |
| 4. NORTRON | 3.3 L/AC | 90A | 14BCD | 7B |
| ZIDUA | 100 G/HA | | | |
| 5. NORTRON | 3.3 L/AC | 73AB | 34AB | 17A |
| DUAL II MAGNUM | 0.7 L/AC | | | |
| 6. NORTRON | 3.3 L/AC | 90A | 5D | 3C |
| PROWL H20 | 2.7 L/AC | | | |
| ZIDUA | 100 G/HA | | | |
| 7. NORTRON | 3.3 L/AC | 85A | 27ABC | 14A |
| PROWL H20 | 2.7 L/AC | | | |
| DUAL II MAGNUM | 0.7 L/AC | | | |

LSD (P <0.05) 9 17 19

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

**Conclusions:** The results presented are part of a long term study to develop an approach to managing linuron-resistant pigweed. In the past, tank mixes of Dual II Magnum with Nortron or Prowl H20 (applied PRE) followed by micro-rates of Goal gave the best control of redroot pigweed without injuring carrots. However, we have struggled to obtain minor use registrations with micro-rates of the POST herbicides (Goal or Reflex), so we changed tactics and focused solely on PRE herbicide strategies. I recommend that we continue with looking at PRE strategies in future research, but we will need to examine other tank mix partners, as we need to find appropriate combinations that control pigweed without injuring carrot.

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

### Materials & Methods:

***Crop***: Pea
Variety: various
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 3/22
Depth: 5 cm

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

***Application Information:***

| | A |
|---|---|
| APPLICATION DATE | May-3-2022 |
| TIME OF DAY | 8:20AM |
| TIMING | PRE |
| AIR TEMP (c) | 10 |
| RH (%) | 96 |
| WIND SPEED (KPH) | 3 |
| SOIL TEMP (c) | 15 |
| CROP STAGE | PRE |

***Spray Equipment:***

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

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

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

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

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

| CULTIVAR | ZIDUA RATE (L/AC) | TENDEROMETER PSI | YIELD (T/AC) |
|---|---|---|---|
| 1. RICCO | 0 | 98 | 5.3 |
| | 100 | 99 | 5.2 |
| | 200 | 98 | 5.4 |
| 2. PAO 826 | 0 | 103 | 2.2 |
| | 100 | 101 | 2.5 |
| | 200 | 105 | 2.4 |
| 3. LIL MO | 0 | 117 | 2.7 |
| | 100 | 119 | 2.5 |
| | 200 | 118 | 2.5 |
| 4. CONCEPT | 0 | 103 | 2.5 |
| | 100 | 108 | 2.4 |
| | 200 | 101 | 2.4 |
| 5. TYNE | 0 | 104 | 2.9 |
| | 100 | 108 | 3.1 |
| | 200 | 98 | 3.0 |
| 6. SHERWOOD | 0 | 102 | 1.7 |
| | 100 | 108 | 1.9 |
| | 200 | 105 | 2.0 |
| 7. RELIANCE | 0 | 100 | 2.5 |
| | 100 | 101 | 2.7 |
| | 200 | 102 | 2.9 |
| 8. SWEET SAVOUR | 0 | 97 | 3.1 |
| | 100 | 98 | 3.1 |
| | 200 | 96 | 3.1 |
| LSD (P <0.05) | | NS | NS |

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

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

Visible injury was less than 10% in all pea cultivars at both rates of Zidua at all three rating intervals (7, 14 and 28 days after emergence). Injury symptoms included slight leaf puckering. Pea tenderness ratings were all similar to the untreated check, an indication that pea maturity was not negatively affected. Finally, pea yield in all cultivars was similar to the untreated check.

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

***Crop***: Pea
Variety: various
Planting rate: 300 kg/ha
Row spacing: 18cm
Planting date: May 3/22
Depth: 5 cm

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

***Application Information:***

| | A |
|---|---|
| APPLICATION DATE | Mayl-3-2022 |
| TIME OF DAY | 9:15AM |
| TIMING | PRE |
| AIR TEMP (c) | 14 |
| RH (%) | 96 |
| WIND SPEED (KPH) | 3 |
| SOIL TEMP (c) | 15 |
| CROP STAGE | PRE |

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

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

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

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

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

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

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

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

## TRIAL 9: TOLERANCE OF PROCESSING PEAS TO PRE TANK MIXES OF ZIDUA WITH PURSUIT, DUAL II MAGNUM, PROWL AND SANDEA

***Crop***: Pea

Variety: Welland | Planting date: May 3/22
Planting rate: 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: 52% | OM: 4.3% | Texture: Sandy Clay Loam |
| Silt: 24% | pH: 7.3 | Soil: WATFORD/BRADY |
| Clay: 24% | CEC: 12.3 | |

***Application Information:***

| | A |
|---|---|
| APPLICATION DATE | Mayl-3-2022 |
| TIME OF DAY | 9:45AM |
| TIMING | PRE |
| AIR TEMP (c) | 16 |
| RH (%) | 96 |
| WIND SPEED (KPH) | 3 |
| SOIL TEMP (c) | 15 |
| CROP STAGE | PRE |

**Table 9.1. Effect of herbicide treatment on percent injury (7 days after application), and tenderometer readings and yield at harvest.**

| HERBICIDE | RATE | % INJURY 7D | TENDEROMETER | YIELD T/ac |
|---|---|---|---|---|
| 1. UNTREATED | | 0C | 110A | 2.4A |
| 2. ZIDUA | 0.1 L/AC | 0C | 109A | 2.3A |
| 3. ZIDUA | 0.1 L/AC | 0C | 111A | 2.6A |
| PURSUIT | 0.125 L/AC | | | |
| 4. ZIDUA | 0.1 L/AC | 4B | 108A | 2.9A |
| DUAL II MAGNUM | 0.7 L/AC | | | |
| 5. ZIDUA | 0.1 L/AC | 0C | 110A | 2.4A |
| PROWL H20 | 2.7 L/AC | | | |
| 6. ZIDUA | 0.1 L/AC | 13A | 108A | 2.7A |
| SANDEA | 28 G/AC | | | |
| LSD (P <0.05) | | 3 | 3 | 0.7 |

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

**Results/Conclusions:**

This trial was established to test for tolerance of Welland peas to Zidua and Zidua tank mixes (with Pursuit, Dual II Magnum, Prowl H20 and Sandea). Pea tenderness at harvest was rated using a tenderometer and final yield adjusted based on tenderometer readings.

Visible injury was less than 10% in most treatments, except where Zidua was tank mixed with Sandea (13% injury). Pea tenderometer readings and yield were similar to the untreated, weedfree check in all treatments.

**Project Title:** Determining the Potential Impact of Tar Spot in Sweet Corn

**Start and Completion Date:** May 2022 to October 2022
**Project Term Length:** 1 year
**Research Agency/Location:** University of Guelph, Ridgetown Campus
**Lead and Key Investigators:** Dr. Cheryl Trueman, formerly of the University of Guelph and Elaine Roddy, OMAFRA.

**Summary:** Small plot, replicated trials were established assess the impact of tar spot on yield and quality of late planted sweet corn. Two cultivars were used, GSS3951 was selected for having good overall disease tolerance. GH6462 was chosen as a less resilient variety. For each cultivar, there was an unsprayed treatment and a disease-free treatment. To maintain the disease-free plots, Roxar (tetraconazole) on a 10-day spray interval. Plots were scouted weekly for signs of disease. When all of the plots (sparyed and unsprayed) were still disease-free at the time of silking, the decision was made to discontinue the trial.

**Introduction:** Tar spot (*Phyllachora maydis*) is a significant disease of field corn. It was first identified in Ontario in the fall of 2020. In 2021, as a result of prolonged cool, wet weather conditions during the reproductive growth stages, it was positively identified in field corn fields across southwestern Ontario.

Corn is the only known host of tar spot. The impact of tar spot on sweet corn has not been well studied. While it most commonly infects field corn at the R-3 stage or later, it can infect corn at any growth stage causing leaf necrosis and premature senescence of the plant. The impact in most sweet corn fields is expected to be minimal because sweet corn is harvested at the R-3 stage. However, for late harvested sweet corn fields, which develop during the peak infection period for field corn, potentially high levels of inoculum combined with cooler late summer/fall weather conditions could result in infections at earlier growth stages and potential yield or quality loss.

**Objective:** To determine if there is a negative yield impact caused by tar spot infections in late-planted processing sweet corn.

**Methodology:** Sweet corn plots were planted at Ridgetown campus on June 29, 2022 using a randomized complete block design with four replications. A late planting date was selected to help increase the likelihood of natural infection with the tar spot pathogen. The decision was made not to inoculate these plots due to the proximity of other field corn trials on campus and the potential for pathogen spread.

Two different processing sweet corn varieties were used, GSS3951 was selected for having good overall disease tolerance. GH6462 was chosen as a less resilient variety.

Plots were 7m long and 1.5 m wide, each plot contained two rows, planted 5 cm deep with an average final plant stand of 19,000 plants per acre. Treatments were as follows:

1. GH6462 – unsprayed
2. GH6462 – treated with Roxar (tetraconazole) on a 10-day spray interval
3. GSS3953 – unsprayed
4. GSS3953 – treated with Roxar (tetraconazole) on a 10-day spray interval

Fungicide treatments were applied by backpack sprayer on August 3, 12, 23 and Sept 2, 2022 at a rate of 480 mL Roxar/Ha in 300 L water/Ha.

Plots were scouted weekly from emergence to silking. At the time of silking there was no tar spot evident in any of the plots. The unsprayed plots showed low levels of Northern corn leaf blight (40% of ear leaves with 4% leaf area infected). At that time the decision was made to discontinue the trial due to the lack of disease present.

**Anticipated benefits/outcome:** Due to the dry summer conditions, tar spot was not present in any of the plots. As a result, it was not possible to study the impact it has on yield or crop quality. Discussions at the annual Pest management priority setting meetings in the Fall of 2022 indicate that the pathogen was not present in commercial sweet corn fields either.

**Project Title:** Discovery phase to investigate potential research methodologies for soybean cyst nematode in snap beans.

**Start and Completion Date:** January-October 2022
**Project Term Length:** 1 year
**Research Agency/Location:** University of Guelph, Ridgetown Campus
**Lead and Key Investigators:** Elaine Roddy, OMAFRA and Dr. Cheryl Trueman, formerly with the University of Guelph, Ridgetown Campus.

**Introduction:** In 2019 and again in 2021, survey work was conducted in commercial snap bean fields to determine if snap beans are a host for soybean cyst nematode (SCN). During these surveys, snap bean roots infested *H. glycines* were found at several different locations across Southwestern Ontario.

Due to the variable nature of SCN in commercial snap bean fields, it is difficult to determine the extent of the yield loss caused by this pest. There is little information available as to the relative susceptibility of snap bean varieties to SCN, although differences in susceptibility have been observed in dry bean classes in Ontario (C. Gillard, University of Guelph). The soils on Ridgetown Campus are not known to be infested with SCN and the costs and time associated with travelling to infested off-campus sites is a considerable deterrent to research activities. Even at heavily infested sites, the variability in SCN populations can make small plot research challenging. The use of inoculated microplots was considered as a potential method to research and quantify the impact of SCN on snap bean varieties in future studies.

**Objective:** To determine if we can effectively retrieve SCN eggs from infested soils and use these to successfully inoculate microplots to achieve SCN infestation on snap bean plants under controlled conditions.

**Methodology:** Outdoor microplots were created using 15-gal plastic pails, filled with sandy loam soil collected from a research range at Ridgetown Campus. Prior to filling, a representative soil sample was sent to the University of Guelph Pest Diagnostic Clinic to ensure that it was not previously infested with SCN. Each pail was placed inside a large plastic bin to prevent any SCN from leaching from the pots into the (uninfested) soil below. The plot area beneath the bins was covered with landscape fabric which acted as an additional barrier between the microplots and the field soil.

The microplots were planted on July 25, 2022. Three snap bean seeds (cv. Huntington) and one SCN susceptible soybean seed (cv. OAC Drayton) were placed in each bucket, 1.5" below the soil surface. Treatment 1 was a non-inoculated control. Treatment 2 was inoculated with 2000 SCN eggs per plant at the 2-true leaf stage. Each treatment was replicated 6 times and placed in a randomized plot design. A data logger was buried in one microplot to record the temperature levels throughout the trial.

*Inoculum preparation:* Cyst extraction was conducted using heavily infested soil collected from long-term soybean cyst nematode research plots in Rodney, Ontario. Soil was collected from random locations across the field at the 0-8" depth using a soil probe.

The infested soil was air dried in small batches for 5-7 days and then passed through a No. 20 sieve to remove any large debris and create a uniform sample. 100 g of soil was placed into a bucket and gradually filled with water, stirring constantly. After allowing to settle for 3-4 minutes, the solution was poured into a beaker set on top of a No. 30-mesh sieve over a No. 60-mesh sieve. The heavy sediment was left in the bucket, fresh water was added and poured over the beaker and the sieves, stopping before reaching the sediment layer. The contents of the beaker were then poured over the sieves and the beaker was rinsed. The upper sieve was rinsed with a gentle stream of water, rotating the sieve to ensure it was thoroughly rinsed. The contents of the bottom sieve (SCN cysts and fine soil particles) were then gently washed into a centrifuge tube using distilled water, the tube was caped and stored at 4 C until ready for crushing. This entire process was repeated until a suitable stock of cysts in solution was attained.

The cysts were crushed using a rubber stopper mounted on a 10" bench drill press. The prepared cyst samples were poured into a 230-mesh sieve over a 500-mesh sieve. Using a steady trickle of water to keep the sample wet, the drill press was run, while rotating the sieves, until the cyst solution had passed through the top sieve. The contents of the bottom sieve (SNC eggs) were then washed with distilled water into a volumetric flask. This was repeated until enough egg solution was collected to treat all 6 replicates.

To determine the concentration of the solution, a pipette was used to place a 1 mL sample on a 1x1 inch square nematode counting slide. The total number of eggs and juveniles were counted with the aid of a dissecting microscope at 45x magnification. This was repeated 3 times to determine the average concentration of the egg solution.

Once the concentration of the egg solution was determined, a pipette was used to transfer 2000 eggs into a centrifuge flask which was transferred to the field for final inoculation in the microplots. On August 5, 2022, reps 4-6 were inoculated at a rate of 2000 eggs in 10 ml of water per plant. Reps 1-3 were inoculated on August 8$^{th}$, 2022, at a rate of 2000 eggs in 6 ml of water per plant.

Plots were fertilized on September 6, 2022 with Miracle Grow 20-20-20 as per label instructions (23 g of fertilizer diluted in 6L of water, applied at a rate of 500 mL per plant).

*Harvest Assessments:* Plant assessments were conducted on September 20, 2022. Each plant was removed from the pails, being careful to preserve as many roots as possible. After the soil was separated from the roots, the plants were cut at the soil line and weighed individually. Roots were also weighed, and the percent root rot was recorded. After weighing, the above ground biomass was put in brown paper bags, labelled and transferred to a tobacco kiln for drying. Each root system was stored in a ziplock bag, labelled and held at 4 C so they could be assessed for the presence of SCN cysts.

Roots were assessed visually under a 10x dissecting microscope. Due to the lack of cysts, the planned root-cyst extraction methodology was not performed. Also due to the lack of cysts, the plant samples were removed from the kilns and dry weights were not taken.

**Results:** Visual assessments of the roots determined that the inoculations with SCN eggs were unsuccessful. Except for one cyst on one snap bean plant, there were no cysts present on any of the roots, including the highly susceptible OAC Drayton soybean variety.

Statistical analysis of the plant weights, root weights and percent root rot was conducted using Proc Glimmix in SAS v9.4 (SAS Institute Inc., Cary, NC). Means comparisons were performed when $P \leq 0.05$ using Tukey's HSD.

For both the soybean and the snap beans, there were no significant differences between the inoculated and non-inoculated treatments in either the above ground fresh weight or the below ground fresh weight.

The non-inoculated snap bean treatments did have significantly more root rot than the inoculated ones. This cannot not be explained by any factors recorded during this study. Root rot on the soybeans was not analyzed because almost all of ratings were zero. See Table 1. Below.

| Table 1. Fresh weights and Percent Root Rots on non-inoculated and inoculated snap bean and soybean cultivars. | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Snap Bean cv. Huntington | | | | Soybean cv. OAC Drayton | | |
| | Above ground fresh weight (g) | Root fresh weight (g) | Root rot (%) | | Above ground fresh weight (g) | Root fresh weight (g) | Root rot (%) |
| Non-inoculated | 98 | 6.52 | **4.7** | **a** | 55 | 10.01 | nil |
| Inoculated | 94 | 8.14 | **1.7** | **b** | 39 | 7.81 | nil |
| se | 11.2 | 1.0094 | 1.0175 | | 8.7 | 0.95 | - |
| P-value | 0.7205 | 0.2942 | 0.0278 | | 0.1014 | 0.0553 | - |

**Research Plan/Measurables:** one of the goals for this research project was to gain practical experience collecting cysts from soil samples known to have high levels of soybean cyst nematode. While we were successful extracting cysts from infested soils, we were not able to successfully inoculate the microplots. This indicates that outdoor inoculated microplots are not a feasible method for future soybean cyst nematode studies.

A secondary goal was to gain experience removing cysts from infested snap bean plants to improve speed and efficacy with which we can analyze root samples for relative infestation levels. Because our inoculations were unsuccessful, we did not have any infested plants with which we could practice these methodologies.

**Anticipated Benefits/Outcome:** This study has effectively demonstrated that inoculated, outdoor microplots are not a feasible method with which to study the impact of soybean cyst nematode on snap beans. Any future research activities will require off-campus collaborations at sites that are already heavily infested with SCN. As a result of this study, OMAFRA staff have gained valuable lab experience related to this pest and its research.

# NORTERA

**PROJECT TITLE:** Processing Pea Cultivar Evaluations

**PROJECT DATE:** April 1, 2023 - October 31, 2023

**TERM LENGTH:** 1 Season

**SUBMITTED BY:** Nortera Foods Inc.

**PROJECT LEAD:** Dan Oliver, Agriculture Technical Programs Specialist, (519) 719-5957, dan.oliver@norterafoods.com

**FUNDING REQUESTED:** CAD $7,500

## PROPOSED INDUSTRY BENEFITS

New processing pea cultivars are being bred all the time. These new cultivars need to be tested in an Ontario growing environment in order to select those with optimum performance in an Ontario climate. Having data to support future cultivar purchases will ensure maximum productivity for Ontario pea growers.

## OBJECTIVES AND MEASURABLES

Pea cultivars will be evaluated on their early season vigour, growth habits, tolerances to heat, disease, and other stresses, average sieve size, yield, days to maturity, and accumulated heat units to maturity. All material will be compared to the most comparable key "standard" variety being grown commercially by Ontario pea growers.

## PROPOSED PROCEDURE

Two trials will be established in existing Nortera pea grower's fields with a to-be-determined number of varieties, with individual plot size estimated at 40' length by 6X7.5" rows in width. Site #1 will be planted to early maturing varieties with an early planting date. Site #2 will be planted to later maturing varieties with a later planting date. Each plot will be replicated 4 times, randomly. Varieties will be separated based on expected market class. Individual plots will be harvested at maturity by hand harvesting 17'5"' of 4 rows, repeated up to a maximum of 2 harvests per variety. Harvested samples will be processed at Bonduelle's pregrade facility, where weights, average sieve size, and average tenderometer values will be determined.

## EXPLANATION OF FUNDING REQUESTED

The funds requested will be used to partially cover the costs incurred for seasonal technicians, suppliers, planting, grower compensation, and other trial related fees and expenses.

## NOTE

Nortera appreciates past contributions made by the OPVG, and looks forward to continued collaboration on this project.

# NEW YORK STATE 2022 PROCESSING SNAP BEAN CULTIVAR TRIAL REPORT

(Large Sieve – 3/4 Sieve – Whole/Extra-Fine)

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*We wish to thank the NYS Vegetable Research Council and Association, Ontario Processing Vegetable Growers, and cooperating seed companies for their financial support of the project. We also wish to thank Michael Gardinier and Roger Ward of Farm Fresh First, and Jeff Johnson of Seneca Foods, for their assistance in planning the trials. Special thanks to my crew members Kim D., Carla Y., Samaya M., and Andrew P., for their assistance in day-to-day operations.*

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## PROCEDURES AND MATERIALS:

**Location:** Cornell AgriTech (Research North) - Geneva NY
**Soil Type:** Honeoye silt loam
**Planting Dates:** Large Sieve - 5/20; 3-4 sieve beans - 6/6; Whole/Fine - 7/8
**Row Width:** 30 inches, Row length: 30 ft.
**In-row Spacing:** 1 5/8 inches (6-8 plants/ft.)
**Fertilizer:** 300#/A of 15-5-10 with Zn and Mn
**Tillage:** Conventional
**Herbicide:** Dual post plant, Assure post emergence
**Planter** - Two Row Monosem Vacuum Planter
**Plot Size:** 1 row - 4 replications (Replicated entries)

## Objectives and Season Summary:

The objective of this trial was to compare various 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, as well as seed companies, in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions. A field day was held for processors and seed companies to view varieties in the field.

For replicated entries, yield of five feet per replication was obtained by pulling the plants and hand picking them. Multiple harvests were made to evaluate 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 for later evaluation by the processors and seed company representatives at our programs annual cutting event.

The **large sieve bean trial** was planted on May 20th with relatively good field conditions. Emergence was satisfactory. June was relatively cool and wet. In July, the trial experienced consistent droughty conditions. The large sieve trial had consistent and decent yields but was slow to size up likely because of the cool June weather and then droughty July weather. **The 3-4 sieve trial** was planted on June 6th and the field conditions and emergence were also satisfactory. Similar to the large sieve trial, the 3-4 sieve trial experienced wet conditions in the first half of its life cycle and droughty conditions in the second half. Yields in the 3-4 sieve trial were relatively consistent but smaller than the large sieve trial, and similarly slow to size up. **The whole/extra-fine bean trial** was planted on July 8th with decent soil conditions. The whole/extra-fine bean trial experienced droughty conditions over the span of the trial. We were forced to irrigate this trial twice because of the lack of precipitation in July and August. Yields from this trial were inconsistent with some varieties recording good yields and others poor. Overall, the droughty July and August weather was the biggest environmental impact on all three trials in 2022 and made it difficult to allow the beans to size up before becoming spongey. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season.

A vegetable "cutting", was held on November 1st, where frozen peas, snap beans, and sweet corn were put on display for processors and seed companies to evaluate. Large and 3-4 sieve snap beans were canned and put on display. Our vegetable cutting is the final step of our program's evaluation. We evaluate the horticultural characteristics in the field and in raw products, but our vegetable cutting takes us all the way to quality evaluation on the plate.

## Table 1: Processing Snap Bean Cultivar List

### Large Sieve

| Variety | Company |
|---|---|
| Bridger | Harris Moran |
| RR2006 | Pure Line |
| Pismo | Syngenta |
| Fraser | Harris Moran |
| GVSB17 | Gallatin Valley |
| RR2015 | Pure Line |
| Bruce (524) | Pure Line |
| Huntington | Syngenta |
| GVS1720 | Gallatin Valley |
| GVSB59 | Gallatin Valley |
| Macallan | Syngenta |
| GVSB94 | Gallatin Valley |

### Whole to Extra Fine

| Variety | Company |
|---|---|
| SV1162GN | Seminis |
| Flavor Sweet | Harris Moran |
| PV987 | Crites |
| Takounya | Seminis |
| Astute | Seminis |
| Bass | Harris Moran |
| SVGG2106 | Seminis |
| RR4005 | Pure Line |
| PV942 | Crites |
| PV957 | Crites |
| RR4050 | Pure Line |
| RR4040 | Pure Line |
| Contada | Pure Line |
| Mustang | Crites |
| BEX041 | Brotherton |
| BEX089 | Brotherton |
| BEX179 | Brotherton |

### 3 to 4 Sieve

| Variety | Company |
|---|---|
| Prevail | Syngenta |
| HM4423 | Harris Moran |
| Byrd (5722) | Harris Moran |
| Peary (7711) | Harris Moran |
| Thompson | Syngenta |
| Cabot | Harris Moran |
| SVGG2097 | Seminis |
| Affirmed | Seminis |
| SVGF2123 | Seminis |
| BEX100 | Brotherton |
| BEX069 | Brotherton |
| World Cup | Brotherton |
| Bex174 | Brotherton |

## *Column Descriptions for Tables 2, 4, and 6.*

***Cultivar*** *- Data is based on four replications for entries in the replicated study. Harvest sample was from five feet of row.*

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

***GDD to Harvest (base 50°F)*** *- The number of growing degree days (GDD) base 50°F 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 1 sieve pods*** *- One seed from ten 1 sieve pods were collectively measured in millimeters as a maturity index.*

***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.*

***Tons/Acre*** *- The yield from the harvest sample (prior to being snipped) extrapolated to a per acre basis.*

***Plants/Foot*** *- Plants per foot recorded from harvest samples. Desired population was 6-8 plants per foot.*

**Table 2: Large Sieve Yield Characteristics (plant date 5/20)**

| Cultivar | Days to Harvest | GDD to Harvest (base 50°F) | % 2 Sieve | % 3 Sieve | % 4 Sieve | % 5 Sieve | % 6 Sieve | % 2-4 Sieve | 4 Sieve Sd. Length (mm) | 5 Sieve Sd. Length (mm) | Tons/Acre | Plants/Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GVSB59 | 63 | 1149 | 14 | 14 | 32 | 32 | 8 | 60 | 95 | 113 | 5.9 | 6.8 |
| GVSB59 | 68 | 1266 | 3 | 13 | 63 | 17 | 4 | 79 | 120 | 132 | 5.3 | 7.2 |
| Bridger | 62 | 1120 | 16 | 16 | 49 | 19 | 0 | 81 | 78 | 90.7 | 4.7 | 7.7 |
| Bridger | 64 | 1176 | 7 | 10 | 55 | 28 | 0 | 72 | 102 | 114 | 3.6 | 7.3 |
| Pismo | 62 | 1120 | 24 | 25 | 42 | 9 | 0 | 91 | 80 | 94 | 5 | 7.9 |
| Pismo | 64 | 1176 | 20 | 18 | 48 | 14 | 0 | 86 | 90 | 109 | 4.2 | 7.5 |
| GVS1720 | 63 | 1149 | 13 | 14 | 22 | 27 | 24 | 49 | 86 | 101 | 6.1 | 7.5 |
| GVS1720 | 68 | 1266 | 3 | 3 | 23 | 48 | 23 | 29 | 107 | 119 | 4.9 | 8 |
| RR2006 | 62 | 1120 | 14 | 14 | 38 | 30 | 4 | 66 | 77 | 89 | 4.1 | 7.4 |
| RR2006 | 64 | 1176 | 8 | 10 | 47 | 32 | 3 | 65 | 83 | 98 | 4.2 | 6.3 |
| Macallan | 64 | 1176 | 10 | 13 | 61 | 15 | 1 | 84 | 84 | 97 | 5.3 | 7.2 |
| Macallan | 68 | 1266 | 7 | 13 | 71 | 9 | 0 | 91 | 105 | 123 | 4.6 | 7.8 |
| Fraser | 63 | 1149 | 16 | 17 | 27 | 25 | 15 | 60 | 83 | 99 | 4.9 | 6.3 |
| Fraser | 68 | 1266 | 5 | 12 | 48 | 31 | 4 | 65 | 98 | 110 | 3.8 | 6.8 |
| Huntington | 63 | 1149 | 17 | 17 | 31 | 25 | 10 | 65 | 82 | 94 | 5.4 | 6.1 |
| Huntington | 68 | 1266 | 6 | 9 | 56 | 27 | 2 | 71 | 98 | 116 | 4.3 | 7.6 |
| Bruce | 62 | 1120 | 24 | 29 | 42 | 5 | 0 | 95 | 81 | 82 | 5.1 | 6.7 |
| Bruce | 67 | 1250 | 28 | 30 | 41 | 1 | 0 | 99 | 96 | - | 3.7 | 7.3 |
| GVSB17 | 63 | 1149 | 21 | 23 | 38 | 18 | 0 | 82 | 80 | 90 | 4.4 | 6.7 |
| GVSB17 | 67 | 1250 | 8 | 34 | 50 | 8 | 0 | 92 | 83 | 106 | 3.5 | 7.6 |
| GVSB94 | 64 | 1176 | 12 | 23 | 50 | 13 | 2 | 85 | 81 | 86 | 4.5 | 6.9 |
| GVSB94 | 67 | 1250 | 8 | 30 | 61 | 1 | 0 | 99 | 92 | 101 | 4.3 | 7.1 |
| RR2015 | 63 | 1149 | 21 | 28 | 37 | 14 | 0 | 86 | 75 | 82 | 5.2 | 7.3 |
| RR2015 | 67 | 1250 | 11 | 22 | 61 | 6 | 0 | 94 | 88 | 92 | 4.3 | 7.5 |

**Table 3: Plant and Pod Characteristics (Large Sieve Beans)**

| Cultivar | Plant Height (in) | Plant Width (in) | Raw Pod Color Rating | Un-snipped Pod Length (in) | Pod Shape | Pod Straight. Rating | Pod Location | Plant Habit Rating |
|---|---|---|---|---|---|---|---|---|
| Bridger | 13~16 | 11~13 | M-L | 5~5.5 | R-O M-C | 3.5 | L-H | 4.5 |
| RR2006 | 13~16 | 12~15 | M-L | 4~5 | R-O M-C | 3.5 | M-H | 4 |
| Pismo | 15~18 | 13~16 | L | 4.5~5.25 | R L-C | 4 | M-H | 3.5 |
| Fraser | 13~16 | 11~13 | M | 4.5~5.75 | R L-C | 3.5 | H | 4.5 |
| GVSB17 | 13~16 | 11~14 | L-M | 4~5 | R-F L-C | 3.5 | M-H | 4 |
| RR2015 | 13~17 | 11~14 | M-L | 5~5.5 | R M-C | 4.5 | M-H | 3-3.5 |
| Bruce | 13~16 | 11~15 | M-L | 4~5 | R L-C | 3.5-4 | L-H | 3.5-4 |
| Huntington | 13~17 | 11~15 | L-M | 4.25~5 | R-O L-C | 3-3.5 | L-H | 3.5 |
| GVS1720 | 12~16 | 12~15 | M-L | 4.5~5.25 | R-O L-C | 3.5-4 | M-H | 3 |
| GVSB59 | 14~18 | 13~15 | M-L | 4.25~5 | R-O M-C | 3.5 | L-H | 3-3.5 |
| Macallan | 14~17 | 13~15 | L-M | 4.5~5.25 | R M-C | 3.5-4 | M-H | 3.5-4 |
| GVSB94 | 15~18 | 13~15 | M-L | 5~6 | R-O M-C | 4 | M-H | 4 |

**Table 3 Column Descriptions:**

**Plant Height -** Height measurements taken from each replication and a range recorded in inches
**Plant Width -** Width measurements taken from each replication and a range recorded in inches
**Raw Pod Color Rating -** L = light green, M = medium green, D = dark green
**Un-snipped Pod Length -** Pods from each replication measured and a range recorded in inches
**Pod Shape -** R= Round, O=Oval, F=Flat,
L-C=Light Crease, M-C=Medium Crease, H-C=Heavy Crease
**Pod Location -** L=Pods close to or touching the ground, M=Pods located in middle of the plant, H=Pods located high on the plant
**Pod Straight. Rating -** Straightness of pods were visually evaluated from each replication
1=extremely curved/disfigured, 3=acceptable, 5=extremely uniform and straight
**Plant Habit Rating -** 1=totally recumbent plant, 3=acceptable, 5=extremely erect plant

**Snap Bean Descriptions Provided by the Seed Source (Large Sieve)**

***Bridger*** *– Harris Moran, 52 days to maturity. 5% 3 sieve, 65% 4 sieve, amd 30% 5 sieve. HR – BCMV and BCTV. IR – Pss and Psp.*

***RR2006*** *– Pure Line, 54 days to maturity. 10% 2 sieve, 10% 3 sieve, 60% 4 sieve, and 20% 5 sieve.*

***Pismo*** *– Syngenta, 55 days to maturity. 15% 1,2,3 sieves, 35% 4 sieve, and 50% 5 sieve. Resistant to BCMV and Pss.*

***Fraser*** *– Harris Moran, 55 days 5 sieve bean variety with dark green pods (5.8in) with dense sturdy flesh for processing and an upright plant habit. 10% 3 sieve, 45% 4 sieve and 45% 5 sieve. Good disease package: HR – BCMV, BCTV and PSP. IR – Pss.*

***GVSB17*** *– Gallatin Valley, 54-55 days to maturity. 12 % 2 sieve, 18% 3 sieve, 49% 4 sieve, and 19% 5 sieve. Resistant to BBS.*

***RR2015*** *– Pure Line, 56 days to maturity. 10% 2 sieve, 15% 3 sieve, 60% 4 sieve, and 15% 5 sieve.*

***Bruce (524)*** *– Pure Line, 56 days to maturity. 10% 2 sieve, 30% 3 sieve, 50% 4 sieve and 10% 5 sieve.*

***Huntington*** *– Syngenta, 56 days to maturity. 15% 1,2,3 sieves, 30% 4 sieve and 55% 5 sieve. HR – BCMV. IR – Pss.*

***GVSB1720*** *– Gallatin Valley, 56-57 days to maturity. 15% 3 sieve, 35% 4 sieve, and 36% 5 sieve. Resistance to BBS.*

***GVSB59*** *– Gallatin Valley, 56-57 days to maturity. 14% 2 sieve, 18% 3 sieve, 55 % 4 sieve, and 12% 5 sieve.*

***Macallan*** *– Syngenta, 57 days to maturity. 10% 4 sieve and 90% 5 sieve. New, high yielding variety, with an upright bush and smooth straight pods. Resistant to BCMV and Pss.*

***GVSB94*** *– Gallatin Valley, 57-58 days to maturity. 15% 3 sieve, 35% 4 sieve, and 36% 5 sieve. Resistance to BBS.*

**Table 4: 3 to 4 Sieve Yield Characteristics (plant date 6/6)**

| Cultivar | Days to Harvest | GDD to Harvest (base 50°F) | % 2 Sieve | % 3 Sieve | % 4 Sieve | % 5 Sieve | % 6 Sieve | % 2-4 Sieve | 3 Sieve Sd. Length (mm) | 4 Sieve Sd. Length (mm) | Tons/Acre | Plants/Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thompson | 57 | 1127 | 14 | 27 | 58 | 1 | 0 | 99 | 82 | 101 | 3.8 | 7.1 |
| Thompson | 60 | 1199 | 6 | 25 | 68 | 1 | 0 | 99 | 103 | 130 | 3.6 | 6.7 |
| BEX069 | 58 | 1148 | 8 | 21 | 68 | 3 | 0 | 97 | 82 | 107 | 3.8 | 5.2 |
| BEX069 | 60 | 1199 | 7 | 19 | 67 | 7 | 0 | 93 | 97 | 120 | 3.8 | 6.1 |
| Byrd | 54 | 1067 | 12 | 23 | 60 | 5 | 0 | 95 | 55 | 71 | 5.3 | 6.7 |
| Byrd | 58 | 1148 | 5 | 14 | 70 | 11 | 0 | 89 | 74 | 99 | 5.6 | 6.2 |
| Prevail | 54 | 1067 | 36 | 34 | 28 | 2 | 0 | 98 | 62 | 69 | 3.7 | 6.2 |
| Prevail | 59 | 1171 | 10 | 22 | 66 | 2 | 0 | 98 | 88 | 98 | 5.0 | 6.6 |
| HM4423 | 54 | 1067 | 53 | 30 | 17 | 0 | 0 | 100 | 63 | 71 | 2.5 | 6.6 |
| HM4423 | 59 | 1171 | 11 | 28 | 60 | 1 | 0 | 99 | 89 | 102 | 4.1 | 6.5 |
| Peary | 57 | 1127 | 11 | 22 | 55 | 9 | 3 | 88 | 74 | 91 | 3.8 | 6.9 |
| Peary | 59 | 1171 | 4 | 12 | 63 | 20 | 1 | 79 | 90 | 103 | 4.1 | 7.2 |
| Cabot | 57 | 1127 | 15 | 30 | 52 | 3 | 0 | 97 | 72 | 81 | 4.3 | 6.5 |
| Cabot | 59 | 1171 | 9 | 24 | 65 | 2 | 0 | 98 | 93 | 101 | 4.8 | 7.2 |
| SVGG2097 | 57 | 1127 | 23 | 43 | 34 | 0 | 0 | 100 | 79 | 93 | 4.2 | 7.0 |
| SVGG2097 | 59 | 1171 | 15 | 38 | 47 | 0 | 0 | 100 | 89 | 99 | 4.6 | 7.3 |
| SVGF2123 | 57 | 1127 | 16 | 32 | 49 | 3 | 0 | 97 | 69 | 81 | 4.5 | 7.1 |
| SVGF2123 | 59 | 1171 | 12 | 30 | 55 | 3 | 0 | 97 | 79 | 96 | 4.2 | 7.1 |
| BEX174 | 58 | 1148 | 10 | 30 | 57 | 3 | 0 | 97 | 79 | 97 | 3.9 | 6.9 |
| BEX174 | 59 | 1171 | 9 | 23 | 63 | 5 | 0 | 95 | 85 | 105 | 5.2 | 6.9 |
| BEX100 | 57 | 1127 | 30 | 47 | 22 | 1 | 0 | 99 | 90 | 94 | 3.4 | 6.5 |
| BEX100 | 60 | 1199 | 12 | 41 | 46 | 1 | 0 | 99 | 94 | 106 | 3.6 | 6.1 |
| World Cup | 58 | 1148 | 7 | 12 | 65 | 16 | 0 | 84 | 75 | 88 | 4.0 | 5.0 |
| World Cup | 60 | 1199 | 6 | 15 | 68 | 11 | 0 | 89 | 85 | 99 | 3.8 | 6.1 |
| Affirmed | 57 | 1127 | 39 | 37 | 24 | 0 | 0 | 100 | 61 | 65 | 3.0 | 6.4 |
| Affirmed | 61 | 1227 | 20 | 34 | 45 | 1 | 0 | 99 | 80 | 85 | 4.0 | 6.5 |

**Table 5: Plant and Pod Characteristics (3 to 4 Sieve)**

| Cultivar | Plant Height (in) | Plant Width (in) | Un-snipped Pod Length (in) | Raw Pod Color Rating | Pod Shape Rating | Pod Straight. Rating | Pod Location Rating | Plant Habit Rating |
|---|---|---|---|---|---|---|---|---|
| Prevail | 15~17 | 14~16 | 4.5~5.0 | M-D | R-O L-C | 4 | M-H | 3.5 |
| HM4423 | 15~18 | 13~15 | 4.5~5.0 | D | R-O L-C | 3.5-4 | M-H | 4 |
| Byrd | 14~16 | 14~15 | 4.0~5.0 | L-M | R-O M-C | 4 | M-H | 4 |
| Peary | 13~14 | 12~14 | 3.75-4.5 | M | R-O L-C | 3.5 | M-H | 3.5 |
| Thompson | 13~15 | 13~14 | 4.0-4.75 | L-M | R-O L-C | 3.5 | L-H | 3.5 |
| Cabot | 14~16 | 12~14 | 4.0~5.0 | M-D | R-O L-C | 3.5 | M-H | 3.5 |
| SVGG2097 | 13~15 | 13~14 | 4.5~5.0 | M-D | R L-C | 3.5 | M-H | 3.5 |
| Affirmed | 14~16 | 14~15 | 4.5~5.5 | M-D | R L-C | 3.5 | M-H | 3.5 |
| SVGF2123 | 13~16 | 13~15 | 4.5~5.25 | M-D | R-O L-C | 4 | M-H | 3 |
| BEX100 | 15~17 | 13~15 | 4.5~5.0 | M-D | R L-C | 3.5 | L-H | 3 |
| BEX069 | 13~15 | 12~15 | 4.5~5.5 | M | R L-C | 3.5 | M-H | 3 |
| World Cup | 13~16 | 13~14 | 4.25~5.25 | M-D | R M-C | 4 | M-H | 4 |
| BEX174 | 13~15 | 13~15 | 5.0~6.0 | M-D | R-O L-C | 3.5 | M-H | 3 |

**Table 5 Column Descriptions**

**Plant Height -** Height measurements taken from each replication and a range recorded in inches

**Plant Width -**Canopy width measurements taken from each rep. and a range recorded in inches

**Raw Pod Color Rating -** L = light green, M = medium green, D = dark green

**Un-snipped Pod Length** - Pods from each replication measured and a range recorded in inches

**Pod Shape** - R= Round, O=Oval, F=Flat
L-C=Light Crease, M-C=Medium Crease, H-C=Heavy Crease

**Pod Location -** L=Pods close to or touching the ground, M=Pods located in middle of the plant, H=Pods located high on the plant

**Pod Straight. Rating -** Straightness of pods were visually evaluated from each replication
1=extremely curved/disfigured, 3=acceptable, 5=extremely uniform and straight

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

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

***Prevail*** *– Syngenta, 54 days to maturity. 80% 4 sieve and 20% 5 sieve. Nice 4-sieve bean with a darker pod color. Known for its stress tolerance and a concentrated set. Resistant to BCMV and BCTV.*

***HM4423*** *– Harris Moran, 54-day variety. Attractive dark green pods for freezing. 30% 3 sieve, 60% 4 sieve and 10% 5 sieve. HR – BCMV, Cl, and PSP, IR – Pss.*

***Byrd (5722)*** – Harris Moran, 54 days, light green pods with upright plant structure and consistent yields across multiple environments. 10% 3 sieve, 65% 4 sieve, and 25% 5 sieve. Strong disease package: HR – BCMV, BCTV and PSP, IR – Pss.

***Peary (7711)*** *– Harris Moran, 55-day variety with medium dark green pod color. Solid pod interiors. 25% 3 sieve, 60% 4 sieve and 15% 5 sieve. HR- BCMV and BCTV, IR – Pss.*

***Thompson*** *– Syngenta, 55 days to maturity. 5% 1,2,3 sieves, 60% 4 sieve, and 35% 5 sieve. Exciting new 4-sieve bean that performs well under challenging conditions. Strong disease package, upright bush, and high yield potential. Resistant to BCMC and Pss.*

***Cabot*** *– Harris Moran, 55 days to maturity. 25% 3 sieve, 60% 4 sieve and 15% 5 sieve. HR – BCMV, Ua and Xap. IR – BCTV, Psp, and Pss.*

***SVGG2097*** *– Seminis, 56 days to maturity. 15% 3 sieve, 65% 4 sieve, and 20% 5 sieve. Disease package pending verification.*

***Affirmed*** *– Seminis, 56 days to maturity. 10% 2 sieve, 30% 3 sieve, 50% 4 sieve, and 10% 5 sieve. HR – BCMV. IR – Ua:90.*

***SVGF2123*** *– Seminis, 57 days to maturity. 10% 2 sieve, 30% 3 sieve, 50% 4 sieve, and 10% 6 sieve. Disease package pending verification.*

***BEX100*** *– Brotherton, 66 days to maturity, 3 to 4 sieve bean. BCMV:R, BBS:T, Rust:R.*

***BEX069*** *– Brotherton, 66 days to maturity, 3 to 4 sieve bean. BCMV:R, BBS:T, Rust:R.*

***World Cup*** *– Brotherton, 66 days to maturity, 3 to 4 sieve bean. BCMV:R, BBS:T, Beet Curly Top Virus:R, Rust:R.*

***BEX174*** *– Brotherton, 69 days to maturity, 3 to 4 sieve bean. BCMV:R, BBS:T, Rust:R.*

Table 6: Whole/Extra-Fine Bean Yield Characteristics (plant date 07/08)

| Cultivar | Days to Harvest | GDD to Harvest (base 50°F) | % 1 Sieve | % 2 Sieve | % 3 Sieve | % 4 Sieve | % 5 Sieve | % 1-3 Sieve | 1 Sieve Sd. Length (mm) | 2 Sieve Sd. Length (mm) | 3 Sieve Sd. Length (mm) | Tons/Acre | Plants/Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SV1162GN | 53 | 1177 | 83 | 17 | 0 | 0 | 0 | 100 | 68 | - | - | 4.3 | 7.2 |
| SV1162GN | 57 | 1244 | 81 | 19 | 0 | 0 | 0 | 100 | 73 | - | - | 4.4 | 7.5 |
| PV987 | 53 | 1177 | 0 | 53 | 35 | 12 | 0 | 88 | - | 70 | 81 | 5.3 | 7.5 |
| PV987 | 57 | 1244 | 0 | 41 | 47 | 12 | 0 | 88 | - | 78 | 85 | 6.0 | 7.5 |
| Takounya | 53 | 1177 | 88 | 12 | 0 | 0 | 0 | 100 | 61 | - | - | 3.5 | 7.9 |
| Takounya | 57 | 1244 | 85 | 15 | 0 | 0 | 0 | 100 | 70 | - | - | 4.3 | 7.5 |
| Astute | 53 | 1177 | 78 | 20 | 2 | 0 | 0 | 100 | 68 | - | - | 3.2 | 7.7 |
| Astute | 58 | 1266 | 77 | 23 | 0 | 0 | 0 | 100 | 82 | - | - | 4.2 | 7.3 |
| Flavor Sweet | 53 | 1177 | 0 | 40 | 36 | 24 | 0 | 76 | - | 61 | 73 | 4.0 | 6.9 |
| Flavor Sweet | 55 | 1217 | 0 | 37 | 36 | 27 | 0 | 73 | - | 62 | 84 | 5.2 | 6.7 |
| Bass | 53 | 1177 | 0 | 36 | 32 | 32 | 0 | 68 | - | 60 | 76 | 3.4 | 5.7 |
| Bass | 55 | 1217 | 0 | 24 | 39 | 36 | 1 | 63 | - | 67 | 83 | 6.5 | 6.7 |
| SVGG2106 | 54 | 1197 | 8 | 61 | 31 | 0 | 0 | 100 | - | 66 | 71 | 5.6 | 7.3 |
| SVGG2106 | 58 | 1266 | 36 | 45 | 19 | 0 | 0 | 100 | - | 66 | 85 | 6.4 | 6.9 |
| PV942 | 54 | 1197 | 43 | 42 | 14 | 1 | 0 | 99 | 57 | 73 | - | 3.4 | 7.2 |
| PV942 | 59 | 1283 | 36 | 36 | 26 | 2 | 0 | 98 | 70 | 74 | - | 5.3 | 6.9 |
| PV957 | 54 | 1197 | 60 | 27 | 13 | 0 | 0 | 100 | 69 | 77 | - | 4.9 | 7.7 |
| PV957 | 59 | 1283 | 48 | 32 | 18 | 2 | 0 | 98 | 70 | 77 | - | 5.2 | 6.8 |
| Mustang | 55 | 1217 | 47 | 49 | 4 | 0 | 0 | 100 | 54 | 68 | - | 4.3 | 8.0 |
| RR4005 | 54 | 1197 | 92 | 8 | 0 | 0 | 0 | 100 | 47 | 61 | - | 2.5 | 7.4 |
| RR4005 | 56 | 1229 | 95 | 5 | 0 | 0 | 0 | 100 | 63 | 69 | - | 3.6 | 7.4 |

**Table 6 Continued: Whole/Fine Bean Yield Characteristics (plant date 07/08)**

| Cultivar | Days to Harvest | GDD to Harvest (base 50°F) | % 1 Sieve | % 2 Sieve | % 3 Sieve | % 4 Sieve | % 5 Sieve | % 1-3 Sieve | 1 Sieve Sd. Length (mm) | 2 Sieve Sd. Length (mm) | 3 Sieve Sd. Length (mm) | Tons/Acre | Plants/Foot |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RR4050 | 54 | 1197 | 70 | 27 | 3 | 0 | 0 | 100 | 47 | 55 | - | 2.1 | 7.2 |
| RR4050 | 56 | 1229 | 48 | 46 | 6 | 0 | 0 | 100 | 48 | 57 | - | 2.5 | 7.2 |
| RR4040 | 54 | 1197 | 88 | 12 | 0 | 0 | 0 | 100 | 45 | 56 | - | 2.0 | 7.2 |
| RR4040 | 56 | 1229 | 89 | 11 | 0 | 0 | 0 | 100 | 55 | 60 | - | 2.1 | 7.4 |
| BEX089 | 56 | 1229 | 0 | 23 | 46 | 31 | 0 | 69 | - | 57 | 70 | 5.5 | 7.5 |
| BEX089 | 59 | 1283 | 0 | 31 | 41 | 28 | 0 | 72 | - | 60 | 75 | 4.9 | 6.5 |
| Contada | 55 | 1217 | 0 | 73 | 23 | 4 | 0 | 96 | - | 60 | 63 | 4.6 | 7.0 |
| Contada | 57 | 1244 | 0 | 68 | 28 | 4 | 0 | 96 | - | 60 | 73 | 5.5 | 6.9 |
| BEX041 | 55 | 1217 | 75 | 25 | 0 | 0 | 0 | 100 | 55 | - | - | 3.1 | 6.9 |
| BEX041 | 57 | 1244 | 73 | 27 | 0 | 0 | 0 | 100 | 65 | - | - | 4.1 | 7.2 |
| BEX179 | 56 | 1229 | 0 | 58 | 27 | 15 | 0 | 85 | - | 55 | 62 | 3.0 | 6.0 |
| BEX179 | 59 | 1283 | 0 | 31 | 41 | 28 | 0 | 72 | - | 55 | 64 | 5.5 | 6.1 |

**Table 7: Plant and Pod Characteristics (Whole to Extra Fine)**

| Cultivar | Plant Height (in) | Plant Width (in) | Un-snipped Pod Length (in) | Raw Pod Color Rating | Pod Shape Rating | Pod Straight. Rating | Pod Location Rating | Plant Habit Rating |
|---|---|---|---|---|---|---|---|---|
| SV1162GN | 13~14 | 12~13 | 4.50~5.25 | M | R M-C | 4 | M-H | 4.5 |
| Flavor Sweet | 16~20 | 15~16 | 3.0~4.0 | M | R-O M-C | 3.5 | L-H | 3.5 |
| PV987 | 13~14 | 11~13 | 4.0~4.75 | M-D | R-O L-C | 3.5 | M-H | 4 |
| Takounya | 13~16 | 13~15 | 4.0~4.75 | L-M | R-O L-C | 4 | M-H | 3.5 |
| Astute | 13~16 | 13~15 | 4.0~4.75 | M | R L-C | 4 | M-H | 3.5 |
| Bass | 13~16 | 13~15 | 3.25~4.0 | L-M | R-O M-C | 4 | L-H | 4 |
| SVGG2106 | 14~16 | 13~15 | 4.0~4.5 | M-D | R-O M-C | 4 | L-H | 3.5 |
| RR4005 | 13~14 | 11~13 | 3.75~4.5 | M | R-O L-C | 3.5 | M-H | 3.5 |
| PV942 | 17~21 | 14~16 | 4.0~4.5 | M | R-O M-C | 3.5 | L-H | 3.5 |
| PV957 | 13~14 | 12~13 | 3.75~4.0 | M | R-O M-C | 3.5 | L-H | 4 |
| RR4050 | 12~14 | 12~13 | 3.5~4.5 | M-D | R L-C | 4 | L-H | 4 |
| RR4040 | 13~15 | 12~14 | 3.75~4.25 | L-M | R-O L-C | 4 | L-H | 3.5 |
| Contada | 13~14 | 12~14 | 4.0~4.75 | M | R-O M-C | 4 | M-H | 4 |
| Mustang | 14~17 | 14~16 | 4.0~5.0 | M | R-O L-C | 4 | M-H | 3.5 |
| BEX041 | 15~17 | 14~16 | 4.0~5.0 | L-M | R-O L-C | 4.5 | L-H | 3.5 |
| BEX089 | 14~16 | 12~15 | 4.0~4.5 | M | R-O M-C | 4 | M-H | 3.5 |
| BEX179 | 12~16 | 13~15 | 4.0~4.75 | M-D | R-O L-C | 4 | L-H | 3.5 |

*Table 7 Column Descriptions same as Table 5 on page 9

**Descriptions Provided by the Seed Source - Whole Beans/ Extra Fine**

***SV1162GN*** *– Seminis, 54 days to maturity. 65% 1 sieve and 35% 2 sieve. HR – BCMV, PSP:2, Cl:55.*

***Flavor Sweet*** *– Harris Moran, 55 days to maturity, 85% 3 sieve and 15% 4 sieve. HR – BCMV, Cl, and Psp.*

***PV987*** *– Crites, 54 days to maturity. 70% 2 sieve and 30% 3 sieve.*

***Takounya*** *– Seminis. 55 days to maturity. 30% 1 sieve and 70% 2 sieve. HR – BCMV, PSP:2, Cl:55.*

***Astute*** *– Seminis, 55 days to maturity. 70% 1 sieve and 30% 2 sieve. HR – BCMV, PSP:2, Cl:17, 23/Ua38.*

***Bass*** *– Harris Moran, 56-day variety with medium dark green pod color. Similar sieve size to Flavor Sweet but extra pod length (4.3in). Improved disease package compared to Flavor Sweet. 85% 3 sieve and 15% 4 sieve. HR – BCMV, BCTV, Cl, and PSP.*
*IR – Pss.*

***SVGG2106*** *– Seminis, 56 days to maturity. 70% 3 sieve and 30% 4 sieve. Disease package pending verification.*

***RR4005*** *– Pure Line, 56 days to maturity. Predominately 1 and 2 sieve beans.*

***PV942*** *– Crites, 57 days to maturity. 80% 2 sieve and 20% 3 sieve.*

***PV957*** *– Crites, 58 days to maturity. 90% 2 sieve and 10% 3 sieve.*

***RR4050*** *– Pure Line, 58 days to maturity. Predominately 2 and 3 sieve beans.*

***RR4040*** *– Pure Line, 58 days to maturity. Predominately 1 and 2 sieve beans.*

***Contada*** *– Pure Line, 58 days to maturity. 75% 2 sieve, 20% 3 sieve, and 5% 4 sieve.*

***Mustang*** *– Crites, 59 days to maturity. 5% 1 sieve and 95% 2 sieve.*

***BEX041*** *– Brotherton, 70 days to maturity, 1 to 2 sieve beans. BCMV:R, BBS:T, Rust:R.*

***BEX089*** *– Brotherton, 72 days to maturity, whole sieve bean. BCMV:R, BBS:T, Rust:R.*

***BEX179*** *– Brotherton, 72 days to maturity, whole sieve bean. BCMV:R, BBS:T, Rust:R.*

**Table 8 - Large Sieve Weather Data**

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 5/20/22 | 65.8 | 80.8 | 50.9 | 0.04 | 0.04 | 16 | 16 |
| 5/21/22 | 77.5 | 90.5 | 64.4 | 0.19 | 0.23 | 27 | 43 |
| 5/22/22 | 65.8 | 79.3 | 52.3 | 0.03 | 0.26 | 15 | 59 |
| 5/23/22 | 54.3 | 61.9 | 46.8 | 0.00 | 0.26 | 4 | 62 |
| 5/24/22 | 56.9 | 72.3 | 41.5 | 0.00 | 0.26 | 7 | 69 |
| 5/25/22 | 61.1 | 74.8 | 47.5 | 0.00 | 0.26 | 11 | 80 |
| 5/26/22 | 71.8 | 81.9 | 61.7 | 0.00 | 0.26 | 22 | 102 |
| 5/27/22 | 66.0 | 70.5 | 61.5 | 0.90 | 1.16 | 15 | 117 |
| 5/28/22 | 60.7 | 67.8 | 53.6 | 0.16 | 1.32 | 11 | 128 |
| 5/29/22 | 65.6 | 77.4 | 53.8 | 0.00 | 1.32 | 16 | 143 |
| 5/30/22 | 72.3 | 87.8 | 56.7 | 0.00 | 1.32 | 22 | 166 |
| 5/31/22 | 76.8 | 88.9 | 64.6 | 0.00 | 1.32 | 27 | 192 |
| 6/1/22 | 72.8 | 78.3 | 67.3 | 0.56 | 1.88 | 23 | 215 |
| 6/2/22 | 66.8 | 74.7 | 58.8 | 0.08 | 1.96 | 17 | 232 |
| 6/3/22 | 65.0 | 75.7 | 54.3 | 0.00 | 1.96 | 15 | 247 |
| 6/4/22 | 59.5 | 68.0 | 51.1 | 0.00 | 1.96 | 10 | 257 |
| 6/5/22 | 61.5 | 75.7 | 47.3 | 0.00 | 1.96 | 12 | 268 |
| 6/6/22 | 69.0 | 79.3 | 58.8 | 0.00 | 1.96 | 19 | 287 |
| 6/7/22 | 66.1 | 71.2 | 61.0 | 0.32 | 2.28 | 15 | 302 |
| 6/8/22 | 64.2 | 72.9 | 55.4 | 0.02 | 2.30 | 14 | 316 |
| 6/9/22 | 60.8 | 66.2 | 55.4 | 0.65 | 2.95 | 11 | 327 |
| 6/10/22 | 63.6 | 72.0 | 55.2 | 0.10 | 3.05 | 14 | 341 |
| 6/11/22 | 62.7 | 73.6 | 51.8 | 0.00 | 3.05 | 13 | 354 |
| 6/12/22 | 66.0 | 72.9 | 59.0 | 0.33 | 3.38 | 16 | 369 |
| 6/13/22 | 64.5 | 73.0 | 56.1 | 0.13 | 3.51 | 14 | 384 |
| 6/14/22 | 65.9 | 76.6 | 55.2 | 0.00 | 3.51 | 16 | 400 |
| 6/15/22 | 69.9 | 84.4 | 55.4 | 0.00 | 3.51 | 20 | 419 |
| 6/16/22 | 77.9 | 85.6 | 70.2 | 0.61 | 4.12 | 28 | 447 |
| 6/17/22 | 70.1 | 77.9 | 62.2 | 0.15 | 4.27 | 20 | 467 |
| 6/18/22 | 57.5 | 64.4 | 50.5 | 0.08 | 4.35 | 7 | 475 |
| 6/19/22 | 58.2 | 66.7 | 49.6 | 0.00 | 4.35 | 8 | 483 |
| 6/20/22 | 64.8 | 76.5 | 53.2 | 0.00 | 4.35 | 15 | 498 |
| 6/21/22 | 72.8 | 89.6 | 56.1 | 0.00 | 4.35 | 23 | 521 |
| 6/22/22 | 78.0 | 88.9 | 67.1 | 0.70 | 5.05 | 28 | 549 |
| 6/23/22 | 69.3 | 78.4 | 60.3 | 0.01 | 5.06 | 19 | 568 |
| 6/24/22 | 70.3 | 82.0 | 58.6 | 0.00 | 5.06 | 20 | 588 |
| 6/25/22 | 71.9 | 87.1 | 56.7 | 0.00 | 5.06 | 22 | 610 |

**Table 8 Continued - Large Sieve Weather Data**

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 6/26/22 | 77.5 | 87.6 | 67.5 | 0.79 | 5.85 | 28 | 638 |
| 6/27/22 | 66.7 | 74.1 | 59.2 | 0.06 | 5.91 | 15 | 653 |
| 6/28/22 | 63.4 | 73.2 | 53.6 | 0.00 | 5.91 | 13 | 666 |
| 6/29/22 | 64.6 | 75.2 | 54.0 | 0.00 | 5.91 | 15 | 681 |
| 6/30/22 | 69.0 | 83.1 | 55.0 | 0.00 | 5.91 | 19 | 700 |
| 7/1/22 | 78.2 | 88.3 | 68.0 | 0.00 | 5.91 | 28 | 728 |
| 7/2/22 | 73.8 | 81.9 | 65.8 | 0.06 | 5.97 | 24 | 752 |
| 7/3/22 | 67.7 | 75.9 | 59.4 | 0.00 | 5.97 | 18 | 770 |
| 7/4/22 | 66.9 | 81.1 | 52.7 | 0.00 | 5.97 | 17 | 787 |
| 7/5/22 | 71.6 | 75.7 | 67.5 | 0.00 | 5.97 | 22 | 808 |
| 7/6/22 | 66.8 | 73.0 | 60.6 | 0.00 | 5.97 | 15 | 823 |
| 7/7/22 | 68.0 | 81.1 | 54.9 | 0.00 | 5.97 | 18 | 841 |
| 7/8/22 | 69.5 | 79.7 | 59.2 | 0.00 | 5.97 | 19 | 861 |
| 7/9/22 | 64.3 | 72.7 | 55.9 | 0.00 | 5.97 | 14 | 875 |
| 7/10/22 | 64.0 | 79.3 | 48.6 | 0.00 | 5.97 | 14 | 889 |
| 7/11/22 | 72.2 | 89.1 | 55.2 | 0.00 | 5.97 | 22 | 911 |
| 7/12/22 | 75.7 | 85.3 | 66.0 | 0.01 | 5.98 | 25 | 936 |
| 7/13/22 | 70.0 | 78.8 | 61.3 | 0.02 | 6.00 | 20 | 956 |
| 7/14/22 | 66.9 | 76.8 | 57.0 | 0.00 | 6.00 | 16 | 972 |
| 7/15/22 | 67.9 | 82.4 | 53.4 | 0.00 | 6.00 | 18 | 990 |
| 7/16/22 | 71.5 | 84.7 | 58.3 | 0.00 | 6.00 | 22 | 1012 |
| 7/17/22 | 72.9 | 87.3 | 58.5 | 0.03 | 6.03 | 23 | 1035 |
| 7/18/22 | 74.5 | 82.0 | 66.9 | 0.14 | 6.17 | 24 | 1059 |
| 7/19/22 | 78.5 | 88.0 | 68.9 | 0.06 | 6.23 | 28 | 1087 |
| 7/20/22 | 82.8 | 91.2 | 74.5 | 0.05 | 6.28 | 33 | 1120 |
| 7/21/22 | 79.4 | 84.7 | 74.1 | 0.00 | 6.28 | 29 | 1149 |
| 7/22/22 | 77.1 | 88.5 | 65.7 | 0.00 | 6.28 | 27 | 1176 |
| 7/23/22 | 77.9 | 91.0 | 64.8 | 0.00 | 6.28 | 28 | 1204 |
| 7/24/22 | 75.8 | 85.8 | 65.7 | 0.22 | 6.50 | 26 | 1230 |
| 7/25/22 | 70.3 | 76.8 | 63.9 | 0.05 | 6.55 | 20 | 1250 |
| 7/26/22 | 66.5 | 76.5 | 56.5 | 0.05 | 6.60 | 17 | 1266 |

**Table 9 - 3 to 4 Sieve Weather Data**

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 6/6/22 | 69.0 | 79.3 | 58.8 | 0.00 | 0.00 | 19 | 19 |
| 6/7/22 | 66.1 | 71.2 | 61.0 | 0.32 | 0.32 | 15 | 34 |
| 6/8/22 | 64.2 | 72.9 | 55.4 | 0.02 | 0.34 | 14 | 48 |
| 6/9/22 | 60.8 | 66.2 | 55.4 | 0.65 | 0.99 | 11 | 59 |
| 6/10/22 | 63.6 | 72.0 | 55.2 | 0.10 | 1.09 | 14 | 73 |
| 6/11/22 | 62.7 | 73.6 | 51.8 | 0.00 | 1.09 | 13 | 85 |
| 6/12/22 | 66.0 | 72.9 | 59.0 | 0.33 | 1.42 | 16 | 101 |
| 6/13/22 | 64.5 | 73.0 | 56.1 | 0.13 | 1.55 | 14 | 116 |
| 6/14/22 | 65.9 | 76.6 | 55.2 | 0.00 | 1.55 | 16 | 132 |
| 6/15/22 | 69.9 | 84.4 | 55.4 | 0.00 | 1.55 | 20 | 151 |
| 6/16/22 | 77.9 | 85.6 | 70.2 | 0.61 | 2.16 | 28 | 179 |
| 6/17/22 | 70.1 | 77.9 | 62.2 | 0.15 | 2.31 | 20 | 199 |
| 6/18/22 | 57.5 | 64.4 | 50.5 | 0.08 | 2.39 | 7 | 207 |
| 6/19/22 | 58.2 | 66.7 | 49.6 | 0.00 | 2.39 | 8 | 215 |
| 6/20/22 | 64.8 | 76.5 | 53.2 | 0.00 | 2.39 | 15 | 230 |
| 6/21/22 | 72.8 | 89.6 | 56.1 | 0.00 | 2.39 | 23 | 253 |
| 6/22/22 | 78.0 | 88.9 | 67.1 | 0.70 | 3.09 | 28 | 281 |
| 6/23/22 | 69.3 | 78.4 | 60.3 | 0.01 | 3.10 | 19 | 300 |
| 6/24/22 | 70.3 | 82.0 | 58.6 | 0.00 | 3.10 | 20 | 320 |
| 6/25/22 | 71.9 | 87.1 | 56.7 | 0.00 | 3.10 | 22 | 342 |
| 6/26/22 | 77.5 | 87.6 | 67.5 | 0.79 | 3.89 | 28 | 370 |
| 6/27/22 | 66.7 | 74.1 | 59.2 | 0.06 | 3.95 | 15 | 385 |
| 6/28/22 | 63.4 | 73.2 | 53.6 | 0.00 | 3.95 | 13 | 398 |
| 6/29/22 | 64.6 | 75.2 | 54.0 | 0.00 | 3.95 | 15 | 413 |
| 6/30/22 | 69.0 | 83.1 | 55.0 | 0.00 | 3.95 | 19 | 432 |
| 7/1/22 | 78.2 | 88.3 | 68.0 | 0.00 | 3.95 | 28 | 460 |
| 7/2/22 | 73.8 | 81.9 | 65.8 | 0.06 | 4.01 | 24 | 484 |
| 7/3/22 | 67.7 | 75.9 | 59.4 | 0.00 | 4.01 | 18 | 502 |
| 7/4/22 | 66.9 | 81.1 | 52.7 | 0.00 | 4.01 | 17 | 519 |
| 7/5/22 | 71.6 | 75.7 | 67.5 | 0.00 | 4.01 | 22 | 540 |
| 7/6/22 | 66.8 | 73.0 | 60.6 | 0.00 | 4.01 | 15 | 555 |
| 7/7/22 | 68.0 | 81.1 | 54.9 | 0.00 | 4.01 | 18 | 573 |
| 7/8/22 | 69.5 | 79.7 | 59.2 | 0.00 | 4.01 | 19 | 593 |
| 7/9/22 | 64.3 | 72.7 | 55.9 | 0.00 | 4.01 | 14 | 607 |
| 7/10/22 | 64.0 | 79.3 | 48.6 | 0.00 | 4.01 | 14 | 621 |
| 7/11/22 | 72.2 | 89.1 | 55.2 | 0.00 | 4.01 | 22 | 643 |

**Table 9 Continued - 3 to 4 Sieve Weather Data**

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 7/12/22 | 75.7 | 85.3 | 66.0 | 0.01 | 4.02 | 25 | 668 |
| 7/13/22 | 70.0 | 78.8 | 61.3 | 0.02 | 4.04 | 20 | 688 |
| 7/14/22 | 66.9 | 76.8 | 57.0 | 0.00 | 4.04 | 16 | 704 |
| 7/15/22 | 67.9 | 82.4 | 53.4 | 0.00 | 4.04 | 18 | 722 |
| 7/16/22 | 71.5 | 84.7 | 58.3 | 0.00 | 4.04 | 22 | 744 |
| 7/17/22 | 72.9 | 87.3 | 58.5 | 0.03 | 4.07 | 23 | 766 |
| 7/18/22 | 74.5 | 82.0 | 66.9 | 0.14 | 4.21 | 24 | 791 |
| 7/19/22 | 78.5 | 88.0 | 68.9 | 0.06 | 4.27 | 28 | 819 |
| 7/20/22 | 82.8 | 91.2 | 74.5 | 0.05 | 4.32 | 33 | 852 |
| 7/21/22 | 79.4 | 84.7 | 74.1 | 0.00 | 4.32 | 29 | 881 |
| 7/22/22 | 77.1 | 88.5 | 65.7 | 0.00 | 4.32 | 27 | 908 |
| 7/23/22 | 77.9 | 91.0 | 64.8 | 0.00 | 4.32 | 28 | 936 |
| 7/24/22 | 75.8 | 85.8 | 65.7 | 0.22 | 4.54 | 26 | 962 |
| 7/25/22 | 70.3 | 76.8 | 63.9 | 0.05 | 4.59 | 20 | 982 |
| 7/26/22 | 66.5 | 76.5 | 56.5 | 0.05 | 4.64 | 17 | 998 |
| 7/27/22 | 70.8 | 82.9 | 58.8 | 0.03 | 4.67 | 21 | 1019 |
| 7/28/22 | 74.6 | 82.2 | 66.9 | 0.02 | 4.69 | 25 | 1044 |
| 7/29/22 | 73.4 | 81.0 | 65.8 | 0.00 | 4.69 | 23 | 1067 |
| 7/30/22 | 69.0 | 76.8 | 61.3 | 0.00 | 4.69 | 19 | 1086 |
| 7/31/22 | 68.0 | 79.0 | 57.0 | 0.00 | 4.69 | 18 | 1104 |
| 8/1/22 | 73.3 | 85.6 | 61.0 | 0.00 | 4.69 | 23 | 1127 |
| 8/2/22 | 71.3 | 79.7 | 62.8 | 0.00 | 4.69 | 21 | 1148 |
| 8/3/22 | 73.0 | 88.0 | 58.1 | 0.00 | 4.69 | 23 | 1171 |
| 8/4/22 | 78.2 | 84.0 | 72.3 | 0.00 | 4.69 | 28 | 1199 |
| 8/5/22 | 77.3 | 86.2 | 68.5 | 0.00 | 4.69 | 27 | 1227 |

**Table 10 - Whole to Extra Fine Sieve Weather Data**

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 7/8/22 | 69.5 | 79.7 | 59.2 | 0.00 | 0.00 | 19 | 19 |
| 7/9/22 | 64.3 | 72.7 | 55.9 | 0.00 | 0.00 | 14 | 33 |
| 7/10/22 | 64.0 | 79.3 | 48.6 | 0.00 | 0.00 | 14 | 47 |
| 7/11/22 | 72.2 | 89.1 | 55.2 | 0.00 | 0.00 | 22 | 69 |
| 7/12/22 | 75.7 | 85.3 | 66.0 | 0.01 | 0.01 | 25 | 95 |
| 7/13/22 | 70.0 | 78.8 | 61.3 | 0.02 | 0.03 | 20 | 115 |
| 7/14/22 | 66.9 | 76.8 | 57.0 | 0.00 | 0.03 | 16 | 131 |
| 7/15/22 | 67.9 | 82.4 | 53.4 | 0.00 | 0.03 | 18 | 149 |
| 7/16/22 | 71.5 | 84.7 | 58.3 | 0.00 | 0.03 | 22 | 170 |
| 7/17/22 | 72.9 | 87.3 | 58.5 | 0.03 | 0.06 | 23 | 193 |
| 7/18/22 | 74.5 | 82.0 | 66.9 | 0.14 | 0.20 | 24 | 218 |
| 7/19/22 | 78.5 | 88.0 | 68.9 | 0.06 | 0.26 | 28 | 246 |
| 7/20/22 | 82.8 | 91.2 | 74.5 | 0.05 | 0.31 | 33 | 279 |
| 7/21/22 | 79.4 | 84.7 | 74.1 | 0.00 | 0.31 | 29 | 307 |
| 7/22/22 | 77.1 | 88.5 | 65.7 | 0.00 | 0.31 | 27 | 335 |
| 7/23/22 | 77.9 | 91.0 | 64.8 | 0.00 | 0.31 | 28 | 362 |
| 7/24/22 | 75.8 | 85.8 | 65.7 | 0.22 | 0.53 | 26 | 388 |
| 7/25/22 | 70.3 | 76.8 | 63.9 | 0.05 | 0.58 | 20 | 408 |
| 7/26/22 | 66.5 | 76.5 | 56.5 | 0.05 | 0.63 | 17 | 425 |
| 7/27/22 | 70.8 | 82.9 | 58.8 | 0.03 | 0.66 | 21 | 446 |
| 7/28/22 | 74.6 | 82.2 | 66.9 | 0.02 | 0.68 | 25 | 470 |
| 7/29/22 | 73.4 | 81.0 | 65.8 | 0.00 | 0.68 | 23 | 494 |
| 7/30/22 | 69.0 | 76.8 | 61.3 | 0.00 | 0.68 | 19 | 513 |
| 7/31/22 | 68.0 | 79.0 | 57.0 | 0.00 | 0.68 | 18 | 531 |
| 8/1/22 | 73.3 | 85.6 | 61.0 | 0.00 | 0.68 | 23 | 554 |
| 8/2/22 | 71.3 | 79.7 | 62.8 | 0.00 | 0.68 | 21 | 575 |
| 8/3/22 | 73.0 | 88.0 | 58.1 | 0.00 | 0.68 | 23 | 598 |
| 8/4/22 | 78.2 | 84.0 | 72.3 | 0.00 | 0.68 | 28 | 626 |
| 8/5/22 | 77.3 | 86.2 | 68.5 | 0.00 | 0.68 | 27 | 653 |
| 8/6/22 | 77.0 | 86.9 | 67.1 | 0.01 | 0.69 | 27 | 680 |
| 8/7/22 | 81.6 | 90.7 | 72.5 | 0.00 | 0.69 | 32 | 712 |
| 8/8/22 | 82.2 | 91.4 | 73.0 | 0.11 | 0.80 | 32 | 744 |
| 8/9/22 | 70.3 | 77.5 | 63.0 | 0.06 | 0.86 | 20 | 764 |
| 8/10/22 | 70.2 | 79.5 | 60.8 | 0.00 | 0.86 | 20 | 784 |
| 8/11/22 | 70.2 | 79.0 | 61.3 | 0.00 | 0.86 | 20 | 805 |
| 8/12/22 | 66.2 | 75.2 | 57.2 | 0.00 | 0.86 | 16 | 821 |

Table 10 Continued - Whole to Extra Fine Sieve Weather Data

| Date | Avg. Air Temp. (°F) | Max Air Temp. (°F) | Min. Air Temp. (°F) | Precipitation (inches) | Accumulated Precipitation (inches) | GDD Base 50°F | Accumulated GDD Base 50°F |
|---|---|---|---|---|---|---|---|
| 8/13/22 | 65.1 | 77.9 | 52.2 | 0.00 | 0.86 | 15 | 836 |
| 8/14/22 | 65.8 | 81.7 | 49.8 | 0.00 | 0.86 | 16 | 852 |
| 8/15/22 | 68.9 | 81.3 | 56.5 | 0.01 | 0.87 | 19 | 870 |
| 8/16/22 | 70.6 | 81.5 | 59.7 | 0.45 | 1.32 | 21 | 891 |
| 8/17/22 | 69.0 | 78.6 | 59.4 | 0.00 | 1.32 | 19 | 910 |
| 8/18/22 | 69.8 | 79.0 | 60.6 | 0.00 | 1.32 | 20 | 930 |
| 8/19/22 | 71.5 | 85.1 | 57.9 | 0.00 | 1.32 | 22 | 951 |
| 8/20/22 | 74.7 | 87.8 | 61.5 | 0.02 | 1.34 | 25 | 976 |
| 8/21/22 | 74.4 | 82.8 | 66.0 | 0.15 | 1.49 | 24 | 1000 |
| 8/22/22 | 71.8 | 77.9 | 65.8 | 0.04 | 1.53 | 22 | 1022 |
| 8/23/22 | 71.5 | 77.7 | 65.3 | 0.03 | 1.56 | 22 | 1043 |
| 8/24/22 | 72.8 | 81.7 | 63.9 | 0.02 | 1.58 | 23 | 1066 |
| 8/25/22 | 71.3 | 80.8 | 61.9 | 0.02 | 1.60 | 21 | 1088 |
| 8/26/22 | 72.0 | 79.3 | 64.8 | 0.01 | 1.61 | 22 | 1110 |
| 8/27/22 | 66.8 | 75.6 | 58.1 | 0.01 | 1.62 | 16 | 1126 |
| 8/28/22 | 70.5 | 85.5 | 55.6 | 0.01 | 1.63 | 21 | 1147 |
| 8/29/22 | 80.3 | 90.7 | 69.8 | 0.01 | 1.64 | 30 | 1177 |
| 8/30/22 | 69.9 | 75.0 | 64.8 | 0.01 | 1.65 | 20 | 1197 |
| 8/31/22 | 70.0 | 77.9 | 62.1 | 0.00 | 1.65 | 20 | 1217 |
| 9/1/22 | 62.0 | 70.5 | 53.6 | 0.01 | 1.66 | 12 | 1229 |
| 9/2/22 | 65.5 | 78.8 | 52.3 | 0.00 | 1.66 | 16 | 1244 |
| 9/3/22 | 71.9 | 82.6 | 61.3 | 0.00 | 1.66 | 22 | 1266 |
| 9/4/22 | 67.1 | 71.6 | 62.6 | 0.00 | 1.66 | 17 | 1283 |

# NEW YORK STATE 2022 PROCESSING PEA CULTIVAR TRIAL REPORT

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## Procedure & Materials

**Location:** Cornell AgriTech Farm, Geneva - soil type – silt loam. **Tillage** – Conventional. **Fertilizer:** broadcast 400 lb/A of 8-14-21 and worked in. **Planter** – Modified Hege 80 (cone type). **Planting Date:** 5/01. Picking started on 6/24 and we finished on 7/14. **Herbicide** – Dual directly after planting. **Plot Size:** 7 rows by 30 ft. **Row Width:** 6 inches, Row length: 30 ft. **In-row Spacing:** All cultivars were adjusted (seed planted) to 100% germination. Our processor has asked us to target 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 and seed companies, in an attempt to find new, higher quality, and disease resistant varieties that are adapted to our climate and soil conditions. Evaluation of processed products was held on 11/01/22 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

April was seasonable, with about 2.0 inches of precipitation. Towards the end of April, soils were starting to dry out enough to plant and the forecast showed consistent rains the first week of May. The trial was planted on May 1st, soil conditions were slightly clumpy due to moisture during tillage but overall conditions were adequate. The peas were planted into moist soils but they soon dried down because of lack of precipitation. The first 15 days of May resulted in 0.12 inches of precipitation. Emergence was slow due to cool temps and lack of moisture but overall emergence was decent. The second half of May was more seasonable with regards to precipitation. For the most part, June was relatively cool and wet, with about 5.2 inches of rain for the month. Then, from July 1st to July 14th, the research farm received about 0.09 inches of rain. Overall, the pea trial experienced relatively mild temps, with both dry and wet periods. See the weather insert at the end of the summary for a breakdown of temperatures and precipitation over the growing season.

**Table 2: Cultivar List and Maturity from Seed Source**

| Cultivar | GDD (40°F) | Seed Source | Leaf Type | Seed Treatment | Seed Count/lb | Germ. % | Sieve Index | Nodes to blossom |
|---|---|---|---|---|---|---|---|---|
| Premium | 1150 | Brotherton | NL | - | 2143 | 96 | - | - |
| FP2269 | 1190 | Gallatin Valley | AF | - | - | - | 3.8 | 9 to 10 |
| Spring | 1200 | Pure Line | NL | LSV | 2097 | 88 | 4.5 | 9 to 10 |
| Eldorado | 1200 | Pure Line | NL | LSV | 2586 | 99 | 4.5 | 9 to 10 |
| GVS171 | 1220 | Gallatin Valley | NL | - | 2105 | 96 | 3.8 | 10 |
| SV6485QH | 1250 | Seminis | DN | - | 2524 | 89 | 3.3 | - |
| EXP455 | 1280 | Brotherton | AF | Captan + Allegiance + Cruiser | 2268 | 84 | 3.2 | 9 to 10 |
| M-14 | 1310 | Pure Line | NL | LSV | 3040 | 93 | 4 | 9 to 10 |
| Portage | 1325 | Crites | AF | - | 2200 | 95 | 3.75 | 10 |
| SV0969QH | 1360 | Seminis | NL | - | 3340 | 95 | 3.1 | 11 |
| EXP773 | 1360 | Brotherton | NL | Captan + Allegiance + Cruiser | 2548 | 93 | 3.4 | 13 |
| Nitro | 1370 | Seminis | NL | - | 4934 | - | 2 | 13 to 14 |
| GVS518 | 1380 | Gallatin Valley | AF | - | 2417 | 94 | 3.8 | 12 to 13 |
| Idalgo | - | Syngenta | AF | Apron + Maxim | 1970 | 98 | - | 12 |
| BSC489 | 1383 | Brotherton | AF | Captan + Allegiance + Cruiser | 4775 | 99 | 1.9 | 12 to 13 |
| DGL0027 | 1430 | Pure Line | AF | LSV | 2838 | - | 3.5 | 12 |
| GVS828 | 1450 | Gallatin Valley | AF | - | 2919 | 98 | 3.8 | 14 to 15 |
| CS-492AF | 1450 | Crites | AF | Apron + Maxim + Cruiser | 2180 | 99 | 3.5 | 12 to 13 |
| Da 1470 | 1470 | Seminis | DA | - | 2985 | - | 3.2 | 12 to 15 |
| CS-494DAF | 1470 | Crites | AF | Apron + Maxim + Cruiser | 3780 | 97 | 3.2 | 14 |
| Saltingo | 1470 | Pure Line | AF | LSV | 3018 | 98 | 3.5 | 11 |
| Boogie | 1470 | Brotherton | AF | - | 1862 | 97 | - | - |
| SV1231QF | 1480 | Seminis | AF | - | 2668 | 95 | 3.2 | 15 |
| SV0371QF | 1480 | Seminis | - | - | 2793 | - | - | - |
| PLS586 | 1490 | Pure Line | AF | LSV | 2441 | 97 | 4 | 12 to 13 |
| PLS576 | 1500 | Pure Line | AF | LSV | 2812 | 93 | 4 | 12 to 13 |
| CS-500F | 1500 | Crites | NL | Apron + Maxim + Cruiser | 3150 | 98 | 3.4 | 14 |
| Rihanna | 1500 | Pure Line | - | - | 6090 | 93 | - | - |
| SV0823QG | 1525 | Seminis | AF | - | 2766 | 95 | 3.3 | 17 |
| Jerome(712) | 1530 | Brotherton | AF | - | 2075 | 98 | - | - |
| PLS 602 | 1530 | Pure Line | AF | LSV | 3101 | 99 | 3.2 | 15 to 16 |
| Ricco | 1530 | Gallatin Valley | AF | - | 2413 | 98 | 3.8 | 15 to 16 |
| FP2278 | 1500 | Gallatin Valley | AF | - | 2592 | 91 | 3.6 | 15 |
| BSC482 | 1545 | Brotherton | AF | - | 4525 | 96 | - | - |
| BSC737 | 1560 | Brotherton | AF | Captan + Allegiance + Cruiser | 2592 | 99 | 3.6 | 15 to 17 |
| CS-441AF | 1575 | Crites | AF | Apron + Maxim + Cruiser | 2150 | 97 | 3.5 | 15 |
| BSC599 | 1600 | Brotherton | AF | Captan + Allegiance + Cruiser | 2520 | 100 | 3.8 | 15 |
| Festivert | - | Syngenta | - | - | - | - | - | - |
| SV6844QG | 1600 | Seminis | FA | - | 2493 | 95 | 3.6 | 17 |
| PLS 196 | 1610 | Pure Line | AF | LSV | 2441 | 93 | 4 | 16 |
| EXP649 | 1650 | Brotherton | AF | Captan + Allegiance + Cruiser | 2170 | 96 | 3.6 | 14 to 15 |
| SV5685QG | 1750 | Seminis | NL | - | 2346 | - | 3.4 | 14 |

**Table 3: Plant Characteristics**

| Cultivar | GDD to Full Flower | Plant Height at Harvest (in) | Plant Stand Rating | Root Rot Rating (in trial) |
|---|---|---|---|---|
| Premium | 911 | 9 to 11 | 3 | 5 |
| FP2269 | 937 | 8 to 11 | 3 | 5 |
| Spring | 988 | 10 to 13 | 3 | 5 |
| Eldorado | 988 | 9 to 11 | 3 | 5 |
| GVS171 | 1018 | 7 to 10 | 3 | 5 |
| SV6485QH | 1085 | 9 to 13 | 3.5 | 5 |
| EXP455 | 1018 | 10 to 13 | 3 | 5 |
| M-14 | 1102 | 10 to 13 | 2.5 | 5 |
| Portage | 1085 | 11 to 14 | 3.5 | 5 |
| SV0969QH | 1120 | 12 to 15 | 3 | 5 |
| EXP773 | 1085 | 11 to 14 | 3.5 | 5 |
| Nitro | 1145 | 13 to 16 | 3.5 | 5 |
| GVS518 | 1085 | 10 to 13 | 4 | 5 |
| Idalgo | 1085 | 13 to 16 | 4 | 5 |
| BSC489 | 1120 | 17 to 19 | 3.5 | 5 |
| DGL0027 | 1055 | 11 to 14 | 4 | 5 |
| GVS828 | 1120 | 10 to 13 | 3 | 5 |
| CS-492AF | 1120 | 12 to 15 | 4 | 5 |
| Da 1470 | 1145 | 12 to 15 | 3.5 | 5 |
| CS-494DAF | 1120 | 13 to 16 | 3 | 5 |
| Saltingo | 1055 | 11 to 14 | 4 | 5 |
| Boogie | 1085 | 12 to 15 | 3.5 | 5 |
| SV1231QF | 1145 | 12 to 15 | 4.5 | 5 |
| SV0371QF | 1145 | 11 to 14 | 4 | 5 |
| PLS586 | 1120 | 11 to 13 | 3.5 | 5 |
| PLS576 | 1102 | 11 to 14 | 3.5 | 5 |
| CS-500F | 1178 | 10 to 13 | 4.5 | 5 |
| Rihanna | 1216 | 18 to 20 | 2.5 | 5 |
| SV0823QG | 1245 | 10 to 13 | 4 | 5 |
| Jerome(712) | 1178 | 9 to 12 | 4 | 5 |
| PLS 602 | 1145 | 10 to 13 | 3.5 | 5 |
| Ricco | 1216 | 9 to 11 | 4 | 5 |
| FP2278 | 1145 | 11 to 14 | 3 | 5 |
| BSC482 | 1216 | 16 to 19 | 4 | 5 |
| BSC737 | 1178 | 13 to 16 | 3.5 | 5 |
| CS-441AF | 1216 | 12 to 14 | 3.5 | 5 |
| BSC599 | 1120 | 11 to 14 | 3.5 | 5 |
| Festivert | 1245 | 17 to 20 | 3.5 | 5 |
| SV6844QG | 1276 | 19 to 22 | 3 | 5 |
| PLS 196 | 1216 | 13 to 16 | 3 | 5 |
| EXP649 | 1276 | 8 to 11 | 3.5 | 5 |
| SV5685QG | 1448 | 12 to 15 | 3.5 | 5 |

## Explanations for Headings in Table 3:

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

**Plant Height at Harvest** – Height measurements are taken on the day of harvest from all 3 plot replicatioms and a range is recorded.

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

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

**Root Rot Trial*** - Due to logistics and weather we were not able to evaluate our root rot planting for 2022. We will continue the ratings in 2023. A field at the research farm that was planted with peas too many times has turned into a root rot nursery. We plant peas annually to encourage inoculum and plant all the varieties in the variety trial into that field and rate for root rot damage using a scale of 1 to 5. 1 – completely dead, 5 – no visual symptoms.

**Table 4: Maturity, Sieve Distribution and Yield - (in order of trial maturity)**

| Cultivar | Days to harv. | GDD (40°F) | % Sieve >1 | % Sieve 1 | % Sieve 2 | % Sieve 3 | % Sieve 4 | % Sieve 5 | % Sieve 6 | % Sieve 6> | Sieve size index | Ten. (TU) | Berry yield (lbs/A) | Berry yield (tons/A) | Adj. yield 110 TU (tons/A) | Plants per Acre (1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eldarado | 55 | 1276 | 6 | 7 | 8 | 17 | 24 | 30 | 6 | 2 | 3.87 | 108 | 5961 | 2.98 | 3.04 | 639710 |
| Eldarado | 56 | 1307 | 2 | 4 | 5 | 7 | 28 | 42 | 11 | 1 | 4.36 | 131 | 6352 | 3.18 | 2.80 | 631412 |
| FP2269 | 55 | 1276 | 2 | 2 | 4 | 11 | 28 | 39 | 12 | 2 | 4.40 | 98 | 7728 | 3.86 | 4.51 | 614818 |
| FP2269 | 56 | 1307 | 1 | 2 | 3 | 7 | 22 | 43 | 20 | 2 | 4.66 | 113 | 9411 | 4.71 | 4.60 | 593245 |
| Premium | 55 | 1276 | 1 | 3 | 5 | 11 | 22 | 31 | 23 | 4 | 4.50 | 95 | 5178 | 2.59 | 3.24 | 511934 |
| Premium | 56 | 1307 | 1 | 3 | 4 | 7 | 34 | 25 | 22 | 4 | 4.47 | 101 | 8237 | 4.12 | 4.57 | 567524 |
| Premium | 57 | 1345 | 0 | 1 | 2 | 6 | 15 | 35 | 35 | 6 | 4.98 | 115 | 8690 | 4.35 | 4.20 | 570843 |
| GVS171 | 55 | 1276 | 3 | 5 | 10 | 29 | 33 | 15 | 4 | 1 | 3.57 | 94 | 7629 | 3.81 | 4.87 | 633901 |
| GVS171 | 57 | 1345 | 0 | 1 | 5 | 14 | 41 | 35 | 4 | 0 | 4.16 | 111 | 9503 | 4.75 | 4.70 | 598224 |
| Spring | 58 | 1370 | 1 | 1 | 3 | 7 | 14 | 30 | 22 | 22 | 4.75 | 117 | 6601 | 3.30 | 3.14 | 592416 |
| Spring | 59 | 1394 | 0 | 1 | 2 | 5 | 18 | 40 | 32 | 2 | 4.94 | 135 | 7713 | 3.86 | 3.36 | 645517 |
| EXP455 | 58 | 1370 | 0 | 1 | 3 | 13 | 32 | 40 | 6 | 5 | 4.32 | 127 | 6905 | 3.45 | 3.11 | 512763 |
| EXP455 | 59 | 1394 | 0 | 0 | 1 | 12 | 36 | 43 | 8 | 0 | 4.45 | 147 | 6505 | 3.25 | - | 487872 |
| SV6485QH | 58 | 1370 | 5 | 10 | 22 | 29 | 12 | 16 | 3 | 3 | 3.12 | 78 | 2874 | 1.44 | - | 508615 |
| SV6485QH | 60 | 1419 | 3 | 4 | 7 | 26 | 46 | 12 | 2 | 0 | 3.63 | 90 | 4332 | 2.17 | 3.08 | 446386 |
| SV6485QH | 62 | 1486 | 1 | 2 | 4 | 20 | 40 | 28 | 4 | 1 | 4.02 | 111 | 7512 | 3.76 | 3.72 | 552589 |
| M-14 | 60 | 1419 | 1 | 3 | 9 | 22 | 41 | 20 | 3 | 1 | 3.77 | 94 | 6912 | 3.46 | 4.42 | 500317 |
| M-14 | 62 | 1486 | 0 | 2 | 4 | 16 | 42 | 32 | 4 | 0 | 4.10 | 114 | 7783 | 3.89 | 3.73 | 381669 |
| Portage | 60 | 1419 | 1 | 2 | 5 | 19 | 35 | 30 | 7 | 1 | 4.10 | 97 | 8207 | 4.10 | 4.87 | 562546 |
| Portage | 61 | 1448 | 0 | 1 | 4 | 18 | 35 | 35 | 6 | 1 | 4.18 | 99 | 9367 | 4.68 | 5.38 | 599883 |
| Portage | 62 | 1486 | 1 | 1 | 1 | 6 | 33 | 46 | 12 | 0 | 4.60 | 131 | 10714 | 5.36 | 4.72 | 599054 |
| GVS518 | 61 | 1448 | 0 | 1 | 3 | 17 | 43 | 31 | 4 | 1 | 4.13 | 105 | 9909 | 4.95 | 5.19 | 604032 |
| GVS518 | 62 | 1486 | 1 | 1 | 3 | 14 | 46 | 31 | 4 | 0 | 4.16 | 109 | 10234 | 5.12 | 5.17 | 573334 |
| Idalgo | 60 | 1419 | 2 | 4 | 12 | 28 | 35 | 18 | 1 | 0 | 3.55 | 79 | 6777 | 3.39 | - | 632242 |
| Idalgo | 62 | 1486 | 1 | 1 | 4 | 16 | 37 | 32 | 9 | 0 | 4.23 | 93 | 8979 | 4.49 | 5.88 | 623115 |
| Idalgo | 63 | 1520 | 0 | 1 | 3 | 7 | 28 | 53 | 7 | 1 | 4.51 | 113 | 11460 | 5.73 | 5.56 | 586608 |

**Table 4 continued: Maturity, Sieve Distribution and Yield - (in order of trial maturity)**

| Cultivar | Days to harv. | GDD (40°F) | % Sieve >1 | % Sieve 1 | % Sieve 2 | % Sieve 3 | % Sieve 4 | % Sieve 5 | % Sieve 6 | % Sieve 6> | Sieve size index | Ten. (TU) | Berry yield (lbs/A) | Berry yield (tons/A) | Adj. yield 110 TU (tons/A) | Plants per Acre (1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EXP773 | 62 | 1486 | 2 | 2 | 4 | 12 | 33 | 39 | 8 | 0 | 4.30 | 102 | 7962 | 3.98 | 4.33 | 441408 |
| EXP773 | 63 | 1520 | 0 | 1 | 5 | 8 | 24 | 48 | 13 | 1 | 4.54 | 116 | 9909 | 4.95 | 4.70 | 493680 |
| BSC489 | 63 | 1520 | 2 | 7 | 22 | 53 | 14 | 2 | 0 | 0 | 2.82 | 114 | 8423 | 4.21 | 4.04 | 665430 |
| DGL0027 | 62 | 1486 | 2 | 2 | 4 | 16 | 39 | 34 | 3 | 0 | 4.10 | 100 | 8873 | 4.44 | 5.01 | 526038 |
| DGL0027 | 63 | 1520 | 0 | 1 | 4 | 11 | 30 | 48 | 6 | 0 | 4.38 | 112 | 9272 | 4.64 | 4.55 | 531846 |
| SV0969QH | 64 | 1548 | 2 | 5 | 10 | 27 | 32 | 22 | 2 | 0 | 3.63 | 111 | 4001 | 2.00 | 1.98 | 465469 |
| CS-492AF | 61 | 1448 | 0 | 3 | 9 | 30 | 41 | 15 | 2 | 0 | 3.62 | 82 | 4592 | 2.29 | - | 607350 |
| CS-492AF | 64 | 1548 | 1 | 2 | 5 | 16 | 31 | 34 | 10 | 1 | 4.22 | 115 | 5807 | 2.90 | 2.78 | 491605 |
| Saltingo | 64 | 1548 | 0 | 2 | 5 | 16 | 35 | 37 | 5 | 0 | 4.15 | 114 | 9918 | 4.96 | 4.76 | 596149 |
| GVS828 | 64 | 1548 | 1 | 6 | 13 | 24 | 41 | 14 | 1 | 0 | 3.48 | 98 | 6959 | 3.48 | 4.07 | 535166 |
| GVS828 | 65 | 1575 | 1 | 9 | 10 | 23 | 33 | 22 | 2 | 0 | 3.56 | 105 | 8009 | 4.00 | 4.20 | 532677 |
| Nitro | 63 | 1520 | 11 | 21 | 37 | 29 | 2 | 0 | 0 | 0 | 2.14 | 88 | 6904 | 3.45 | 5.21 | 629753 |
| Nitro | 66 | 1606 | 3 | 11 | 28 | 53 | 5 | 0 | 0 | 0 | 2.54 | 133 | 10527 | 5.26 | 4.63 | 505296 |
| CS-494DAF | 64 | 1548 | 2 | 4 | 11 | 31 | 38 | 12 | 2 | 0 | 3.50 | 102 | 5016 | 2.51 | 2.74 | 470448 |
| CS-494DAF | 65 | 1575 | 1 | 4 | 10 | 27 | 36 | 18 | 4 | 0 | 3.68 | 111 | 4764 | 2.38 | 2.36 | 384158 |
| Boogie | 65 | 1575 | 0 | 1 | 3 | 8 | 20 | 37 | 25 | 6 | 4.75 | 106 | 6297 | 3.15 | 3.28 | 540144 |
| Boogie | 66 | 1606 | 0 | 1 | 2 | 9 | 16 | 36 | 29 | 7 | 4.84 | 124 | 8789 | 4.39 | 3.99 | 462980 |
| SV0371QF | 64 | 1548 | 3 | 9 | 16 | 32 | 34 | 6 | 0 | 0 | 3.12 | 102 | 7124 | 3.56 | 3.88 | 577481 |
| SV0371QF | 65 | 1575 | 2 | 6 | 20 | 30 | 33 | 8 | 1 | 0 | 3.20 | 110 | 7274 | 3.64 | 3.64 | 487042 |
| PLS586 | 64 | 1548 | 1 | 5 | 9 | 26 | 38 | 20 | 1 | 0 | 3.63 | 102 | 7623 | 3.81 | 4.15 | 607350 |
| PLS586 | 65 | 1575 | 1 | 2 | 5 | 16 | 38 | 34 | 4 | 0 | 4.10 | 113 | 10296 | 5.15 | 4.99 | 565865 |
| Ricco | 64 | 1548 | 0 | 1 | 4 | 13 | 29 | 39 | 13 | 1 | 4.40 | 102 | 9132 | 4.57 | 4.98 | 526453 |
| Ricco | 65 | 1575 | 0 | 1 | 3 | 14 | 27 | 41 | 13 | 1 | 4.44 | 106 | 9579 | 4.79 | 4.98 | 561716 |
| BSC599 | 65 | 1575 | 0 | 0 | 2 | 15 | 24 | 37 | 20 | 2 | 4.59 | 119 | 9041 | 4.52 | 4.25 | 556738 |
| BSC599 | 66 | 1606 | 0 | 0 | 2 | 7 | 21 | 46 | 20 | 4 | 4.78 | 138 | 9103 | 4.55 | - | 501147 |

**Table 4 continued: Maturity, Sieve Distribution and Yield - (in order of trial maturity)**

| Cultivar | Days to harv. | GDD (40°F) | % Sieve >1 | % Sieve 1 | % Sieve 2 | % Sieve 3 | % Sieve 4 | % Sieve 5 | % Sieve 6 | % Sieve 6> | Sieve size index | Ten. (TU) | Berry yield (lbs/A) | Berry yield (tons/A) | Adj. yield 110 TU (tons/A) | Plants per Acre (1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jerome (712) | 64 | 1548 | 1 | 5 | 11 | 23 | 34 | 23 | 3 | 0 | 3.69 | 91 | 6932 | 3.47 | 4.93 | 622285 |
| Jerome (712) | 66 | 1606 | 0 | 2 | 4 | 18 | 32 | 34 | 9 | 1 | 4.20 | 129 | 9239 | 4.62 | 4.11 | 502806 |
| Da1470 | 64 | 1548 | 1 | 4 | 9 | 29 | 44 | 13 | 0 | 0 | 3.54 | 97 | 8820 | 4.41 | 5.24 | 674557 |
| Da1470 | 66 | 1606 | 0 | 1 | 5 | 19 | 34 | 28 | 13 | 0 | 4.22 | 115 | 8551 | 4.28 | 4.11 | 491190 |
| CS-500F | 64 | 1548 | 1 | 5 | 8 | 18 | 31 | 27 | 9 | 1 | 3.96 | 92 | 5192 | 2.60 | 3.48 | 445556 |
| CS-500F | 66 | 1606 | 2 | 6 | 7 | 17 | 25 | 30 | 12 | 1 | 4.05 | 110 | 6688 | 3.34 | 3.34 | 451364 |
| CS-441AF | 66 | 1606 | 2 | 5 | 26 | 24 | 31 | 10 | 2 | 0 | 3.21 | 113 | 8082 | 4.04 | 3.92 | 501977 |
| FP2278 | 67 | 1633 | 0 | 1 | 4 | 18 | 39 | 34 | 4 | 0 | 4.13 | 126 | 9414 | 4.70 | 4.23 | 495339 |
| FP2278 | 68 | 1661 | 0 | 1 | 2 | 10 | 36 | 45 | 6 | 0 | 4.40 | 155 | 10816 | 5.40 | - | 507785 |
| PLS576 | 64 | 1548 | 0 | 3 | 9 | 22 | 28 | 37 | 1 | 0 | 3.90 | 83 | 6180 | 3.10 | - | 497828 |
| PLS576 | 67 | 1633 | 0 | 1 | 3 | 13 | 33 | 41 | 8 | 1 | 4.35 | 119 | 9820 | 4.91 | 4.62 | 485382 |
| BSC737 | 67 | 1633 | 0 | 0 | 4 | 20 | 38 | 31 | 7 | 0 | 4.17 | 119 | 7907 | 3.95 | 3.71 | 456342 |
| BSC737 | 68 | 1661 | 0 | 1 | 2 | 18 | 37 | 38 | 3 | 1 | 4.19 | 144 | 11233 | 5.61 | - | 540144 |
| SV0823QG | 67 | 1633 | 1 | 5 | 25 | 38 | 25 | 6 | 0 | 0 | 3.02 | 110 | 6690 | 3.35 | 3.35 | 506125 |
| SV0823QG | 68 | 1661 | 0 | 4 | 8 | 35 | 39 | 13 | 1 | 0 | 3.52 | 116 | 7629 | 3.81 | 3.62 | 521890 |
| BSC482 | 67 | 1633 | 2 | 15 | 46 | 32 | 4 | 1 | 0 | 0 | 2.29 | 109 | 6857 | 3.43 | 3.46 | 652985 |
| BSC482 | 68 | 1661 | 1 | 24 | 33 | 32 | 9 | 1 | 0 | 0 | 2.29 | 126 | 7720 | 3.86 | 3.47 | 685344 |
| PLS602 | 67 | 1633 | 1 | 4 | 17 | 44 | 29 | 5 | 0 | 0 | 3.14 | 107 | 9246 | 4.62 | 4.76 | 540973 |
| PLS602 | 68 | 1661 | 2 | 5 | 12 | 39 | 35 | 6 | 1 | 0 | 3.29 | 109 | 7764 | 3.88 | 3.92 | 433110 |
| SV1231QF | 67 | 1633 | 2 | 4 | 11 | 30 | 35 | 17 | 1 | 0 | 3.54 | 104 | 8039 | 4.02 | 4.26 | 536825 |
| SV1231QF | 68 | 1661 | 0 | 1 | 3 | 17 | 42 | 35 | 2 | 0 | 4.13 | 127 | 8778 | 4.39 | 3.95 | 526038 |
| Festivert | 67 | 1633 | 3 | 14 | 40 | 37 | 4 | 2 | 0 | 0 | 2.38 | 99 | 5788 | 2.89 | 3.32 | 535995 |
| Festivert | 68 | 1661 | 3 | 26 | 29 | 38 | 3 | 1 | 0 | 0 | 2.22 | 106 | 5078 | 2.54 | 2.64 | 503636 |
| Rihanna | 67 | 1633 | 12 | 25 | 48 | 15 | 0 | 0 | 0 | 0 | 1.89 | 91 | 4507 | 2.25 | 3.10 | 531017 |
| Rihanna | 69 | 1692 | 10 | 19 | 35 | 35 | 1 | 0 | 0 | 0 | 2.20 | 107 | 4705 | 2.35 | 2.42 | 441408 |

**Table 4 continued: Maturity, Sieve Distribution and Yield - (in order of trial maturity)**

| Cultivar | Days to harv. | GDD (40°F) | % Sieve >1 | % Sieve 1 | % Sieve 2 | % Sieve 3 | % Sieve 4 | % Sieve 5 | % Sieve 6 | % Sieve 6> | Sieve size index | Ten. (TU) | Berry yield (lbs/A) | Berry yield (tons/A) | Adj. yield 110 TU (tons/A) | Plants per Acre (1000) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EXP649** | **69** | **1692** | **2** | **3** | **5** | **16** | **30** | **31** | **13** | **1** | **4.22** | **100** | **6919** | **3.46** | **3.91** | **502806** |
| **EXP649** | **70** | **1716** | **0** | **2** | **4** | **13** | **27** | **39** | **15** | **1** | **4.42** | **110** | **7014** | **3.51** | **3.51** | **487042** |
| PLS196 | 69 | 1692 | 1 | 3 | 7 | 21 | 36 | 26 | 5 | 1 | 3.92 | 98 | 7651 | 3.83 | 4.48 | 402411 |
| PLS196 | 71 | 1740 | 0 | 3 | 6 | 11 | 35 | 36 | 8 | 1 | 4.20 | 132 | 9103 | 4.55 | 4.00 | 368393 |
| **SV6844QG** | **69** | **1692** | **2** | **3** | **6** | **19** | **37** | **31** | **2** | **0** | **3.95** | **88** | **8196** | **4.10** | **-** | **441408** |
| **SV6844QG** | **72** | **1772** | **0** | **0** | **2** | **7** | **29** | **49** | **12** | **1** | **4.63** | **121** | **9480** | **4.74** | **4.41** | **404070** |
| SV5685QG | 72 | 1772 | 1 | 3 | 8 | 21 | 35 | 28 | 4 | 0 | 3.90 | 72 | 4844 | 2.42 | - | 500317 |
| SV5685QG | 75 | 1864 | 1 | 3 | 7 | 15 | 20 | 35 | 18 | 1 | 4.34 | 106 | 5971 | 2.99 | 3.11 | 460491 |

**Explanations for Headings in Table 4:**

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

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

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

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

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

**Yield lbs/A** - Pounds per acre was determined by extrapolating the total weight of the berries per plot to obtain lbs per acre. Harvest plot was 7 rows by 5 ft in length.

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

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

**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.

**Table 5: Plant and Pod Charactertistics (In order of trial maturity)**

| Cultivar | Node to first flower (avg.) | Vine length (in) (avg.) | Ht. at harvest (in) | Pods per plant (avg.) | Avg. # nodes w/ pods/plt. | # Single pods/ node | # Double pods/ node | # Triple pods/ node | # Quad pods/ node | % of Single pods/ node | % of Double pods/ node | % of Triple pods/ node | % of Quad pods/ node | Berries per pod (avg.) | Pod length (in) (avg.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Eldarado** | **8.4** | **20.7** | **9 to 11** | **3.8** | **3.7** | **3.6** | **0.1** | **0.0** | **0** | **96** | **4** | **0** | **0** | **7.1** | **3.1** |
| FP2269 | 7.3 | 16.7 | 8 to 11 | 3.0 | 2.1 | 1.2 | 0.9 | 0.0 | 0 | 57 | 43 | 0 | 0 | 6.8 | 2.9 |
| **Premium** | **7.7** | **21.0** | **9 to 11** | **3.1** | **2.8** | **2.5** | **0.3** | **0.0** | **0** | **89** | **11** | **0** | **0** | **6.8** | **3.1** |
| GVS171 | 8.4 | 21.7 | 7 to 10 | 3.6 | 2.5 | 1.5 | 1.0 | 0.0 | 0 | 59 | 41 | 0 | 0 | 7.0 | 2.9 |
| **Spring** | **7.1** | **19.7** | **10 to 13** | **3.2** | **2.8** | **2.3** | **0.5** | **0.0** | **0** | **82** | **18** | **0** | **0** | **6.4** | **3.0** |
| EXP455 | 8.2 | 20.7 | 10 to 13 | 3.4 | 2.3 | 1.1 | 1.2 | 0.0 | 0 | 50 | 50 | 0 | 0 | 8.1 | 3.0 |
| **SV6485QH** | **10.2** | **19.5** | **9 to 13** | **3.6** | **2.5** | **1.4** | **1.0** | **0.1** | **0** | **59** | **39** | **2** | **0** | **7.2** | **3.1** |
| M-14 | 7.5 | 25.0 | 10 to 13 | 5.0 | 3.3 | 1.6 | 1.6 | 0.0 | 0 | 49 | 50 | 1 | 0 | 6.2 | 2.8 |
| **Portage** | **9.2** | **25.3** | **11 to 14** | **5.0** | **3.0** | **1.2** | **1.5** | **0.3** | **0** | **42** | **50** | **8** | **0** | **6.7** | **2.8** |
| GVS518 | 10.1 | 25.1 | 10 to 13 | 4.3 | 3.2 | 2.2 | 1.0 | 0.0 | 0 | 67 | 33 | 0 | 0 | 6.7 | 3.4 |
| **Idalgo** | **9.9** | **24.6** | **13 to 16** | **3.7** | **2.9** | **2.1** | **0.8** | **0.0** | **0** | **72** | **28** | **0** | **0** | **8.8** | **3.6** |
| EXP773 | 9.5 | 22.2 | 11 to 14 | 5.0 | 3.2 | 1.5 | 1.6 | 0.1 | 0 | 47 | 51 | 2 | 0 | 7.0 | 2.8 |
| **BSC489** | **10.0** | **18.0** | **17 to 19** | **5.8** | **3.2** | **1.2** | **1.6** | **0.5** | **0** | **39** | **45** | **16** | **0** | **7.7** | **2.2** |
| DGL0027 | 9.7 | 27.8 | 11 to 14 | 5.6 | 3.4 | 1.2 | 2.2 | 0.0 | 0 | 35 | 65 | 0 | 0 | 7.2 | 3.1 |
| **SV0969QH** | **9.3** | **21.5** | **12 to 15** | **5.0** | **3.1** | **1.4** | **1.4** | **0.3** | **0** | **49** | **44** | **7** | **0** | **7.6** | **2.7** |
| CS-492AF | 10.2 | 19.8 | 12 to 15 | 3.3 | 2.2 | 1.2 | 0.8 | 0.1 | 0 | 53 | 41 | 6 | 0 | 7.6 | 2.8 |
| **Saltingo** | **9.7** | **23.0** | **11 to 14** | **4.9** | **3.4** | **1.9** | **1.4** | **0.1** | **0** | **57** | **41** | **2** | **0** | **7.4** | **3.2** |
| GVS828 | 10.2 | 25.5 | 10 to 13 | 5.4 | 2.7 | 0.7 | 1.3 | 0.7 | 0 | 28 | 46 | 26 | 0 | 9.0 | 3.0 |
| **Nitro** | **9.6** | **25.4** | **13 to 16** | **8.6** | **3.7** | **0.5** | **1.6** | **1.6** | **0** | **14** | **44** | **42** | **0** | **8.8** | **2.6** |
| CS-494DAF | 9.3 | 19.5 | 13 to 16 | 4.3 | 2.5 | 1.0 | 1.4 | 0.1 | 0 | 41 | 56 | 3 | 0 | 7.2 | 3.0 |
| **Boogie** | **12.3** | **22.4** | **12 to 15** | **4.9** | **3.1** | **1.5** | **1.4** | **0.2** | **0** | **43** | **50** | **7** | **0** | **8.2** | **3.2** |
| SV0371QF | 10.2 | 28.0 | 11 to 14 | 7.2 | 3.5 | 0.6 | 2.1 | 0.8 | 0 | 17 | 60 | 23 | 0 | 8.6 | 2.7 |

**Table 5 continued: Plant and Pod Charactertistics (In order of trial maturity)**

| Cultivar | Node to first flower (avg.) | Vine length (in) (avg.) | Ht. at harvest (in) | Pods per plant (avg.) | Avg # nodes w/ pods plt. | # Single pods/ node | # Double pods/ node | # Triple pods/ node | # Quad pods/ node | % of Single pods/ node | % of Double pods/ node | % of Triple pods/ node | % of Quad. pods/ node | Berries per pod (avg.) | Pod length (in) (avg.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLS586 | 10.6 | 25.9 | 11 to 13 | 4.3 | 3.6 | 1.0 | 1.5 | 0.1 | 0 | 39 | 58 | 3 | 0 | 7.9 | 3.2 |
| Ricco | 10.6 | 26.8 | 9 to 11 | 4.8 | 3.1 | 1.3 | 1.8 | 0.0 | 0 | 41 | 59 | 0 | 0 | 7.0 | 3.4 |
| BSC599 | 12.2 | 30.0 | 11 to 14 | 4.6 | 2.9 | 1.3 | 1.6 | 0.0 | 0 | 44 | 56 | 0 | 0 | 7.5 | 3.3 |
| Jerome (712) | 9.4 | 29.7 | 9 to 12 | 4.6 | 2.9 | 1.4 | 1.4 | 0.1 | 0 | 49 | 49 | 2 | 0 | 7.8 | 3.1 |
| Da1470 | 8.6 | 23.3 | 12 to 15 | 5.4 | 2.9 | 0.9 | 1.4 | 0.6 | 0 | 28 | 54 | 18 | 0 | 7.6 | 2.9 |
| CS-500F | 7.0 | 25.7 | 10 to 13 | 4.8 | 2.9 | 1.2 | 1.4 | 0.3 | 0 | 38 | 53 | 9 | 0 | 6.7 | 3.0 |
| CS-441AF | 10.1 | 29.1 | 12 to 14 | 3.6 | 2.4 | 1.3 | 1.1 | 0.0 | 0 | 57 | 43 | 0 | 0 | 7.6 | 3.1 |
| FP2278 | 11.4 | 21.7 | 11 to 14 | 5.2 | 3.3 | 1.5 | 1.6 | 0.1 | 0 | 48 | 49 | 3 | 0 | 7.7 | 3.0 |
| PLS576 | 9.8 | 26.6 | 11 to 14 | 4.8 | 3.3 | 1.8 | 1.5 | 0.0 | 0 | 50 | 50 | 0 | 0 | 7.7 | 3.6 |
| BSC737 | 11.2 | 25.3 | 13 to 16 | 5.1 | 2.9 | 1.1 | 1.5 | 0.2 | 0 | 33 | 59 | 8 | 0 | 8.0 | 3.0 |
| SV0823QG | 11.5 | 28.3 | 10 to 13 | 4.5 | 2.5 | 1.1 | 1.0 | 0.3 | 0 | 46 | 41 | 13 | 0 | 6.9 | 3.0 |
| BSC482 | 13.1 | 25.7 | 16 to 19 | 4.6 | 3.1 | 1.7 | 1.3 | 0.1 | 0 | 52 | 46 | 2 | 0 | 8.3 | 2.8 |
| PLS602 | 9.0 | 28.5 | 10 to 13 | 7.0 | 4.1 | 1.2 | 2.9 | 0.0 | 0 | 29 | 71 | 0 | 0 | 8.7 | 3.2 |
| SV1231QF | 10.9 | 23.7 | 12 to 15 | 4.5 | 2.6 | 1.0 | 1.4 | 0.2 | 0 | 40 | 54 | 6 | 0 | 8.6 | 2.9 |
| Festivert | 11.3 | 20.4 | 17 to 20 | 5.6 | 3.5 | 1.6 | 1.7 | 0.2 | 0 | 48 | 49 | 3 | 0 | 8.8 | 3.0 |
| Rihanna | 10.7 | 20.4 | 18 to 20 | 7.9 | 3.9 | 1.1 | 1.6 | 1.2 | 0 | 28 | 42 | 30 | 0 | 7.0 | 2.5 |
| EXP649 | 10.3 | 22.3 | 8 to 11 | 4.3 | 3.1 | 1.9 | 1.2 | 0.0 | 0 | 58 | 41 | 1 | 0 | 6.8 | 3.1 |
| PLS196 | 9.0 | 24.5 | 13 to 16 | 5.2 | 3.5 | 1.9 | 1.5 | 0.1 | 0 | 54 | 44 | 2 | 0 | 10.0 | 3.8 |
| SV6844QG | 12.7 | 28.2 | 19 to 22 | 5.2 | 3.5 | 1.8 | 1.6 | 0.1 | 0 | 55 | 43 | 2 | 0 | 7.6 | 3.2 |
| SV5685QG | 14.5 | 30.0 | 12 to 15 | 4.2 | 2.7 | 1.3 | 1.2 | 0.2 | 0 | 49 | 46 | 5 | 0 | 7.0 | 3.7 |

## Explanation for Headings in Table 5:

This data was derived from 30 plants harvested the same day as our yield harvest that was closest to our objective of 110 tenderometer unit reading. 30 plants, 10 from each of the 3 replicated plots were harvested, then 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 (starting at the soil line node).

**Vine Length** – Vines were measured from soil line on root to top tip of plant.

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

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

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

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

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

**Pod length** - An average of 10 pods were lined up and measured in inches.

**Table 6: Maturity**

Tenderometer unit measurment (days after palnting, gray area indicates prime harvest date)

| Cultivar | Day 55<br>1276 HU<br>6/24 | Day 56<br>1307 HU<br>6/25 | Day 57<br>1345 HU<br>6/26 | Day 58<br>1370 HU<br>6/27 | Day 59<br>1394 HU<br>6/28 | Day 60<br>1419 HU<br>6/29 | Day 61<br>1448 HU<br>6/30 | Day 62<br>1486 HU<br>7/01 | Day 63<br>1520 HU<br>7/02 | Day 64<br>1548 HU<br>7/03 | Day 65<br>1575 HU<br>7/04 | Day 66<br>1606 HU<br>7/05 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eldarado | **108** | 131 | | | | | | | | | | |
| FP2269 | 98 | **113** | | | | | | | | | | |
| Premium | 95 | 101 | **115** | | | | | | | | | |
| GVS171 | 94 | | **111** | | | | | | | | | |
| Spring | | | | **117** | 135 | | | | | | | |
| EXP455 | | | | **127** | 147 | | | | | | | |
| SV6485QH | | | | 78 | | 90 | | **111** | | | | |
| M-14 | | | | | | 94 | | **114** | | | | |
| Portage | | | | | | 97 | 99 | **131** | | | | |
| GVS518 | | | | | | | 105 | **109** | | | | |
| Idalgo | | | | | | 79 | | 93 | **113** | | | |
| EXP773 | | | | | | 85 | | 102 | **116** | | | |
| BSC489 | | | | | | | | | **114** | | | |
| DGL0027 | | | | | | 84 | | 100 | **112** | | | |
| SV0969QH | | | | | | | | | | **111** | | |
| CS-492AF | | | | | | | 82 | | | **115** | | |
| Saltingo | | | | | | | | | | **114** | | |
| GVS828 | | | | | | | | | | 98 | **105** | |
| Nitro | | | | | | | | | 88 | | | **133** |
| CS-494DAF | | | | | | | | | | 102 | **111** | |
| Boogie | | | | | | | | | | | **106** | 124 |
| SV0371QF | | | | | | | | | | 102 | **110** | |
| PLS586 | | | | | | | | | | 102 | **113** | |
| Ricco | | | | | | | | | | 102 | **106** | |
| BSC599 | | | | | | | | | | | **119** | 138 |
| Jerome (712) | | | | | | | | | | 91 | | **129** |
| Da1470 | | | | | | | | | | 97 | | **115** |

| Table 6 continued: Maturity | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tenderometer unit measurment (days after palnting, gray area indicates prime harvest date) | | | | | | | | | | | | |
| Cultivar | Day 64<br>1548 HU<br>7/03 | Day 65<br>1575 HU<br>7/04 | Day 66<br>1606 HU<br>7/05 | Day 67<br>1633 HU<br>7/06 | Day 68<br>1661 HU<br>7/07 | Day 69<br>1692 HU<br>7/08 | Day 70<br>1716 HU<br>7/09 | Day 71<br>1740 HU<br>7/10 | Day 72<br>1772 HU<br>7/11 | Day 73<br>1807 HU<br>7/12 | Day 74<br>1837 HU<br>7/13 | Day 75<br>1864 HU<br>7/14 |
| CS-500F | 92 | | **110** | | | | | | | | | |
| CS-441AF | | | **113** | | | | | | | | | |
| FP2278 | | | | **126** | 155 | | | | | | | |
| PLS576 | 83 | | | **119** | | | | | | | | |
| BSC737 | | | | **119** | 144 | | | | | | | |
| SV0823QG | | | | **110** | 116 | | | | | | | |
| BSC482 | | | | **109** | 126 | | | | | | | |
| PLS602 | | | | 107 | **109** | | | | | | | |
| SV1231QF | | | | **104** | 127 | | | | | | | |
| Festivert | | | | 99 | **106** | | | | | | | |
| Rihanna | | | | 91 | | **107** | | | | | | |
| EXP649 | | | | | | 100 | **110** | | | | | |
| PLS196 | | | | | | 98 | | **132** | | | | |
| SV6844QG | | | | | | 88 | | | **121** | | | |
| SV5685QG | | | | | | | | | 72 | | | **106** |

**Table 7: Weather Summary and Adjusted Yield Factors**

| Day | Mean Temp. (F) | Max Temp. (F) | Min. Temp. (F) | Daily Precip. (in) | Accum. Precip. (in) | GDD Base 40°F | Acc. GDD Base 40°F | Tend. Units (TU) | Correction factor for Yield |
|---|---|---|---|---|---|---|---|---|---|
| 5/1/22 | 50.8 | 68.3 | 33.4 | 0.00 | 0.00 | 11 | 11 | 80 | 2.33 |
| 5/2/22 | 54.7 | 58.1 | 51.2 | 0.02 | 0.02 | 15 | 26 | 81 | 2.18 |
| 5/3/22 | 55.1 | 64.4 | 45.8 | 0.00 | 0.02 | 15 | 41 | 82 | 2.05 |
| 5/4/22 | 56.1 | 62.9 | 49.3 | 0.10 | 0.12 | 16 | 56 | 83 | 1.93 |
| 5/5/22 | 51.5 | 60.1 | 42.9 | 0.00 | 0.12 | 12 | 68 | 84 | 1.82 |
| 5/6/22 | 52.3 | 59.0 | 45.5 | 0.00 | 0.12 | 12 | 80 | 85 | 1.72 |
| 5/7/22 | 50.5 | 57.9 | 43.2 | 0.00 | 0.12 | 9 | 89 | 86 | 1.64 |
| 5/8/22 | 48.8 | 63.2 | 34.4 | 0.00 | 0.12 | 9 | 98 | 87 | 1.57 |
| 5/9/22 | 54.1 | 71.1 | 37.2 | 0.00 | 0.12 | 14 | 112 | 88 | 1.51 |
| 5/10/22 | 59.6 | 75.8 | 43.4 | 0.00 | 0.12 | 20 | 132 | 89 | 1.46 |
| 5/11/22 | 63.3 | 79.6 | 47.0 | 0.00 | 0.12 | 23 | 155 | 90 | 1.42 |
| 5/12/22 | 66.5 | 82.5 | 50.5 | 0.00 | 0.12 | 27 | 182 | 91 | 1.38 |
| 5/13/22 | 70.8 | 81.2 | 60.3 | 0.00 | 0.12 | 31 | 212 | 92 | 1.34 |
| 5/14/22 | 70.3 | 80.2 | 60.5 | 0.00 | 0.12 | 30 | 243 | 93 | 1.31 |
| 5/15/22 | 70.9 | 80.6 | 61.3 | 0.00 | 0.12 | 31 | 274 | 94 | 1.28 |
| 5/16/22 | 60.4 | 68.2 | 52.5 | 0.25 | 0.37 | 20 | 294 | 95 | 1.25 |
| 5/17/22 | 55.2 | 58.7 | 51.7 | 0.00 | 0.37 | 15 | 308 | 96 | 1.22 |
| 5/18/22 | 52.5 | 60.7 | 44.4 | 0.03 | 0.40 | 13 | 321 | 97 | 1.19 |
| 5/19/22 | 56.5 | 63.9 | 49.2 | 0.06 | 0.46 | 17 | 338 | 98 | 1.17 |
| 5/20/22 | 65.3 | 79.4 | 51.3 | 0.04 | 0.50 | 25 | 363 | 99 | 1.15 |
| 5/21/22 | 76.9 | 89.2 | 64.6 | 0.15 | 0.65 | 37 | 400 | 100 | 1.13 |
| 5/22/22 | 65.3 | 78.9 | 51.7 | 0.05 | 0.70 | 25 | 425 | 101 | 1.11 |
| 5/23/22 | 54.5 | 62.7 | 46.3 | 0.00 | 0.70 | 14 | 439 | 102 | 1.09 |
| 5/24/22 | 55.6 | 69.5 | 41.7 | 0.00 | 0.70 | 16 | 454 | 103 | 1.07 |
| 5/25/22 | 60.8 | 73.7 | 47.8 | 0.00 | 0.70 | 21 | 475 | 104 | 1.06 |
| 5/26/22 | 70.7 | 80.0 | 61.4 | 0.00 | 0.70 | 31 | 506 | 105 | 1.05 |
| 5/27/22 | 65.5 | 69.5 | 61.6 | 0.78 | 1.48 | 25 | 530 | 106 | 1.04 |
| 5/28/22 | 61.7 | 68.4 | 54.9 | 0.18 | 1.66 | 22 | 552 | 107 | 1.03 |
| 5/29/22 | 65.1 | 76.5 | 53.7 | 0.00 | 1.66 | 25 | 577 | 108 | 1.02 |
| 5/30/22 | 71.5 | 87.1 | 56.0 | 0.00 | 1.66 | 32 | 609 | 109 | 1.01 |
| 5/31/22 | 76.2 | 88.7 | 63.7 | 0.00 | 1.66 | 36 | 645 | 110 | 1.00 |
| 6/1/22 | 72.5 | 77.6 | 67.5 | 0.42 | 2.08 | 33 | 677 | 111 | 0.99 |
| 6/2/22 | 66.1 | 74.0 | 58.2 | 0.00 | 2.08 | 26 | 703 | 112 | 0.98 |
| 6/3/22 | 63.8 | 73.6 | 54.1 | 0.00 | 2.08 | 24 | 727 | 113 | 0.97 |
| 6/4/22 | 58.6 | 66.4 | 50.7 | 0.00 | 2.08 | 19 | 746 | 114 | 0.96 |
| 6/5/22 | 61.0 | 74.6 | 47.4 | 0.00 | 2.08 | 21 | 767 | 115 | 0.96 |
| 6/6/22 | 69.3 | 79.8 | 58.9 | 0.00 | 2.08 | 29 | 796 | 116 | 0.95 |
| 6/7/22 | 66.3 | 71.0 | 61.5 | 0.30 | 2.38 | 25 | 821 | 117 | 0.95 |
| 6/8/22 | 64.1 | 72.9 | 55.2 | 0.18 | 2.56 | 24 | 845 | 118 | 0.94 |

**Table 7 continued: Weather Summary and Adjusted Yield Factors**

| Day | Mean Temp. (F) | Max Temp. (F) | Min. Temp. (F) | Daily Precip. (in) | Accum. Precip. (in) | GDD Base 40°F | Acc. GDD Base 40°F | Tend. Units (TU) | Correction factor for Yield |
|---|---|---|---|---|---|---|---|---|---|
| 6/9/22 | 60.4 | 65.7 | 55.0 | 0.93 | 3.49 | 20 | 865 | 119 | 0.94 |
| 6/10/22 | 63.0 | 71.6 | 54.5 | 0.00 | 3.49 | 23 | 888 | 120 | 0.93 |
| 6/11/22 | 62.5 | 73.8 | 51.3 | 0.00 | 3.49 | 23 | 911 | 121 | 0.93 |
| 6/12/22 | 66.5 | 74.5 | 58.5 | 0.50 | 3.99 | 27 | 937 | 122 | 0.92 |
| 6/13/22 | 65.1 | 73.4 | 56.7 | 0.00 | 3.99 | 25 | 962 | 123 | 0.92 |
| 6/14/22 | 66.0 | 77.0 | 55.0 | 0.00 | 3.99 | 26 | 988 | 124 | 0.91 |
| 6/15/22 | 69.4 | 83.8 | 55.0 | 0.00 | 3.99 | 29 | 1018 | 125 | 0.91 |
| 6/16/22 | 77.9 | 85.8 | 70.0 | 1.14 | 5.13 | 38 | 1055 | 126 | 0.90 |
| 6/17/22 | 70.2 | 77.4 | 63.0 | 0.00 | 5.13 | 30 | 1085 | 127 | 0.90 |
| 6/18/22 | 57.5 | 64.2 | 50.7 | 0.13 | 5.26 | 17 | 1102 | 128 | 0.89 |
| 6/19/22 | 57.8 | 66.6 | 48.9 | 0.00 | 5.26 | 18 | 1120 | 129 | 0.89 |
| 6/20/22 | 64.6 | 75.9 | 53.2 | 0.00 | 5.26 | 25 | 1145 | 130 | 0.89 |
| 6/21/22 | 72.8 | 88.7 | 57.0 | 0.00 | 5.26 | 33 | 1178 | 131 | 0.88 |
| 6/22/22 | 78.1 | 89.4 | 66.7 | 0.75 | 6.01 | 38 | 1216 | 132 | 0.88 |
| 6/23/22 | 69.8 | 78.8 | 60.8 | 0.00 | 6.01 | 30 | 1245 | 133 | 0.88 |
| 6/24/22 | 70.7 | 82.2 | 59.2 | 0.00 | 6.01 | 31 | 1276 | 134 | 0.87 |
| 6/25/22 | 71.3 | 85.8 | 56.8 | 0.00 | 6.01 | 31 | 1307 | 135 | 0.87 |
| 6/26/22 | 77.1 | 87.3 | 66.9 | 0.77 | 6.78 | 37 | 1345 | 136 | 0.87 |
| 6/27/22 | 66.9 | 73.9 | 59.9 | 0.06 | 6.84 | 26 | 1370 | 137 | 0.86 |
| 6/28/22 | 63.9 | 73.8 | 54.0 | 0.00 | 6.84 | 24 | 1394 | 138 | 0.86 |
| 6/29/22 | 64.8 | 76.1 | 53.6 | 0.00 | 6.84 | 25 | 1419 | 139 | 0.86 |
| 6/30/22 | 69.0 | 82.2 | 55.8 | 0.00 | 6.84 | 29 | 1448 | 140 | 0.86 |
| 7/1/22 | 78.2 | 88.2 | 68.2 | 0.00 | 6.84 | 38 | 1486 | 141 | 0.85 |
| 7/2/22 | 74.0 | 81.9 | 66.0 | 0.06 | 6.90 | 34 | 1520 | 142 | 0.85 |
| 7/3/22 | 68.3 | 76.6 | 59.9 | 0.00 | 6.90 | 28 | 1548 | 143 | 0.85 |
| 7/4/22 | 67.1 | 81.3 | 52.9 | 0.00 | 6.90 | 27 | 1575 | 144 | 0.85 |
| 7/5/22 | 71.1 | 75.6 | 66.6 | 0.02 | 6.92 | 31 | 1606 | 145 | 0.85 |
| 7/6/22 | 66.7 | 73.6 | 59.7 | 0.00 | 6.92 | 26 | 1633 | 146 | 0.84 |
| 7/7/22 | 68.2 | 80.8 | 55.6 | 0.00 | 6.92 | 28 | 1661 | 147 | 0.84 |
| 7/8/22 | 70.7 | 81.0 | 60.3 | 0.00 | 6.92 | 31 | 1692 | 148 | 0.84 |
| 7/9/22 | 64.8 | 72.7 | 57.0 | 0.00 | 6.92 | 25 | 1716 | 149 | 0.84 |
| 7/10/22 | 63.8 | 78.8 | 48.7 | 0.00 | 6.92 | 24 | 1740 | 150 | 0.84 |
| 7/11/22 | 71.7 | 88.3 | 55.0 | 0.00 | 6.92 | 32 | 1772 | 151 | 0.83 |
| 7/12/22 | 76.1 | 85.6 | 66.6 | 0.03 | 6.95 | 35 | 1807 | 152 | 0.83 |
| 7/13/22 | 70.3 | 78.1 | 62.6 | 0.05 | 7.00 | 30 | 1837 | 153 | 0.83 |
| 7/14/22 | 67.7 | 76.8 | 58.6 | 0.00 | 7.00 | 27 | 1864 | 154 | 0.83 |

## Explanation for Headings in Table 7:

**Mean Temp.** – The daily mean temperature (°F).

**Max Temp.** – The daily maximum temperature (°F).

**Min. Temp.** – The daily minimum temperature (°F)

**Daily Precip.** – The daily amount of precipitation in inches.

**Accum. Precip.** – Accumulated precipitation from the plant date all the way to the last day of harvest (inches).

**GDD Base 40°F** – Growing degree days base 40°F.

**Acc. GDD Base 40°F** – Accumulation of growing degree days, base 40°F, starting from plant date and ending at the final harvest date for the trial.

**Tend. Units** – Tenderometer units are derived from our Model TG4EI Integrating Texturegage machine.

**Correction factor for Yield** – Yield was taken, and depending on what the TU reading was, the yield is then multiplied by the correction factor for an adjusted yield based on an ideal harvest of 110 tenderometer units.

## *Descriptions Provided by the Seed Source*

***Premium*** *– Brotherton, nomal leaf, 1150 heat units.*

***FP2269*** *– Gallatin Valley, afila leaf, 1190 heat units. 9 to 10 nodes to flower. 3.8 sieve index.*

***Spring*** *– Seminis, normal leaf, 1200 heat units, 9 to 10 nodes to flower. 4.5 sieve index.*

***Eldorado*** *– Pure Line, normal leaf, 1200 heat units, 10 nodes to flower. 4.5 sieve index. Spring replacement. Fusarium wilt race 1, PM; IR: DM.*

***GVS171*** *– Gallatin Valley, normal leaf, 1220 heat units, 10 nodes to flower. 3.8 sieve index.*

***SV6485QH*** *– Seminis, determinate normal leaf, 1250 heat units. 3.3 sieve index. HR: Fop1, PEMV/BYMV/ IR:Pv.*

***EXP455*** *– Brotherton, afila leaf, 1280 heat units, 9 to 10 nodes to flower. 3.2 sieve index. Tomahawk+ 1/2d, stands well, pod on top, bold premium pod. FW1 & 2:R.*

***M-14*** *– Pure Line, normal leaf, 1310 heat units, 9 to 10 nodes to flower. 4 sieve index. Reliable normal leaf, second early. FW r1; IR: Aschocyta, Root Rot Complex.*

***Portage*** *– Crites, afila leaf, 1325 heat units, 10 nodes to flower.*

***SV0969QH*** *– Seminis, normal leaf, 1376 Heat Units, 11 nodes to flower. 3.1 sieve index. Sweet savor gene. HR BYMV/Ep/Fop:1,2 IR Pv.*

***EXP773*** *– Brotherton, normal leaf, 1360 heat units, 13 nodes to flower. 3.4 sieve index. Tonic Season+1d, 3s, less root rot than Tonic, good yielder as second early . FW1 & 2:R.*

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

***GVS 518*** *– Gallatin Valley, afila leaf, 1380 heat units, 12 to 13 nodes to flower. 3.8 sieve index.*

***Idalgo*** – *Syngenta, afila leaf, 730 European heat units, 12 nodes to flower. HR: Pv and Fop 1. IR: Ep and PEMV. Vigirous early variety, with good disease package, and high yield potential.*

***BSC489*** - *Brotherton, afila leaf, 1383 heat units, 12 to 13 nodes to flower. 1.9 sieve index. Nitro/Digit season, determinate, good uniform early pod, light pea color, stands well, yield good. FW1 & 2:R, DM:T.*

***DGL0027*** – *Pure Line, afila leaf, 1430 heat units, 12 nodes to flower. 3.5 sieve index. Second early with high downy mildew tolerance. FW r1; IR: Aschocyta, Root Rot Complex.*

***GVS828*** – *Gallatin Valley, afila leaf, 1450 heat units, 14 to 15 nodes to flower. S.8 sieve index.*

***CS-492AF*** – *Crites, afila leaf, 1450 heat units, 12 to 13 nodes to flower. 3.5 sieve index. Mid-early afila, with a good disease resistance package. Ep, PEMV, Fop1, Fop2.*

***DA 1470*** – *Seminis, determinate afila leaf, 1470 heat units, 12 to 15 nodes to flower. Sweet savor gene.*

***CS-494DAF*** – *Crites, afila leaf, 1470 heat units, 14 nodes to flower. 3.2 sieve index. Mid-season determinate afila with a good disease package & intermediate root rot resistance. Pv, Ep, PEMV, Fop1, Fop2.*

***Saltingo*** – *Pure Line, afila leaf, 1470 heat units, 11 nodes to flower. 3.5 sieve index. Second early to mid, with high downy mildew tolerance. FWr1, PM; IR: DM, PEMV.*

***Boogie***– *Brotherton, afila leaf, 1470 heat units.*

***SV1231QF*** – *Seminis, aflia leaf, 1480 heat units, 15 nodes to flower. 3.2 sieve index. Sweet savor gene. HR PEMV/Ep/Fop:1,2 IR PV.*

***SV0371QF*** – *Seminis, 1480 heat units. 3.1 sieve index. HR BYMV/PEMV/Ep.*

***PLS586*** – *Pure Line, afila leaf, 1490 heat units, 12 to 13 nodes to flower. 4 sieve index. Strong root, large sieve. FWr1, PM; IR: FWr2.*

***PLS576*** *– Pure Line, afila leaf, 1500 heat units, 12 to 13 nodes to flower. 4 sieve index. Strong root, long pod. FWr1, PM; IR: FWr2, Root Rot Complex.*

***CS-500F*** *– Crites, normal leaf, 1500 heat units, 14 nodes to flower. 3.4 sieve index. Mid-season leafy pea, with a good disease resistance package. Pv, Ep, PEMV, Fop1, Fop2.*

***Rihanna*** *– Pure Line, 1500 heat units.*

***SV0823QG*** *– Seminis, afila leaf, 1525 heat units, 17 nodes to flower. 3.3 sieve index. HR PEMV/Ep/Fop:1,2 IR PV.*

***Jerome (712)*** *– Brotherton, afila leaf, 1530 heat units.*

***PLS602*** *– Pure Line, afila leaf, 1530 heat units, 15 to 16 nodes to flower. 3.2 sieve index. Healthy plant, smaller sieve size. FWr1, PM; IR: FWr2, Root Rot Complex.*

***Ricco*** *– Gallatin Valley, afila leaf, 1530 heat units, 15 to 16 nodes to first flower.*

***FP2278*** *– Gallatin Valley, afila leaf, 1500 heat units, 15 nodes to flower. 3.6 sieve index.*

***BSC482*** *– Brotherton, afila leaf, 1545 heat units.*

***BSC737*** *– Brotherton, afila leaf, 1560 heat units, 15 to 17 nodes to flower. 3.6 sieve index. Fantasy Season+1d, longer Fantasy pod (, stands well, lodging tolerant, tall robust plant structure, yield very good. FW1 & 2:R,PM:R.*

***CS-441AF*** *– Crites, afila leaf, 1575 heat units, 15 nodes to flower. 3.5 sieve index. Late-season afila, with high yield potential. Ep, PEMV, Fop2.*

***BSC599*** *– Brotherton, afila leaf, 1600 heat units, 15 nodes to flower. 3.8 seive index. Concept Season, longer Fantasy pod, stands well, good resistance. FW1,2,5:T, DM:T.*

***Festivert*** *– Syngenta.*

***SV6844QG** – Seminis, faciated afila, 1600 heat units, 17 nodes to flower. 3.6 sieve index. Sweet savor gene. HR BYMV/PEMV/Ep/Fop:1,2 IR Pv.*

***PLS196** – Pure Line, afila leaf, 1610 heat units, 16 nodes to flower. 4 sieve index. Consistently healthy, full season. FWr1, PM; IR: FWr2.*

***EXP649** – Brotherton, afila leaf, 1650 heat units, 14 to 15 nodes to flower. 3.6 sieve index. Concept Season+1d, Feisty/Boogie pod, stands well, good looking pod, yield very good. FW1 & 2, PEMV:R*

***SV5685QG** – Seminis, normal leaf, 1750 heat units, 14 nodes to flower. 3.4 sieve index. HR BYMV/PEMV/Ep/Fop:1.*

## - 2022 Annual Cutting -

A vegetable "cutting", was held on November 1st, where frozen peas, snap beans, and sweet corn were put on display for processors and seed companies to evaluate. Large and 3-4 sieve snap beans were canned and also put on display. Our vegetable cutting is the final step of our program's evaluation. We evaluate the horticultural characteristics in the field and in raw products, but our vegetable cutting takes us all the way to quality evaluation on the plate.

# **Pea Yield Response to Planting Populations in Ontario**

## Background

Over time, genetic advancements have been made in the pea cultivars grown in Ontario. Seeding rates tend to vary based on the maturity or type of pea (large sieve versus petite sieve), however there is limited understanding of each unique cultivar's optimum plant density in order to maximize crop yield.

## Objective

1. Quantify the impact of increasing or decreasing the seeding rate on pea yields of THREE key cultivars grown in Ontario
2. Begin to collect baseline information to support to use of variable rate seeding technology in the future

## Deliverables

1. Relative pea yield compared to current standard seeding rate across multiple seeding rates.

## Locations

| Site # | County | Soil Type | Planting Date | Variety |
|---|---|---|---|---|
| 1 | Kent | Tavistock Loam | April 30, 2022 | Sherwood |
| 2 | Kent | Tavistock Loam | April 30, 2022 | Sherwood |
| 3 | Essex | Berrien Sandy Loam | May 9, 2022 | Nitro |
| 4 | Middlesex | Tavistock Loam | June 5, 2022 | Tyne |

## Materials & Method

All sites followed the standard agronomic practices employed by the site cooperator. Prior to seeding, a variable rate seeding prescription was built in order to place multiple (5 to 10) replications of the various seeding rates randomly throughout the field.

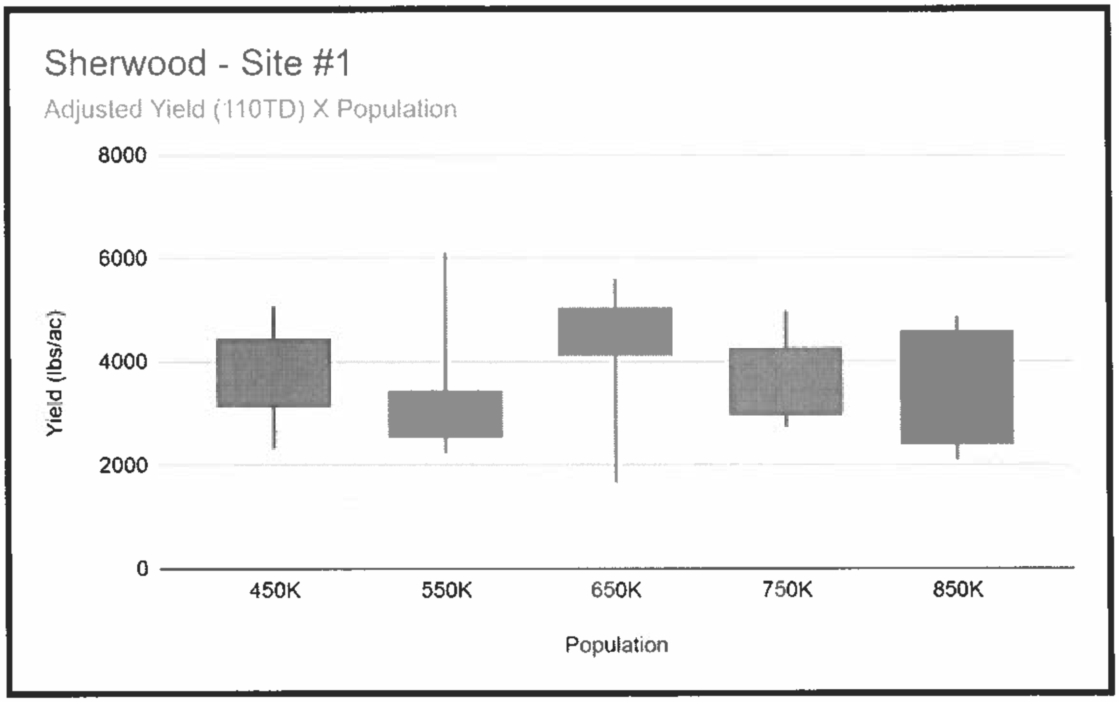
Replication size: Seeder width X 100-150' in length.
Seeding rates per acre (Sherwood): 450,000, 550,000, 650,000 (check), 750,000, 850,000
Seeding rates per acre (Nitro): 520,000, 620,000, 720,000 (check), 820,000, 920,000
Seeding rates per acre (Tyne): 400,000, 475,000, 550,000 (check), 625,000, 700,000

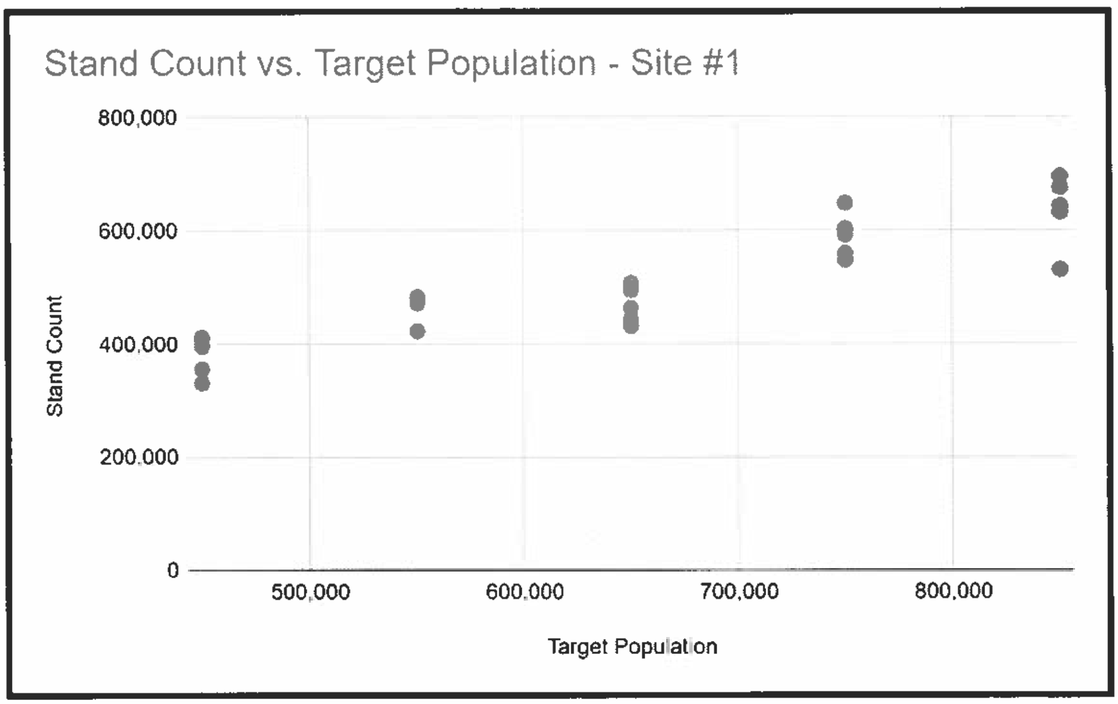
At harvest, 5 replications of each seeding rate were chosen to harvest. All above-ground plant material was hand harvested from 4 rows, 17'5" long. These samples were then sent through a thrasher to separate the peas from the pods. Harvested peas were weighed and run through the tenderometer machine.

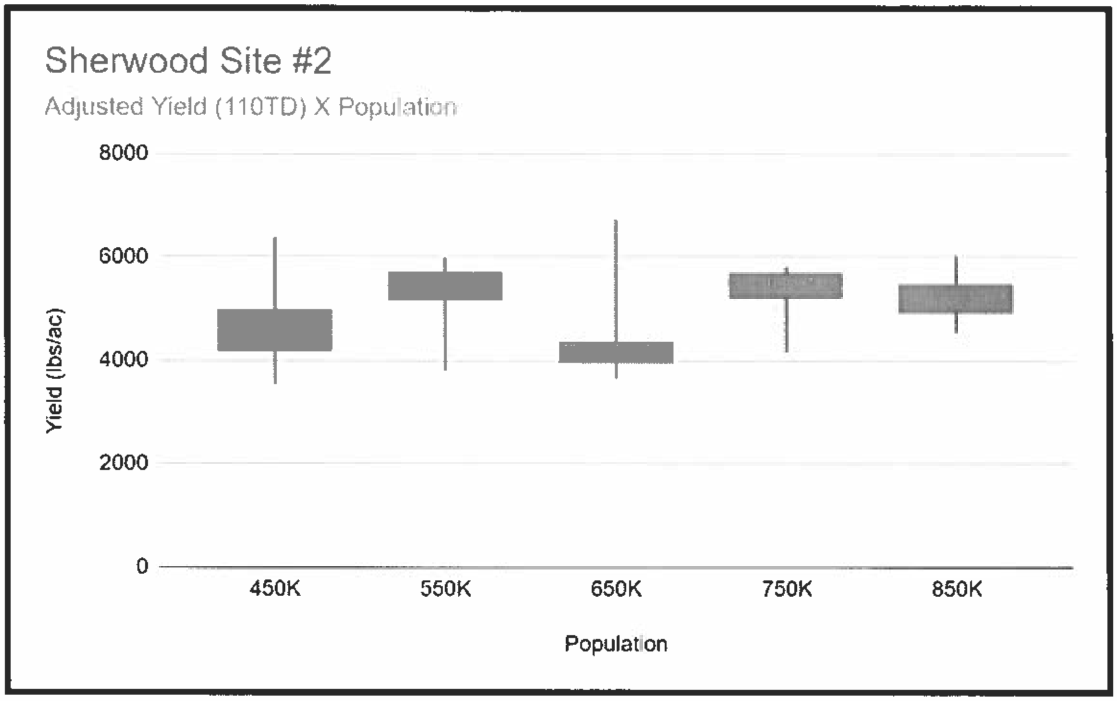
All yields were adjusted to 110 TD, assuming peas add 28 lbs/ac for every tenderometer point increase.

**Results**

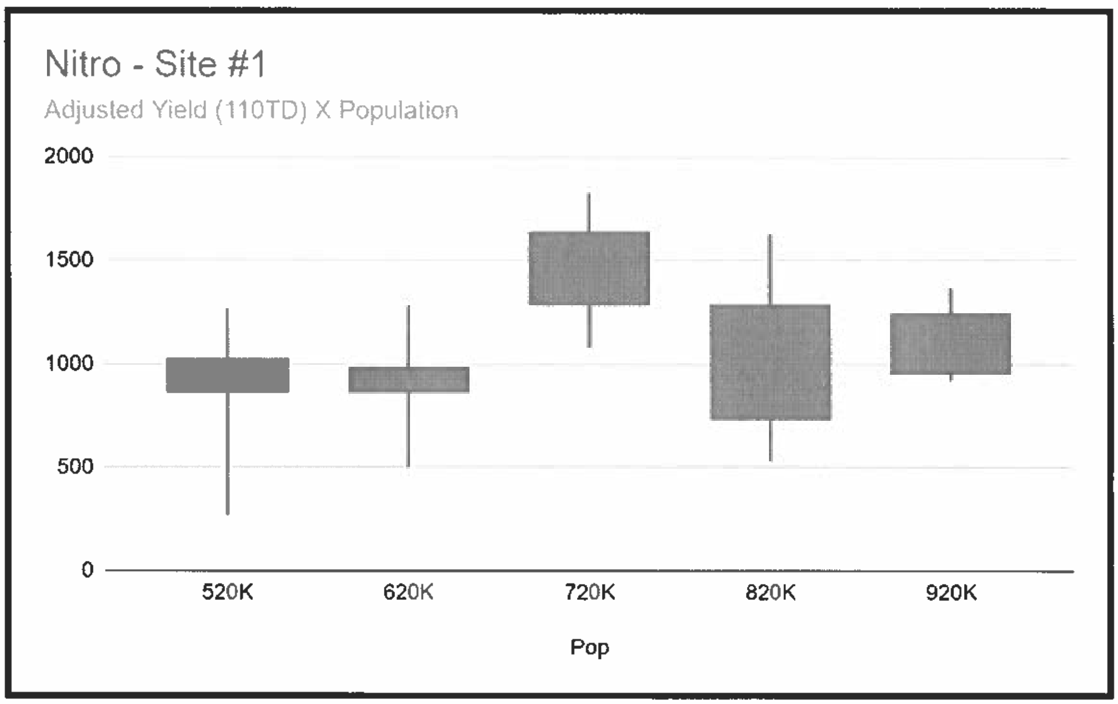
Yield results from the sites planted with Sherwood were quite variable across planting populations. The results from Site #2 were tighter, however no obvious trend was apparent this season.



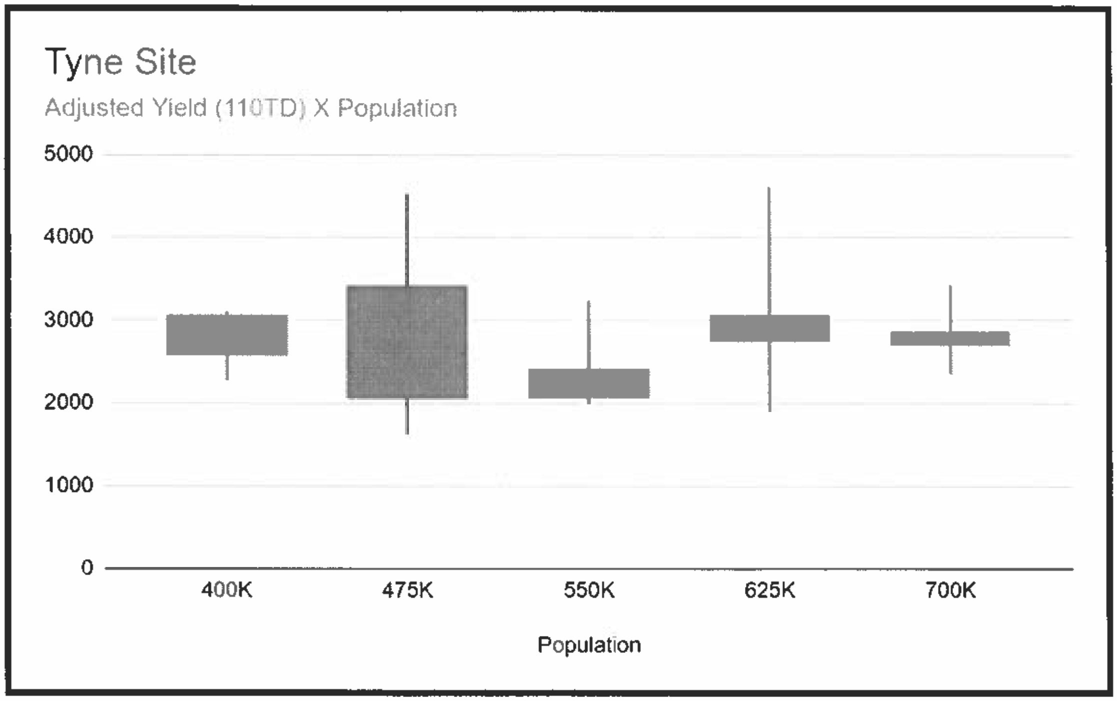






The results from the site planted to Nitro expressed a similar trend to the trial conducted in 2021 with this cultivar. However, harvest was conducted approximately 1 day prior to the field being harvested. Due to this, the crop was slightly too young for harvest and the peas did not fully develop in size. This could have an impact on the dataset.



The site planted to Tyne also expressed no obvious relationship between planting population and yield.




**Discussion**

Although no data was collected on average pods per plant or peas per pod across the various treatments, it could be hypothesized that areas of lower plant density were able to "flex" and develop more pods per plant and/or peas per pod.

Going forward, this data will be captured in order to understand the "flex" of pea varieties when planted at various densities in the field.

The main challenge with executing these trials has been aligning growers with VR capable seeders with varieties targeted for the study. At harvest time, plots needed to be harvested prior to the balance of the field being harvested, in order to capture all the available data. All of this combined created a logistical challenge. Going forward, this work should be completed at a long term, dedicated research site, where grower equipment capabilities and commercial harvest logistics are not impeding factors.

# EVALUATION OF SEED TREATMENTS FOR CONTROL OF FUSARIUM WILT IN PEAS

**Final report**

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November 21, 2022
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## BACKGROUND

Fusarium wilt of peas is caused by the soil borne fungus *Fusarium oxysporum* and has been reported in pea growing regions globally. The disease can cause severe crop losses and is most common in growing regions with short rotations that allow for inoculum build up in the soil.

Presently, there are 4 described races of *Fusarium oxysporum* that cause wilt in peas: race 1, 2, 5 & 6. Races are described based on their symptomology and pathogenicity on different pea cultivars. Symptoms from race 1, 5 & 6 infection are predominately seen early in the growing season and symptoms include stunting and downwards curling of the leaves. As disease progresses, the leaves will turn yellow, starting at the lower section and moving upwards. When soil temperatures warm to over 20, the infected plants will die. Symptoms with race 2 are slightly different – often random plants will start to show symptoms starting at flowering. These will then quickly collapse similar to those individual plants in race 1, 5, & 6. Discolouration of the roots is more severe with plants infected with *F. oxysporum* race 2 and plants will rapidly collapse when soil temperatures increase over 25°C. In processing peas, fields with Fusarium wilt will mature more quickly and make optimal harvest timing difficult.

In Ontario, 15,000 acres of processing peas are grown annually, and Fusarium wilt is the top issue identified by growers threatening production. Growers are often using a 4+ year rotation but are still seeing severe losses from Fusarium wilt and in severe cases are abandoning fields due to disease. Cultivars are chosen based on disease resistance secondarily – the first need is to supply the demand for certain processing characteristics. When possible, pea cultivars with resistance to race 1 and races 1& 2 are used, however in recent years, both race 1 and race 2 resistant cultivars are showing high levels of disease.

Most processing peas in Ontario are treated with a seed treatment of fludioxonil (Maxim – FRAC group 12), mefenoxam (Apron – FRAC group 4) and an insecticide. Seed treatments are used for early season damping off caused by *Rhizoctonia*, *Pythium*, *Phytophthora* and *Fusarium* species. New seed treatments are showing promising results against sudden death syndrome caused by *Fusarium virguliforme* in soybeans. We hypothesized that early season protection would decrease the level of Fusarium wilt and some seed treatments would have efficacy later into the season, as peas are a relatively short crop (60 average days from planting to harvest). Our objective was to evaluate a susceptible pea cultivar under low and high disease pressure with registered and unregistered seed treatments for control of Fusarium wilt.

## METHODS

Three field trials were established, one on May 19, 2022 near Belmont, ON to a field that had a low risk of Fusarium wilt (based on cropping history) and two trials were planted on May 20, 2022 near Ilderton, ON in a field with a high risk of Fusarium wilt (bottom and top of a hill). The trial was set up in a randomized complete block design with 4 replications (blocks). Plots were 6 m long by 6 rows wide. Seed treatments (table 1) were applied by the companies on the susceptible variety DA1470.

**Table 1.** List of treatments tested for Fusarium wilt in processing peas, 2022

| Treatment | Active(s) | Registrant | FRAC group | Rate per 100 kg of seed |
|---|---|---|---|---|
| Untreated control | | | | |
| Syngenta base | mefenoxam + sedaxane | Syngenta | 4 + 7 | |
| Maxim 480 FS | fludioxonil + mefenoxam + sedaxane | Syngenta | 12 + 4 +7 | 5.2 ml |
| Maxim 480 FS | fludioxonil + mefenoxam + sedaxane | Syngenta | 12 + 4 + 7 | 10.4 ml |
| Saltro | pydiflumetofen + mefenoxam + sedaxane | Syngenta | 7 + 4 + 7 | 100 ml |
| Experimental | unknown + mefenoxam + sedaxane | Syngenta | ? + 4 + 7 | 10 g ai |
| Experimental | unknown + mefenoxam + sedaxane | Syngenta | ? + 4 + 7 | 20 g ai |
| Ceramax | natamycin | Andermatt | 48 | 80 ml |
| Trilex Evergol | penflufen/trifloxystrobin + metalaxyl | Bayer | 7 + 11 + 4 | 25 ml |
| Zeltera Pulse | ethaboxam + mandestrobin + mefenoxam + inpyrfluxam | Valent | 22 + 11 + 4 + 7 | 313 ml |

Stand counts were taken from the centre meter of the middle four rows two weeks after planting on June 3 and 10 days later on June 13. Above ground disease symptoms were assessed at the 3-4 node stage (June 13), full bloom (June 28) and pre-harvest (July 14) from 4 plants in 4 locations within the plot based on a 1-5 scale; 1=dead plant, 2=heavily stunted plant/major chlorosis/lesions, 3=mildly stunted plant/chlorosis/lesions, 4=few signs of stunting chlorosis and lesions and, 5=no signs of root rot symptoms. Only trial 3 had Fusarium wilt symptoms present on June 13; others started to show symptoms on June 28.

A pre-harvest root rot assessment was conducted on July 14 from 4 plants in 4 locations on the following scale; on a 0 to 5 scale, with zero indicating no root infection and 5 being 81-100% infected root area.

Above ground plant biomass was taken from the emergence count area (1m x 4 rows) on July 15, 2022. Weight was recorded in pounds per plot.

Data was analyzed using analysis of variance function in R Studio. A significance level of P = 0.05 was used to determine if there was any statistical difference.

**RESULTS**

Refer to tables 2, 3, & 4. There were no significant differences in stand counts in any of the locations. Disease pressure was low in trial 1 compared to trials 2 & 3. All treatments were similar to the untreated control at all locations. There was no difference in visual severity, root severity or above ground plant biomass in treatments compared to the untreated control.

**Table 2.** Results from Trial 1 (Blemont – low risk)

| Treatment | Stand Count[1] | Stand Count | Visual severity[2] | Visual severity | Root severity[3] | Yield (lbs/plot) |
|---|---|---|---|---|---|---|
| | June 3 | June 13 | June 28 | July 14 | July 14 | July 14 |
| Untreated | 8.0ns | 12.4ns | 4.0ns | 2.9ns | 3.4ns | 3.4ns |

| | | | | | | |
|---|---|---|---|---|---|---|
| Syngenta base | 8.7 | 13.2 | 4.2 | 2.8 | 3.4 | 3.3 |
| Maxim 480 FS | 7.4 | 11.9 | 4.0 | 2.7 | 3.5 | 3.0 |
| Maxim 480 FS | 7.4 | 13.3 | 4.1 | 2.8 | 3.4 | 3.5 |
| Saltro | 11.3 | 16.7 | 3.9 | 2.8 | 3.3 | 3.8 |
| Experimental | 9.4 | 14.4 | 4.4 | 3.0 | 2.5 | 3.7 |
| Experimental | 10.4 | 17.1 | 4.2 | 2.8 | 2.7 | 3.9 |
| Ceramax | 7.3 | 12.3 | 4.3 | 2.9 | 3.4 | 4.0 |
| Trilex Evergol | 9.5 | 15.3 | 3.9 | 2.7 | 3.5 | 3.6 |
| Zeltera Pulse | 7.2 | 12.7 | 4.0 | 2.8 | 3.5 | 3.0 |

ns= not statistically significant

[1]average number of plants per m row

[2]Visual severity average of 4 plants per plot: 1=dead plant, 2=heavily stunted plant/major chlorosis/lesions, 3=mildly stunted plant/chlorosis/lesions, 4=few signs of stunting chlorosis and lesions and, 5=no signs of root rot symptoms

[3]Root severity average of 4 plants per plot: 0= no symptoms of root infection, 1= 1-20% infected root area, 2=21-40%, 3=41-60%, 4=61-80% and 5=81-100%.

**Table 3.** Results from Trial 2 (Ilderton – high risk)

| Treatment | Stand Count[1] | Stand Count | Visual severity[2] | Visual severity | Root severity[3] | Yield (lbs/plot) |
|---|---|---|---|---|---|---|
| | June 3 | June 13 | June 28 | July 14 | July 14 | July 14 |
| Untreated | 14.5ns | 14.8ns | 3.4ns | 2.4ns | 3.8ns | 2.8ns |
| Syngenta base | 15.5 | 15.3 | 3.1 | 2.3 | 3.9 | 2.6 |
| Maxim 480 FS | 15.8 | 16.0 | 3.1 | 2.6 | 3.7 | 4.0 |
| Maxim 480 FS | 15.4 | 15.6 | 3.3 | 2.4 | 3.8 | 3.5 |
| Saltro | 13.8 | 13.3 | 2.9 | 2.4 | 3.9 | 3.6 |
| Experimental | 16.6 | 16.1 | 3.2 | 2.5 | 3.6 | 3.5 |
| Experimental | 17.8 | 17.7 | 2.9 | 2.3 | 3.8 | 3.7 |
| Ceramax | 17.7 | 17.7 | 3.4 | 2.6 | 3.9 | 4.0 |
| Trilex Evergol | 14.3 | 13.9 | 3.3 | 2.3 | 3.8 | 3.0 |
| Zeltera Pulse | 16.4 | 16.1 | 3.4 | 2.3 | 4.1 | 3.9 |

ns= not statistically significant

[1]average number of plants per m row

[2]Visual severity average of 4 plants per plot: 1=dead plant, 2=heavily stunted plant/major chlorosis/lesions, 3=mildly stunted plant/chlorosis/lesions, 4=few signs of stunting chlorosis and lesions and, 5=no signs of root rot symptoms

[3]Root severity average of 4 plants per plot: 0= no symptoms of root infection, 1= 1-20% infected root area, 2=21-40%, 3=41-60%, 4=61-80% and 5=81-100%.

**Table 4.** Results from Trial 3 (Ilderton – high risk)

| Treatment | Stand Count[1] | Stand Count | Visual severity[2] | Visual severity | Visual severity | Root severity[3] | Yield (lbs/plot) |
|---|---|---|---|---|---|---|---|
| | June 3 | June 13 | June 13 | June 28 | July 14 | July 14 | July 14 |
| Untreated | 18.0ns | 17.3ns | 4.8ns | 2.4ns | 2.0ns | 4.5ns | 2.1ns |
| Syngenta | 19.6 | 18.6 | 4.4 | 2.4 | 1.9 | 4.7 | 1.5 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| base | | | | | | | |
| Maxim 480 FS | 17.4 | 17.5 | 4.8 | 2.3 | 1.9 | 4.7 | 1.5 |
| Maxim 480 FS | 20.2 | 20.2 | 4.6 | 2.3 | 1.9 | 4.5 | 1.5 |
| Saltro | 19.2 | 18.6 | 4.5 | 2.2 | 1.8 | 4.6 | 1.1 |
| Experimental | 18.4 | 18.4 | 4.7 | 2.5 | 1.7 | 4.5 | 2.3 |
| Experimental | 19.4 | 18.9 | 4.4 | 2.2 | 1.5 | 4.8 | 1.5 |
| Ceramax | 18.6 | 18.3 | 4.6 | 2.4 | 1.9 | 4.7 | 2.1 |
| Trilex Evergol | 17.8 | 17.4 | 4.5 | 2.3 | 1.5 | 4.8 | 1.4 |
| Zeltera Pulse | 16.1 | 16.0 | 4.8 | 2.7 | 2.2 | 4.5 | 2.7 |

ns= not statistically significant

[1]average number of plants per m row

[2]Visual severity average of 4 plants per plot: 1=dead plant, 2=heavily stunted plant/major chlorosis/lesions, 3=mildly stunted plant/chlorosis/lesions, 4=few signs of stunting chlorosis and lesions and, 5=no signs of root rot symptoms

[3]Root severity average of 4 plants per plot: 0= no symptoms of root infection, 1= 1-20% infected root area, 2=21-40%, 3=41-60%, 4=61-80% and 5=81-100%.

**CONCLUSION & NEXT STEPS**

Fluctuating temperatures and precipitation are becoming more and more common, stress diseases such as Fusarium wilt in peas are leading to severe losses in food production. Based on this research, we know that fungicide seed treatments are not able to manage Fusarium wilt in Ontario under moderate and high disease pressure – they may still be effective at managing other soil borne diseases.

In conjunction to this research, a survey of commercial fields was conducted by OMAFRA's soil management specialist Anne Verhallen and vegetable crop specialist Elaine Roddy. Results will be available in 2023.

Breeding lines need to be screened locally to know if they are resistant to our race of *Fusarium oxysporum*. The predominate race in Ontario is currently unknown as we do not have a researcher able to perform race identification using bioassay phenotyping. Based on disease symptomology, it is likely that we have race 2, but this has not been confirmed. In 2023, we will work on identifying a researcher able to do race identification on Ontario isolates of *Fusarium oxysporum*. Samples would be collected from infected peas during the season and sent to a lab. To identify race, there is a differential set of pea cultivars that have to be grown for each isolate and symptoms are then identified. This work will allow Ontario growers to better select cultivars for genetic resistance to Fusarium wilt and breeders to develop varieties with specific resistance genes.

**Background**

Lima beans are growing for a minimum of 90 days and up to 115 days in Ontario. Many growers are applying all of the crop's nitrogen (N) needs prior to planting and incorporating into the soil. Results from previous trials that have included tissue sampling in the protocol appear to suggest that lima beans do not have much demand for N until the reproductive stages, which start roughly 45 days after planting (DAP). We believe there could be economic gains from split-applying the N requirements of the lima bean crop and improvements to be made toward respecting 4R Nutrient Stewardship.

**Objective**

1. Determine the impact on yield from split applying nitrogen fertilizer.
2. Improve our understanding of the N demand of a lima bean crop

**Deliverables**

1. Lima bean yield information relative to the application strategies implemented
2. Plant tissue N concentration at various crop stages across the various N application timings

**Materials & Methods**

Soil Type: Huron Clay Loam
Tillage: Fall disc ripper, followed by spring cultivator
Previous Crop: Field corn
Broadcast fertilizer: 0 - 0 - 60 @ 100 lbs/ac
Starter fertilizer: 6.6 - 31.2 - 16.4 - 4.4S - 2.2Mg @ 120 lbs/ac
Preplant Herbicides: 126mL/ac Pursuit, 0.7L/ac Dual II Magnum, 0.6L/ac Prowl H2O applied June 4, 2022
Planting Date: June 5, 2022
Plot size: 12 rows wide, 2250 feet long

On June 6 (1 day after planting), 3 replications of treatment 1, and 3 replications of treatment 2 were established using 28% UAN applied as a mid-row subsurface band. Treatment 1 received 30 gallons per acre of 28% UAN (90 lbs N/ac) and Treatment 2 received 15 gallons per acre of 28% UAN (45 lbs N/ac). Treatment 3 was left with 0 additional nitrogen applied at planting.

On July 11, 36 days after planting, Treatment 2 received an additional 15 gallons of 28% UAN per acre, bringing the total nitrogen applied to 90 lbs per acre. Treatment 3 received 30 gallons per acre of 28% UAN (90 lbs N/ac) on the same day.

| | Application Timing and Amount (expressed as % of Grower Standard Rate) | |
|---|---|---|
| Treatment # | Preplant | 40 DAP |
| 1 | 100 | 0 |
| 2 | 50 | 50 |
| 3 | 0 | 100 |

1. Plant tissue samples were collected and analysed for N from each treatment at 22, 36, 50, and 79 days after planting
2. At harvest, 5 rows from each plot were harvested from the entire length of the field. The harvester was equipped with scales in order to weigh the harvested lima beans

**Results**

| Tissue Test Results - Nitrogen % | | | | | |
|---|---|---|---|---|---|
| Treatment | Plot Code | June 27 | July 11 | July 25 | August 23 |
| | | 22 DAP | 36 DAP | 50 DAP | 79 DAP |
| PP-1 | 13E | 4.72 | 3.28 | 3.69 | 3.74 |
| PP-2 | 16E | 4.78 | 3.42 | 3.46 | 4.04 |
| PP-3 | 19E | 4.41 | 2.94 | 3.78 | 3.84 |
| PP/SD-1 | 14E | 4.31 | 2.67 | 3.94 | 3.21 |
| PP/SD-2 | 17E | 4.85 | 3.18 | 3.94 | 3.94 |
| PP/SD-3 | 20E | 4.23 | 2.86 | 3.52 | 3.8 |
| SD-1 | 15E | 4.78 | 2.85 | 3.85 | 3.72 |
| SD-2 | 18E | 4.7 | 3.04 | 3.84 | 3.85 |
| SD-3 | 21E | 4.91 | 2.86 | 3.87 | 3.82 |

**Tissue Sample Data**
Significant differences in plant tissue nitrogen concentrations were not evident across treatments or replications. This suggests that the small amount (~7.5 lbs/ac) of nitrogen applied in the starter fertilizer was sufficient to carry the crop to side-dress timing, in this case 36 days after planting.

It is worth noting that outside of the trial area, the field received 100% of its nitrogen ahead of planting as a broadcast application. The field displayed slightly more vigorous, larger plants as compared to the trial area. It is hypothesised that this evenly distributed nitrogen was easier for the crop to access early in the season. This is shown in the centre of the field at the bottom of the image below.

In a second small plot study of nitrogen demand in lima beans (right), nitrogen application rates of 0, 60, and 120 pounds per acre were applied at planting and tissue samples were analysed at 42, 49, and 59 days after planting. The objective of this study was to estimate the growth stage at which lima bean demand for nitrogen increases. Although the 0 nitrogen treatments never showed deficiency, these replications were on the lower end of the range of results.

| Tissue Test Results - % Nitrogen | | | | |
|---|---|---|---|---|
| Plot # | N Rate (lbs/ac) | Aug 3 42 DAP | Aug 12 49 DAP | Aug 22 59 DAP |
| 1 | 0 | 3.64 | 3.54 | 3.38 |
| 6 | 0 | 3.76 | 3.96 | 3.62 |
| 8 | 0 | 3.66 | 3.93 | 3.61 |
| 10 | 0 | 3.72 | 3.9 | 3.71 |
| 2 | 60 | 4.13 | 4.26 | 4.05 |
| 4 | 60 | 3.75 | 3.76 | 4.13 |
| 9 | 60 | 4.54 | 4.09 | 3.91 |
| 11 | 60 | 4.19 | 3.91 | 4.04 |
| 3 | 120 | 4.19 | 4.2 | 3.88 |
| 5 | 120 | 4.08 | 3.7 | 3.97 |
| 7 | 120 | 4.04 | 4.23 | 4.01 |
| 12 | 120 | 4.27 | 4.28 | 4.36 |

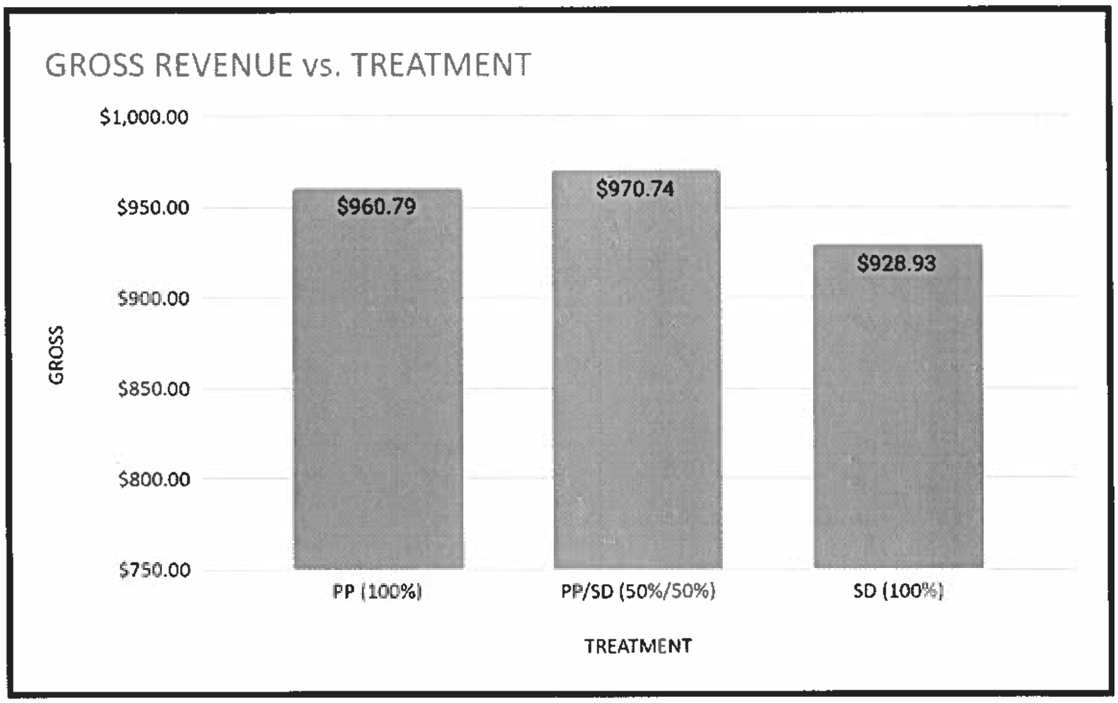
**Tissue Sample Results Discussion**

In the field scale trial, no visual or analytical differences in tissue nitrogen concentration was evident across application timings. However, outside of the trial area, plants that received preplant nitrogen as a broadcast application appeared more vigorous when compared to the trial strips that received all nitrogen as an at-planting mid row subsurface band application.

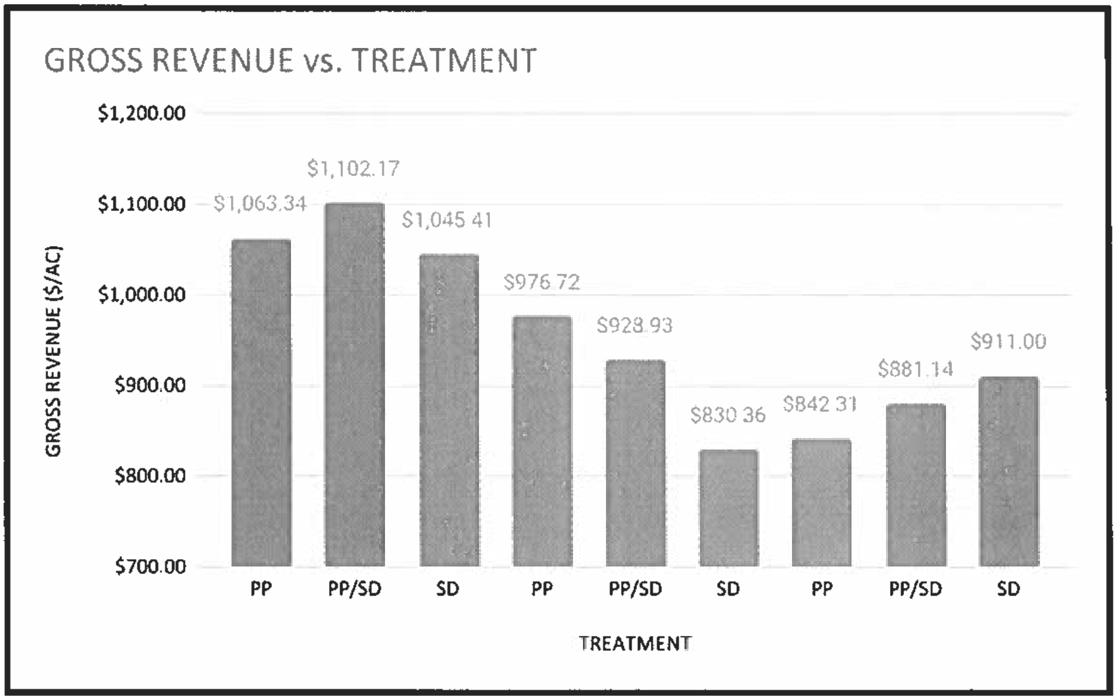
Further to this, the small plot study of various nitrogen application rates (discussed above) did show some slightly lower nitrogen concentration levels in the tissue samples taken from the 0 nitrogen application rate replications throughout the season, especially in the early sample timing (42 days after planting).

Based on these observations, it could be suggested that lima beans do respond positively to a small amount of readily available nitrogen during the early vegetative growth stages.

**Crop Yield Results**




At this site, there was minimal difference in per acre revenue between applying all nitrogen at planting and split applying the nitrogen. When all replications are averaged, there is a revenue disadvantage to applying 100% of the crop's nitrogen in season as a mid row subsurface band. However, when looking at each replication individually, we see significant variability in crop yield (see below). It is worth noting that weed pressure (namely pigweed) was extremely variable across the trial area. It is highly likely that this variable weed competition had an impact on the results of the trial.




**Discussion**

Results from previous years, and tissue sample data collected over the same period would suggest that a lima bean crop does not demand a significant amount of nitrogen in the early vegetative stages of growth.

This site was very dry throughout the majority of the growing season. This could have reduced the movement of nitrogen in the soil and reduced the plants ability to find the nitrogen it needed. This could be another contributing factor that led to limited differences between treatments.

Continued work will be done on this project into 2023 and 2024 to understand if split applying nitrogen in lima beans can improve our nitrogen use efficiency, and in turn improving grower profitability and reducing the risk of negative environmental impacts.

NORTERA

***Corn Hybrid Tolerance to Tar Spot - 2022***

**Background**
Presence of Tar Spot (*Phyllachora maydis*) has been confirmed in Ontario and infected a significant amount of field corn in 2021. Limited screening has been performed to identify sweet corn hybrid tolerance to tar spot. Based on experiences across midwestern US sweet corn production regions, this pathogen can have a dramatic impact on crop quality, sometimes rendering the crop unharvestable due to rapidly declining kernel moisture.

**Objective**
Screen the various processing sweet corn hybrids grown in Ontario in order to determine their individual tolerance, if any, to tar spot.

**Deliverables**
Weekly assessments of 12 key Ontario-grown sweet corn hybrids on % leaf area coverage by tar spot stromata.

**Method**

1. 2 rows of 12 unique hybrids planted a length of 150 feet.
2. Hybrids tested:
   - 2.1. GH6462
   - 2.2. Azlan
   - 2.3. Suza
   - 2.4. Early Cogent
   - 2.5. GSS3951
   - 2.6. GSS8937
   - 2.7. Overland
   - 2.8. Messenger
   - 2.9. Bull Moose
   - 2.10. Pronghorn
   - 2.11. Cumberland
   - 2.12. BSS8040
3. This trial area was NOT sprayed with any in-season fungicides
4. Previous crop: Field Corn

**Results**

All hybrids emerged well and remained relatively stress free for the duration of the season. Due to various factors, incidence of tar spot was nearly nonexistent. In 2022 there were no significant differences in hybrid tolerance to tar spot due to extremely limited incidence of the disease in the trial area.

**Discussion**

This trial should be continued in 2023 and 2024 on high risk site(s) in order to improve our understanding of hybrid tolerance to tar spot in Ontario.