

# **2024 Minnesota Canola Production Center (CPC)**

***Cooperative Project with the Minnesota  
Canola Council and the University of  
Minnesota***

**2024 Research Summary Report**

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## Acknowledgements

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## **SITE INFORMATION - 2024 MN Canola Production Center (CPC)**

**Location:** One mile west of Roseau on Hwy 11

**Cooperator:** Northern Resources Cooperative

**Previous Crop:** Soybeans

### **Soil Test Results:**

Nitrogen - 0-6'	9#/acre
Nitrogen - 6-24"	28#/acre
Phosphorous -	16 ppm
Potassium -	119 ppm
Target Yield Goal	2,500 #/ac
Fertilizer Applied (#/ac):	N - 140; P - 30; K - 20; S - 20s
%Organic Matter:	2.9
Soil pH:	8.2

**Tillage Operations:** A single pass with a high-speed disc in the spring of 2024, followed by a single pass with harrow with rolling baskets prior to seeding. All plots were rolled after seeding to improve seed-soil contact.

**Fertilizer Applied:** All small plot trials received 140-20-40-20S which was incorporated with the last tillage pass in the spring.

**Seeding Method:** Small plot trials were seeded with a 5' Hege plot seeder.

**Herbicides Applied:** Section 3 at 4 oz/ac + 1% crop oil + Warrior 1.5 oz/ac was applied to the entire area, except for the flea beetle trial which received section 3 only, for general grass and flea beetle control on 6/15/24. The herbicides listed below were applied to the appropriate canola varieties.  
A) Liberty Link (LL) hybrids - Liberty 280SL 26 fl. oz/ac + AMS @ 2.5% on 6/26/24.

B) Roundup Ready (RR) and Truflex hybrids - Roundup Power Max 16 fl. oz/ac + AMS @ 2.5% on 6/26/24.

**Fungicides applied:** Proline at 5.7 oz/ac was applied to all plots, except the white mold trial at first petal drop (approximately 30% bloom) for white mold control.

Priaxor at 6 oz/ac was applied on 6/15 to all plots after a pea to marble sized hail event on 6/13/24.

**Comments:**

The winter of 2024 was mild and dryer than normal. Spring of 2024 was looking to follow the dry weather patterns of the previous three growing seasons. That changed in April. Weather records dating back to 1895 indicated that the spring of 2024 was the 15<sup>th</sup> wettest on record. Rainfall totals were above normal for the months of April, May, June, and July. This above normal rainfall resulted in delayed seeding of canola and some fields were prevented from being planted (PP). The wet field conditions resulted in three planting windows. The first was prior to April 15<sup>th</sup>. The second was the end of April into the first couple weeks of May and the third was the end of May. The daily high temperatures were 5 to 10 degrees above normal for the months of April to mid-August. The daily high temperatures in late-August and September averaged 15-20 degrees above average. The daily low temperatures were 10 degrees warmer than the long-term average.

Primary tillage at the CPC was completed in early May. Fertilizer was applied and incorporated on May 22. A couple of rain events delayed canola seeding until May 29. Prior to canola seeding the entire area was lightly tilled with a harrow. All canola trials at the CPC had good emergence and early season vigor.

In early June, all canola trials had good early season vigor ratings. Early season flea beetle populations were less than 2023 and were in the low to medium category. A hailstorm that produced pea to marble sized hail passed over the CPC on June 13<sup>th</sup>. The hail and the accompanying wind caused considerable damage to the canola seedlings. The hail damage confounded flea beetle ratings. After this hailstorm and the accompanying rain, the flea beetle population declined to sporadic levels. Due to the canola damage from the hailstorm the entire area was sprayed with Priaxor at 6 oz/ac. To control flea beetles, all canola trials, except the flea beetle trial, received an application of Warrior at 1.5 oz/ac on June 15<sup>th</sup>.

The NDAWN predictive model for Sclerotinia was forecasting a high probability of white mold, for the entire canola bloom period, at the CPC in 2024. An application of Proline at 5.7 oz/ac was applied to all canola plots at 30% bloom, except for the white mold trial. Canola plants were beginning to show white mold symptomology by the end of July into August. White mold pressure was high for the entire canola bloom period. Late season flea beetle and diamondback moth feeding were at low levels in 2024. Roundup was applied to Liberty Link canola on September 1<sup>st</sup> and canola was swathed on September 3<sup>rd</sup>. Canola harvest began on 9/12 and finished on 9/20. In addition to the CPC, two canola fields in Roseau County were surveyed on a weekly basis after flowering for bertha

armyworm and diamondback moth. Two additional canola fields were surveyed on a weekly basis after flowering for Canola flower midge and Swede Midge .

### **The public canola trials conducted at the 2024 CPC included:**

- Small plot canola variety trials
- Swath vs direct canola harvest
- Flea beetle seed treatment trial
- Sclerotinia control with biologics and conventional fungicides
- Late season flea beetle trial
- Soil applied herbicide trial
- Desiccation as a harvest aid in canola
- Bertha armyworm and diamondback moth surveys
- Canola Flower and Swede Midge surveys

### **Variety and Systems Trial**

#### **Objective:**

To evaluate agronomic characteristics of canola varieties with different herbicide production systems (Liberty Link (LL) and Roundup Ready (RR) grown in the environmental conditions of northern Minnesota.

#### **Background:**

Canola varieties with new and emerging technology traits have given canola growers several options for weed control. Yield, lodging resistance, maturity, and crop quality are important traits for growers to consider when making canola variety selections. Canola seed companies were invited to submit current and pending varieties for entry in the canola variety trial for comparison in a small plot replicated research trial.

#### **Methods:**

Canola varieties were seeded at 10-12 PLS/ft.<sup>2</sup> on 5/29. The experimental design was a randomized complete block (RCB) with four replications. Broadcast fertilizer rate of 140-30-20-20s applied to the entire area and incorporated prior to planting. Due to a delay in planting due to wet weather the entire area was worked with a harrow with a rolling basket prior to planting. The individual plot size was 6 x 30', end-trimmed to a harvest area of 5 x 20'. The LL and RR canola varieties were seeded in separate blocks with buffers to reduce potential herbicide drift. On June 13, a hailstorm passed over the CPC and deposited pea-marble sized hail which caused significant canola leaf damage. Priaxor at 6 + Warrior at 1.5 + Section 3 at 4 oz/ac were applied to all plots on June 15. Roundup and Liberty herbicides were applied on 6/26. Proline at 5.7 oz/ac was applied to all plots (approximately 30% bloom) for white mold control. The direct harvest LL canola had Roundup at 24 oz/ac applied as a desiccant on 9/1. The direct

harvest Roundup canola varieties did not receive a desiccant. Canola was swathed on 8/3 and harvested on 9/12&13. Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields are adjusted to 8.5% moisture. Additional data collected include early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

### **Results:**

A total of 30 canola lines were entered in the 2024 CPC (Table 1). A breakdown of the canola varieties: 19 LL and 11 RR varieties were evaluated in this small plot replicated research trial. The Roundup and Liberty canola varieties were planted in separate blocks in the field. In 2024, canola yields ranged from 1,302 to 2,859 #/ac with a trial average of 2,261#/ac. The trial average for LL varieties was 2,401 and RR varieties was 2,019 #/ac. The LSD (0.05) for RR varieties was 514 with a CV of 17.6%. The LSD (0.05) for LL varieties was 320 with a CV of 9.4%. The average number of days in bloom was 22.3 for Roundup Ready and 19.1 for Liberty Link.

A comparison of selected canola varieties in the yield response to swath and harvest compared to direct harvest is presented in Table 1. The average yield of swath and harvest for RR canola was 2,262 #/ac compared to 1,663 #/ac for direct harvest. The average yield of swath and harvest for LL canola was 2,491 #/ac compared to 2,520 #/ac for direct harvest. This data would suggest that for the RR varieties evaluated in this trial, higher yields were obtained from swath and harvest compared to direct harvest. In the LL varieties evaluated the canola yield was similar from swath and harvest and direct harvest.

A canola seed subsample was taken from each plot and a percentage protein, percent oil, test weight and oil partitioning are presented in Table 2. This data is presented for reference for specific canola varieties. This information may be useful in plant breeding efforts when looking at oil profiles of specific canola varieties.

The wet spring delayed canola planting in 2024. This wet pattern continued for the months of June and July. Rainfall in the months of June and July were above average. This wet soil conditions were favorable for white mold infections. Even with a fungicide application at 30% bloom, significant white mold symptomology was observed in the canola variety trial in 2024. With the benefit of hindsight, the 2024 growing season would have been a year to make a fungicide application at 30% bloom and a sequential treatment 7 days later to provide protection for the entire canola bloom period. Canola planted in late May into warm moist soil resulted in rapid germination and good early season vigor ratings. The hail damage on June 13<sup>th</sup> caused a setback in canola growth and development. The heavy white mold pressure during the entire canola bloom period resulted in significant white mold infection and limited top-end canola yields. .

## **Canola Sclerotinia (White Mold) Control Trials**

### **Objective:**

The objective of this trial was to evaluate two commercially available canola fungicides to several biological products for white mold control in canola.

### **Methods:**

This trial was conducted at two locations, U of MN St. Paul and at the CPC in Roseau, MN. The canola variety LL 345PC treated with Helix vibrance + Lumiderm seed treatment was seeded on 4/23 at St. Paul and on 5/29 in Roseau. The seeding rate was 12 PLS with individual plots 6x30 feet long and end trimmed to 20 feet. A white mold disease incidence was determined at both locations by an evaluation of fifteen feet of row and expressed as a %. The disease severity index is a more comprehensive indicator of injury and is determined by evaluating plants based on a 0-to- 6 scale with 0 no disease and 6 severe disease symptoms.

#### **Methods for the Roseau location**

The entire area was worked with a high-speed disk in early May. A broadcast fertilizer rate of 140-30-20-20s applied to the entire area and incorporated prior to planting. Due to a delay in planting because of wet weather the entire area was worked with a harrow with a rolling basket prior to planting. Canola emergence was uniform and with average early season vigor. On June 13, a hailstorm passed over the CPC and deposited pea-marble sized hail which caused significant canola leaf damage. Priaxor at 6 + Warrior at 1.5 + Section 3 at 4 oz/ac were applied to the entire plot area on June 15. Liberty herbicide was applied for general weed control on 6/26. Canola was direct harvested on 9/14.

#### **Methods for the St. Paul location**

The entire area was worked with field cultivator and rolling basket in mid-April. A broadcast fertilizer rate of 100-0-0-20S applied to the entire area and incorporated prior to planting. Canola emergence was uniform with good early season vigor. Liberty herbicide was applied for general weed control on 5/15 and again on 5/30. Canola was direct harvested on 8/14.

The following 11 fungicide treatments were applied at both locations. In St. Paul, the first application was on 6/13, and the second application was 6/19. In Roseau, the first application was on 7/15 and the second application on 7/22. The Contans treatment at St.Paul was applied 4/22 and 5/15 in Roseau and lightly harrowed after application.

<b>Trt#</b>	<b>Treatment</b>	<b>Application Timing</b>	<b>Rate/acre</b>
1	Untreated		
2	Contans	Pre and incorporated	4 pounds.
3	Double Nickel LC	20-30% bloom	5 quarts
4	Double Nickel LC	50-60% bloom	5 quarts
5	Double Nickel LC	20-30% bloom + 7 days	5 quarts + 5 quarts
6	Serenade OPTI	20-30% bloom	20 oz
7	Serenade OPTI	50-60% bloom	20 oz
8	Serenade OPTI	20-30% bloom + 7days	20 oz + 20 oz
9	Contans+Serenade	Pre incorporated+20-30% bloom	4 pounds + 20 oz
10	Endura	20-30% bloom	5.5 oz
11	Proline + Endura	20-30% bloom + 7 days	5.7 + 5.5

Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields are adjusted to 8.5% moisture. Additional data collected include early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

### **Results:**

In general canola yields were higher at Roseau than at St. Paul (Table 3). In St. Paul, canola yields ranged from 1,191 to 1,638 #/ac. Statistical analysis indicated that canola yields were no different from any of the treatments compared to the untreated. The disease rating index ranged from 1.53 to 4.08. Proline + Endura and Serenade OPTI applied at 20-30% bloom gave the lowest disease rating index.

At Roseau canola yields ranged from 1,655 to 2,538 #/ac (Table 3). The LSD (0.05) for canola yield was 240 with a CV of 8.7%. All treatments gave similar yields as the untreated except, Serenade applied at 30% bloom and again 7 days later (2,072 #/ac) and Proline at 30% bloom and Endura 7 days later (2,538 #/ac). The disease rating index at Roseau was lowest from Endura applied at 30% bloom (1.89) and Proline + Endura applied at 30% bloom and 7 days later (0.91).

White mold disease incidence ratings ranged from 3.25 to 7.5 at St. Paul and 2.25 to 24.25 at Roseau (Table 3). These ratings would suggest that white mold pressure was greater at Roseau than at St. Paul in the 2024 season. At Roseau, the North Dakota Agricultural Network (NDAWN) white mold predictive model indicated a high white mold risk for the entire canola bloom period. A double fungicide treatment of Proline applied at 30% bloom followed by Endura 7 days later gave 745 #/ac more canola seed yield than the untreated. The data from the Roseau location suggests that white mold infection occurred throughout the entire canola bloom period in 2024. The sequential commercial fungicide treatment provided disease protection for the entire canola bloom period. The data suggests that the 30% bloom timing may have been a bit on the early side for white mold control in the environmental conditions of 2024.



## Canola Seed Treatment Trials

### Objective:

The objective of this trial was to evaluate several commercially available canola seed treatments for early season flea beetle control.

### Methods:

This experiment was conducted at the CPC in Roseau, MN. The experimental design was a RCB with four replications. Two canola varieties were seeded in this trial. DK400TL (1-14) and LL350PC (15-16). The entire area was worked with a high-speed disk in early May. Fertilizer in this trial was a 140-30-20-20S and incorporated prior to planting. Canola was seeded on 5/29. The individual plot size was 6 x 30' and end-trimmed to a harvest area of 5' x 20'. Canola emerged well and exhibited good early season vigor. On June 13, a hailstorm passed over the CPC and deposited pea-marble sized hail which caused significant canola leaf damage. Priaxor at 6oz/ac + Section 3 at 4 oz/ac were applied to the entire plot area on June 15. Liberty herbicide was applied for general weed control on 6/26. Proline at 5.7 oz/ac was applied to the entire plot area at 30% bloom for white mold control. Canola was direct harvested on 9/20. Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields were adjusted to 8.5% moisture. Additional data collected included: early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

The following sixteen treatments were evaluated in this seed treatment trial. Treatment 1-14 were on canola variety DK400TL and 15-16 LL350PC. In the Brigade split application treatment, the first application was to 1-2 leaf canola on 6/17, and the second Brigade application was applied on 6/23.

<b>Trt#</b>	<b>Treatment</b>	<b>Rate (ounces)</b>
1	Fungicide Check	
2	Helix Vibrance	23
3	Helix Vibrance + Fortenza	23+10.2
4	Helix Vibrance + Fortenza + Brigade	23+15.4+2.6
5	Prosper Evergol (PE)	21.5
6	PE+ Lumiderm	21.5+9.8
7	PE+ Lumiderm + Brigade	21.5+9.8+2.6
8	PE+ Buteo Start	21.5+9.6
9	PE+ Buteo Start +Brigade	21.5+9.6+2.6
10	PE+ Buteo Start	21.5+16
11	PE+ Buteo Start+ Brigade	21.5+16+2.6
12	PE+ Buteo Start+ Lumiderm	21.5+9.6+9.8
13	PE +Buteo Start+ Lumiderm+ Brigade	21.5+9.6+9.8+2.6
14	Brigade + Brigade	2.6 + 2.6
15	Helix Vibrance +Lumiderm	23 + 9.8
16	Helix Vibrance +Lumiderm + Brigade	23 + 9.8+ 2.6

### **Results:**

Flea beetle pressure was light to moderate at the CPC in 2024. The pea-marble size hail caused significant leaf damage which confounded the flea beetle ratings. The flea beetle population appeared to decline after this hail event. A decision was made to apply the post-emergence Brigade to canola even with significant leaf damage from hail.

Canola yield results and other agronomic data for individual treatments are presented in Table 4. The LSD (0.05) for canola yields 391 with a CV of 11.6%. Canola seed yield averaged 1,880 #/ac for the fungicide treated check (DK400TL). All canola seed treatments (DK400TL) produced more canola yield compared to the fungicide check. Canola yields of LL 350PC were higher than the DK400TL untreated check. An untreated check of LL 350PC was not included in this trial.

### **Late Season Flea Beetle Trial**

#### **Objective:**

The objective of this trial was to determine if late season flea beetle feeding has a negative impact on canola seed yield.

#### **Methods:**

The entire area was worked with a high-speed disk in early May. A broadcast fertilizer rate of 140-30-20-20s applied to the entire area and incorporated prior to planting. Due to a delay in planting because of wet weather the entire area was worked with a harrow with a rolling basket prior to planting. Canola variety LL 340PC was seeded at 12 PLS/square foot on 5/29. The individual plot size was 6 x 30', end end-trimmed to a harvest area of 5 x 20'. Canola emergence was uniform with average early season vigor. On June 13, a hailstorm passed over the CPC and deposited pea-marble sized hail which caused significant canola leaf damage. Priaxor at 6 + Warrior at 1.5 + Section 3 at 4 oz/ac were applied to the entire plot area on June 15. Liberty herbicide was applied for general weed control on 6/26. Proline at 5.7 oz/ac was applied to the entire plot area for white mold control. The late season flea beetle trial was staked out and treatments applied with a back-pack sprayer. Canola was direct harvested on 9/12. The treatments in this late season flea beetle trial included:

- Untreated
- Brigade at 2.6 oz/ac on 8/24
- Brigade at 2.6 oz/ac on 8/28
- Brigade at 2.6 oz/ac on 9/5

Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields are adjusted to 8.5% moisture. Additional data collected include early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

### **Results:**

Canola yield results and other agronomic data for individual treatments are presented in Table 6. Canola seed yields ranged from 2,401 to 2,843 #/ac. Statistical analysis of the data indicated no treatment differences for yield, protein, oil, and test weight at the 95% level of confidence.

Late season flea beetle population was low in 2024. Flea beetle counts were less than 10/plant throughout the duration of this trial. Research from Canada suggest flea beetle populations have to be over 100/plant before canola seed yield is impacted from late season flea beetle feeding.

## **Canola Desiccation as a Harvest Aid Trial**

### **Objective:**

The objective of this trial was to evaluate several commercially available products that can be used as a desiccant in LL canola.

### **Methods:**

The entire area for this trial was worked with a high-speed disk in early May of 2024. Broadcast fertilizer rate of 140-30-20-20s applied to the entire area and incorporated prior to planting. Due to a delay in planting because of wet weather the entire area was worked with a harrow with a rolling basket prior to planting. Canola variety LL 345PC was seeded at 12 PLS/square foot on 5/29. The individual plot size was 6 x 30', end end-trimmed to a harvest area of 5 x 20'. Canola emergence uniform and with average early season vigor. On June 13, a hailstorm passed over the CPC and deposited pea-marble sized hail which caused significant canola leaf damage. Priaxor at 6 + Warrior at 1.5 + Section 3 at 5 oz/ac were applied to the entire plot area on June 15. Liberty herbicide was applied for general weed control on 6/26. Proline at 5.7 oz/ac was applied to the entire plot area for white mold control. The desiccation trial was staked out and treatments applied with a back-pack sprayer. Canola was swathed on 9/3 and harvested the swathed direct harvest plots on 9/14. The treatments in this desiccation trial included:

- Untreated
- Roundup 24 oz/ac + MSO (1%) + AMS (2%) applied on 9/3
- Roundup 24 oz/ac + Sharpen 2 oz/ac +MSO (1%) + AMS (2%) applied on 9/3
- Reglone 1.5 pints/ac + NIS (0.25%) applied on 9/9
- Sharpen 2 oz/ac + MSO (1%) + AMS (2%) applied on 9/9
- Swathed 9/3

Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields are adjusted to 8.5% moisture. Additional data collected include early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

### **Results:**

Canola yield results and other agronomic data for individual treatments are presented in Table 7. Canola seed yields ranged from 2,242 to 2,752 #/ac. The LSD for canola yield at the (0.05) level of confidence was 280 and a CV of 7.6%. The swathed canola gave the highest yield in this trial at 2,752#/ac. Roundup at 1.5 pt + Sharpen at 2 oz + MSO (1%) gave similar canola yield as the swath treatment. All other desiccant treatments and the untreated gave lower canola seed yield compared to the swathed and Roundup + Sharpen treatment. No treatment differences were detected for canola protein and oil.

The results of this trial indicate that Roundup + Sharpen were similar in yield as swathing. One of the field observations from the Roundup treatments were the canola stalks were brown to the soil level. Canola stalks that were brown to the soil level had increased harvest efficiency compared to untreated and Reglone and Sharpen which had green canola stalks. Daily high temperatures were 15 degrees above normal, which accelerated canola maturity. This trial was weed free. This trial should be repeated in a canola field that had green weeds at the time of swathing.

### **Canola No-till Burndown Trial**

#### **Objective:**

The objective of this trial was to evaluate several herbicides in combination with Roundup for weed control in no-till canola.

#### **Methods:**

The canola variety in this trial was L345PC with treatments arranged in a RCB design with 4 replications. The individual plot size was 6 x 30', end-trimmed to a harvest area of 5' x 20'. The trial area was staked out and burndown treatments were applied on 5/15. The weed population was light with the primary weeds, common lambsquarters, common dandelion, field pennycress and Pennsylvania smartweed. Treatments were applied with a back-pack sprayer. Herbicides and rate applied were:

Roundup PowerMax 24 oz/ac

Roundup PowerMax + Spartan at 2 oz/ac

Roundup PowerMax + Aim at 0.33 oz/ac

Roundup PowerMax + Aim at 0.33 oz/ac + Moxy at 12 oz/acre

Broadcast fertilizer (140-30-20-20-20S) was applied on 5/22. A rain event delayed canola planting until 5/29. Plot stakes were removed prior to planting and the entire area had a light harrow due to significant soil crusting. After planting, individual plots were restaked. The canola emergence and early season vigor was good, and no differences observed due to herbicide treatment. A hailstorm with pea-marble sized hail passed over the plot area on June 13. Canola leaves and stems were damaged from this hailstorm and a decision was made to apply a fungicide (Priaxor at 6 oz/ac) over the entire plot area. Flea beetle populations were light to moderate in this trial. Warrior II at

1.5 oz/a + Section 3 at 4 oz/a was applied for flea beetle and grass control on 6/15. The entire area received an application of Liberty at 26 oz/ac on 6/26. Proline at 5.7 oz was applied to all plots at first petal fall (approximately 30% bloom) for white mold control. Canola was direct harvested on 9/19. Harvested canola was cleaned, weighted and a sub-sample taken from each plot for moisture, percent oil content and other quality factors. Canola yields were adjusted to 8.5% moisture. Additional data collected included early season vigor and percent ground cover, beginning and end of bloom, plant height and lodging.

### **Results:**

Canola yield results and other agronomic data for individual treatments are presented in Table 5. Canola seed yields ranged from 2,687 to 3,160 #/ac. Statistical analysis of the data indicated no treatment differences at the 95% level of confidence.

This trial was conducted to evaluate several burndown herbicide that could be used in combination with Roundup for weed control in a no-till system. The results from this trial suggest that soil applied herbicides may have utility for weed control when combined with Roundup applied as a burndown prior to canola planting. Further research should be conducted in no-till canola field with moderate to heavy weed pressure. Weed pressure at this site was light and future trial locations with more weed pressure will give a more accurate picture of herbicide performance when used as a burndown prior to canola planting.

## **Bertha Armyworm and Diamondback Moth Survey**

### **Objective:**

The objective of this survey was to determine the incidence and severity of Bertha Armyworms and Diamondback Moths in canola fields at two locations in northwest Minnesota.

### **Methods:**

In 2024, two canola fields were surveyed for Bertha Armyworm and two fields for Diamondback moth. Pheromone traps were hung from a shepherd hook on the edge of canola fields. These traps were placed in the canola field on 6/18/24. Location 1 was on the edge of a canola field in cooperation with Rice Farms and location 2 was in cooperation with Magnusson Farms. Both sites were in Roseau County. Traps were put out on June 18 prior to canola bloom and were removed on August 8. All traps were checked weekly. Pheromone lures were changed after four weeks in the field.

**Results:**

Pheromone traps were effective in the capture of Bertha armyworm and Diamondback moth (Table 8). Total number of Bertha Armyworms and Diamondback moths were higher at Location 1 than location 2. Total Bertha armyworms capture was 55 at location 1 and 25 at location 2. Total Diamondback moth capture was 211 at location 1 and 171 at location 2. Survey results in 2024 indicate that both insect pests were below economic threshold levels for canola.

**Canola Flower and Swede Midge Survey****Objective:**

The objective of this survey was to determine the incidence and severity of canola flower and Swede midge in canola fields at two locations in northwest Minnesota.

**Methods:**

In 2024, two canola fields were surveyed for canola flower midge and two fields for Swede midge. Pheromone traps were hung from a shepherd hook on the edge of canola fields. These traps were placed in the canola field on 6/18/24. Location 1 was on the edge of a canola field in cooperation with Rice Farms and location 2 was in cooperation with Magnusson Farms. Both sites were in Roseau County. Traps were put out on June 18 prior to canola bloom and were removed on August 8. All traps were checked weekly. Pheromone lures were changed after four weeks in the field.

**Results:**

Canola flower and Swede midges are new insect pests that have the potential to cause damage to canola grown in Minnesota. To date, economic thresholds levels have not been established for either of these insect species for canola grown in Minnesota. Swede midge was not detected from any of the traps in 2024. Pheromone traps were effective in the capture of canola flower midge although at very low levels. Additional survey information will be required to determine the scope and intensity of these two insect species in canola.

# 2024 Canola Production Center Research Data Summaries for Minnesota

The summary and previous annual research summaries are on the Web at

<http://www.mncanola.org/CPC.php>

***Table 1. Variety Trial***

***Table 2. Variety Trial Oil Seed Components***

***Table 3. White Mold Control Treatments***

***Table 4. Flea Beetle Seed Treatments***

***Table 5. No-Till Herbicide Burndown Treatments***

***Table 6. Late Flea Beetle Control Effects***

***Table 7. Desiccation as a Harvest Aid***

***Table 8. Insect Monitoring***

Table 1.

## 2024 Canola Swath and Direct Harvest Variety Trial Northern Resources Cooperative- Roseau, Mn

Ent#	Company	Variety	Herbicide Tolerance*	#/acre Swath + combine	Protein <sup>2</sup>	Oil <sup>2</sup>	Test wt./bu.	Lodging <sup>3</sup>	Harvest Height (in)	White Mold <sup>5</sup>	ESV-21DAP <sup>4</sup>	Begin Bloom Date	End Bloom Date	Days of bloom	
<u>Swath+Combine plots</u>															
1	BASF	InVigor LR354PC	RR/LL	<b>2336</b>	21.5	44.2	52.1	5.0	58.3	0.3	8.0	12-Jul	30-Jul	18	
2	BASF	InVigor L340PC	LL	<b>2740</b>	22.1	42.5	51.9	4.0	58.3	1.0	8.0	8-Jul	26-Jul	18	
3	BASF	InVigor L343PC	LL	<b>2528</b>	22.1	43.2	52.2	4.5	56.3	1.3	7.8	8-Jul	26-Jul	18	
4	BASF	InVigor L345PC	LL	<b>2571</b>	22.3	42.3	52.2	2.5	58.0	1.8	8.0	9-Jul	28-Jul	19	
5	BASF	InVigor L350PC	LL	<b>2506</b>	22.1	44.5	52.6	3.5	62.5	0.0	8.3	12-Jul	30-Jul	18	
6	BASF	XP1	LL	<b>2833</b>	21.1	43.4	53.1	6.0	59.8	0.3	8.3	9-Jul	26-Jul	17	
7	CROPLAN	CP7250LL	LL	<b>1765</b>	23.4	43.3	52.4	6.5	55.3	0.8	8.3	10-Jul	30-Jul	19	
8	CROPLAN	CP7130LL	LL	<b>1937</b>	22.1	43.6	51.4	2.5	57.8	1.3	8.3	9-Jul	27-Jul	18	
9	Dekalb	DK800LL	LL	<b>2384</b>	21.5	45.1	52.5	2.0	54.5	3.8	8.3	7-Jul	27-Jul	20	
10	Dekalb	DK801LL	LL	<b>2642</b>	22.1	44.6	53.2	2.0	55.0	3.0	8.8	5-Jul	27-Jul	21	
11	Dekalb	DK401TL	TF/LL	<b>2488</b>	21.8	44.8	53.3	3.0	55.5	3.5	8.5	7-Jul	27-Jul	19	
12	Dekalb	DK400TL	TF/LL	<b>2376</b>	22.1	44.5	52.6	3.0	53.5	5.0	9.0	5-Jul	25-Jul	20	
13	Pioneer	P612L	LL	<b>2031</b>	23.1	44.3	52.6	3.0	59.8	0.0	7.8	10-Jul	29-Jul	19	
14	Pioneer	P505MSL	LL	<b>2173</b>	21.5	43.7	52.7	6.0	63.5	0.3	9.0	9-Jul	28-Jul	20	
15	BrettYoung	BY7204LL	LL	<b>2231</b>	21.4	45.3	52.7	3.5	57.8	1.8	8.3	9-Jul	29-Jul	20	
<u>Straight combine plots<sup>6</sup></u>															
16	BrettYoung	BY7204LL	LL	<b>2147</b>	22.2	44.4	52.7	3.5	62.0	2.0	8.3	9-Jul	29-Jul	20	
17	Dekalb	DK800LL	LL	<b>2486</b>	22.1	44.6	52.8	3.0	62.0	3.0	8.8	7-Jul	28-Jul	20	
18	BASF	InVigor L340PC	LL	<b>2859</b>	22.1	42.1	52.8	5.0	62.3	0.5	7.3	8-Jul	28-Jul	20	
19	BASF	InVigor L343PC	LL	<b>2586</b>	22.4	42.4	52.9	3.5	55.0	1.5	8.3	8-Jul	27-Jul	19	
RR/TF only				LSD @ 5% level	<b>320</b>	0.9	1.1	1.0	1.8	3.8	1.2	1.0	1	1	1
				CV(%)	<b>9.4</b>	3	1.8	1.3	1.3	4.5	53.3	8.1	5.4	2.5	4.1
<u>Swath+Combine plots</u>															
20	BASF	InVigor LR354PC	RR/LL	<b>2324</b>	21.9	44.1	52.8	8.0	57.8	0.0	7.3	11-Jul	31-Jul	19.5	
21	CROPLAN	CP9978TF	TF	<b>2138</b>	22.2	45.2	53.5	4.5	52.0	0.0	7.5	7-Jul	31-Jul	23.3	
22	CROPLAN	CP9221TF	TF	<b>2039</b>	22.8	42.3	52.3	5.5	53.0	1.8	9.0	6-Jul	29-Jul	23.0	
23	Pioneer	P515G	Optimum Gly	<b>2140</b>	20.7	46.5	51.9	6.5	51.3	3.0	7.5	7-Jul	26-Jul	19.3	
24	Nuseed	NC527CR TF	TF	<b>2130</b>	23.5	43.5	52.5	6.0	55.3	0.5	9.0	6-Jul	1-Aug	25.8	
25	Star Specialty	StarFlex	TF	<b>2449</b>	22.1	45.6	52.9	5.0	53.8	0.5	7.5	7-Jul	29-Jul	22.3	
26	Proseed	TR23127	TF	<b>2331</b>	22.9	44.3	52.5	3.5	50.3	3.0	6.3	7-Jul	27-Jul	19.5	
<u>Straight combine plots</u>															
27	Star Specialty Seed	StarFlex	TF	<b>1931</b>	20.4	47.1	52.7	5.5	53.3	0.3	7.0	6-Jul	29-Jul	23.0	
28	Nuseed	NC527CR TF	TF	<b>1302</b>	23.1	43.8	51.8	6.0	51.5	0.0	8.3	7-Jul	1-Aug	25.5	
29	Proseed	TR23127	TF	<b>1566</b>	20.5	46.3	52.6	2.5	53.8	3.0	6.3	6-Jul	27-Jul	20.3	
30	CROPLAN	CP9978TF	TF	<b>1854</b>	21.0	46.3	52.3	5.5	50.3	0.3	7.3	7-Jul	30-Jul	23.0	
LL only				LSD @ 5% level	<b>514</b>	1.1	1.0	1.0	1.5	3.3	1.0	1.5	1	1	1
				CV(%)	<b>17.6</b>	3.5	1.5	1.3	19.2	4.3	62.5	13.6	7	1	3
All canola varieties				LSD @ 5% level	<b>388</b>	1.3	1.4	1.0	2.0	3.6	1.1	1.1	1	1	1
				LSD @ 10% level	<b>325</b>	1.0	1.1	0.8	1.7	3	1	0.9	1	1	1
				CV(%)	<b>12.2</b>	4.2	2.2	1.3	33.3	4.6	56.4	10.2	6.7	2.4	4.1
Trial Mean=				<b>2261</b>	Pea-marble size hail 6/13- 6oz.Priaxor+4oz. Section 3 was applied on 6/15/2024										
Mean of RR/TF only varieties=				2019											
Mean of LL only varieties=				2401											

Experimental Design: RCB w/4reps

Seeding rate=10-12PLS/Ft.<sup>2</sup>

Planting Date- 5/29/2024

\*Herbicide Tolerance--LL=Liberty Link, RR=Roundup Ready, Opt.Gly=Optimum Glyphosate Tolerant and TF=TruFlex Roundup Ready

<sup>1</sup>Clean Seed Yields corrected to 8.5% moisture.<sup>2</sup>Protein and oil reported on dry matter basis.<sup>3</sup>-Lodging-9=upright;1=flat.<sup>4</sup>ESV(early season vigor) 21 days after planting 9= best;1=least.<sup>5</sup>White mold(sclerotinia) 8/14/2024 0=none;6=severe infection impact<sup>6</sup>Straight combine LL plots received Roundup PowerMaxII 2 weeks prior to harvest

Fertilizer application- 140-30-20-20s applied PPI 5/22/2024.

Past crop= Soybean-conventional tillage.



Table 2.

## 2024 Canola Swath and Direct Harvest Variety Trial

### Northern Resources Cooperative- Roseau, Mn

Ent#	Company	Variety	Herbicide Tolerance*	#/acre Swath + combine	Protein <sup>2</sup>	Oil <sup>2</sup>	Palmitic acid	Stearic acid	Oleic acid	Linoleic acid	Linolenic acid	Erucic acid	Eicosenoic acid
<u>Swath+Combine LL plots</u>													
1	BASF	InVigor LR354PC	RR/LL	2336	21.5	44.2	4.8	1.6	64.5	21.0	9.9	1.0	2.2
2	BASF	InVigor L340PC	LL	2740	22.1	42.5	4.7	1.8	57.7	19.3	8.9	2.5	0.4
3	BASF	InVigor L343PC	LL	2528	22.1	43.2	4.7	1.7	54.5	19.7	10.3	2.1	0.9
4	BASF	InVigor L345PC	LL	2571	22.3	42.3	4.9	1.7	48.3	20.3	10.9	2.1	0.8
5	BASF	InVigor L350PC	LL	2506	22.1	44.5	4.7	1.7	61.6	20.1	8.9	0.7	2.8
6	BASF	XP1	LL	2833	21.1	43.4	4.7	1.8	64.1	19.8	8.8	1.4	1.2
7	CROPLAN	CP7250LL	LL	1765	23.4	43.3	4.5	1.7	65.4	19.7	8.1	1.5	1.1
8	CROPLAN	CP7130LL	LL	1937	22.1	43.6	4.9	1.7	64.2	19.6	8.4	2.4	0.8
9	Dekalb	DK800LL	LL	2384	21.5	45.1	4.7	1.7	61.6	20.6	9.3	1.4	2.0
10	Dekalb	DK801LL	LL	2642	22.1	44.6	4.7	1.5	66.2	21.7	9.9	1.3	1.4
11	Dekalb	DK401TL	TF/LL	2488	21.8	44.8	4.7	1.6	61.7	20.9	9.4	1.1	2.2
12	Dekalb	DK400TL	TF/LL	2376	22.1	44.5	4.8	1.4	63.9	22.6	11.1	1.2	1.0
13	Pioneer	P612L	LL	2031	23.1	44.3	4.8	1.5	65.6	21.7	9.7	1.2	1.1
14	Pioneer	P505MSL	LL	2173	21.5	43.7	4.9	1.8	65.8	19.2	8.3	2.2	0.5
15	BrettYoung	BY7204LL	LL	2231	21.4	45.3	4.7	1.6	57.1	21.2	10.4	1.4	1.5
<u>Straight combine LL plots</u>													
16	BrettYoung	BY7204LL	LL	2147	22.2	44.4	4.6	1.5	54.7	20.4	10.3	1.5	1.4
17	Dekalb	DK800LL	LL	2486	22.1	44.6	4.7	1.7	61.6	20.8	9.2	1.4	1.9
18	BASF	InVigor L340PC	LL	2859	22.1	42.1	4.7	1.9	59.1	18.9	8.7	2.6	0.2
19	BASF	InVigor L343PC	LL	2586	22.4	42.4	4.6	1.7	51.8	19.5	10.3	2.3	0.3
<u>Swath+Combine RR plots</u>													
20	BASF	InVigor LR354PC	RR/LL	2324	21.9	44.1	4.6	1.6	62.9	20.7	9.8	1.2	1.8
21	CROPLAN	CP9978TF	TF	2138	22.2	45.2	4.5	1.4	66.7	21.8	9.9	1.1	1.0
22	CROPLAN	CP9221TF	TF	2039	22.8	42.3	4.8	1.5	62.4	20.8	9.4	1.8	0.2
23	Pioneer	P515G	Optimum Gly	2140	20.7	46.5	4.6	1.5	68.5	21.4	9.4	0.9	0.4
24	Nuseed	NC527CR TF	TF	2130	23.5	43.5	4.5	1.7	53.3	18.9	10.0	2.0	1.2
25	Star Specialty	StarFlex	TF	2449	22.1	45.6	4.4	1.4	66.6	21.5	9.6	1.4	0.8
26	Proseed	TR23127	TF	2331	22.9	44.3	4.4	1.6	62.9	19.9	8.5	1.3	2.0
<u>Straight combine RR plots</u>													
27	Star Specialty Seed	StarFlex	TF	1931	20.4	47.1	4.4	1.4	69.8	21.2	9.3	1.1	1.1
28	Nuseed	NC527CR TF	TF	1302	23.1	43.8	4.5	1.7	51.7	18.7	9.5	2.1	1.3
29	Proseed	TR23127	TF	1566	20.5	46.3	4.3	1.6	66.9	20.0	8.2	0.9	2.3
30	CROPLAN	CP9978TF	TF	1854	21.0	46.3	4.4	1.4	68.7	21.7	9.5	1.1	1.1
All canola varieties			<b>LSD @ 5% level</b>	388	1.3	1.4	0.1	0.1	4.2	0.5	0.4	0.2	0.5
			<b>CV(%)</b>	12.2	4.2	2.2	2.1	2.7	4.8	1.8	3.0	10.9	27.7

Experimental Design: RCB w/4reps

table 3.

## 2024 Canola Sclerotinia Control Trial Northern Resources-Roseau and St.Paul Campus-U of M.

Roseau location-planted 5/29/2024

TRT#	Product Brand name	Target Application Timing	Yield <sup>1</sup>	Disease <sup>3</sup>		test wt			Ht(in.)	Lodging <sup>4</sup>	
		1st app.+ 2nd app(if any)	#/acre	DSI <sup>2</sup>	Incidence	ESV <sup>5</sup>	#/bushel	Protein			Oil
1	Untreated control	NA	1793	5.70	17.3	8.3	54.2	24.5	39.8	62	6.5
2	Contans	Pre-plant soil/harrow	1916	9.21	24.3	8.0	54.1	25.0	39.5	62	6.0
3	Double Nickel LC	20-30% bloom	1932	5.00	17.0	7.8	54.0	24.6	40.1	61	6.0
4	Double Nickel LC	50-60% bloom	1824	5.51	16.8	7.0	53.9	24.7	40.3	62	6.5
5	Double Nickel LC	20-30% bloom + 7 days later	1955	7.44	19.3	8.0	54.2	24.9	39.6	62	5.0
6	Serenade OPTI	20-30% bloom	1900	5.46	16.0	7.3	53.9	24.1	40.3	62	6.0
7	Serenade OPTI	50-60% bloom	1665	6.04	17.3	7.8	54.0	24.9	40.2	63	6.0
8	Serenade OPTI	20-30% bloom + 7 days later	2072	6.16	18.0	9.0	54.0	24.3	40.1	63	6.5
9	Contans + Serenade OPTI	Pre-plant soil+20-30%bloom	1730	4.76	14.3	8.0	53.9	24.2	40.3	63	5.5
10	Endura	20-30% bloom	1924	1.89	4.5	7.8	54.0	24.7	40.3	62	6.0
11	Proline + Endura	20-30% bloom + 7 days later	2538	0.91	2.3	7.0	53.8	24.3	40.4	63	6.0
LSD @ 5% level:			240	3.70	10.1	1.1	0.4	0.8	0.9	2	1.5
CV(%)			8.7	48	46	10	0.5	2.3	2.4	2.3	17.4

Experimental Design: RCB w/4reps

St.Paul location\*-planted 4/23/2024

TRT#	Product Brand name	Target Application Timing	Yield <sup>1</sup>	Disease <sup>3</sup>		test wt		
		1st app.+ 2nd app(if any)	#/acre	DSI <sup>2</sup>	Incidence	#/bushel	Protein	Oil
1	Untreated control	NA	1515	3.07	6.3	48.1	28.6	33.4
2	Contans	Pre-plant soil/harrow	1333	3.77	7.3	48.7	28.7	33.2
3	Double Nickel LC	20-30% bloom	1240	3.83	7.5	48.6	28.4	33.1
4	Double Nickel LC	50-60% bloom	1491	3.44	6.8	48.8	28.1	34.7
5	Double Nickel LC(2x)	20-30% bloom + 7 days later	1638	3.28	6.8	49.4	28.2	34.4
6	Serenade OPTI	20-30% bloom	1506	1.53	3.5	48.9	28.1	34.7
7	Serenade OPTI	50-60% bloom	1581	2.58	4.8	48.5	28.5	33.9
8	Serenade OPTI(2x)	20-30% bloom + 7 days later	1611	4.08	7.5	48.4	27.8	34.0
9	Contans + Serenade OPTI	Pre-plant soil+20-30%bloom	1191	2.76	5.0	48.5	29.1	33.1
10	Endura	20-30% bloom	1613	2.07	4.0	49.2	27.7	33.7
11	Proline + Endura	20-30% bloom + 7 days later	1497	1.63	3.3	48.4	28.6	33.6
LSD @ 5% level:			344	3.60	6.4	1.2	1.1	1.2
CV(%)			16.2	85	78	1.7	2.8	2.5

Experimental Design: RCB w/4reps

Variety= InVigor L345PC

Seed Treatment=Helix Vibrance + Lumiderm

\*Severe lodging in St.Paul may have influenced disease impacts and control by product applications.

Both locations had sunflower hulls infected with sclerotinia applied and incorporated with shallow cultivation prior to planting.

Product name + Rate/acre	Active Ingredient	Roseau-	St.Paul-
Untreated control	NA	1st-application 7-15-2024 NNW 5-7 70F ptcldy 30%bloom	
Contans @ 4#	Coniothyrium minitans	2nd-application 7-22-2024 wet foliage cldy 71F 5mph NNW 10am full bloom	
Double Nickel LC @ 5 quarts	Bacillus amyloliquefaciens		
Serenade OPTI @ 20oz.	Bacillus subtilis	1st-application 6-13-2024 12:00 30% bloom 65F 6mph WNW-foliage damp	
Endura @ 5.5oz.	Boscalid	2nd-application 6-19-2024 2:00 full bloom and badly lodged 68F 6mph ENE	
Proline @ 5.7oz.	Prothioconazole		

<sup>1</sup>Yield-Clean seed #/acre adjusted to 8.5% moisture.

<sup>2</sup>Disease Severity Index(DSI) -A weighted disease incidence rating where the severity of disease is taken into account.

A sub sample plants rated for severity(0=clean;6=severe sclerotinia) in each plot.

<sup>3</sup>Disease Incidence (DI)- % of infected plants in 15' of sampled area/plot.

<sup>4</sup>Lodging-1=upright; 9=flat

<sup>5</sup>ESV (Early Season Vigor 6/14)- 9=best;1=least



table 6.

**2024 Late Season Flea Beetle Pod Feeding Trial  
Northern Resources-Roseau,Mn**

Treatment and Date	#/Ac <sup>1</sup>	Protein <sup>2</sup>	Oil <sup>2</sup>	Test wt/ #/bu.			Flea <sup>5</sup> beetle 8/24	Harvest Height (in)	Begin Bloom Date	End Bloom Date
1 No treatment-straight combine	2581	23.9	41.1	51.4	3.5	9.3	1.8	63	8-Jul	27-Jul
2 Brigade-2.6oz. 8/28/2024	2401	24.3	41.0	51.5	5.0	9.3	2.0	63	8-Jul	27-Jul
3 Brigade-2.6oz. 9/5/2024	2843	23.7	41.4	51.1	4.0	9.3	2.0	63	8-Jul	27-Jul
4 Brigade 2.6oz. 8/24/2024	2603	23.7	41.8	51.5	3.0	9.5	2.5	60	8-Jul	27-Jul
LSD @5% level	NS	NS	NS	NS	1.3	NS	NS	1	0	0
CV(%)	11.5	2.3	1.4	0.7	21.5	2.7	60	1.1	0	0

Experimental Design: RCB w/4reps. A buffer plot was seeded between treatments and mowed down on 8/24/2024.

Variety=L340PC

Harvested 9/12/2024

<sup>1</sup>Clean Seed Yields corrected to 8.5% moisture.

<sup>2</sup>Protein and oil reported on dry matter basis.

<sup>3</sup>Lodging-1=upright;9=flat.

<sup>4</sup>ESV(early season vigor) 6/24 9= best;1=least.

<sup>5</sup>Flea beetle injury-1=none;6=severe

High tunnels were not placed as very low populations of late season flea beetle presence.

As a result, treatments were modified to applying Brigade 2EC (Bifenthrin) at various times to control remaining flea beetles.

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table 7.

**2024 Desiccation Applications as a Harvest Aid Evaluation  
Northern Resources-Roseau,Mn**

Trt#	Desiccation Treatment	Date	#/Ac <sup>1</sup>	Protein <sup>2</sup>	Oil <sup>2</sup>	Test wt./ bu.		Harvest Height (in)	Begin Bloom Date	End Bloom Date
1	No treatment-straight combine	14-Sep	2395	22.2	44.5	52.0	4.0	57	11-Jul	29-Jul
2	Reglone 1.5pt.	9-Sep	2258	22.3	44.4	52.3	4.5	57	10-Jul	29-Jul
3	Sharpen 2 oz.	9-Sep	2242	22.5	44.2	52.3	4.0	56	10-Jul	29-Jul
4	Roundup PowerMaxIII 1.5pt	3-Sep	2355	22.2	44.5	52.4	3.5	57	11-Jul	29-Jul
5	Roundup 1.5pt+Sharpen 2 oz.	3-Sep	2593	22.6	44.1	52.4	3.5	55	11-Jul	29-Jul
6	Swath	3-Sep	2752	22.4	44.4	52.0	4.0	55	10-Jul	29-Jul
	LSD @5% level		280	NS	NS	0.4	1.6	2	NS	NS
	CV(%)		7.6	0.5	1.2	0.5	26.8	3	0	1.4

Experimental Design: RCB w/4reps. A buffer plot was seeded between treatments and mowed down on 8/24/2024.

Variety= L345PC

A buffer border isolation plot planted between treatments.

<sup>1</sup>Clean Seed Yields corrected to 8.5% moisture.

<sup>2</sup>Protein and oil reported on dry matter basis.

<sup>3</sup>Lodging-1=upright;9=flat.

Planting date=5/24 Separate plots and mow off buffer plots- 8/28/2024

Harvest date=9/14/2024

Treatment+adjuvants	Target application timing	Trt. Date
Trt 1 - Untreated	1-combine-<10%moisture	14-Sep
Trt 2 - Reglone 1.5 pint + NIS 0.25%	2-Apply 7 days after 4&5	9-Sep
Trt 3 - Sharpen 2 oz + MSO 1% + AMS 2%	3-Apply 3-4 days after 4&5	9-Sep
Trt 4 - Roundup 24 oz + MSO 1% + AMS 2%	4- Apply 70% seed color change	3-Sep
Trt 5 - Roundup 24 oz + Sharpen 2 oz + MSO 1% + AMS 2%	5-Apply 70%seed color change	3-Sep
Trt 6 - Swathed	6-Swath 30% seed color change(?)	3-Sep

