Pulse Replicated On-Farm Independent Trials

Pea Fungicide Trial

Disease in peas is a serious concern and can have dramatic yield implications if not monitored and no appropriate control measures are taken when risk is high. Fungicide decision support check lists can help inform if applications are warranted by rating crop canopy, leaf wetness, crop humidity, weather forecasts, and if disease symptoms already present. In Saskatchewan, the most common species of disease found on peas is Ascochyta pinodes (sexual stage: Mycosphaerella pinodes), also referred to as mycosphaerella blight. Losses attributed to this disease have been reported to be as high as 80%. Although measures can be taken to estimate risk of disease, the use of check strips is still an excellent way of determining if the applications were economically beneficial to the farm's net income. Check strips can be easily incorporated on farm and can help producers in their future fungicide decision support check lists when they have statistically significant, replicated trial results from their own farm to reference.

Objective

To evaluate fungicide performance and farm economics on field pea from a fungicide application vs. untreated check strips.

Treatments

1)	Untreated check
2)	Treated with fungicide

Trials were set up as randomized strip trials, with a minimum 3 replicates per treatment, preferred 4. Untreated check plots were still driven through with the sprayer with the booms turned off to create equal amounts of crop trampling in treated and untreated plots. All plots were managed the same agronomically aside from treatments.

Data Collection

- Seed test of seed lot to be used
- Soil test (N, P, K, S, OM%, pH, CEC, etc.)
- In-season disease assessments at R2-R3 stage (beginning bloom-flat pod)
- Assessments scales included below
- Seeding information (depth, opener type, fertilizer/inoculant placement, speed, etc.)
- Plant density, vigour (plant height) per plot
- Field history and management practices (E.g. fertility, pesticides, etc.)
- Yield by plot
- Harvest subsample per plot for grain analysis
- Economics
- General in-season observations such as weed competition, disease susceptibility, standability, days to flower, and maturity
- Weather data (in-field or nearby weather station)

Root Rot Rating Scale

Rating	Lesions	% affected	Pruning
1	None	0	0
2	Small (<1 cm), lesion near seed attachment	0	0
3	Small coalescing lesions approximately 180° around the stem	10-20%	0
4	Lesions extending and completely encircling the stem	20-95%	5-20%
5	Increasingly discolored and extended epicotyl lesions	100%	20-50%
6	Epicotyl lesions encircling the stem extending up to 2 cm	100%	50-80%
7	Tap root (including epicotyl) completely lesioned	Dead	Dead

Mycosphaerella/Ascochyta Blight Complex Rating Scale

Rating	Description
1	No disease
2	Mild to moderate disease on less than 5% of plant
3	Moderate to severe disease on 5-20% of plant
4	Moderate to severe disease symptoms on 20-50% of plant
5	Moderate to severe disease symptoms 50-80% of plant
6	Disease on all or most of the plant, plant stunted but alive
7	Plant stunted/dying

Bacterial Blight, White Mold and Downy Mildew

1 = Yes symptoms
0 = No symptoms

The follow footnotes will be referred to for the combined and individual site reports for this protocol

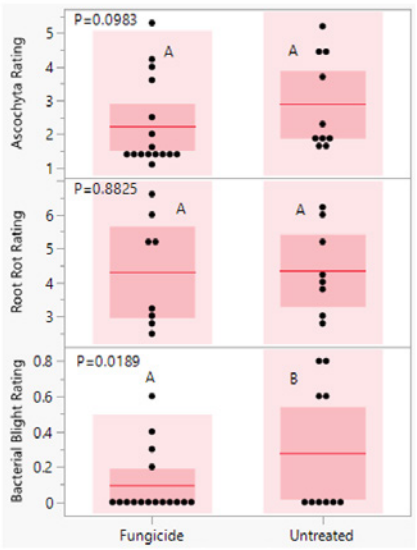
[1]SE is the standard error which is the same unit as the measurement and indicates the level of variability or uncertainty in the data

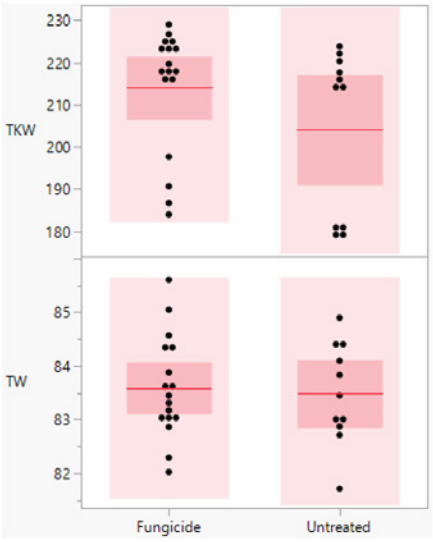
[2]All response data was analyzed using a Standard Least Square Model in JMP. Replicate and location were considered random effects while fungicide application was considered a fixed effect. If the assumptions of normality and equal variance were not met, the data was transformed and back transformed for the data presented. Treatment means were separated using Tukey's test; however, letter groupings for the interactions were only presented when they were significant according to the overall tests of fixed effects. All treatment effects and differences between means were considered significant at $p \leq 0.05$; however, p-values in the range of 0.5-1.0 and other meaningful trends may also be discussed. P values >0.1 indicate that there is no difference between treatments.

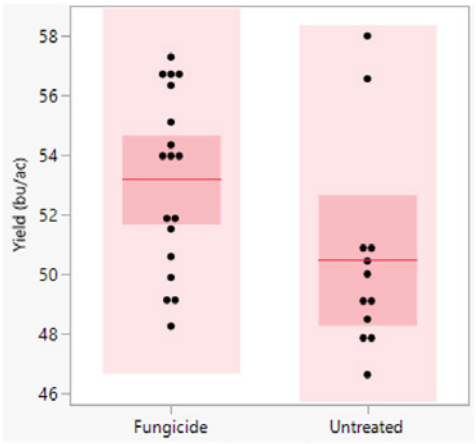
2024 Pea Fungicide Trial Results Summary

The results below are from three sites across Saskatchewan. No significant effects on yield were observed, with only a 1.2 bu/ac difference. Given the cost of fungicides, not applying them in these circumstances would be more economical. However, thousand kernel weights and test weights did increase with fungicide application. Bacterial blight was significantly reduced with fungicide use (p=0.0189). Overall, these results may be attributed to the high temperatures and low precipitation experienced at these locations in July and August.

			Disease Rating						
Treatment	Plant Density (plants/ft²)	Heights (cm)	Root Rot (1-7)	Mycos/ Ascochyta (1-7)	Bact. Blight (Y=1, N=0)	Yield (bu/ac)	Thousand Kernel Weights (TKW) (g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Untreated	8.1	82.3	4.4	2.7	0.2	51.3	205.8	83.1	24.6
Fungicide	7.7	84.5	4.3	2.4	0.1	52.5	210.5	83.5	24.8
SE[1]	0.088	2.96	1.24	0.9	0.05	0.66	1.75	0.23	0.11
p-value[2]	0.0054	0.4781	0.8825	0.0983	**0.0189**	0.0953	**0.0122**	**0.0472**	0.2695







Pulse Replicated On-Farm Independent Trials

Pea Fungicide
(Lone Rock)

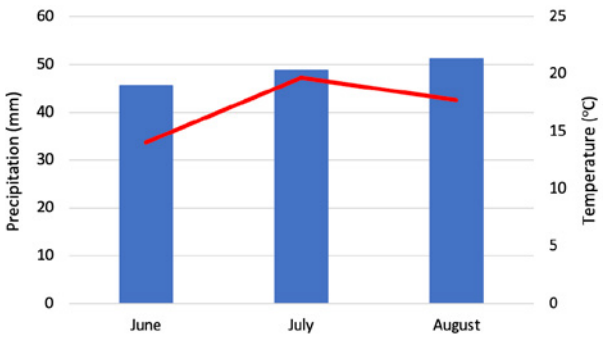
Treatment #	Description
1	Untreated
2	Fungicide

Objective: To evaluate seeding rates of chickpeas including comparisons of seedling survivability, harvested seed size, seed-borne disease, maturity, and yield in response to plant population across various landscapes.

General Trial Information:

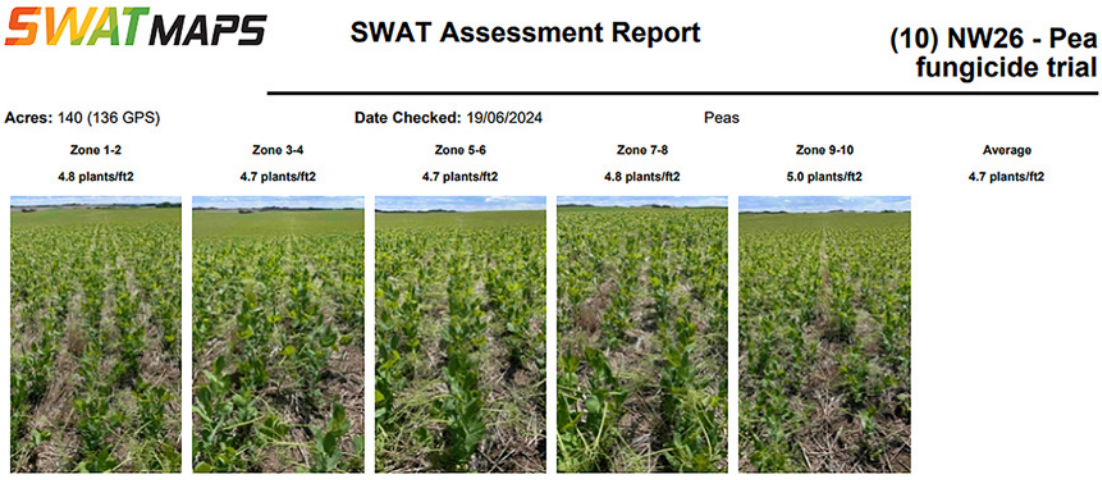
Variety	CDC Canary
Thousand Kernel Weight	263.1 g
Germination	91%
Seed Treatment	Apron Maxx®
Inoculant	Nodulator® Duo
Previous Crop	Wheat
Soil Organic Matter	4.1%
Residual Nitrate-N (0-6")	19 lb/ac
Soil Texture	Medium
Seeding Date	April 27
Seeding Equipment	Bourgault 3320
Seeding Rate	187 lb/ac
Seeding Depth	1"
Seeding Speed	4.7 mph
Row Spacing	10"
Total Applied Fertilizer (lbs/ac N-P-K-S)	5-24-0-0
Crop Protection	April 25: Glyphosate + trifludimoxazin + saflufenacil June 1: Imazamox + bentazon + UAN August 4: Glyphosate

Weather obtained from local weather station



Fungicide Application

Product	Pydiflumetofen + azoxystrobin + propiconazole
Rate	0.5L/ac
Date	July 4
Crop Stage	2 days after first flower
Tank Mix	NA
Water Volume	10 gal/ac
Speed	10.5 mph
Sprayer	Case 4440, 120', 120 US Gal tank

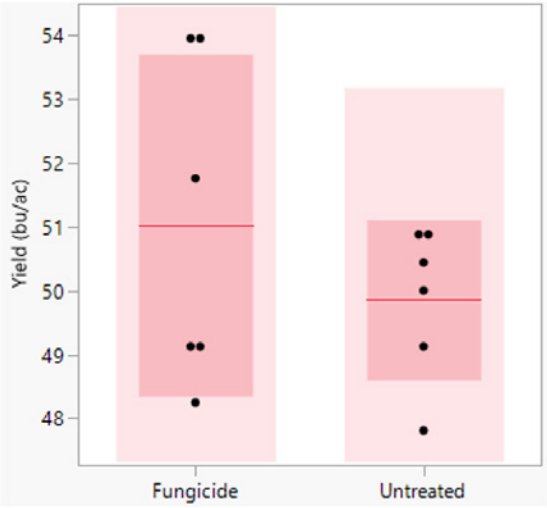


Results

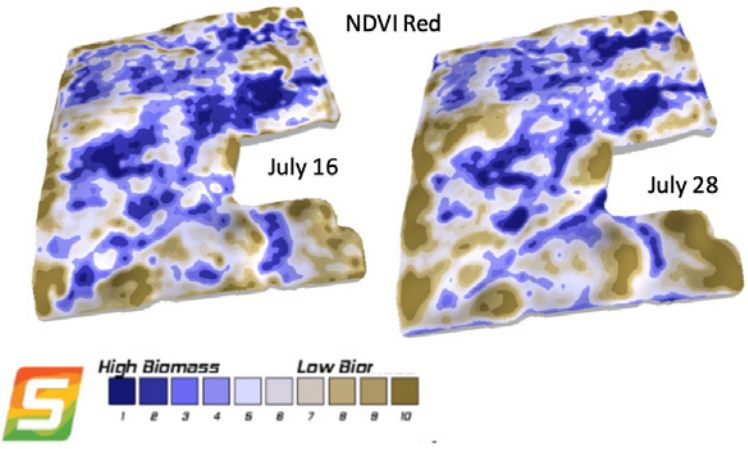
			Disease Rating								
Treatment	Plant Density (plants/ft²)	Heights (cm)	Root Rot (1-7)	Mycos/ Ascochyta (1-7)	White Mold	Downy Mildew	Bact. Blight	Yield (bu/ac)	Thousand Kernel Weights (TKW) (g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Untreated	8.1	87.6	3.4	1.8	0.0	0.0	0.7	49.8	219.8	84.5	24.3
Fungicide	7.7	91.4	2.9	1.4	0.0	0.0	0.4	51.0	217.2	84.2	24.1
SE[1]	0.088	5.1	0.23	0.08	0	0	0.103	1.03	1.29	0.25	0.11
p-value[2]	0.0054	0.6202	0.1957	**0.0034**	0.1	0.1	**0.0197**	0.1608	0.1933	0.3855	0.0773

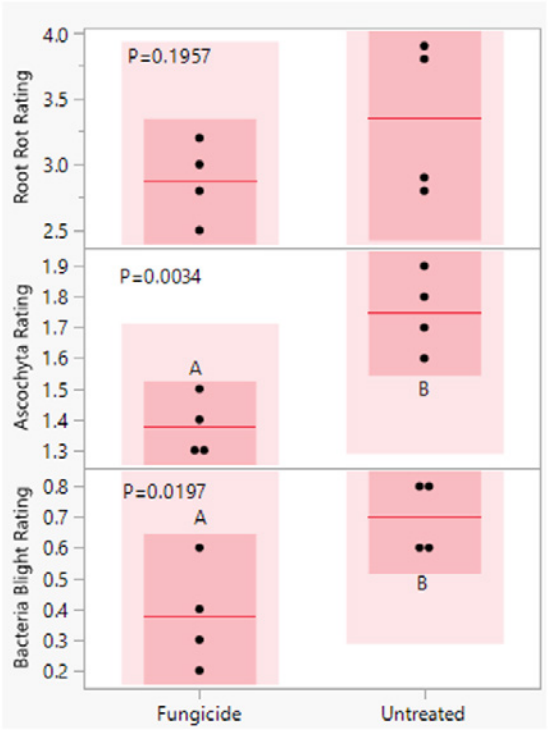
Treatment Description	Fungicide ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/Loss ($/ac)
Untreated	0.0	0.00	49.8	11.00	548.39	548.39	0.00
Fungicide	25.1	25.14	51.0	11.00	561.26	536.12	-12.27

[y]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (fungicide cost $25.14/ac)
[z]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (estimated farm gate price $11.00/ac)



Mycosphaerella/Ascochyta blight (p=0.0034) and bacterial blight (p=0.0197) ratings were significantly lower with fungicide application. An average yield increase of 1.2 bu/ac was observed with fungicide use; however, given the cost of fungicides, not applying them in this situation proved to be more economical.





To review footnote references please refer to overall trial summary on page 129.

This trial was conducted with the agronomic support of

SWATMAPS

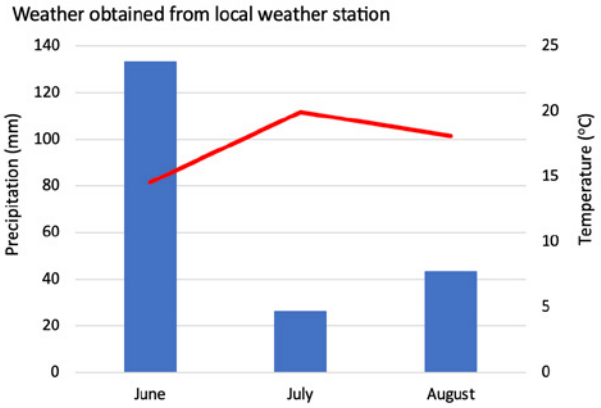
Pea Fungicide
(Luseland)

Treatment #	Description
1	Untreated
2	Fungicide

Objective: To evaluate seeding rates of chickpeas including comparisons of seedling survivability, harvested seed size, seed-borne disease, maturity, and yield in response to plant population across various landscapes.

General Trial Information:

Variety	CDC Spectrum
Thousand Kernel Weight	255.4 g
Germination	98%
Seed Treatment	N/A
Inoculant	Nodulator® Duo
Previous Crop	Canola
Soil Organic Matter	4.0%
Residual Nitrate-N (0-6")	42 lb/ac
Soil Texture	Medium
Seeding Date	May 19
Seeding Equipment	Bourgault twin knife
Seeding Rate	235.51 lb/ac
Seeding Depth	1.5"
Seeding Speed	4.3 mph
Row Spacing	12"
Total Applied Fertilizer (lbs/ac N-P-K-S)	6-28-0-0
Crop Protection	April 25: Glyphosate + trifludimoxazin + saflufenacil June 1: Imazamox + bentazon + UAN August 4: Glyphosate



Fungicide Application

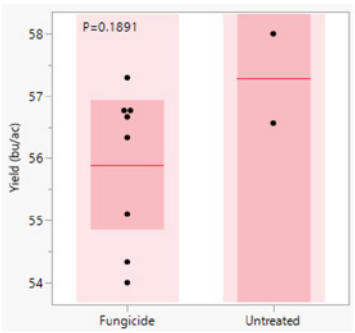
Product	Florylpicoxamid + pyraclostrobin	Prothioconazole + trifloxystrobin	Mefentrifluconazole + prothioconazole
Rate	37.2 L/ac	37.7 L/ac	38.0 L/ac
Date	July 12	July 11	July 12
Speed	12.6 mph	12.8 mph	11.8 mph
Crop Stage	Early Flowering		
Tank Mix	NA		
Water Volume	10 gallons		
Sprayer	100' Millar Nitro		

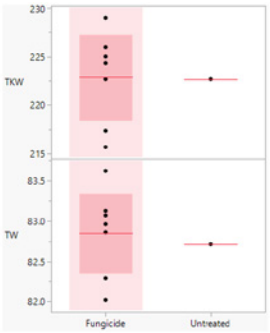
Results

		Disease Rating								
Treatment	Heights (cm)	Root Rot (1-7)	Mycos/ Ascochyta (1-7)	White Mold	Downy Mildew	Bact. Blight	Yield (bu/ac)	Thousand Kernel Weights (TKW) (g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Untreated	70.9	0.0	2.1	0.0	0.0	0.0	57.3	222.7	82.7	25.8
Fungicide	72.8	0.0	1.6	0.0	0.0	0.0	55.9	222.9	82.8	25.9
SE[1]	4.69	0	0.34	0	0	0	0.96	5.101	0.572	0.35
p-value[2]	0.6862	0.1	0.2362	0.1	0.1	0.1	0.1891	0.9714	0.8188	0.6493

Treatment Description	Fungicide ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/Loss ($/ac)
Untreated	0	0	55.9	11.00	614.90	614.90	0.00
Fungicide	25.14	25.14	57.3	11.00	630.30	605.16	-9.74

[y]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (fungicide cost $25.14/ac)
[z]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (estimated farm gate price $11.00/ac)

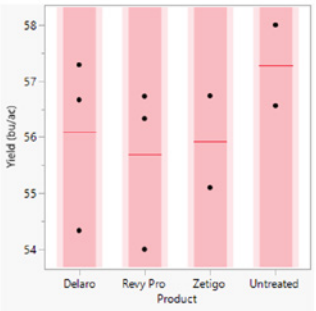




		Disease Rating								
Treatment	Heights (cm)	Root Rot (1-7)	Mycos/ Ascochyta (1-7)	White Mold	Downy Mildew	Bact. Blight	Yield (bu/ ac)	Thousand Kernel Weights (TKW) (g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
Untreated	71.2	0.0	2.1	0.0	0.0	0.0	56.9	222.7	82.6	25.5
Zetigo	69.5	0.0	2.0	0.0	0.0	0.0	55.5	220.0	83.0	26.1
Delaro	72.1	0.0	1.4	0.0	0.0	0.0	56.4	221.7	83.0	25.9
Revy Pro	75.6	0.0	1.5	0.0	0.0	0.0	56.0	227.5	82.5	26.0
SE[1]	5.8	0	0.341	0.0	0.0	0.0	0.52	3.0	0.84	0.115
p-value[2]	0.7485	0.1	0.4457	0.1	0.1	0.1	0.1297	0.427	0.792	0.0516

Treatment Description	Fungicide ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/ Loss ($/ac)
Untreated	0	0	57.3	11.00	630.08	630.08	0.00
Zetigo	25.14	25.14	55.9	11.00	615.12	589.98	-40.10
Delaro	25.14	25.14	56.1	11.00	617.07	591.93	-38.15
Revy Pro	25.14	25.14	55.7	11.00	612.57	587.43	-42.65

[y]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (fungicide cost $25.14/ac)
[z]2024 Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (estimated farm gate price $11.00/ac)



Overall, no significant effects were observed between the untreated and fungicide treatments. Additionally, there was little yield difference among the three fungicide products. In this case, opting not to spray was the more economical decision.

To review footnote references please refer to overall trial summary on page 129.

This trial was conducted with the agronomic support of

MNP AgINTELLECT

Pea Fungicide
(Wilkie)

Treatment #	Description
1	Untreated
2	Fungicide

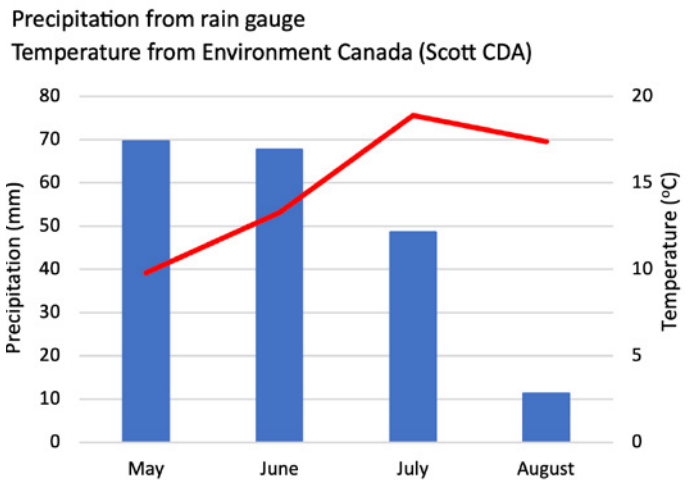
Objective: To evaluate fungicide performance and farm economics on field pea from a fungicide application vs. untreated check strips.

General Trial Information:

Variety	CDC Mosaic
Thousand Kernel Weight	240 g
Germination	84%
Seed Treatment	Insure® Pulse
Inoculant	TagTeam® LCO
Previous Crop	Canola
Seeding Date	May 11
Seeding Equipment	SeedHawk iCon 60-12
Seeding Rate	3.5 bu/ac
Seeding Depth	1.75”
Seeding Speed	5 mph
Row Spacing	12”
Total Applied Fertilizer (lbs/ac N-P-K-S)	6-13-6-4
Crop Protection	June 9: Imazamox + bentazon + UAN + Bio-Forge™ August 20: Diquat + LI 700®

Fungicide Application

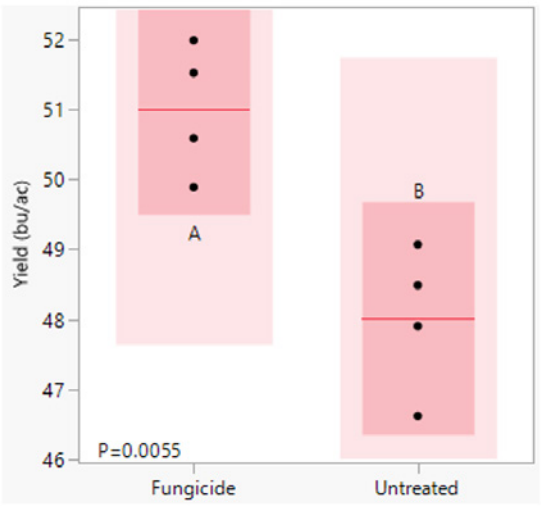
Product	Fluxapyroxad + pyraclostrobin
Date	July 15
Crop Stage	Start of flowering
Tank Mix	N/A
Water Volume	12.6 gal/ac
Speed	12 mph
Sprayer	Case Patriot 4440

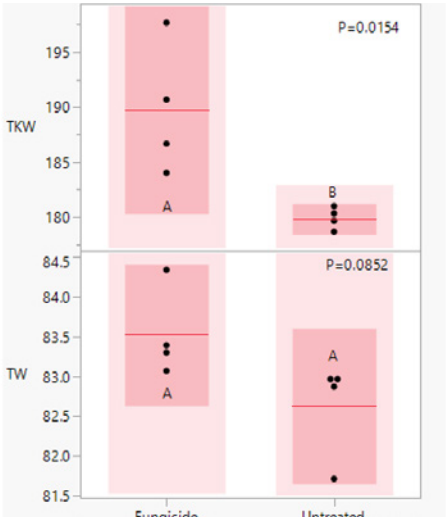


Treatment	Heights (cm)	Disease Rating					Yield (bu/ac)	Thousand Kernel Weights (TKW) (g/1000s)	Test Weight (TW) (kg/hL)	Protein (%)
		Root Rot (1-7)	Mycos/ Ascochyta (1-7)	White Mold	Downy Mildew	Bact. Blight				
Untreated	88.3	5.4	4.5	0.0	0.0	0.0	48.0 B	179.8 B	82.6	24.1
Fungicide	89.8	5.8	4.3	0.0	0.0	0.0	51.0 A	189.8 A	83.5	24.0
SE[1]	2.52	0.393	0.475	0.1	0.1	0.1	0.4973	2.74	0.418	0.23
p-value[2]	0.6983	0.5256	0.7257	0.1	0.1	0.1	**0.0055**	**0.0154**	0.0852	0.8393

Treatment Description	Fungicide ($/ac)[y]	Total Cost ($/ac)	Yield (bu/ ac)	Target Price ($/bu)[z]	Gross Revenue ($/ac)	Net Revenue ($/ac)	Profit/Loss ($/ac)
Untreated	-	-	48.0	18.00	864.36	864.36	0.00
Fungicide	25.14	25.14	51.0	18.00	917.82	892.68	28.32

[y]2024 Green/Yellow Peas, 2024 Crop Planning Guide, Government of Saskatchewan (fungicide cost $25.14/ac)
[z]Rayglen Commodities, August 21, 2024, online article, https://www.rayglen.com/rayglen-market-comments-august-21-2024/ (target price $18/bu)





Heights, disease ratings, thousand kernel weights, and protein levels showed no significant differences with fungicide application compared to the untreated check. However, the fungicide application resulted in significantly higher yields (p=0.0055), with an increase of 3 bu/ac over the check. Additionally, thousand kernel weights were significantly increased by the fungicide (p=0.0154). Accounting for the cost of the fungicide, the 3 bu/ac yield increase with a target selling price of $18/bu would lead to a profit of $28.32/ac compared to untreated.

To review footnote references please refer to overall trial summary on page 129.

This trial was conducted with the agronomic support of

Western Applied Research Corporation WARC Research from our farm to yours