



2013 ADOPT Project Report

Effect of Fungicide Application and Seeding Rate on Disease Levels in Field Pea and Lentil



Prepared by:

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1. **Project Title:** The Effect of Fungicide Application and Seeding Rate on Disease Levels in Field Pea and Lentil
2. **Project Number:** 20120401
3. **Producer Group Sponsoring the Project:** Conservation Learning Centre Inc.
4. **Project Location:** Conservation Learning Centre. Prince Albert, Sask.
Located on the SW 20-46-26 W2, RM 461
5. **Project Start Date and End Date:** May 1, 2013 to February 15, 2014
6. **Project Contact Person and Contact Details:** Larry White, A/Manager
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7. **Project Objectives:** To demonstrate the effect of seeding rate and fungicide application on field pea and lentil production.
8. **Project Rationale:** Diseases such as white mold in lentil and mycorosphaerella blight are frequently believed to reduce yield and quality in northern Sask. While there are many fungicides on the market the benefits to producers are not always evident. Increased seeding rates in peas and lentils have been promoted as a good practise to increase yields and reduce weed competition, but a dense crop canopy can also increase the incidence and severity of disease. This project will demonstrate what effect seeding rate and fungicide application can have on field pea and lentil crops.
9. **Methodology:** The project layout was a randomized complete block design with four replicates. The treatment sizes were 2.5m x 10m. The treatments were as follows;
 1. Lentil seeded at 130 seeds/m² (low seeding rate), no fungicide
 2. Lentil seeded at 260 seeds/m² (regular seeding rate), no fungicide
 3. Lentil seeded at 520 seeds/m² (high seeding rate), no fungicide
 4. Lentil seeded at 130 seeds/m² (low seeding rate), at least one fungicide application (second application if required).
 5. Lentil seeded at 260 seeds/m² (regular seeding rate), at least one fungicide application (second application if required).
 6. Lentil seeded at 520 seeds/m² (high seeding rate), at least one fungicide application (second application if required).
 7. Field pea seeded at 50 seeds/m² (low seeding rate), no fungicide
 8. Field pea seeded at 100 seeds/m² (regular seeding rate), no fungicide
 9. Field pea seeded at 200 seeds/m² (high seeding rate), no fungicide
 10. Field pea seeded at 50 seeds/m² (low seeding rate), at least one fungicide application (second application if required)
 11. Field pea seeded at 100 seeds/m² (regular seeding rate), at least one fungicide application (second application if required)
 12. Field pea seeded at 200 seeds/m² (high seeding rate), at least one

application of fungicide (second application if required)

The project will be evaluated by recording spring plant density, disease ratings, crop maturity, seed yield and thousand kernel weight.

The project was planted on summerfallow, which had been in corn in 2011. A pre seed burn off of Advantage Plus was applied at 1.5 L/ac on May 17, 2013. The cultivar choices were Centennial field pea and CDC Maxim Lentil. The seed treatment used was Cell Tech.

The peas were seeded on May 22, 2013 when the soil temperature was 12C. The fertilizer applied with the seed was 59.8 lbs/ac N, 20.8 lbs/ac P and 26 lbs/ac S. The soil surface was dry at seeding time. The peas emerged May 27, 2013. The spring plant density was as follows;

- Low seeding rate—36 plants
- Regular seeding rate—81 plants
- High seeding rate—161 plants

The lentils were planted on May 24, 2013 when the soil temperature was 12C. The soil surface was dry at planting time. The lentils emerged on May 29, 2013. The spring plant density was as follows;

- Low seeding rate---90 plants
- Regular seeding rate---212 plants
- High seeding rate---460 plants

The treatments were all sprayed on June 28, 2013 with the herbicide Sencor at a rate of 110 g/ac in 10 gallons of water/ac. The temperature that day was 18C at 5:30 a.m. The initial weed control was very good. Later in the season there was a fair bit of cleavers and barnyard grass in most of the treatments.

The treatments calling for fungicide were sprayed on July 14, 2013 with Headline @ 160 ml/ac using a water rate of 10 gal/ac. The peas and lentils were just beginning to bloom. The temperature was 20C that day.

On August 7, 2013 there was no evidence of any disease showing up in any of the treatments.

On August 26, 2013 the treatments were beginning to ripen as follows;

- Peas, low seeding rate—pods about 1/4 ripe
- Peas, regular seeding rate---pods about 1/2 ripe
- Peas, high seeding rate---pods about 2/3 ripe

The Lentil treatments were very similar to the peas above in terms on maturity on August 26, 2013

The treatments were all sprayed with 1.5 L/ac Weather Max in a 10 gal/ac water equivalent on August 27, 2013. The temperature was 24C that day.

The treatments were all combined on September 16, 2013

10. Results:

1. Lentil, low seeding rate at 130 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
101	36.80	15.25
210	28.40	16.96
311	33.20	15.86
411	34.00	18.61
Average	33.10	16.67

2. Lentil, regular seeding rate at 260 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
102	32.60	33.55
205	35.40	28.98
302	30.80	19.52
410	32.00	22.57
Average	32.70	26.16

3. Lentil, high seeding rate at 520 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
103	34.80	35.99
212	31.60	16.76
306	30.20	26.23
402	30.00	12.20
Average	31.65	22.80

4. Lentil, low seeding rate at 130 seeds/m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushels/ac
104	34.00	24.71
206	33.67	42.70
301	34.20	29.28
407	30.20	17.38
Average	33.02	28.52

5. Lentil, regular seeding rate at 260 seeds/m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushel/ac
105	33.50	35.69
209	29.96	35.99
303	33.00	15.56
408	30.60	21.35
Average	31.77	27.15

6. Lentil, high seeding rate at 520 seeds/m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushels/ac
106	34.20	42.70
204	34.60	27.15
307	30.40	21.96
405	No data	No data
Average	33.07	30.60

7. Pea, low seeding rate at 50 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
107	130.67	34.77
211	140.58	16.96
310	145.00	38.74
401	139.94	26.96
Average	139.04	29.36

8. Pea, regular seeding rate at 100 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
108	137.06	41.79
202	138.26	32.94
304	133.55	42.70
406	No data	No data
Average	136.29	39.14

9. Pea, high seeding rate at 200 seeds/m², no fungicide

Plot	1000 Kernel Weight	Yield in Bushels/ac
109	129.84	42.09
207	137.07	28.37
312	130.13	39.04
404	126.99	44.35
Average	131.01	38.46

10. Pea, low seeding rate at 50 seeds/m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushels/ac
110	130.06	40.26
208	137.67	32.94
308	150.50	32.33
412	138.76	37.43
Average	139.25	35.74

11. Pea, regular seeding rate at 100 seeds/m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushels
111	140.02	38.74
203	138.11	43.62
305	147.05	43.62
409	130.35	47.89
Average	138.88	43.47

12. Pea, high seeding rate at 200 seeds m², one fungicide application

Plot	1000 Kernel Weight	Yield in Bushels
112	140.41	33.55
201	139.97	40.87
309	133.68	41.18
403	132.56	38.74
Average	136.66	38.59

The weather conditions saw a later than normal spring as there was snow on the ground on May 1, 2013. Quite surprisingly normal spring field operations resumed by May 17. May was drier than normal and warmer than normal. Seeding later in May was into a dry top soil. June saw normal temperatures and over twice the normal rainfall (181.6 mm). July saw near normal precipitation and temperatures. August was slightly cooler and drier than normal.

Disease ratings were not conducted, however staff reported no visible signs of disease in either the peas or lentils. Pea yields were higher (2519 kg/ha) than for lentils (1702 kg/ha). Although yields at the medium and high seeding rates were numerically higher than the low seeding rates, these differences were not statistically significant. The thousand kernel weight was not affected by seeding rate or fungicide application.

The average yields for the treatments are as follows;

Lentil	No Fungicide	One Fungicide	Diff for fungicide
Low seed rate	16.67	28.52	11.85
Regular seed rate	26.16	27.15	0.99
High seed rate	22.80	30.60	7.80

The cost of Headline EC on December 31, 2013 was \$610/jug. A jug will treat 40 acres at the recommended rate, resulting in a cost of \$15/ac.

The average price of red lentils in December 2013 was about \$18/bushel.

Based on these prices and costs and one year trial results at the CLC, the net return from using one application of fungicide would be as follows;

Low seed rate---\$198.30/ac

Regular seed rate—breakeven

High seed rate---\$125.40

It should be noted that the above net returns were achieved in a year when no disease was visually evident in the crop.

Peas	No Fungicide	One Fungicide	Diff for Fungicide
Low seed rate	29.36	35.74	6.38
Regular seed rate	39.14	43.47	4.33
High seed rate	39.04	38.59	(0.45)

The price of feed field peas on December 31, 2013 was in the range of \$2.50/bushel.

The cost of Headline EC on December 31, 2013 was \$15/ac as above.

Based on these prices and costs and one year trial results at the CLC it would not provide a positive net return to apply fungicide. One should keep in mind that the increases in yield seen above were achieved in a year when disease in the crop was not visually evident.

11. Conclusions and Recommendations: This project was also carried out at Scott, Melfort and Swift Current. The following is provided by Laryssa Grenkow at Scott who compiled the composite report for the project in 2013.

In general, applying a fungicide increased yields by 9-21% at these sites, which on average was enough to re-cover the additional cost of the fungicide. Targeting an optimum plant density by using seeding rates of 100 seeds/m² for peas and 260 seeds/m² for lentils resulted in higher yields compared to the lower seeding rates. Improvements in yields beyond these medium seeding rates were not consistent, and highest net return was achieved with the medium seeding rate, regardless of whether or not a fungicide was applied. Based on these results it is recommended to target plant populations from provincial guidelines (75-85 and 130 plants/m² for peas and lentils respectively) and protecting a crop with high yield potential using a fungicide to maintain yield and improve net return'.

12. Acknowledgements: The Conservation Learning Centre would like to acknowledge the funding provided to the project from the Ministry of Agriculture ADOPT Program and the CLC staff for their dedication in the establishment and maintenance of the project.

The CLC would also like to recognize the leadership provided to the project by Laryssa Grenkow of WARC at Scott.

13. Appendices: Nil

14. Abstract/Summary: The following abstract was provided by Laryssa Grenkow, WARC who compiled the composite report for this project for the four locations involved in the project.

Increased seeding rates in peas and lentils can increase seed yield and weed competition, however, a denser crop canopy may increase the incidence and severity of disease. The objective of the demonstration was to help farmers determine the benefit, if any, of applying a foliar fungicide in peas and lentils at low, medium and high seeding rates. The treatments consisted of a combination of crop (pea and lentil), fungicide application (yes or no), and seeding rate (low, medium, high). Seeding rates were adjusted for lentil and pea to 130, 260 and 520 viable seeds m² for lentil and 50, 100 and 200 viable seeds m² for pea. Applying a fungicide increased yields by 9-21% at all sites, which, on average, was enough to re-cover the cost of the fungicide. Targeting an optimum plant density by using seeding rates of 100 seeds m² for peas and 260 seeds m² for lentils resulted in higher yields compared to the lower seeding rates. Improvements in yield beyond the medium seeding rates produced inconsistent results and highest net return was achieved with the medium seeding rate, regardless of whether or not a fungicide was applied. The lack of interaction between seeding rate and fungicide at 3 of 4 sites in 2013 shows the benefit of fungicide application in protecting high yield potential under optimal growing conditions. Thus, we recommend targeting plant populations from provincial guidelines (75-85 and 130 plants m² for peas and lentil, respectively) and protecting a crop with high yield potential using a fungicide to maintain yield and improve net returns'.