

## Foliar Application of 2,4-D Reduces Damage to Potato Tubers by Common Scab

Common scab (*Streptomyces scabies*) is a persistent soil-borne disease that causes rough corky lesions on the surface of potato tubers. Scab lesions begin to form early in the development of the tuber and increase in size as time passes in the field. Tuber infection and subsequent growth of the scab lesions are favoured by warm dry soil conditions. Growth of the scab lesions ceases once the crop is harvested. Scab damage to the tubers is strictly cosmetic, but consumers have a low tolerance for scabby looking tubers.

Tolerances for scab on seed potatoes are also low, as planting scab-infested seed is a common means of introducing the disease into previously uninfected fields. Many commercial potato fields and backyard gardens in Saskatchewan are contaminated with common scab. The red-skinned potato varieties in demand in Saskatchewan table potato markets are all more or less susceptible to common scab. Russet potato varieties are more scab resistant, while the yellow-fleshed varieties range from highly sensitive (Yukon Gold) to quite resistant (Milva and Yellow Star).

There are few effective or affordable cultural control options available for management of common scab. Extended crop rotations to non-host crops can reduce damage by common scab, but common scab has a wide host range and the pathogen can use decaying crop residues as an alternative food source. Keeping the potato crop well irrigated, especially during tuber set will reduce problems with common scab. Minimizing the period of time that the crop is left in the ground once the crop is mature can help limit the size of the lesions produced by the common scab organism. However, there are logistical limits as to how quickly a potato crop can be harvested. Some fungicidal seed treatments (metiram) claim to be able to prevent the introduction of common scab to a field when scab-infested seed potatoes are used. However, short of fumigating the field, chemical control options registered in Canada for control of common scab once it becomes established in a field are limited. In-furrow application of the fungicide PCNB has recently been approved on an emergency basis in a limited number of states in the USA for control of common scab in potatoes. PCNB fungicides are already registered in Canada for control of a range of soil-borne and foliar diseases of potatoes.

While studying the potential to improve the color of red-skinned potatoes by foliar application of low rates of the herbicide 2,4-D, we observed that the 2,4-D treatment also had the unexpected effect of suppressing the development of common scab on the harvested crop. **This project further explored the impact of foliar-applied 2,4-D on common scab in potato.**

### Materials and Methods

Trials were conducted in 2010-2012 and 2014 at the Department of Plant Sciences Potato Research plots in Saskatoon Saskatchewan. Two sites were employed. The Main field had never been cropped to potatoes before and as such its scab status was unknown. The Scab field has been in a 2-3 year potato rotation for > 40 years (1970-2014) during which time it became heavily infested with common scab (*Streptomyces scabies*) and to a lesser extent powdery scab (*Spongospora subterranean*). Both fields have a sandy loam soil, pH 7.8, EC < 1 dS, with 2-4% O.M. Both fields were used in the trials conducted in 2010 and 2011. Only the Scab Field was used in the 2012 and 2014 trials – but in 2014 the trial in the Scab Field was conducted under both irrigated and rain-fed conditions.

The cultivars tested were;

**Norland** - is the industry standard for red-skinned table potatoes in Canada. Norland is early maturing and high yielding. Norland is moderately resistant to common scab, but susceptible to powdery scab.

**AC Peregrine Red** - is later maturing than Norland but produces darker red, more uniform tubers than Norland. AC Peregrine Red is more sensitive to both common and powdery scab than Norland.

**Shepody** - is a light russet, early maturing table potato. Shepody is very sensitive to common scab and moderately sensitive to powdery scab.

All trials utilized standard production practices. Weeds were controlled by tillage and the application of pre and post-emergent herbicides. The trial was planted in mid-May using cut certified (scab-free) seed. Each treatment row was 8 m long. The crop was hilled prior to emergence and again just prior to row closure. Unless otherwise specified, an overhead irrigation system was employed whenever soil moisture potentials averaged over the effective root zone dropped below  $-50$  kPa.

The treatments tested in 2010 were;

- 1) 2,4-D (700 g/L LV ester) – applied at 2.5 fl.oz product/a in 80L/water/a. This concentration of 2,4-D represents the approved rate of 2,4-D for color enhancement in red-skinned potato.
- 2) 2,4-D (700 g/L LV ester) – applied at 5 fl.oz product/a. This heavier dosage was used to determine if the effects of 2,4-D are dosage dependent.
- 3) Fluazinam – applied in-furrow at seeding at 1 kg/a of fluazinam (Allegro at 40% fluazinam) in the equivalent of 80L/water/a. Preliminary work has shown that fluazinam has some potential to control powdery scab. The fluazinam treatment was only tested in the Scab field as there was no powdery scab in the Main Field.
- 4) Control – sprayed with water alone.

The treatments tested in 2011 were;

- 1) 2,4-D (700 g/L LV ester) at 2.5 fl.oz product/a. See 2010 trial for treatment details.
- 2) 2,4-D (700 g/L LV ester) at 5.0 fl.oz product/a. See 2010 trial for treatment details.
- 3) Fluazinam - applied as a split application - with 0.75 kg/a of fluazinam applied in-furrow at seeding and another 0.75 kg/ha applied over the row just prior to the first hilling of the crop. The fluazinam was only tested in the Scab field as there was no powdery scab in the Main Field.
- 5) Control – sprayed with water alone.

The treatments tested in 2012 were;

- 1) 2,4-D (700 g/L LV ester) at 2.5 fl.oz product/a. See the 2010 trial for treatment details.
- 2) Fluazinam - applied as a split application. See the 2011 trial for treatment details.
- 3) 2,4-D + fluazinam – the 2,4-D was applied to the foliage as outlined in treatment 1 and the fluazinam was applied as a split application to the planted row as outlined in treatment 2.
- 4) Control – sprayed with water alone.

The treatments tested in 2014 were:

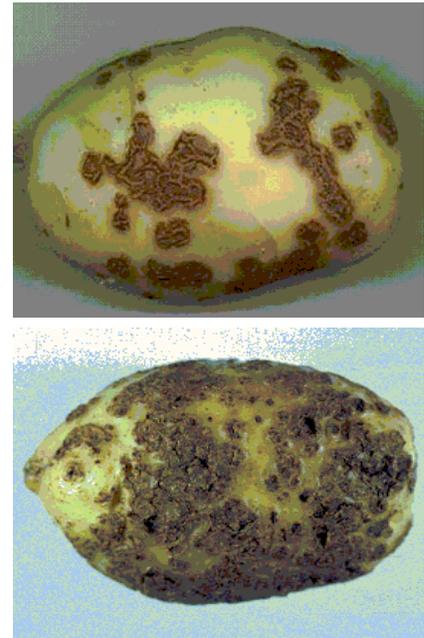
- 1) 2,4-D (700 g/L LV ester) at 2.5 fl.oz product/a. See the 2010 trial for treatment details.
- 2) Pentachloronitrobenzene (PCNB) (Blocker at 50 % PCNB) was applied to the planting furrow at the label recommended rate of 6.6 L of product/a.
- 3) PCNB applied in furrow + foliar applied 2,4-D.
- 4) Control – sprayed with water alone.

All in-furrow treatments were applied in a 20 cm wide band across the bottom of the planting furrow. The 2<sup>nd</sup> application to the treatment row was made before the crop had emerged and just prior to the first hilling step. Flat fan nozzles were used to direct the treatment spray over the entire hill. The first treatment with the foliar-applied products was made as the flower buds were just beginning to form. This coincides with the start of tuber development. Infection of potato tubers by both common and powdery scab occurs at this time. The second application occurred 10 days later, at which time the crop was in full

flower. The period of tuber set also covers about 10 days. The foliar-applied PGR's were sprayed prior to 10 a.m. The crop was not watered for at least 3 days after application of the various treatments.

The crops were top-killed in early September using the desiccant diquat and machine harvested by late September. The tubers were weighed and graded within 3 weeks of harvest and then held in a dark 6°C storage. After six weeks of storage, 25 potatoes randomly selected from each treatment of each cultivar were washed and then visually evaluated for incidence and severity of the skin lesions caused by common and powdery scab (Fig. 1). These data were used to determine the proportion of the tubers that would have been rendered unmarketable due to excessive levels of the disease in question. **Canadian Food Inspection Agency standards stipulate that potatoes are no longer marketable if more than 5% of the surface area is affected by diseases such as scab.**

**Fig 1. Potato tubers infected with common scab (top) or powdery scab (bottom).**



## Results and Discussion

**Crop Health** - within a few days of application of the 2,4-D treatments the treated leaves cupped and the growing points formed the classic fiddlehead. Subsequent development of new leaves appeared to slow but the internodes continued to elongate, giving the 2,4-D sprayed plants a leggy look. The severity of these growth effects were increased when higher concentrations of 2,4-D were applied. None of the other treatments had any impact on the appearance of the plants.

## 2010 Trial - Main Field

In Norland, the 2,4-D treatments had no impact on yields relative to the controls (Table 1). In Peregrine the 2,4-D treatments reduced yields relative to the controls in a dosage dependent manner. This yield reduction was due to a reduction in average tuber size (data not shown). The 2,4-D treatments had no impact on yields of Shepody.

Levels of common scab in the Main Field were much higher than anticipated. As *Streptomyces scabies* has a wide host range, the fact that this field had not been planted to potatoes in the recent past did not preclude contamination of the site by *Streptomyces scabies*. Nonetheless, “new” land is anticipated to have fewer scab problems than land that has been in a long-term potato rotation.

As anticipated, Norland had lower levels of grade-out to common scab relative to Peregrine and Shepody. In Norland, the 2,4-D treatments reduced the % grade-out to excess common scab, with the low rate of 2,4-D proving to be most effective (Table 1). The low rate of 2,4-D enhanced Norland yields after grade out to common scab relative to the untreated control. Peregrine showed a very high rate of grade out to common scab, irrespective of the treatment applied (Table 1).

**Table 1. Influence of PGR's on yields and grade-out to common scab for Norland, Peregrine and Shepody potatoes grown in the Main Field in 2010**

	Marketable sized tubers (t/ha)	% grade out to C. Scab	Yield after grade out (t/ha)
<b>Norland</b>			
2,4-D (low rate)	47.3a	14c	37.2a
2,4-D (high rate)	43.0b	32b	29.2b
Control	45.4ab	44a	25.4b
<b>Peregrine</b>			
2,4-D (low rate)	40.7b	83b	6.9a
2,4-D (high rate)	32.6c	85b	4.9a
Control	46.1a	98a	0.9b
<b>Shepody</b>			
2,4-D (low rate)	37.6a	77b	8.6a
2,4-D (high rate)	34.7a	88a	4.2b
Control	33.2a	88a	4.0b

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ).

Tubers graded out when >5% of the surface is covered with scab.

Both 2,4-D treatments reduced the % grade-out of Peregrine to excess common scab relative to the non-treated controls, leading to significant yield advantage after grade out to common scab was considered. Grade-out to common scab was also very high in Shepody. The low rate of 2,4-D again provided the greatest degree of protection against tuber damage by common scab, leading to a significant yield advantage after grade out to common scab was considered.

### 2010 Trial - Scab Field

None of the treatments applied to the Norland crop in the Scab field altered yields relative to the controls. The high rate of 2,4-D reduced yields of Peregrine relative to all other treatments.

Both common and powdery scab were detected on tubers grown in the Scab field in 2010. In Norland, all of the treatments reduced grade-out due to common scab relative to the untreated control - with the 2,4-D treatments showing the greatest efficacy and the fluazinam treatment the least (Table 2). A similar range of treatment effects was seen when yields of Norland after grade-out to excessive common scab were calculated. The only treatment that reduced grade-out of the Norland crop to powdery scab was fluazinam - it enhanced marketable yields accordingly. Treatment of the Norland crop with 2,4-D produced the highest yields after grade-out to both types of scab, but all of the treatments providing some degree of yield enhancement relative to the non-treated controls. In Peregrine, both 2,4-D treatments reduced the severity of common scab relative to the controls (Table 2). Marketable yields of Peregrine after grade-out to common scab were highest when the low rate of 2,4-D was applied. The 2,4-D treatments appeared to marginally increase the severity of powdery scab on Peregrine relative to the

controls and the fluazinam treatment. By suppressing damage by the more prevalent common scab, the 2,4-D treatments may have been leaving areas of the skin open to attack by the less aggressive powdery scab organism. The 2,4-D treatments again provided the highest marketable yields after grade-out when both types of scab were considered. The combined effects of common and powdery scab resulted in 100% of the untreated control crop of AC Peregrine failing to meet grade standards.

**Table 2. Influence of PGR's on yields and grade out to common and powdery scab for Norland and AC Peregrine potatoes grown in the Scab Field in 2010**

	Yield (t/ha)	Grade out (%)		Yield after grade out (t/ha)		
		C. Scab	P. Scab	C. Scab	P. Scab	C. + P. Scab
<b>Norland</b>						
2,4-D (low rate)	29.2a	1d	33a	28.9a	19.6b	19.3a
2,4-D (high rate)	32.0a	10c	29a	28.8a	22.7ab	19.5a
Fluazinam	29.9a	49b	16b	15.2b	25.1a	10.5b
Control	27.9a	65a	32a	9.8c	19.0b	0.8c
<b>Peregrine</b>						
2,4-D (low rate)	32.6a	38b	34a	20.2a	21.5a	9.1a
2,4-D (high rate)	23.5b	41b	30a	13.9b	16.4b	6.8a
Fluazinam	29.6a	88a	20b	3.6c	23.7a	0b
Control	31.4a	87a	22b	4.0c	24.5a	0b

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ). Tubers graded out when >5% of the surface is covered with scab.

### 2011 Trial – Main field

In Norland, the 2,4-D treatments did not altered total yields relative to the controls (Table 3). In Peregrine, the 2,4-D treatments reduced yields relative to the controls in a dosage-dependent manner. The yield reduction was due to a reduction in average tuber size (data not shown).

Once again there was a significant amount of common scab in the Main Field in 2011 – despite the fact that this field has not previously been planted to potatoes. As expected, Norland had lower levels of grade out to common scab relative to Peregrine.

**Table 3. Influence of PGR's on yields and grade out to common scab for Norland and Peregrine potatoes grown in the Main Field in 2011**

	Yield (t/ha)	Grade out to C. Scab	Yield (t/ha) after grade out to C. Scab
<b>Norland</b>			
2,4-D (low rate)	46.5ab	5b	44.2a
2,4-D (high rate)	43.8b	5b	41.7a
Control	47.9a	13a	41.6a
<b>Peregrine</b>			
2,4-D (low rate)	44.6b	57b	19.2a
2,4-D (high rate)	35.5c	38c	22.0a
Control	51.3a	76a	12.3b

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ).

Tubers graded out when > 5% of tuber surface covered by scab.

In Norland, both 2,4-D treatments reduced grade-out to common scab in the Main Field (Table 3). However, as overall levels of scab were low, the 2,4-D treatments did not significantly improve yields of Norland after grade-out to scab. Peregrine showed a very high rate of grade-out to common scab in the Main Field. Both 2,4-D treatments reduced grade-out of Peregrine to common scab, relative to the non-treated controls. The reduction in grade-out to common scab provided by the 2,4-D treatments more than compensated for any yield reduction caused by these treatments – resulting in an increase in marketable yields.

### 2011 Trial - Scab Field

Yield responses to the treatments applied in the Scab Field in 2011 varied greatly from cultivar to cultivar. In Norland the fluazinam treatment increased yields relative to the control, while the high rate of 2,4-D reduced yields of Peregrine relative to the untreated control. Yields of Shepody were highly variable across the trial and the control treatment produced exceptionally low yields.

Both common and powdery scab were present at high levels in the Scab Field in 2011 – however the distribution of powdery scab was uneven across the plot, resulting in high levels of variability in the powdery scab ratings. In Norland, both 2,4-D treatments and the fluazinam treatment provided effective control of both types of scab – resulting in yields after grade out to the two types of scab that were significantly higher than the controls (Table 4). In Peregrine, grade out to common scab was greater than in Norland, but grade out to powdery scab was comparable to that seen in Norland. The 2,4-D treatments also reduced grade out to both types of scab in Peregrine – again resulting in enhanced marketable yields after grade out to scab relative to the untreated controls. The fluazinam treatment again provided a significant degree of protection against powdery scab in the Peregrine crop. The disease responses to the experimental treatments in Shepody were dissimilar to those seen in the two red-skinned cultivars. The 2,4-D treatments did not protect the crop against common scab and appeared to increase grade out to powdery scab. The fluazinam treatment did provide the Shepody some degree of protection against damage by powdery scab.

**Table 4. Influence of PGR's and fungicides on yields and grade out to common and powdery scab for Norland, Peregrine and Shepody potatoes grown in the Scab Field in 2011**

	Yield (t/ha)	Grade out (%)		Yield after grade out (t/ha)		
		C. Scab	P. Scab	C. Scab	P. Scab	C. + P. Scab
<b>Norland</b>						
2,4-D (low rate)	45.7ab	0c	10c	45.7a	41.2a	41.2a
2,4-D (high rate)	45.5ab	3c	31b	44.1a	31.3b	30.0b
Fluazinam	48.5a	11b	21b	43.2a	38.3ab	33.0b
Control	42.6b	21a	68a	33.7b	13.6c	4.7c
<b>Peregrine</b>						
2,4-D (low rate)	53.3a	17c	12c	44.3a	46.9a	37.8a
2,4-D (high rate)	46.3b	26c	33b	34.3b	31.0b	18.9b
Fluazinam	52.2a	71b	10c	15.1c	47.0a	9.9bc
Control	51.2a	94a	53a	3.0d	24.0b	0c
<b>Shepody</b>						
2,4-D (low rate)	39.2a	71a	76a	13.7b	9.4b	0b
2,4-D (high rate)	40.6a	66a	78a	11.8b	8.9b	0b
Fluazinam	32.0b	68a	41c	20.3a	18.9a	6.7a
Control	22.3c	65a	53b	7.8b	10.5b	0b

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ). Tubers graded out when >5% of the surface is covered with scab.

### 2012 Trial – Scab Field

The 2,4-D treatment reduced yields of both Norland and Peregrine relative to the control, while the fluazinam had no impact on overall yields of either cultivar.

Although the Scab field had produced crops heavily damaged by powdery scab in previous years, in the 2012 trial very few powdery scab lesions were detected in any of the treatments, including the control. This was unexpected as powdery scab tends to be highly persistent in infected fields.

**Table 2012. Influence of PGR's and fungicides on yields and grade out to common scab for Norland and Peregrine potatoes grown in the Scab Field in 2012**

	Yield (t/ha)	% grade-out to C. Scab	Yields after grade-out to C. Scab (t/ha)
<b>Norland</b>			
2,4-D (low rate)	38.0b	0b	38.0a
Fluazinam	44.0a	13a	38.3a
2,4-D + fluazinam	41.5ab	0b	41.5a
Control	41.9ab	16a	35.2a
<b>Peregrine</b>			
2,4-D (low rate)	27.6c	20b	22.1b
Fluazinam	39.7ab	77a	9.1c
2,4-D + fluazinam	34.4b	7b	32.0a
Control	43.6a	75a	10.9c

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ).

Tubers graded out when >5% of the surface is covered with scab.

In both Norland and Peregrine, application of 2,4-D either alone or in combination with fluazinam significantly reduced grade-out to common scab relative to the control treatment or when fluazinam was applied alone. In Norland, marketable yields after grade-out to common scab were similar for all treatments - the reduction in grade-out to scab provided by the 2,4-D treatments offset its negative impact on total yields. In the more scab sensitive Peregrine, the benefits provided by 2,4-D treatments in terms of scab protection more than offset the substantial negative impact the 2,4-D treatment had on yields.

### 2104 Trial – Scab Field (Irrigated)

Only common scab was seen in the irrigated field in 2014 and levels of grade out to this disease were much lower than in previous years. The absence of powdery scab in this trial is puzzling as this pathogen tends to be highly persistent in infected fields and should have thrived under the cool moist conditions that prevailed in this trial.

Levels of grade-out to excessive scab were uniformly low across all the treatments applied to Norland – including the untreated controls. None of the treatments altered marketable yields of Norland relative to the control (Table 6). Application of 2,4-D alone reduced total yields of Peregrine relative to the control. The 2,4-D applied alone or in combination with PCNB reduced grade out to common scab in Peregrine. PCNB alone had no impact on grade-out to common scab in Peregrine. The reduction in grade out to common scab provided by the 2,4-D treatments did not result in any significant increase in marketable yields of Peregrine. In Shepody none of the treatments had any impact on yields and grade out to common scab was uniformly low across all treatments.

**Table 6. Influence of PGR's and fungicides on yields and grade out to common scab for Norland, AC Peregrine and Shepody potatoes grown under irrigation in the Scab Field in 2014**

	Yield (t/ha)	% grade-out to C. Scab	Yields after grade-out to C. Scab (t/ha)
<b>Norland</b>			
2,4-D (low rate)	34.8a	0a	34.8a
PCNB	33.3a	0a	33.3a
PCNB + 2,4-D	27.6b	2a	26.3b
Control	30.4ab	0a	30.4ab
<b>Peregrine</b>			
2,4-D (low rate)	30.0b	0c	30.0a
PCNB	38.8a	15ab	32.9a
PCNB + 2,4-D	37.4a	8bc	34.4a
Control	40.6a	20a	32.5a
<b>Shepody</b>			
2,4-D (low rate)	32.7a	0a	32.7a
PCNB	27.8a	0a	27.8a
PCNB + 2,4-D	26.7a	0a	26.a
Control	29.6a	2a	29.0a

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ).

Tubers graded out when >5% of the surface is covered with scab.

### **2014 Trial – Scab Field (Rainfed)**

The treatments had no impact on the yields of Norland or Shepody under rainfed conditions in 2014, but foliar application of 2,4-D and furrow applied PCNB increased total yields of Peregrine relative to the controls (Table 7). While yields under rain-fed conditions were only marginally lower than under irrigation, the severity of common scab was much higher in the dryland trial. In all three cultivars, treatment with 2,4-D significantly reduced grade out to common scab relative to the untreated control treatment (Table 7). This reduction in grade out resulted in a significant increase in marketable yields relative to the controls. The efficacy of the 2,4-D treatment at reducing scab and improving marketable yields was never improved by using it following in-furrow treatment with PCNB and the PCNB treatment alone had no impact on grade out to scab in any of the cultivars tested.

**Table 7. Influence of PGR's and fungicides on yields and grade out to common scab for Norland, Peregrine and Shepody potatoes grown under rainfed conditions in the Scab Field in 2014.**

	Yield (t/ha)	% grade-out to C. Scab	Yields after grade-out to C. Scab (t/ha)
<b>Norland</b>			
2,4-D (low rate)	40.3a	30c	28.2a
PCNB	39.5a	88a	4.7c
PCNB + 2,4-D	36.2a	58b	15.2b
Control	35.5a	95a	1.8c
<b>AC Peregrine</b>			
2,4-D (low rate)	39.2a	83b	6.6a
PCNB	37.4a	100a	0b
PCNB + 2,4-D	33.9b	72b	9.5a
Control	34.5b	100a	0b
<b>Shepody</b>			
2,4-D (low rate)	30.4a	63b	11.2a
PCNB	30.8a	97a	0.9b
PCNB + 2,4-D	29.5a	78b	6.5ab
Control	33.2a	100a	0b

For each cultivar, values within columns followed by the same letter are not significantly different ( $P=0.05$ ). Tubers graded out when >5% of the surface is covered with scab.

### Treatment Cost/Benefit Analysis

**2,4-D.** This study suggests that treating a potato crop growing on scab infested land with 2,4-D can consistently reduce the risk of grade-out due to common scab. Treatment of potatoes with 2,4-D at the rate registered in Canada for color enhancement (2.5-5.0 fl oz product/a) is inexpensive - ca. \$0.87-1.70/a. Assuming a wholesale price for washed graded red Table potatoes F.O. B. Saskatoon at \$ 0.21/lb (average for 2010-2014), the cost of the 2,4-D treatment (materials only) would be recouped if the treatment prevented just 7 lb/a of potatoes being graded out to scab. Even on land with “light” levels of scab, grade out levels of 5% are common in Saskatchewan and growers regularly experience grade out rates approaching 20% as a function of unfavorable growing conditions and crop management practices.

**Fluazinam** Allegra (40% fluazinam) costs \$ 130/kg (2013 price). Applying fluazinam at the rates tested in this study (1 kg fluazinam/a in 2010 and 1.5 kg/a in 2011) would cost from \$

325 to 487/a. Again assuming a price of \$0.21/lb for potatoes the fluazinam treatments would need to reduce grade out to scab in table potatoes by 1600-2400 lb/a to be cost effective. The data presented in this study suggests that this saving could only be achieved in fields with a significant powdery scab problem.

**Conclusion** – data generated over multiple cropping seasons appears to confirm that 2,4-D applied at the rate approved for enhancement color in red-skinned potatoes has the potential to provide a consistent and significant degree of protection from common scab in Norland and Peregrine cultivars. A less consistent but still significant protective effect was observed in the light russet cultivar Shepody. The lower dosage of 2,4-D tested (2.5 fl oz/a) generally provided the greatest degree of scab protection and was less prone to compromising the yield potential of the crop than when higher dosages of 2,4-D were applied. **These results are important, as aside from soil fumigation, there are presently no treatments registered in Canada for the management of common scab once it becomes established in potato fields.** Losses due to grade out from excessive common scab can reach the point where growers are forced to stop growing potatoes on infected fields. This represents an expensive restriction to production, especially as it can take years for scab to decline to tolerable levels. By protecting the potato crop from common scab while also enhancing skin color the 2,4-D treatments could provide significant benefits and at minimal added cost.

Powdery scab is less widespread in Saskatchewan than common scab but its incidence is increasing. Like common scab, powdery scab is highly persistent once it becomes established in a field and there are presently no products registered for its control. This project demonstrated that application of the fungicide fluazinam in the planting furrow and to the hill just prior to hilling had the potential to provide at least some protection against powdery scab. Fluazinam is presently registered for use in potatoes in Canada but only as a foliar-applied product for the control of late blight. It is however registered as a soil-applied treatment for control of powdery scab in several other countries (USA, New Zealand and Australia) suggesting that; a) there are no significant crop safety or environmental impact considerations arising from this method of application and b) that the manufacturer (Syngenta) may be interested in supporting a label expansion to include soil applications as a powdery scab management tool.

There were some situations where products known to control one type of scab also appeared to protect against the other type of scab – ie; in 2011 the 2,4-D treatments reduced powdery scab as well as common scab, and the fluazinam treatment appeared to provide some degree of control of common scab as well as powdery scab. While being able to achieve control of both types of scab with a single product would be highly desirable, this effect was not consistent. As the two types of scab are difficult to visually differentiate, it is possible that these results may simply reflect errors in identifying the type of scab being encountered.