

Common Scab Management in Washington Potato Seed Project

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And

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Materials and Methods

During the summer of 2017, the staff at the Agriculture Development Group, Inc. conducted a research trial investigating the efficacy of multiple products for common potato scab, *Streptomyces scabies*, control (Table 1). The experimental design for this trial was a randomized complete block design with four replications and plot sizes of 11.5 ft x 20 ft (four potato rows). Applications for this trial were made at planting with a backpack sprayer calibrated to apply treatment sprays at 25 gallons per acre or as a seed treatment (see Table 1 below).

Single application was made on June-21-2017. Evaluations of vigor (1-9 scale), stand count, and stem count within 15 feet of the middle two rows were made at 36 days after planting (July-27-2017). Scab incidence % of 50 tubers and yield were evaluated after harvest.

The trial site was just north of Lynden, WA on a location provided and managed by Jeff Bedlington. The trial site and management was excellent.

Table 1. Treatment list and application details.

Trt No.	Treatment Name	Rate Rate Unit	Appl Code	Appl Description	Rep 1	2	3	4
1	Untreated Check				101	213	314	417
2	Serenade ASO	68fl oz/1000 row-ftB	B	in furrow	102	207	304	410
3	Blocker	10.4fl oz/1000 row-ftB	B	in furrow	103	216	312	407
4	Blocker	5.2fl oz/1000 row-ftB	B	in furrow	104	208	317	405
5	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	105	214	311	418
6	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	106	218	306	406
	HF723	3.1fl oz/1000 row-ftB	B	in furrow				
7	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	107	206	313	414
	HF723	6.2fl oz/1000 row-ftB	B	in furrow				
8	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	108	217	309	411
	AmyProtec	14fl oz/1000 row-ftB	B	in furrow				
9	AmyProtec	14fl oz/1000 row-ftB	B	in furrow	109	209	301	401
	AmyProtec seed*		A	seed treatment				
10	AmyProtec seed		A	seed treatment	110	201	305	416
11	AmyProtec seed		A	seed treatment	111	203	302	415
	AmyProtec	14fl oz/1000 row-ftB	B	in furrow				
	Blocker	3.3fl oz/1000 row-ftB	B	in furrow				
12	AmyProtec seed		A	seed treatment	112	210	308	403
	Blocker	3.3fl oz/1000 row-ftB	B	in furrow				
13	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	113	215	318	404
	AMV 1014	0.2fl oz/1000 row-ftB	B	in furrow				
14	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	114	202	307	402
	AMV 1014	0.3fl oz/1000 row-ftB	B	in furrow				
15	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	115	211	303	408
	Quadris	0.8fl oz/1000 row-ftB	B	in furrow				
16	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	116	204	316	412
	Serenade ASO	4.4fl oz/1000 row-ftB	B	in furrow				
17	Blocker	3.3fl oz/1000 row-ftB	B	in furrow	117	212	315	409
	Azteroid	1fl oz/1000 row-ftB	B	in furrow				
18	Serifel 10 WP	8fl oz/1000 row-ftB	B	in furrow	118	205	310	413

Results and Conclusions

Although no statistical differences were found among the treatments, the data showed differences of consequence. All treatments reduced percent scab incidence (Table 2) compared to the untreated check. AmyProtec + seed treatment of AmyProtec (treatment 9), Blocker + AMV 1014 at higher rate (Treatment 14), and Blocker + Quadris (Treatment 15) provided the greatest control with greater than 45% reduction of scab incidence, followed by Blocker at 5.2fl oz/1000 row-ft (Treatment 4), Blocker at 3.3 fl oz/1000 row-ft + HF723 at 3.1 fl oz/1000 row-ft (Treatment 6), AmyProtec seed treatment (Treatment 10), AmyProtec seed treatment + Blocker (treatment 12), Blocker + AMV 1014 at low rate (treatment 13), and Blocker + Azteroid (Treatment 17) with >30% incidence reduction. Rest of the treatments had the reduction ranged from 25% (treatment 18: Serifel 10 WP) to 7% (treatment 2: Serenade ASO).

When reviewing results, the most important information is in Table 2 in the column on the far right about % incidence of common scab. The lower the number the greater the level of efficacy.

Some of the more important points on the results:

- 1) There was no dose response when Blocker was applied alone. This is a result that was identical to the 2016 result.
- 2) There was a negative dose response from HF723 when Blocker was mixed with HF723.
- 3) AmyProtec in furrow application seems to enhance the control efficacy when combined with AmyProtec seed treatment compared to AmyProtec seed treatment alone, while similar enhancement was not observed when AmyProtec was mixed with Blocker as in furrow application. This similar to the 2016 trial results. There was a roughly similar trial conducted at the University of Wisconsin on potato scab that found similar results, Blocker in combination with AmyProtect, provided a substantial reduction in potato scab.
- 4) The three-way combination of AmyProtec seed treatment + AmyProtec in furrow + Blocker in furrow further reduced efficacy, compared to their individual applications or two way combinations. This is an important new finding.

5) Mixing Blocker with AMV 1014 as in furrow treatment seems also improved control efficacy compared to Blocker in furrow alone (again similar to results in 2016), and there was a dose response from AMV 1014 as well. Based on these results, Amvac has decided to pursue registration of this product on potatoes.

6) Quadris and Azteroid also increased the control efficacy when they were mixed with Blocker compare to Blocker alone, yet mixing Serenade ASO with Blocker did not show similar promotion but rather decreased control efficacy as compared to Blocker alone at the same rate.

7) Serenade alone was ineffective. This is interesting as it is similar species, but different strain, than other microbial products used in this trial.

8) Serifel, the new BASF product, appears to have some efficacy against scab but not as much as combination treatments. In this trial it was only used alone. This product should be screened in future potato scab trials in combination with other products such as Blocker.

Table 2. Treatment effect on final yield (tons/a) and potato scab incidence (%).

Trt No.	Treatment Name	Application rates	Number of Application	Stand Count (Jul-27-2017)	Stem Count (Jul-27-2017)	Vigor level (1-9, higher is better)	Yield (lbs/a)	Yield (tons/a)	Potato scab incidence (%)
1	Untreated Check			6.3a	5.4a	3.5a	17111.2a	8.6a	4.8a
2	Serenade ASO	68fl oz/1000 row-ft	B	6.3a	5.0a	3.9a	14939.5a	7.5a	4.6a
3	Blocker	10.4fl oz/1000 row-ft	B	6.5a	5.8a	3.6a	12088.0a	6.0a	4.0a
4	Blocker	5.2fl oz/1000 row-ft	B	7.0a	7.5a	4.0a	13227.6a	6.6a	3.2a
5	Blocker	3.3fl oz/1000 row-ft	B	6.8a	6.1a	3.5a	13630.1a	6.8a	4.2a
6	Blocker	3.3fl oz/1000 row-ft	B	6.8a	5.1a	3.6a	9461.4a	4.7a	3.1a
	HF723	3.1fl oz/1000 row-ft	B						
7	Blocker	3.3fl oz/1000 row-ft	B	6.9a	7.3a	3.8a	12908.0a	6.5a	4.0a
	HF723	6.2fl oz/1000 row-ft	B						
8	Blocker	3.3fl oz/1000 row-ft	B	6.3a	7.3a	3.5a	14872.1a	7.4a	3.9a
	AmyProtec	14fl oz/1000 row-ft	B						
9	AmyProtec	14fl oz/1000 row-ft	B	6.5a	5.5a	3.9a	13097.8a	6.5a	2.5a
	AmyProtec seed*		A						
10	AmyProtec seed		A	6.3a	5.1a	3.8a	11325.8a	5.7a	3.0a
11	AmyProtec seed		A	6.6a	5.6a	3.6a	14491.9a	7.2a	4.3a
	AmyProtec	14fl oz/1000 row-ft	B						
	Blocker	3.3fl oz/1000 row-ft	B						
12	AmyProtec seed		A	6.4a	4.5a	4.0a	11427.7a	5.7a	3.3a
	Blocker	3.3fl oz/1000 row-ft	B						
13	Blocker	3.3fl oz/1000 row-ft	B	6.5a	5.9a	3.8a	10278.6a	5.1a	3.0a
	AMV 1014	0.2fl oz/1000 row-ft	B						
14	Blocker	3.3fl oz/1000 row-ft	B	6.6a	6.1a	4.0a	6930.0a	3.5a	2.2a
	AMV 1014	0.3fl oz/1000 row-ft	B						
15	Blocker	3.3fl oz/1000 row-ft	B	6.9a	6.1a	3.8a	15901.5a	8.0a	2.6a
	Quadris	0.8fl oz/1000 row-ft	B						
16	Blocker	3.3fl oz/1000 row-ft	B	6.6a	6.0a	3.8a	11310.8a	5.7a	3.9a
	Serenade ASO	4.4fl oz/1000 row-ft	B						
17	Blocker	3.3fl oz/1000 row-ft	B	6.3a	7.6a	3.8a	14654.4a	7.3a	3.3a
	Azteroid	1fl oz/1000 row-ft	B						
18	Serifel 10 WP	8fl oz/1000 row-ft	B	7.1a	6.6a	3.8a	12499.9a	6.2a	3.6a

Notes: Means within each column with the same letters are not significant different based on the F test of LSD at P<0.05.

Graph 1. Treatment effect on potato scab incidence (%).

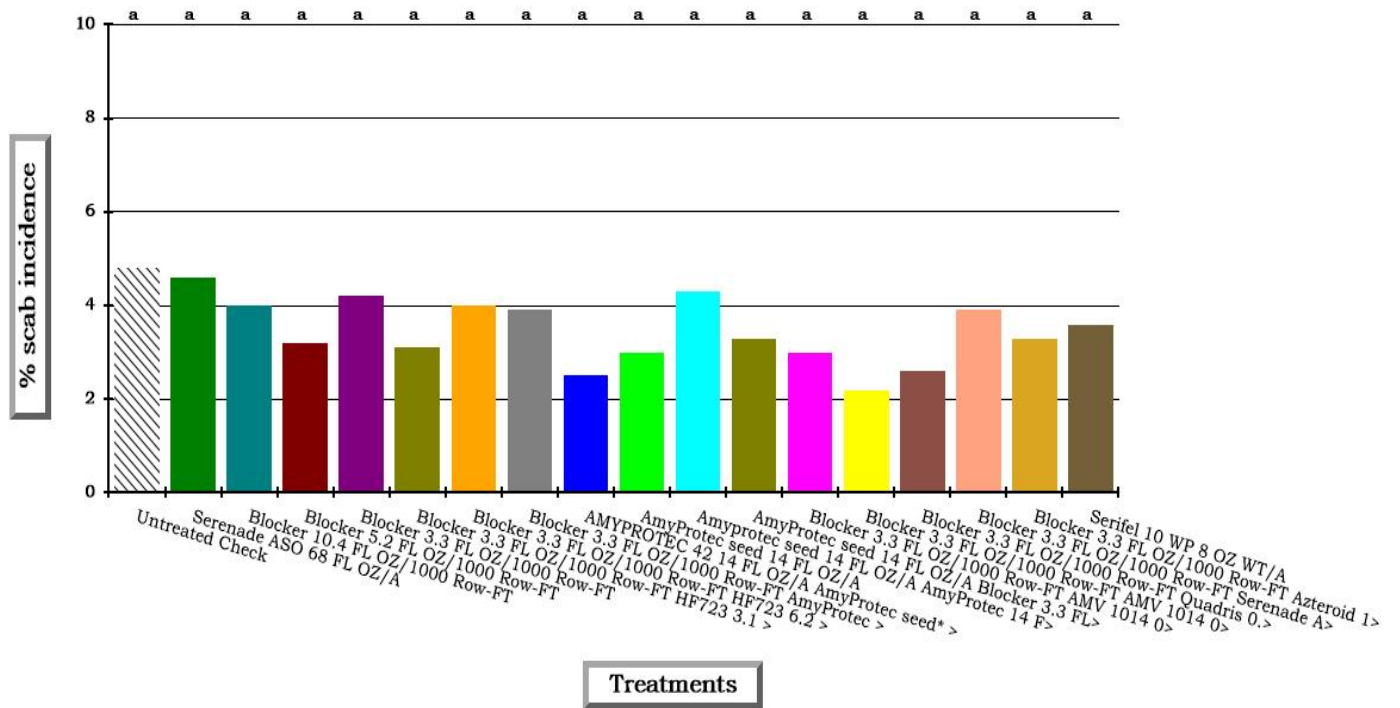


Photo 1. Trial Setup.



Photo 2. Trial evaluation.



Conclusions: Historically, there has been virtually no data generated on management of potato scab in Washington potatoes. The results of two years of field studies in Whatcom County can be used to start to make recommendations for management of potato scab. These recommendations should be considered preliminary and that significant additional work is necessary to further refine these management guidelines.

Management recommendations: The best efficacy has been achieved by combination treatments including Blocker mixed with other products. The products include Quadris and certain microbial products applied either as a seed treatment or an in furrow treatment. Based on 2017 research data, a three-way mix of an application of Blocker and a microbial product applied in furrow with a microbial seed treatment may provide additional control of potato scab. The products that seemed to be the best tank mix partners with Blocker are AmyProtec and AMV 1014. Unfortunately, at this time these product are not yet registered in for use on potatoes. AmyProtec contains the microbe, *Bacillus amyloliquefaciens*. Amv 1014 is not currently registered for this use pattern. It is in the process of being registered but it is expected to take two to three years before it is registered according to an Amvac company representatives. Serifel is a BASF product that contains the same active ingredient as AmyProtec, but contains a different strain. This product is registered on potatoes. It has not shown the same efficacy as AmyProtec, but the higher level of efficacy for this product was obtained when used in combination with Blocker. Unfortunately, we have not tested Serifel in combination with Blocker. One possible scenario for a registered and useful use pattern to aid in the management of common scab would be tank mixes of Blocker with Serifel, although this treatment has not be screened for efficacy. An additional treatment option would be an in furrow tank mix of Blocker plus Quadris. It is likely the most effective treatment will end up being a combination of an in furrow application of a synthetic fungicides with a microbial fungicide with a microbial seed treatment. One year of research suggests this treatment has significant value. Ideally more than one year's work of data is needed to verify this result. Once AmyProtec and/ or AMV 1014 are registered, growers would have additional options for management of potato scab. Regardless of the use patterns described it is important that growers incorporate non-chemical control options such as resistant variety and proper selection of production location to help manage common scab.