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Evaluation of Fungicides Applied Via Drip Irrigation for Control of Silver Scurf on Potato in Western Washington

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Abstract

Silver scurf is an economically important disease on potato tubers caused by *Helminthosporium solani*. Two studies were established near Mount Vernon, WA at Washington State University NWREC on 20 May 2011 and 21 May 2012 in Skagit silt loam soil. Five treatments included: penthiopyrad applied at 45 days after planting (dap), penthiopyrad applied at 60 dap, azoxystrobin (Quadris; 9 oz/acre) applied at 45 dap, and azoxystrobin applied at 60 dap, and a non-treated non-irrigated control. This study did not control for the effect of irrigation, as azoxystrobin- and penthiopyrad-treated plots were drip-irrigated while non-treated plots were not irrigated. The results of this study are therefore limited but do suggest a reduction in silver scurf incidence and severity with no significant impact on yield of potatoes when treated fungicide applied through drip irrigation systems.

Keywords: Potatoes, Silver Scurf, Helminthosporium solani, drip irrigation, chemigation

1. Introduction

Silver scurf is an economically important disease on potato tubers caused by *Helminthosporium solani* (Figure 1). Silver scurf is a cosmetic skin blemish of the tuber

that results in no internal damage (Powelson, 2008). The pathogen infects the tuber periderm causing lesions that reduce marketability (Errampalli, 2001). Silver Scurf also overwinters in soil, and it has been demonstrated that daughter tubers can become infected by soil borne inoculum (Stevenson, 2004). Fungicides applied through drip irrigation were evaluated for effectiveness in controlling silver scurf and as an alternative to preplant fungicide treatments (maritime, Puget Sound region with mean temps of 58, 62, and 61 ℉ and mean precipitation of 1.84, 0.86, and 1.28 in. for Jun, Jul, and Aug respectively).

Figure 1. Silver Scurf (*Helminthosporium solani*) on Chieftian Potato

2. Methods

Two studies were established near Mount Vernon, WA at Washington State University NWREC on 20 May 2011 and 21 May 2012 in Skagit silt loam soil. Treatments in both years were arranged as a randomized complete block design with four replications. Treatments were administered via drip irrigation tape. There were two treatments in 2011: penthiopyrad (Vertisan; 24 oz/acre; emulsifiable concentrate) and a non-irrigated, non-treated control. In 2012, five treatments included: penthiopyrad applied at 45 days after planting (dap), penthiopyrad applied at 60 dap, azoxystrobin (Quadris; 9 oz/acre) applied at 45 dap, and azoxystrobin applied at 60 dap, and a non-treated non-irrigated control.

The seed lot had a mean of 100% incidence (percent of infected tubers per plot) and 79% severity (percent of tuber surface infected) in 2011, and 70% incidence and 1.4% severity in 2012. Plots consisted of 10-ft rows on 38-inch centers with a 10-ft separation between plots.

In 2011, non-irrigated non-treated and penthiopyrad-treated plots were randomized with other treatments not evaluated for silver scurf and therefore not included in this study. Azoxystrobin and penthiopyrad-treated plots were drip-irrigated (T-Tape US Model 506-12-220; low flow, 16 mm diam., 6 mil wall thickness, 9 in emitter spacing).

3. Management and Harvest

The trial was maintained both years with fertilizer and pesticide management practices standard for commercial potato production in the area. Plants were topped (mowed) and then sprayed with Diquat on 25 Aug 2011 and 31 Aug 2012. Harvest took place on 7 Oct 2011 and 10 Oct 2012 to ensure the maximum exposure to silver scurf inoculum in the soil. Each tuber was weighed and graded. Twenty-five potatoes from each plot were evaluated postharvest for 2 weeks, being careful to make sure the samples did not rot before evaluating them for incidence and severity of silver scurf. Data were analyzed with one-way analysis of variance (ANOVA) using PROC MIXED (SAS ver. 9.2). Homogeneity of variance was assessed in all cases using Levene's test in SAS. Treatment means were separated using LSMeans ($P = 0.05$).

4. Results

In 2011, control plots had 38% silver scurf incidence, significantly higher than 4% for penthiopyrad-treated drip-irrigated plots (P=0.004). Severity of silver scurf also was significantly higher in control plots than penthiopyrad-treated drip-irrigated plots (6% vs. 0.8%, $P = 0.0087$). Total marketable yield of control plots was significantly less than penthiopyrad-treated potatoes (6.24 vs. 6.83 tons/acre; $P = 0.03$). In 2012, incidence of silver scurf again was higher for the control plots (96.92%) as compared to azoxystrobin-treated at 45 dap and 60 dap (83.00% and 81.45%, respectively) and penthiopyrad -treated plots at 45 and 60 dap (76% and 74%, respectively), although treatment differences were not significant (Figure 2). Control plots also had higher silver scurf severity (11%), as compared to plots treated with azoxystrobin at 45 and 60 dap (8% and 7.5%, respectively) and plots treated with penthiopyrad at 45 and 60 dap (7% and 6%, respectively) (Table 1). However, mean severity did not differ significantly among treatments. Although the control plots had lower yields (7.56 tons/acre) than the plots treated with azoxystrobin at 45 and 60 dap (8.35 and 7.92 tons/acre, respectively) and plots treated with penthiopyrad at 45 and 60 dap (8.21 and 8.64 tons/acre, respectively), effect was not significant (Figure 3). This study did not control for the effect of irrigation, as azoxystrobin- and penthiopyrad-treated plots were drip-irrigated while non-treated plots were not irrigated. The results of this study are therefore limited but do suggest a reduction in silver scurf incidence and severity with no significant impact on yield of potatoes when treated fungicide applied through drip irrigation systems.

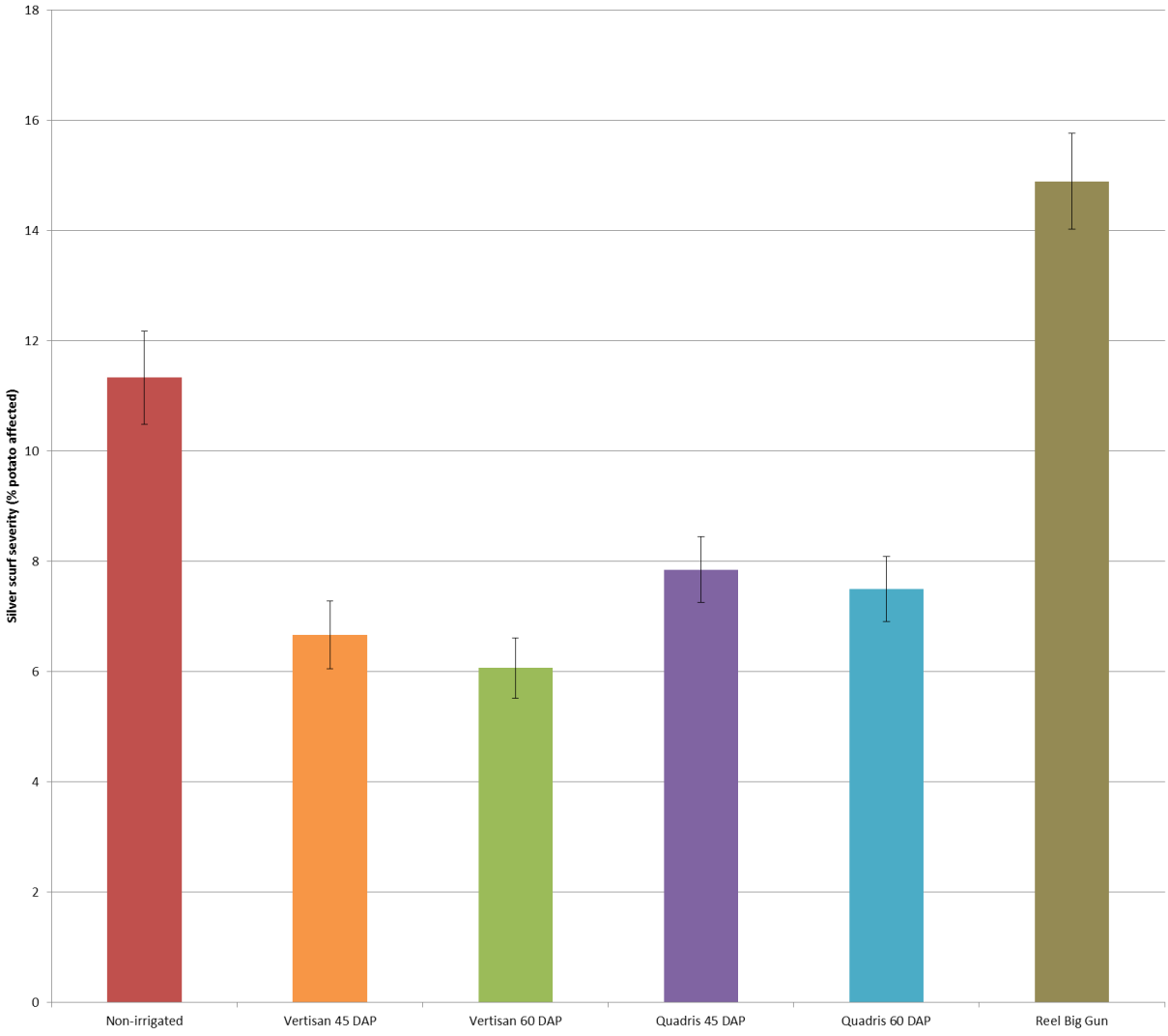

Figure 2. Silver Scurf Severity 2012 Trial

Table 1. Average Silver Scurf Severity 2012 Trial

Row Labels	Average of % Silver Scurf
Non-irrigated	11.32916667
Vertisan 45 DAP	6.666666667
Vertisan 60 DAP	6.061762422
Quadris 45 DAP	7.85
Quadris 60 DAP	7.4993083
Reel Big Gun	14.89347826
Average Total	9.050063719

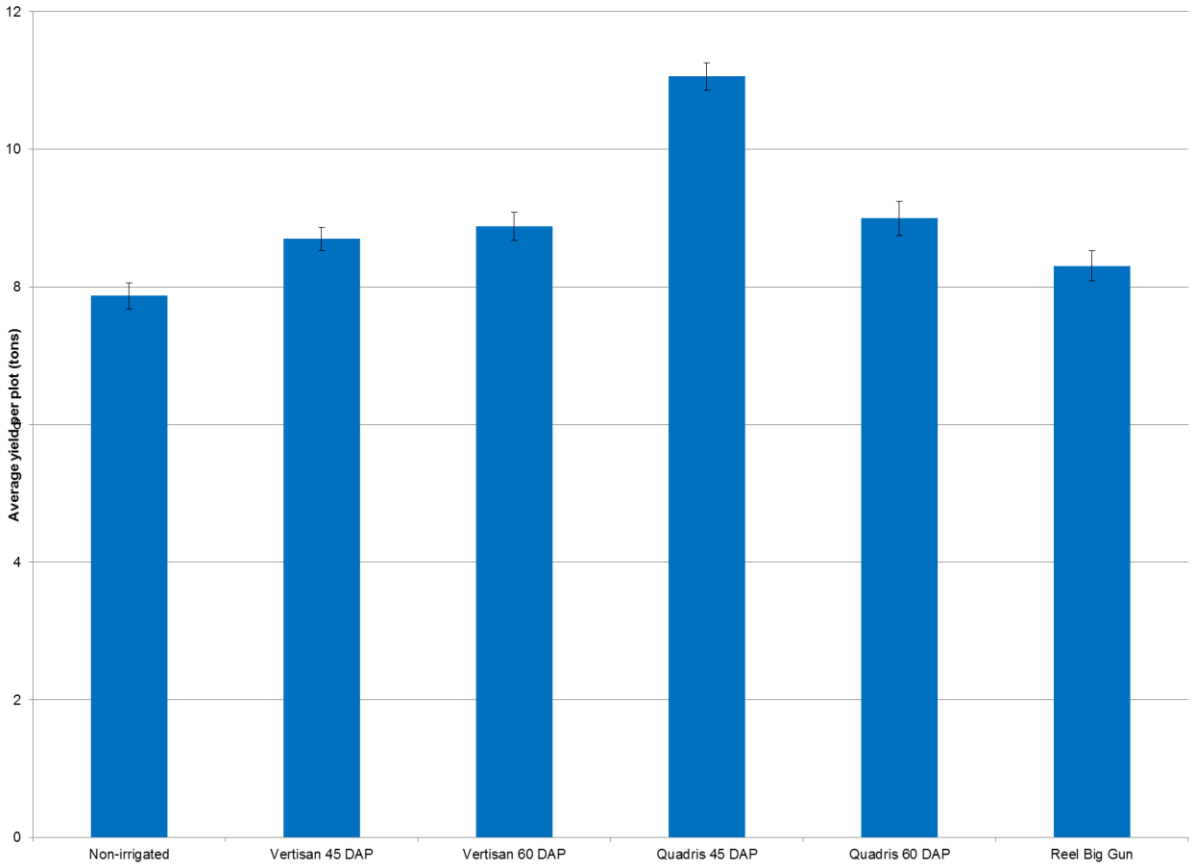

Figure 3. Average Yield 2012 Trial

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References

Errampalli, D., Saunders, J. M., & Holley, J. D. (2001). Emergence of silver scurf (Helminthosporium solani) as an economically important disease of potato. *Plant Pathology*, *50*(2), 141-153.

Powelson, M. L., Randall, R.C. (2008). Managing Diseases Caused by Seedborn and Soilborne Fungi and Fungus-Like Pathogens, Potato Health Management, second edition.

Stevenson, W. R., Loria, R., Franc, G. D., Weingartner, D. P. (2004). Compendium of Potato Diseases, second edition.

Glossary

Dap: days after planting.

Silver Scurf: disease affecting the skin of potatoes caused by the fungus *Helminthosporium solani*.

Silver Scurf Severity: percent of tuber surface infected.