

Evaluation of conventional and biological fungicides applied in-furrow at planting for management of powdery scab of potato in a highly infested field, Terminous, California, 2010

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Powdery scab, caused by *Spongospora subterranea*, is a soil-borne disease of potatoes which is increasing in incidence as more of our soils become infested with this long-lived and difficult to control pathogen. A field trial was established with the generous cooperation of Ken Jochimsen and Zuckerman Family Farms. This site, near Terminous in the Sacramento - San Joaquin Delta, was in its third year of potato production following the finding of powdery scab in the field in 2008. In 2009, the majority of the field was planted to sod but a roughly one-acre piece was replanted to potatoes for our 2009 trial which exhibited severe powdery scab throughout the trial. In 2010, this same area was used for the trial described here.

The trial was established at planting on March 19th, 2010. There were seven treatments arranged in a randomized complete block design with four replications. Plot size was four 32" beds wide by 165 feet long. Treatments included *Streptomyces lydicus* WYEC 108 (9 oz Actinovate, a biofungicide from Natural Industries), fluazinam (3 pints Omega[®], a phenyl-pyridinamine fungicide from Syngenta), flutolanil (1.1 lbs Moncut[®], a benzanilide fungicide from Gowan), *Bacillus subtilis* QST713 (3 quarts Serenade, a biofungicide from AgraQuest), *Gliocladium virens* GL-21(5 lbs SoilGard, a biofungicide from Certis USA), and a non-treated control. The products were applied as a banded, in-furrow spray as part of the planting operation. The applications were made with a commercial potato planter with two nozzles spraying a roughly 16" band. One nozzle sprayed over the seed pieces in the open furrow, followed by a second nozzle which sprayed the soil as it was moved to cover the seed pieces. Note that the listed per acre rate was concentrated into the treated area, such that the product rate within the treated band was roughly twice the listed rate. Spray volumes were approximately 30 gallons per acre. Non-treated seed was used.

The vines were sprayed with a dessicant on July 7th. The following week, on July 13th, the plots were evaluated for the severity of root galling caused by the powdery scab pathogen. Harvest was on July 29th. A section of each plot was hand dug and tubers were sorted for culls and weighed. Sound tubers were retained for further evaluations in which incidence and severity of powdery scab and black scurf were evaluated for 50 tubers per treatment.

Yields were extremely low and variable from row to row due to other production issues and there was no yield effect of the treatments. Tuber disease levels were very high. Non-parametric statistical methods were used to analyze tuber lesion count data, analysis of variance was used on incidence data. Under these conditions of very high disease pressure, none of the materials significantly reduced disease incidence, although one material (Omega) did reduce the median number of powdery scab lesions down to 10.1 per tuber from 35.1 in the non-treated control.

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Table 1. Effect of in-furrow sprays at planting on the disease level of harvested tubers.

<u>Product and active ingredient</u>	<u>Rate per acre</u>	<u>Powdery Scab</u> <i>(Spongospora subterranea)</i>		<u>Black Scurf</u> <i>(Rhizoctonia solani)</i>
		<u>Median no. scabs per tuber</u>	<u>Incidence (% tubers)</u>	<u>Incidence (% tubers)</u>
Actinovate (<i>Streptomyces lydicus</i> WY108)	9 oz	39.1 a	89.6	69.3
nontreated control	---	35.1 a	90.1	90.8
Moncut (flutolanil)	1.1 lb	40.4 a	84.6	60.8
SoilGard (<i>Gliocladium virens</i> strain GL-21)	5 lb	41.9 a	86.1	75.6
Serenade (QST 713 strain of <i>Bacillus subtilis</i>)	3 qt	32.5 a	94.7	73.2
Omega (fluazinam)	3 pt	10.1 b	82.3	69.5
Mean		33.2	87.90	73.19
	<i>P</i> value	<0.0001	0.64	0.33
		significant	not significant	not significant

Note: Numbers represent the means of four observations, means in the same column followed by the same letter are not different, according to Wilcoxon signed rank tests comparing individual treatments (P = 0.05)