Title: Evaluation of Fosphite as a Postharvest Disease Management Treatment for Control of Potato Diseases

Investigators: Dr. Nora Olsen, Ext. Potato Specialist, University of Idaho, Twin Falls
Dr. Jeff Miller, Potato Pathologist, University of Idaho, Aberdeen
Lynn Woodell, Support Scientist, University of Idaho, Kimberly
Dr. Lyndon Porter, Post-Doctoral Fellow, University of Idaho, Aberdeen

Project Contact: Dr. Mohamed Rakha
JH Biotech Inc.
Plant Protection Department
4951 Olivas Park Drive
Ventura, CA 93030

Objective: To evaluate the effectiveness of Fosphite against *P. erythroseptica* and *P. infestans* inoculated tubers when used as post-harvest treatments.

Treatment List: OxiDate™ (hydrogen peroxide/peroxyacetic acid mixture) was used in this test as a standard since it is one of the most commonly used post-harvest disinfectant products. Fosphite was applied at varying rates in order to better determine what concentration is required for post-harvest disease control. The spray mixtures were applied to tubers at a rate of 0.5 gal per ton of tubers.

Procedures:
Washed Russet Burbank tubers were inoculated by submersion in a suspension of 3.0×10^4 zoospores of *P. erythroseptica* (cause of pink rot) or 1.0×10^4 sporangia of *P. infestans* (cause of late blight). Inoculated tubers (15 tubers/ replication, 4 replications) were sprayed after a 1-hour time lapse with the test treatments (Table 1) at the rate of 0.5 gal spray volume per ton of tubers using a Research Track Spray Cabinet (set at 37 speed, 42 PSI and a TeeJet™ 8001 EVS nozzle). All treatments stayed in solution and flowed through the nozzle producing an even product coverage on the tubers. These treatments simulated an application with a low-pressure boom sprayer as potatoes are being loaded into the storage. Tubers were stored for 14 days at 60°F (pink rot) or 21 days at 48°F (late blight) both with 95%RH. Tubers were then evaluated for incidence and severity of infection. Analysis of variance (ANOVA) was performed on incidence and percent severity.

Results:

Table 1. Efficacy of Fosphite on late blight and pink rot incidence and severity. Means with the same letter within a column are not significantly different at $p\leq0.05$.

	Late Blight		Pink Rot	
Treatment (rate/ton tubers)	Incidence*	Severity**	Incidence	Severity
Untreated	72.4 a	51.9 a	99.6 a	98.6 a
Oxidate (1:50 dilution)	48.8 b	33.5 b	93.8 b	95.6 a
Fosphite(1:20 dilution, 3.2 fl. oz.)	6.7 c	10.9 c	0.0 c	0.0 b
Fosphite (1:10 dilution, 6.4 fl. oz.)	1.7 c	0.3 c	1.7 c	11.3 b
Fosphite (1:5 dilution, 12.8 fl. oz.)	1.7 c	0.3 c	0.0 c	0.0 b

*Percentage of inoculated tubers developing symptoms of disease.
**Average tuber area affected. Only tubers showing symptoms of disease were used for this assessment (healthy tubers not included).

Discussion:

Incidence of pink rot was significantly lower with a post-harvest application of Fosphite at the 1:20 dilution compared to all other treatments (Table 1; see photos). An application of Fosphite at the 1:50 rate did not significantly impact the incidence of pink rot development compared to the control. There was an application error that may have contributed to this lack of efficacy. Oxybooster did not reduce the incidence of pink rot in this study. All products significantly reduced the severity of tubers with pink rot compared to the control. A Fosphite application at 1:20 reduced the severity of disease development the greatest of all treatments. No visual phytotoxicity symptoms were seen on the Fosphite treated tubers. These results are for treatments that occurred 1 hour after inoculation. A greater delay from inoculation to treatment may provide different results. Oxybooster in combination with Fosphite may be an interesting combination to evaluate in the future.

Plate 1. Pink rot infection on untreated controls and tubers treated with post-harvest disinfestants.

Untreated control OxyBooster 1:50 dilution Oxidate 1:50 dilution

Fosphite 1:50 dilution Fosphite 1:20 dilution

Discussion:

Late blight and pink rot incidence in the untreated control was relatively high in this study (Table 1). Late blight incidence and severity, and pink rot incidence were significantly lower with Oxidate applications compared to the untreated control. All treatments with Fosphite applications resulted in significantly less disease compared to the Oxidate treated and the untreated tubers.

Fosphite at all three dilutions was effective in suppressing late blight and pink rot development when applied as a post-harvest treatment in controlled studies. Fosphite was effective when applied as low as 3.2 fl. oz. per ton tubers (1:20 dilution). No visual phytotoxicity symptoms were seen on the Fosphite treated tubers. These results are for treatments that occurred 1 hour after inoculation. A greater delay from inoculation to treatment may provide different results.

Additional rate studies will provide information on the lowest effective rate of Fosphite against late blight and pink rot. In general, Fosphite appears to be a good postharvest product to protect tubers from becoming infected at harvest by the pink rot and late blight pathogens.