

The Effect of Spray Applications on *Clavibacter Michiganensis* subsp. *michiganensis* Populations (Research in Progress)

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ABSTRACT

The effect of bactericidal spray applications on *Clavibacter Michiganensis* subsp. *michiganensis* (*Cmm*) populations was assessed throughout the 2005 growing season. *Cmm* was allowed to spread from infected tomato plants to healthy plants. Epiphytic population levels were monitored on 22 July, 12 August, and 2 September, 2005. Untreated plants had the highest epiphytic population of *Cmm* while Actigard and Tanos treated tomatoes tended to have lower epiphytic populations. However, differences may not be significant. Future studies will focus on *Cmm* population studies in the greenhouse in response to bactericides as well as repetition in the field next season.

INTRODUCTION

Bacterial canker, caused by *Cmm* is a seed borne disease that has caused great economic losses for the Michigan tomato industry [1]. In the field, disease symptoms can include marginal leaf necrosis, fruit lesions, wilting, stunting, and plant death. Transplants that have a higher than 10^8 CFU of *Cmm* /g of tissue are severely reduced in their ability to survive and produce in the field [1]. Infected transplants have been shown by Ricker et. al have shown that secondary spread of *Cmm* in the field from infected transplants can result in yield loss and cause systemic infections in surrounding plants [2]. The objective of this experiment was to evaluate different bactericidal products on *Cmm* population growth and spread through the growing season.

MATERIALS AND METHODS

Experimental Plots

On 10 June 2005, tomato (*L. esculentum* cv. Mountain Spring) transplants grown in a commercial like setting were hand transplanted 18 inches apart into raised beds covered with black plastic in muck soil in Laingsburg, MI. The plot followed a fresh market planting design and drip irrigation was provided. The beds were 2' wide, 6" high and 50' long with rows spaced at 5.5' apart. Each row comprised of two treatments, 22.5' long with a five-foot section in the middle, reserved for inoculated plants. Treatments were arranged in a complete randomized block design.

Treatments

Treatments consisted of Kocide (copper hydroxide) at 1.5 lbs/acre, Oxidate (hydrogen dioxide) at 4 pints/acre alternated with Kocide at 1.5lbs/acre, Tanos (famoxadone and cymoxanil) at .5lbs/acre alternated with Kocide at 1.5 lbs/acre, Actigard (acibenzolar-S-methyl) at rates of 0.02, 0.03, and 0.05 lbs/acre with remaining applications at 0.05lbs/acre alternated with Kocide at 1.5 lbs/acre and an untreated control. On 27 June 2005, treatments were applied preventively on a 5-day interval ending 31 August 2005. All treatments received alternating Bravo WS and Manzate applications to prevent fungal infections and were applied at the same time as the treatments.

Inoculation

On 24 June 2005, transplants were clip inoculated with a spontaneous rifampicin resistant *Cmm* mutant at 10^8 CFU/ml and incubated on a raised bench in a glass greenhouse. On 29 June 2005, 5 days after inoculation, transplants were hand transplanted in the center 5' of every row between two randomized treatments.

Sampling

On 22 July, 12 August, and 2 September 2005, three asymptomatic leaflets of approximately the same age and size were randomly selected from the lower 2/3 of the tomato plant at each sample location. Treatments were sampled from sites located at 0', 9', 18' from the inoculated plants. Each sample was placed in a sterile plastic bag and transported on ice to the laboratory for immediate processing. Each leaflet was weighed, placed in 20 ml of 0.01 M sodium phosphate buffer (pH 7.0 with 0.1% peptone) in a 125 mL flask, and shaken on a rotary shaker at 140 rpm for 1 hour at room temperature[3]. The buffer from each of the three leaflets was combined and a ten-fold dilution series was plated on NBY amended with 75 μ g/ml Rifampicin and 100 μ g/ml Cycloheximide to select for *Cmm* rifampicin resistant mutant and inhibit contaminant growth. *Cmm* colonies were counted after 5 days incubation at room temperature.

RESULTS AND DISCUSSION

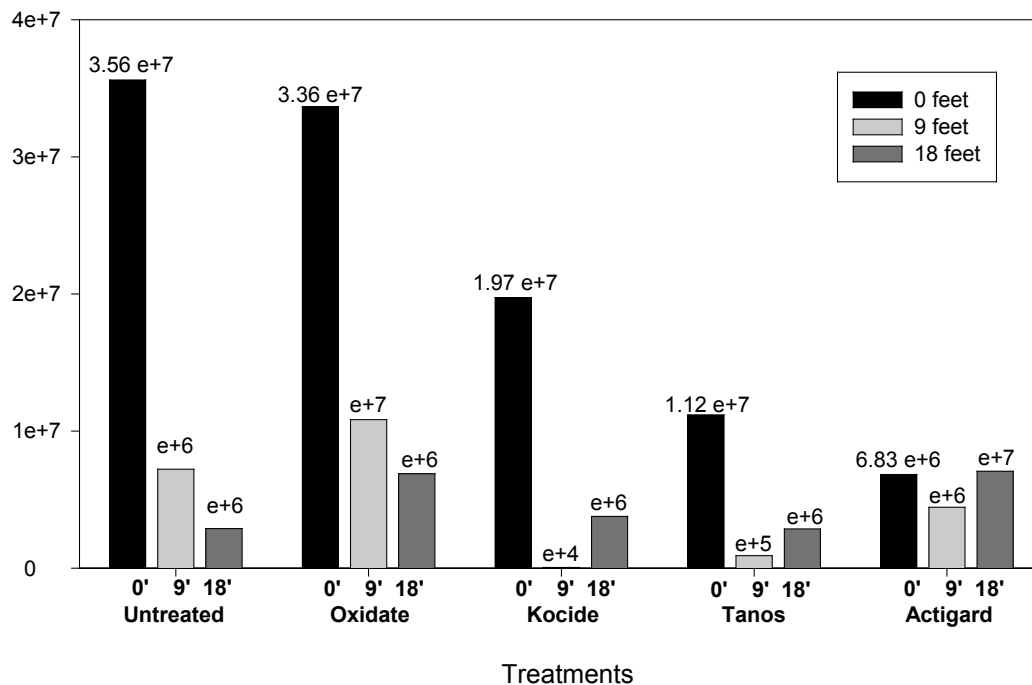


Figure 1. *Cmm* populations on tomato foliage located 0', 9', and 18' from inoculated plants when treated with various products.

Under our field experimental conditions, *Cmm* spread 9' from the point of infection within 3 weeks and to 18' in 6 weeks (Figure 1). Oxidate-treated plants had higher epiphytic populations of *Cmm* at the beginning and the end of season than the control. Tanos and Actigard consistently had lower *Cmm* populations at the end of the season than

other treatments (graphs not pictured). However, difference observed between treatments may not be significant.

Due to the variability of population levels on any given date, *Cmm* populations need to be monitored over the course of the season to assess the ability of treatments to limit pathogen spread. Future studies will be needed to further define the relationship between epiphytic *Cmm* population levels, disease development, and treatment efficacy.

LITERATURE CITED

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2. Ricker, M.D. and R.M. Riedel, *Effect Of Secondary Spread Of Clavibacter-Michiganensis Subsp Michiganensis On Yield Of Northern Processing Tomatoes*. Plant Disease, 1993. **77**(4): p. 364-366.
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