FNE93-36

Dr. Fred Magdoff
SARE Northeast Region Coordinator
Hills Building
University of Vermont
Burlington, VT. 05405

November 15, 1993

Dear Fred,

Please find the final report for the raspberry portion of our grower initiated research project #FNE93-36. As a continuation of a previous project, the bottom line to this years result, again came up with confusing and insignificant data (P score = 0.445). As an individual interested in sustainable Ag research, the data variability mimicked my results from 1992, yet failed to fully falsify my original hypothesis. Welcome to biological testing! Again my bottom line is the lack of any strong correlation inhibits any recommendation to rely on peracetic acid as a silver bullet fungicide.

The major question that arises with this finding is the questionable merit of continuing similar research with the strawberry trial. Current research indicated the plants respond similarly to both the Botrytis disease and control measures. It is my opinion that this portion of the grant should be forfeited to fund a different study or change the proposed treatment material from peracetic acid to another potential candidate (Iodine or sodium bicarbonate come to mind). I am willing to execute a spring trial with the strawberries, but feel that this change in original contract should be cleared through your office. Please advise me on how to proceed.

The project report is also being submitted to the Penna. Assoc. for Sustainable Agriculture, The local Extension Service and the Penna. Vegetable and Berry Growers Association.

I Thank you for your attention, and the opportunity to conduct this trial.

Sincerely, I am,

Jamie Perkins

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FNE93-36
James Perkins
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Peracetic Acid as a Fungicide on Raspberry Plants

Megan Millman , Summer Intern + Project Associate

September 27,1993

Abstract

This experiment attempted to measure the ability of peracetic acid to inhibit the fungus *Botrytis cinera* in raspberry plants when applied to the fruit blossoms. It was conducted during the growing season of 1993 on a farm in eastern Pennsylvania. The treatment consisted of field applications of four different concentrations (0, 0.5, 1.0, and 3.0 percent) of peracetic solution during the month before harvest stage. The number of raspberries from each treatment group infected with *B. cinera* was counted and recorded after 24 hours of storage. Although an increased amount of infection in the two intermediate rates was noticed, no relationship was found between the percent of infected fruit and the increase of peracetic concentration. Strawberries that were treated with peracetic acid as a post harvest dip also showed no effect of treatment.

Introduction

The fungus *Botrytis cinera,* commonly known as gray mold, is a frequent problem for fruit growers. Post harvest rot is considered the most damaging disease in the production of soft fruits, of which *B.cinera* is the most common fungus (Campbell,1989). Gray mold makes these fruit crops fragile during storage and transportation. Fungicides such as Captan and Benomyl have been effective against gray mold in the past, but they have been noted for producing resistant strains of *B.cinera* and having questionable health effects. Captan has been determined in lab studies to be a

mutagen and caricinogen (Bridges, 1975), and has also been noted for being harmful to necessary soil fungi (Vyas, 1988).

There has been wide interest in the search for alternative fungicides (Moline and Locke, 1993). Peracetic acid has several characteristics that suggest it could be an alternative to traditional fungicides. Pilsworth (1992) suggested that peracetic acid, known for its antiseptic properties, could act against gray mold. Its short half life of ten minutes require that it work as an eradicitive, rather than protective, measure. This short half life also assures its safety because it dissolves into vinegar and water.

The goal of this experiment was to determine if peracetic acid can be effective against *Botrytis cinera* infection in small fruit plantings. This experiment continues trails begun by Jamie Perkins the previous season on peracetic acid's potential as a fungicide (Perkins,1993).

Materials and Methods

The raspberry plants used for this experiment were from Titan tissue culture planted in 1986 in a level meadow, in loamy Beddington soil and had been fertilized with 30-60-30 active NPK in August, 1992. They did not receive any fungicide,herbicide, or insecticide treatment during the 1993 growing season. A mite outbreak was noted the first week of July. Leaftip damage was recorded to examine the possible phytotoxicity of our material. This suggests that damage to the plants can be associated with mites rather than peracetic acid.

This experiment was designed in a randomized block design with five replicates of four treatment levels of peracetic acid: 0%, .5%, 1%, and 3%. A single, isolated row of Titan raspberries were initially pruned to uniform,

single stalks. This allowed for even application of material and equal exposure to sun, air, and drainage.

Each sample consisted of two marked branches with three feet of untreated plants inbetween them. The treatments of peracetic acid solution were applied with a handspray bottle to saturate each cluster of blossoms. The first treatment occured on June 15. Treatments were applied three more times the next week and once more on July 7. A point was made of doing treatments after significant rainfall because *B.cinera* has a greater potential to grow and spread in wet conditions. Harvests were conducted by picking all of the ripe fruit from each sample into individual cartons, which were stored at 70 degrees F. for 24 hours. Counts were made of infected and total numbers of fruit. Weather data was also recorded on harvest dates. (Table 1) Seven harvests and counts were performed during the period of July 5 through July 18.

Results and Discussion

Plants that were treated with higher rates of peracetic acid did not have ~~lower~~ higher rates of damage, and the treatment with the least amount of damage was the control (Table 2).

The cumulative average of percent infected with gray mold showed an increase of infection with the .5% and 1% rates, while the 3% rate showed a slight decrease of infection relative to the control (Table 3). The rate of peracetic acid had no relatationship to the overall percentage of infected fruit (Figure 1). The decrease or increase in infection was small and not statistically significant ($F_{3,12} = 0.9556$, $p = 0.445$). There was a general decline in level of infection over the period of the seven counts (Figure 2), however weather data accounts for this decline (Table 1).

While peracetic acid does not appear to be an effective fungicide, other compounds might be tried as alternatives to synthetic fungicides. Baking soda, neem, and iodine have been suggested as other alternatives to traditional fungicides (e.g. Molone and Locke,1993).

-Thanks to Jamie Perkins for his guidance in conducting this experiment and the rough stages of this report and Brian Schultz for his advice in writing this report.

Notes

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Bridges, B.A. 1975. The Mutagenicity of Captan and Related Fungicides. (journal name unknown).

Campbell, R. Biological Control of Microbial Plant Pathogens. 1989. p.164.

Pilsworth, A. 1992. An Update on the Peroxygens. Green Acres. July, 39.

Molone, H. E. and J. C. Locke 1993. Comparing Neem Seed Oil with Calcium Chloride and Fungicide for Controlling Postharvest Apple Decay. HortScience 28(7):719-720.

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