RESEARCH REPORT: EFFECTS OF ROUTINE FUNGICIDE APPLICATIONS ON CRANBERRY VINE PRODUCTIVITY AND BERRY ROTS IN STORAGE, 1986-1988

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INTRODUCTION

The only fungicides labeled for use on cranberry in Wisconsin are for storage rot or cottonball disease management. Storage rots of economic importance in Wisconsin are end rot and black rot primarily, but other storage rot diseases also may occur. Current recommendations for storage rot management call for three fungicide applications beginning during bloom and at 14-day intervals. Research over the years has demonstrated that numerous fungi invade cranberry stems, leaves, and fruit in addition to rotting berries in storage. Some of these fungi are known to cause minor disease problems that rarely are of economic importance in Wisconsin (e.g., upright dieback, red leaf spot, Cladosporium leaf spot, Gibbera leaf spot and berry speckle, etc.). Other fungi that are associated with cranberry but not known to cause a specific disease may be causing infections that go undetected and have a sublethal, deleterious effect on yield or productivity. Consequently, research was designed to determine: 1) if fungicides applied for storage rot management over several years have a beneficial effect on cranberry vine productivity; 2) if these fungicides effectively control storage rots; and 3) if so, do they differ in efficacy.

EXPERIMENTAL PROCEDURES

Research was conducted in two Wood County locations over a three-year period, during the growing seasons of 1986, 1987, and 1988. Climatic conditions were quite different among years. At each location, plots were permanently marked in a mature (30+ years-old) cranberry bed (cv. Searles) with wooden stakes so that the same identical plots could be treated each year. These beds had not received any fungicide applications for at least eight years previously. Four treatments were compared, the three fungicides most frequently used for storage rot management in Wisconsin -- Difolatan 80DG at 4.0 lb/acre, Bravo 720 at 4.2 pt/acre, and Dithane M-45 80WP at 4.0 lb/acre -- and an untreated control. Amounts at the lower end of the range of the labeled rates were used for each product. All treatments at both locations were applied on a 14-day schedule with each application being made on the same day in a given year. Applications were begun at different times relative to bloom in different years. Applications were made on 2 July (late bloom), 16 July, and 30 July in 1986; on 17 June (70% bloom), 1 July, and 15 July in 1987; and on 17 June (10% bloom), 29 June, and 13 July in 1988. Other than fungicide applications, plots were subjected to routine cultural practices.

All samples were collected within seven days of harvest each year. For determining yield and vine productivity, all of the upright shoots and berries from two small areas in the center of each plot were removed and combined together. From each of these samples, the numbers of vegetative uprights, flowering uprights, flowers, marketable berries, and defective berries were counted and the weight of all uprights and marketable berries were measured. From these data, the

following parameters were calculated: the total number of uprights, weight of an individual upright, total number of berries, weight of an individual berry, estimated yield, % marketable berries, % uprights flowering, number of flowers per flowering upright, % fruit set, and number of marketable berries per flowering upright. The five basic components of yield are: no. uprights, % uprights flowering, no. flowers/flowering upright, % fruit set, and weight/berry.

To determine treatment effects on storage rots, a two-liter sample was hand-raked from each plot and soaked in a beaten bed for l-4 hours. Berries were then air-dried, sorted for defects, and stored at 38 F. After three months, berries in each sample were divided into three categories: soft and rotten, black rotted, and marketable. All yield component and storage rot data were analyzed statistically by analysis of variance.

RESULTS

Cranberry Vine Productivity and Yield

At Location 1, estimated yield was decreased by Difolatan in 1986 and by all three fungicides in 1987 and 1988. In all three years, various yield parameters were affected significantly (e.g., no. berries, % uprights flowering, no. flowers/flowering upright, and % fruit set), which accounted for the decreased yields. Fruit size was not affected by any treatment in any year. At Location 2, none of the fungicide treatments significantly affected yield compared to the untreated control treatment. However, in 1987, Bravo reduced yield compared to Difolatan and reduced % fruit set compared to all other treatments. No significant differences among treatments occurred for any of the other yield parameters measured in all three years at this location. At both locations, no beneficial effects were evident after three years in the plots treated with fungicides compared to those left untreated.

Storage Rots

The effects of treatments on storage rots were similar at both locations. Treatments generally did not affect the proportion of berries with black rot in a given year. Although, when Bravo applications were initiated early in 1988 (at 10% bloom), black rot incidence was increased at both locations. The percentage of berries with black rot remained fairly constant at each location among years (3-5% at Location 1 and l-3 % at Location 2). Difolatan consistently increased the percentage of marketable berries in all years at both locations. Bravo increased the percentage of marketable berries at both locations in 1986, increased or had no effect on this percentage in 1987, and reduced or had no effect on the percentage of marketable berries in 1988 at Locations 1 and 2, respectively. Based on these data, the time of beginning Bravo applications appears to have affected the efficacy of this product. Dithane M-45 had no significant effect on the percentage of marketable berries in any year or at either location, except at Location 2 in 1987 when it decreased the percentage compared to the untreated control treatment.

CONCLUSIONS

1. Fungicide applications had either no or a negative effect on yield and yield components in a given year.
2. There was no beneficial effect in plots treated with fungicides after three years compared to those left untreated.
3. Berries that are NOT to be put into storage, should NOT be treated with fungicides.
4. Difolatan was the most effective fungicide for managing storage rots. Unfortunately, however, this product is no longer available.
5. Bravo was less effective for storage rot management when applications were initiated early during bloom. Therefore, Bravo applications should be initiated at late bloom for best storage rot control.
6. Dithane M-45 was ineffective at managing storage rots.

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