

# Field Testing of Potential New Fungicides for Control of Downy Mildew of Broccoli, Cabbage, and Cauliflower, 1993

M.E. Matheron, J.C. Matejka, M. Porchas

## Abstract

*Downy mildew of broccoli, cabbage, and cauliflower is caused by the plant pathogenic fungus *Peronospora parasitica*. Cool damp weather with high humidity is highly favorable for sporulation, dissemination of spores, and infection by this pathogen. The severity of disease is affected by the duration of these weather conditions favorable for disease development. Potential new fungicides were evaluated for disease control in a field trial conducted in the winter of 1992-93. For broccoli, no significant differences in disease severity were detected among treatments. On the other hand, Microthiol and Microthiol + Maneb significantly reduced the number of downy mildew lesions on cabbage and cauliflower compared to nontreated plants. Maneb alone provided significant disease control on cabbage, but not on cauliflower.*

## Introduction

Downy mildew of broccoli, cabbage, and cauliflower, caused by the plant pathogenic fungus *Peronospora parasitica*, is commonly found in areas where these crops are grown during the winter vegetable season. The severity of the disease is strongly influenced by environmental conditions. Cool damp weather with high relative humidity and air movement favor sporulation, dissemination of spores, and infection by the pathogen. Generally, high humidity and free moisture do not occur in a desert environment, although the presence of dew on the leaves provides conditions favorable for disease development. The severity of downy mildew is affected by the duration of moist weather conditions stimulatory to pathogen growth, sporulation, and infection of host leaf tissue.

Initial disease symptoms include the appearance of grayish white fluffy fungal growth on the underside of infected leaves during cool, moist weather. Spots or lesions initially yellow, then turning brown in color appear on both sides of the leaf where the fungal growth originally was observed. Severe infections will cause extensive necrotic areas on leaves, resulting in reduced photosynthesis. In cauliflower and broccoli, the fungal pathogen may spread systemically to stems and flowers, causing black streaks in infected plant parts.

Control of downy mildew can be achieved by planting cultivars that are tolerant or resistant to the disease. If susceptible cultivars are grown, optimum disease control is achieved by having fungicidal protection in place when environmental conditions become favorable for disease development. To increase the potential number of chemical disease control options available to growers for control of downy mildew of broccoli, cabbage, and cauliflower, a field trial was initiated in the winter of 1992-93 to test the efficacy of potential new fungicides for disease control.

## Materials and Methods

This experiment was conducted at the Yuma Valley Agricultural Center. On October 20, 1992 blocks of broccoli and cabbage were seeded in double rows 12 inches apart and cauliflower in single rows, all on beds 40 inches between bed centers. Treatments were replicated five times in a randomized complete block design. Each replicate consisted of 25 feet of bed. Broccoli plants were spaced 6-7 inches apart within the row, while plant spacing for cabbage and cauliflower was 12 inches. Treatment beds were separated by single nontreated beds. Fungicide treatments were applied with a tractor-mounted boom sprayer that delivered 100 gallons/acre at 100 psi to nozzles spaced 12 inches apart. Foliar applications of fungicides were made December 21, 1992 and January 4, 1993. Maximum and minimum ranges of air temperature (F) were as follows: December, 56-71, 31-53; January, 51-75, 36-55. Total rainfall (in.) was as follows: December, 1.83; January, 1.71. Furrow irrigation was used for the duration of this trial. The severity of downy mildew on broccoli caused by *Peronospora parasitica* was determined on January 21 by rating the bottom three leaves from 10 plants randomly selected within each of the five replicate plots per treatment. The following rating system was used: 0 = no downy mildew lesions present; 1 = a few downy mildew lesions present; 2 = light infection; 3 = moderate infection; 4 = heavy infection. The severity of downy mildew on cabbage and cauliflower was determined January 27 by counting all downy mildew lesions occurring on each of five plants randomly selected within each of the five replicate plots per treatment.

## Results and Discussion

The results of this field trial are summarized in Table 1. Disease severity was moderate on broccoli and light on cabbage and cauliflower. No significant differences among treatments were detected for disease ratings on broccoli. On the other hand, Microthiol and Microthiol + Maneb significantly reduced the number of downy mildew lesions on cabbage and cauliflower compared to nontreated plants. Maneb provided significant disease control on cabbage, but not on cauliflower. There was no evidence of phytotoxicity in any of the plots treated with fungicides. Further evaluation of Microthiol for control of downy mildew is planned for next year.

TABLE 1. Results of 1993 field trial to evaluate fungicides for control of downy mildew on broccoli, cabbage and cauliflower.

Treatment	Rate of prod./A	Mean severity rating per broccoli plant **	Mean number of downy mildew lesions per plant *	
			cabbage	cauliflower
Microthiol 80WDG	10.0 lb.	2.2	47 ab	42 a
Microthiol 80WDG	3.0 lb.	2.3	47 ab	50 ab
Maneb 75DF	2.0 lb.	2.4	68 c	76 bc
Maneb + Zn F4	3.0 pts.	2.4	62 bc	87 c
Maneb 75DF + Microthiol 80WDG	2.0 lb. + 3.0 lb.	2.4	39 a	54 ab
Untreated control	----	2.6	89 d	100 c

\* Values in each column followed by a different letter are significantly different ( $P=0.05$ ) according to the Duncan-Waller K-Ratio Test.

\*\* For comparison, Aliette 80WP at a rate of 4.0 lb. prod./A was applied as a separate treatment within the broccoli portion of the field trial. The mean disease rating for this treatment was 1.8.