

Assessment of Fungicide Performance for Control of Powdery Mildew of Lettuce in 1999

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Abstract

Erysiphe cichoracearum is the fungus that causes powdery mildew of lettuce, a disease favored by warm and dry weather conditions. Several potential new fungicides were evaluated for control of this disease in 1999. Untreated lettuce plants were heavily infected with powdery mildew, whereas the disease was very light to virtually nonexistent in plots treated with Sovran, BAS 500, Rally and DPX-MU752. Higher levels of powdery mildew, still significantly less than that observed on untreated plants, were recorded in plots treated with the standard materials Microthiol Special and Trilogy in addition to several other compounds. The possible availability of one or more of these chemistries under development could help in efforts to control powdery mildew of lettuce and to establish and maintain a fungicide resistance management program for plant disease control products of importance for this crop.

Keywords: *Erysiphe cichoracearum*, plant protection chemicals, vegetable diseases.

Introduction

Powdery mildew, caused by the fungus *Erysiphe cichoracearum*, has normally appeared on spring lettuce during March and April in western Arizona, when warm dry environmental conditions prevail. However, during the 1998-99 season, some powdery mildew was detected as early as December and January, then becoming prevalent and increasingly severe from February through April.

Successful control of powdery mildew requires the presence of an effective fungicide on plants before onset of the disease. Successive applications of fungicides are required to maintain disease control until harvest. Sulfur can provide a significant degree of protection against powdery mildew if applied early and often; however, possible burning of lettuce leaves may occur when this product is applied at temperatures at or above 90 to 95°F. Several new plant disease control compounds are in development that have activity on the fungi that cause powdery mildew on lettuce and other vegetable crops. The purpose of this field trial was to test the potential efficacy of these new chemistries on powdery mildew of lettuce.

Materials and Methods

This study was conducted at the Yuma Valley Agricultural Center. The soil was a silty clay loam (7-56-37 sand-silt-

clay, pH 7.2, O.M. 0.7%). Lettuce 'Winterhaven' was seeded and watered November 4, 1998 on double rows 12 inches apart on beds with 40 inches between bed centers. Treatments were replicated five times in a randomized complete block design. Each replicate consisted of 25 feet of bed, which contained two 25 foot rows of lettuce. Plants were thinned December 15 to a 12 inch spacing. Treatment beds were separated by single nontreated beds. Fungicide treatments were applied with a tractor-mounted boom sprayer (flat-fan nozzles spaced 12 inches apart) that delivered 50 gallons/acre at 100 psi. Foliar applications of all materials except Kaligreen were made January 13 and 29 and February 17, 1999. Kaligreen was applied February 5, 12 and 17. Maximum and minimum ranges (°F) of air temperature were as follows: December 1998, 55-79, 31-55; January 1999, 61-77, 36-51; February, 58-86, 33-50; March 1-4, 75-89, 46-60. Total rainfall (inches) was as follows: December, 0.05; January, 0.00; February, 0.53; March 1-4, 0.00. Furrow irrigation was used for the duration of this trial. The severity of powdery mildew caused by *Erysiphe cichoracearum* was determined at plant maturity (March 4) by rating 10 plants randomly selected from each of the five replicate plots per treatment using the following rating system: 0 = no powdery mildew present; 1 = powdery mildew present on bottom leaves of plant; 2 = powdery mildew present on bottom leaves and lower wrapper leaves; 3 = powdery mildew present on bottom leaves and all wrapper leaves; 4 = powdery mildew present on bottom leaves, wrapper leaves and cap leaf.

Results and Discussion

Untreated lettuce plants were heavily infected with powdery mildew, whereas the disease was very light to virtually nonexistent in plots treated with Sovran, BAS 500, Rally and DPX-MU752. Higher levels of powdery mildew, still significantly less than that observed on untreated plants, were recorded in plots treated with the standard materials Microthiol Special and Trilogy in addition to several other compounds. A shorter interval between applications of several of these tested compounds likely would have resulted in better disease control than that achieved in this study. In another study evaluating many of these compounds for control of powdery mildew on cantaloupe, we found good disease suppression when treatments were applied on a 10-day interval compared to 16- and 19-day spray intervals of this study. Also, powdery mildew was already quite advanced before the first application of Kaligreen. This data demonstrates that protectant materials such as Kaligreen are not effective when applied after powdery mildew is already well established. No phytotoxicity was evident in any plots treated with fungicides.

Fungicide resistance management, which seeks to minimize the risk of a plant pathogen population becoming resistant to one or more fungicides, is imperative for the preservation of fungicide effectiveness. Resistance management is achieved by applying mixtures of fungicides or alternating between different classes of chemistries to prevent or minimize a shift in the pathogen population toward tolerance or insensitivity to one or more disease control compounds. The possible availability of one or more of these chemistries under development could help in efforts to control powdery mildew of lettuce and to establish and maintain a fungicide resistance management program for plant medicines of importance for this crop.

Table 1. 1999 Powdery mildew of lettuce fungicide trial.
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Treatment*	Rate (lb a.i./A)	Disease rating **
Sovran	0.2	0.0
BAS 500	0.2	0.0
Rally	0.063	0.0
DPX-MU752	0.125	0.1
Flint	0.09	0.3
DPX-MU752	0.063	1.0
Microthiol Special	4.8	2.2
Actigard	0.03	2.4
Quadris	0.25	2.6
Trilogy	0.35 gal.	3.1
Serenade	4 lb product	3.1
JMS stylet oil	3 pt.	3.2
Kaligreen	3.0 lb	3.3
Nontreated control	-----	3.5
LSD (Least Significant Difference, $P=0.05$)		0.2

* Treatment dates (except for Kaligreen): Jan 13 and 29, Feb 17, 1999.
 Treatment dates for Kaligreen: Feb 5, 12 and 17. Powdery mildew was already well established on plants by Feb 5.

** Disease ratings performed Mar 4, 1999.