

# Effect of Cultivar and Actigard on Development of Powdery Mildew on Lettuce

Michael E. Matheron and Martin Porchas

## Abstract

Nine different cultivars of lettuce were planted at the Yuma Valley Agricultural Center. Plants were treated four times with two different rates of Actigard. Control plants were not treated. Near plant maturity (Mar. 23, 2000) the severity of powdery mildew was recorded. Among nontreated plants, Cibola, Conquistador, and Coolguard had the lowest levels of powdery mildew. On the other hand, Bos 9003 and Mohawk had significantly higher levels of powdery mildew than all other tested cultivars. Four applications of Actigard at a rate of 14 g. of active ingredient per acre significantly reduced the level of powdery mildew on all nine tested cultivars of lettuce. On two lettuce cultivars, powdery mildew was significantly lower when treated with Actigard at the 28 g. a.i./A rate when compared to the 14 g. a.i./A rate. No evidence of phytotoxicity was apparent on plants treated with Actigard. This study suggests that lettuce cultivars differ in susceptibility to powdery mildew. Also, Actigard was able to provide added protection against powdery mildew for all tested lettuce cultivars.

## Introduction

Powdery mildew, caused by the fungus *Erysiphe cichoracearum*, is becoming an increasing concern for lettuce growers in the desert southwest. The disease can cause economic losses, normally on lettuce harvested in March and April, the last months of the production season.

The purpose of this field study was to evaluate the effect of a product under development called Actigard on development of powdery mildew on several different cultivars of lettuce. Actigard is unique in that this chemical activates the defense mechanisms within plants to certain diseases. The compound has no direct effect on plant pathogens themselves.

## 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%). Nine different cultivars of lettuce, including AZ 2000, Bos 9003, Cibola, Conquistador, Coolgreen, Coolguard, HMX 9554, Jackel, and Mohawk, were seeded and watered December 2, 1999 on double rows 12 inches apart on beds with 40 inches between bed centers. Treatments were replicated four times in a randomized complete block design. Each replicate consisted of 25 feet of bed. Actigard 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 materials were made Feb. 16, Feb. 29, Mar. 8 and Mar. 15, 2000. Maximum and minimum ranges (°F) of air temperature were as follows: December 1999, 64-78, 33-53; January 2000, 64-83, 33-54; February, 64-82, 38-57; March 1-23, 60-88, 37-55. Maximum and minimum ranges (%) for relative humidity were as follows: December 1999, 38-91, 12-27; January 2000, 52-98, 13-38; February, 65-100, 15-51; March 1-23, 47-100, 11-63. Rainfall occurred February 21 (0.05 in.) and March 4 and 5 (.21in.). Furrow irrigation was used for the duration of this trial. The severity of powdery mildew caused by *Erysiphe cichoracearum* was determined at plant maturity (Mar. 23) by rating 10 plants randomly selected from each of the five replicate plots per treatment using the following rating system: 0 =

no powdery mildew colonies present on plant; 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; 5 = powdery mildew present on entire lettuce head. Yield loss due to rejected lettuce heads normally would begin to occur on plants with a rating above 2.0.

### Results and Discussion

There were significant differences among the nine tested lettuce cultivars with respect to their susceptibility to powdery mildew. Cibola, Conquistador, and Coolguard had the lowest levels of powdery mildew. On the other hand, Bos 9003 and Mohawk had significantly higher levels of powdery mildew than all other tested cultivars.

Four applications of Actigard at a rate of 14 g. of active ingredient per acre significantly reduced the level of powdery mildew on all nine tested cultivars of lettuce. On two lettuce cultivars, powdery mildew was significantly lower when treated with Actigard at the 28 g. a.i./A rate when compared to the 14 g. a.i./A rate. No evidence of phytotoxicity was apparent on plants treated with either rate of Actigard.

In summary, this study illustrates that lettuce cultivars differ in susceptibility to powdery mildew. Further testing of lettuce cultivars could show which selections have useful levels of genetic resistance to this disease. Use of these cultivars could reduce and perhaps eliminate the use of fungicides, depending upon disease pressure. Also, Actigard was able to provide added protection against powdery mildew for all of the tested lettuce cultivars, suggesting the potential usefulness of this chemistry for management of powdery mildew.

**Table 1. Effect of cultivar and Actigard on severity of lettuce powdery mildew.**

Michael Matheron and Martin Porchas, Yuma Agricultural Center, University of Arizona

Lettuce cultivar	Powdery mildew disease rating **		
	Nontreated lettuce	Actigard (14 g a.i./A)*	Actigard (28 g a.i./A)*
Cibola	1.0 A, b	0.5 a	0.4 a
Conquistador (Romaine)	1.0 A, c	0.2 b	0.1 a
Coolguard	1.0 A, b	0.6 a	0.4 a
Coolgreen	1.3 B, b	1.0 a	1.0 a
AZ 2000	1.3 B, b	0.7 a	0.5 a
Jackel	1.4 B, b	0.7 a	0.6 a
HMX 9554	1.4 B, b	0.6 a	0.4 a
Mohawk	2.6 C, b	1.5 a	1.5 a
Bos 9003 (Romaine)	3.9 D, c	2.5 b	2.1 a

\* Actigard treatments were applied Feb. 16, Feb. 29, Mar. 8, and Mar. 15, 2000. Disease ratings were made on Mar. 23.

\*\* Numbers within the nontreated lettuce column are significantly different if followed by a different capital letter. Numbers across each row for each lettuce cultivar are significantly different if followed by a different lower case letter. These differences are significant at  $P = 0.05$  according to the Duncan-Waller  $k$ -ratio (LSD) test.