Management of Sclerotinia Leaf Drop on Lettuce: Efficacy of Fungicides in 1996 Field Trial

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Abstract

Leaf drop of lettuce is caused by the plant pathogenic fungi Sclerotinia minor and S. sclerotiorum. Cool and moist environmental conditions favor disease development. Potential new fungicides were evaluated in a field trial for management of this disease in 1996. For plots containing Sclerotinia minor, all compounds and rates tested significantly reduced the number of diseased heads compared to plots not treated with a fungicide. All treatments except Ronilan at the 0.5 lb. a.i./A rate yielded a significantly higher number of marketable heads compared to nontreated plots infested with S. minor. For plots containing S. sclerotiorum, all materials except the Ciba compound at the low and high rates decreased the number of diseased heads and increased the number of marketable heads compared to nontreated plots.

Introduction

Leaf drop of lettuce, caused by *Sclerotinia minor* and *S. sclerotiorum*, occurs every year in Arizona lettuce fields. As with other fungal diseases of vegetable crops, environmental conditions have a critical effect on the development of disease. Cool moist conditions favor development of leaf drop; therefore, the incidence of this disease is highest during the months of December through early March. To repress leaf drop, fungicides need to be applied to the plant bed when the lettuce seedlings are very small, so that an effective chemical barrier is established between the soil and the developing leaf canopy of the lettuce plant. With this chemical barrier in place, the bottom leaves and stem of each lettuce plant will be protected from colonization by the germinating sclerotia of the pathogens that cause leaf drop. In an attempt to increase the number of fungicides available to growers for management of leaf drop, a field trial was initiated in 1996 to test the efficacy of potential new chemistries.

Materials and Methods

This trial was conducted at the Yuma Valley Agricultural Center. Sclerotia of *Sclerotinia minor* were produced in 0.25 pt. glass flasks containing 15-20 sterilized 0.5 in. cubes of potato by seeding the potato tissue with mycelia of the fungus. After incubation for 4-6 wk. at 68 F, mature sclerotia were separated from residual potato tissue by washing the contents of each flask in running tap water within a soil sieve. Sclerotia were air-dried at room temperature, then stored at 40 F until needed. Inoculum of *Sclerotinia sclerotiorum* was produced in 2 qt. glass containers by seeding moist sterilized barley grain with sclerotia of this fungus. After 3 months incubation at 75-81 F in the laboratory, abundant sclerotia were formed. The contents of each container were removed, spread on a clean surface and dried. The resultant mixture of sclerotia and infested grain was used as inoculum.

Lettuce (Winterhaven) was seeded and watered October 30, 1995 in double rows 12 in. apart on beds 40 in. wide. Lettuce was thinned at the 3-4 leaf stage to a 12 in. spacing (December 4, 1995). On December 6, 0.1 oz. of sclerotia of *S. minor* was distributed evenly on the surface of each 25-ft.-long plot between the rows of lettuce, then incorporated into the top 2 inches of soil. For plots inoculated with *S. sclerotiorum*, 1 pint of the dried mixture of sclerotia and infested grain was broadcast evenly over the surface of each 25-ft.-long lettuce plot. Fungicides were applied December 7 and 21, 1995 to the surface of inoculated beds with a tractor-mounted boom sprayer that delivered 100 gal/acre at 100 psi to nozzles spaced 12 inches apart. Treatments were replicated 5 times in a randomized complete block design. Each replicate consisted of 25 ft. of bed, which contained two rows of lettuce. Treatment beds were separated by single nontreated but inoculated beds. Mean soil temperature (°F) at the 2-4 inch depth was as follows: December 1995, 64; January 1996, 58; February, 65. Total rainfall (in.) was as follows: December, 0.00; January, 0.00; February, 0.03. Furrow irrigation was used for the duration of this trial. Leaf drop was monitored by recording the number of collapsed lettuce plants. The percentage of marketable heads was determined at the conclusion of the trial at plant maturity (March 8).

Results and Discussion

The results of the 1994 study are presented in Tables 1 and 2. For plots containing *Sclerotinia minor*, all tested compounds and rates significantly reduced the number of diseased heads compared to plots not receiving fungicide. All treatments except Ronilan at the 0.5 lb a.i./A rate yielded a significantly higher number of marketable heads compared to control plots in the *S. minor* study. For plots containing *S. sclerotiorum*, all materials except the Ciba compound at the low and high rates decreased the number of diseased heads and increased the number of marketable heads compared to untreated plots. No symptoms of phytotoxicity were evident in any of the treatments within this trial.

This test has identified some new materials that might increase the chemical disease management options for leaf drop of lettuce in the future. Further evaluation of potential new fungicides for management of lettuce diseases is planned for next year.

Table 1. Effect of fungicide treatments on development of Sclerotinia leaf drop of lettuce cause by *Sclerotinia minor* in 1996 field trial. Michael Matheron and Martin Porchas, Yuma Agricultural Center, University of Arizona.

Treatment	Rate of a.i./A	Diseased heads *	Marketable heads *
Fluazinam 500F	1.0 lb	5.4 a	54.2 f
Fluazinam 500F	0.5 lb	7.4 a	50.4 ef
Rovral 4F	1.0 lb	9.0 ab	49.4 ef
Ciba X	High	14.0 bc	46.0 de
Ronilan 50DF	1.0 lb	16.2 c	41.0 cd
Benlate 50W	1.0 lb	16.8 cd	41.2 cd
Topsin M 70W	1.0 lb	17.0 cd	42.8 d
Rovral 4F	0.5 lb	17.4 cd	42.8 d
Ciba X	Low	19.0 cde	40.2 cd
Ronilan 50DF	0.5 lb	22.2 de	33.2 ab
Topsin M 70W	0.5 lb	24.6 e	36.6 bc
Nontreated control	-----	31.4 f	27.4 a

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

Table 2. Effect of fungicide treatments on development of Sclerotinia leaf drop of lettuce caused by *Sclerotinia sclerotiorum* in 1996 field trial. Michael Matheron and Martin Porchas, Yuma Agricultural Center, University of Arizona.

Treatment	Rate of a.i./A	Diseased heads *	Marketable heads *
Ronilan 50DF	1.0 lb	10.0 a	52.6 f
Ronilan 50DF	0.5 lb	18.0 b	43.0 e
Fluazinam 500F	1.0 lb	19.4 bc	38.4 de
Topsin M 70W	1.0 lb	23.6 bcd	34.4 cd
Fluazinam 500F	0.5 lb	24.0 bcd	35.4 cd
Rovral 4F	1.0 lb	25.4 cd	37.2 cde
Rovral 4F	0.5 lb	25.4 cd	31.0 bc
Benlate 50W	1.0 lb	29.0 de	31.6 bcd
Topsin M 70W	0.5 lb	32.6 e	26.8 b
Ciba X	Low	47.2 f	11.4 a
Ciba X	High	47.4 f	9.6 a
Nontreated control	-----	50.0 f	8.6 a

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