

Evaluation of Products to Manage *Sclerotinia* Leaf Drop of Lettuce in 2003

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Abstract

Sclerotinia leaf drop in Arizona is caused by two soil-borne fungi, *Sclerotinia minor* and *S. sclerotiorum*. Moist soil and moderate temperature favor this disease. Some registered products as well as new chemistries in development were evaluated for control of leaf drop on lettuce during the winter vegetable growing season in 2002-2003. Sclerotia of each pathogen were applied to plots after lettuce thinning and just before the first application of test compounds. In plots infested with *Sclerotinia minor*, all materials tested at an appropriate rate significantly reduced disease. The best treatments included an application of Contans followed by an application of Endura (BAS 510), as well as two applications of an experimental compound or the standard materials Ronilan and Rovral. Other useful products included Endura, Serenade, Pristine (BAS 516), Botran, Switch and Contans. In plots infested with *S. sclerotiorum*, two applications of Contans provided the best level of disease reduction among tested materials. Three applications of Endura or Pristine also were very efficacious. Other compounds that provided some reduction in disease caused by *S. sclerotiorum* included Botran, Serenade and Switch. Two of the products tested, Contans and Serenade, are biological control materials. For a valid comparison of products for control of *Sclerotinia* drop of lettuce, it is important to compare the results obtained from more than one field study. The reader is urged to review previous studies in addition to this report to get a true picture of the relative efficacy of tested compounds for control of *Sclerotinia* drop.

Introduction

Sclerotinia minor and *S. sclerotiorum* are two soil-borne fungi that cause lettuce drop in Arizona. As with other fungal diseases of vegetable crops, environmental conditions govern disease development. Mild to moderate temperatures and moist soil conditions favor lettuce drop; therefore, the incidence of the disease normally is highest from December through March in western Arizona lettuce fields. To minimize the occurrence of *Sclerotinia* drop, a fungicide treatment can be applied to lettuce beds immediately after thinning when plants are very small. This fungicide application, which can be followed in about 3 weeks by another treatment, forms a chemical barrier 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.

Timely application of an effective fungicide is a critical component of an overall disease management strategy when lettuce is planted in fields with a history of drop. Some new agrochemicals are in development that have activity on the group of plant pathogens that includes *Sclerotinia*. Two other products are biological disease control materials; Serenade contains a bacterium and Contans consists of a fungus. A field trial was initiated during the 2002-2003 vegetable season to test the potential efficacy of these new products on *Sclerotinia* drop 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%). Sclerotia of *Sclerotinia minor* were produced in 0.25-pt glass flasks containing 15 to 20 sterilized 0.5 in. cubes of potato by seeding the potato tissue with mycelia of the fungus. After incubation for 4 to 6 weeks 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 seeds with mycelia of the pathogen. After a 2 month incubation at 68°F, abundant sclerotia were formed. The contents of each container were then removed, spread onto a clean surface and air-dried. The resultant mixture of sclerotia and infested barley seed was used as inoculum. Lettuce 'Winterhaven' was seeded and watered October 29, 2002 on double rows 12 in. apart on beds with 40 in. between bed centers. Treatments were replicated five times in a randomized complete block design. Each replicate consisted of 25 ft of bed, which contained two 25 ft rows of lettuce. Plants were thinned November 23 at the 3-4 leaf stage to a 12 in. spacing. After thinning, for plots infested with *Sclerotinia minor*, 0.13 oz (3.6 grams) of sclerotia were distributed evenly on the surface of each 25-ft-long plot between the rows of lettuce and incorporated into the top 1-inch of soil. For plots infested with *Sclerotinia sclerotiorum*, 0.5 pint of a dried mixture of sclerotia and infested barley grain was broadcast evenly over the surface of each 25-ft-long lettuce plot, again between the rows of lettuce on each bed, and incorporated into the top 1-inch of soil. Sclerotia were applied to plots on December 11. Treatment beds were separated by single non-treated beds. Treatments were applied with a tractor-mounted boom sprayer (flat-fan nozzles spaced 12 in. apart) that delivered 50 gal/acre at 100 psi. Test materials were applied to the surface of the bed and plants at the times described in the data table. Mean soil temperature (°F) at the 4 in. depth was as follows: Dec, 54; Jan, 56; Feb, 58. Total rainfall in inches was as follows: December, 0.00; January, 0.03, February, 0.57. Furrow irrigation was used for the duration of this trial. The severity of disease was determined at plant maturity (Feb 24) by recording the number of dead plants in each plot. As a point of reference, the original stand of lettuce was thinned to approximately 55 plants per plot.

Results and Discussion

In plots infested with *Sclerotinia minor*, all materials tested at an appropriate rate significantly reduced disease. The best treatments included an application of Contans followed by an application of Endura (BAS 510), as well as two applications of an experimental compound or the standard materials Ronilan and Rovral. Other useful compounds included Endura, Serenade, Pristine (BAS 516), Botran, Switch and Contans. In plots infested with *S. sclerotiorum*, two applications of Contans provided the best level of disease reduction among tested materials. Three applications of Endura or Pristine also were very efficacious. Other compounds that provided some reduction in disease caused by *S. sclerotiorum* included Botran, Serenade and Switch. Two of the products tested, Contans and Serenade, are biological control materials. Contans is a strain of the fungus *Coniothyrium minitans* and Serenade is a strain of the bacterium *Bacillus subtilis*.

For a valid comparison of products for control of *Sclerotinia* drop of lettuce, it is important to compare the results obtained from more than one field study. The reader is urged to review previous studies in addition to this report to get a true picture of the relative efficacy of compounds for control of *Sclerotinia* drop.

Sclerotinia drop of lettuce fungicide trial, 2003.

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Treatment	Rate (lb a.i./A)	Treatment dates ¹	Diseased plants per 25 ft plot ²	
			<i>S. minor</i>	<i>S. sclerotiorum</i>
Contans (water incorporation) ³	4.0 lb prod.	1		
alternated with BAS 510 70WG	0.45	3	4.4	30.2
Rovral 4F	1.0	1,3	6.4	29.2
Ronilan 50DF	1.0	1,3	9.8	21.2
Endura 70WG (BAS 510)	0.35	1,2,3	10.0	16.6
Serenade AS (water incorp.) ³	4.0 qt prod.	1,3	10.0	27.4
Pristine 38WG (BAS 516)	0.4	1,3	10.2	27.8
Botran 5F	1.87	1,3	10.8	24.6
Endura 70WG (BAS 510)	0.45	1,2,3	11.0	17.2
Pristine 38WG (BAS 516)	0.45	1,2,3	11.0	19.8
Botran 5F	3.75	1,3	11.0	28.2
Switch 62.5WG	0.43	1,3	11.6	27.6
Endura 70WG (BAS 510)	0.35	1,3	11.8	37.2
Switch 62.5 WG	0.56	1,3	12.4	30.0
Contans (water incorporation) ³	4.0 lb prod.	1,3	12.6	12.8
Contans (water incorporation) ³	2.0 lb prod.	1,3	16.8	18.2
Non-treated control	-----	-----	23.2	37.8
LSD (Least Significant Difference, $P=0.05$) ⁴			5.0	8.4

1 Treatments were applied to soil on 1) Dec 12; 2) Dec 20; 3) Dec 31, 2002.

2 Disease assessment was performed at crop maturity on Feb 24, 2003. Each 25 ft. plot contained approximately 55 plants. All diseased plants were dead or dying.

3 Product applied to bed surface between lettuce rows in 1.0 gal of water per plot. An additional 1.0 gal of water was applied to further incorporate the product into the soil.

4 Values in each column differing by more than the least significant difference are significantly different from each other according to the Duncan-Waller K-ratio test.