Comparative Evaluation of Products to Manage Sclerotinia Drop of Lettuce in 2005

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Abstract

Sclerotinia drop on lettuce is caused by two soil-borne fungi, Sclerotinia minor and S. sclerotiorum. Moist soil and moderate temperatures favor this disease. Some registered products as well as new chemistries in development were compared for their ability to suppress Sclerotinia drop on lettuce during the winter vegetable growing season in 2004-2005. Sclerotia of each pathogen were incorporated into plots after lettuce thinning and just before the first application of test compounds. In plots infested with either Sclerotinia minor or S. sclerotiorum, most materials tested at an appropriate rate significantly reduced disease. In plots infested with S. minor, the best treatments included Endura, Endura followed by Rovral, Botran, and Endura + Contans. For plots containing S. sclerotiorum, the best treatments included Endura + Contans, Endura followed by Rovral, and Contans. One of the products tested, Contans, is a biological control material. 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 an accurate picture of the relative efficacy of tested compounds for control of Sclerotinia drop.

Introduction

Sclerotinia minor and *S. sclerotiorum* are the 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.

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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 products are in development that have activity on the group of plant pathogens that includes *Sclerotinia*. One existing product, Contans, is a biological disease control material consisting of a fungus called *Coniothyrium minitans*. A field trial was initiated during the 2004-2005 vegetable season to test and compare the efficacy of available and potentially 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 15-20 sterilized 0.5 in. cubes of potato by seeding the potato tissue with mycelia of the fungus. After incubation for 4-6 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 75°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 2 months 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 November 8, 2004 on double rows 12 in. apart on beds with 40 in. between bed centers, then germinated with furrow irrigation from November 8 to 11. Additional furrow irrigations were performed December 1, December 22, January 21, and February 8. 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 December 12 at the 3-4 leaf stage to a 12 in. spacing. Sclerotia were applied to plots on December 20. 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. Treatment beds were separated by single nontreated beds. Unless noted otherwise in the data tables, treatments were applied with a tractor-mounted boom sprayer (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: December, 53; January, 55; February, 57. Total rainfall in inches was as follows: December, 0.74; January, 0.74; February, 0.61. The severity of disease was determined at plant maturity (February 24) by recording the number of dead plants in each plot. As a point of reference, the original stand of lettuce was thinned to 50 plants per plot.

Results and Discussion

In plots infested either with *Sclerotinia minor* or *S. sclerotiorum*, most materials tested at an appropriate rate significantly reduced disease, as shown in the data table. In plots infested with *S. minor*, the best treatments included Endura, Endura followed by Rovral, Botran, and Endura + Contans. For plots containing *S. sclerotiorum*, the best treatments included Endura + Contans, Endura followed by Rovral, and Contans. One of the products tested, Contans, is a biological control material, containing a strain of the fungus *Coniothyrium minitans*.

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.

2004-2005 Sclerotinia Drop of Lettuce Fungicide Trial

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Treatment	Rate (lb active ingredient per acre, unless noted as amount of product)	Treatment dates [1]	Diseased plants per 25ft plot [2]	
			S. minor	*S. sclerotiorum*
Untreated control	-------	-------	27.4	38.4
Endura 70WG	0.96	1		
alternated with Rovral 4F	1.0	2	9.0	19.4
Endura 70WG	0.48	1,2	12.2	27.6
Botran 75W	3.98	1	15.4	26.2
Endura 70WG + Contans [3]	0.48 + 4.0 lb prod.	1,2	16.0	15.2
Rovral 4F	1.0	1,2	18.6	23.2
Contans [3]	4.0 lb prod.	1,2	20.2	19.6
Endura 70WG	0.96	1	20.2	25.6
Switch 62.5WG	0.55	1		
alternated with Endura 70WG	0.48	2	20.8	27.4
Switch 62.5WG	0.55	1,2	22.6	23.4
LSD (Least Significant Statistical Difference, *P*=0.05)			**7.4** [4]	**2.7** [4]

1. Treatments were applied to soil on 1) December 20, 2004; 2) January 7, 2005.

2. Disease assessment was performed at crop maturity on February 24, 2005. Each 25 ft. plot contained 50 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. Least Significant Statistical Difference at $P = 0.05$.