Comparison of Products to Manage Sclerotinia Drop of Lettuce in 2006

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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 2005-2006. Sclerotia of each pathogen were incorporated into plots after lettuce thinning and just before the first application of test compounds. In plots infested with S. minor, a significant reduction in disease compared to untreated plots was achieved with Omega, Rovral, Endorse, Endura, and Switch. For plots containing S. sclerotiorum, disease was significantly reduced by Contans, Rovral, Omega and Endura. 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. Fungicides are not the only tools available to growers to manage Sclerotinia drop. Cultural methods, such as soil solarization or soil flooding in the summer, as well as crop rotation, can greatly reduce the number of viable sclerotia in an infested field. Use of these cultural methods alone or in combination with fungicide treatments can result in dramatic reductions in the incidence of Sclerotinia drop of lettuce.

Introduction

Sclerotinia drop of lettuce is caused by two fungal pathogens, *Sclerotinia minor* and *S. sclerotiorum*. As with other fungal diseases of vegetable crops, environmental conditions govern disease development. Mild to moderate temperatures and moist soil conditions favor Sclerotinia drop; therefore, the incidence of the disease normally is highest from December through March in western Arizona lettuce fields. Application of certain fungicides to lettuce beds, usually after thinning and again about 2-3 weeks later, can significantly reduce the severity of this disease. Fungicide applications form 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 soil-borne sclerotia of the pathogens.

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Timely application of an effective fungicide can be a critical component of an overall management strategy for Sclerotinia drop. Some new products are in development that have activity on the group of plant pathogens that includes *Sclerotinia*. Two existing products, Contans and Serenade, are biological disease control materials consisting of a fungus called *Coniothyrium minitans* and a bacterium called *Bacillus subtilis*, respectively. A field trial was initiated during the 2005-2006 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 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 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 mo 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 Nov 14, 2005 on double rows 12 in. apart on beds with 40 in. between bed centers, then germinated with sprinkler irrigation from Nov 17 to 22. Additional sprinkler irrigations were performed Dec 1 and 14, followed by furrow irrigations Jan 13 and 30 and Feb 16 and 28. 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 Dec 28 at the 3-4 leaf stage to a 12 in. spacing. Sclerotia were applied to plots on Jan 10, 2006. 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 on Jan 11 and again on Jan 24. Mean soil temperature (°F) at the 4 in. depth was as follows: Nov, 62; Dec, 53; Jan, 54; Feb, 60; Mar, 65. No rainfall was recorded for the duration of the trial. The severity of disease was determined at plant maturity (Mar 13) 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

Some treatments were much more effective than others. The following data table illustrates the degree of control obtained by applications of the various materials tested in this trial. The relatively low level of disease that developed in nontreated plots, especially in plots infested with *Sclerotinia sclerotiorum*, is likely the result of the lack of rainfall during this trial. Wet soil conditions, especially on the top of beds, promotes Sclerotinia drop in lettuce. Without rainfall, the only source of moisture was that provided by irrigation.

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.

Fungicides are not the only tools available to growers to manage Sclerotinia drop. Cultural methods, such as soil solarization or soil flooding in the summer, as well as crop rotation, can greatly reduce the number of viable sclerotia in an infested field. Use of these cultural methods alone or in combination with fungicide treatments can result in dramatic reductions in the incidence of Sclerotinia drop of lettuce.

2005-2006 Sclerotinia Drop of Lettuce Fungicide Trial

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Treatment	**Method of application** [1]	**Rate of product per acre**	**Treatment dates** [2]	**Number of diseased plants per 25 ft plot**	
				Sclerotinia minor	***Sclerotinia sclerotiorum***
Untreated control	-------	-------	-------	**27.0**	**10.0**
Omega 500F Switch 62.5 WG	Soil drench Soil drench	1.5 lb 0.875 lb	1 2	11.2	7.0
Omega 500F	Soil drench	1.5 lb	1	13.2	5.0
Rovral 4F	Soil spray: 50 gpa	1.0 qt	1,2	15.4	5.0
Endorse	Soil drench	6.2 oz	1,2	15.6	10.4
Endura 70WG	Soil drench	0.69 lb	1,2	16.2	6.6
Endura 70WG + Penetrator	Soil spray: 50 gpa	0.69 lb + 1.0 pt	1,2	16.4	7.0
Switch 62.5WG	Soil drench	0.875 lb	1,2	17.2	7.4
Endura 70WG + Penetrator	Soil spray: 100 gpa	0.39 lb + 1.0 pt	1,2	18.8	5.0
Rovral 4F	Soil drench	1.0 qt	1,2	20.2	6.4
Contans	Soil drench	4.0 lb	1,2	26.2	4.6
Serenade AS	Soil drench	4.0 qt	1,2	31.2	7.8
LSD (Least Significant Statistical Difference, *P*=0.05)				**7.1** [4]	**3.8** [4]

1. Soil drenches were applied to the 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. This application method was intended to simulate incorporation of the product into the bed by sprinkler irrigation. The soil spray applications were made to the bed surface without further application of water.

2. Treatments were applied to soil on 1) Jan 11, 2006; 2) Jan 24, 2006.

3. Disease assessment was performed at crop maturity on Mar 13, 2006. Each 25 ft. plot contained 50 plants. All diseased plants were dead or dying.

4. Least Significant Statistical Difference at $P = 0.05$.