Evaluation of Products to Manage *Sclerotinia* Leaf Drop of Lettuce in 2001

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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 new products in development were evaluated for control of leaf drop on lettuce during the winter vegetable growing season of 2000-2001. Sclerotia of each pathogen were applied to plots after thinning and just before the first of two applications of test compounds. A high level of disease control in the S. minor plots occurred with an appropriate concentration of Plantpro 45, Fluazinam, Contans, BAS 510, BAS 510+BAS 500, Medallion and Serenade. The same products (except Serenade) at an appropriate rate significantly reduced the amount of leaf drop caused by S. sclerotiorum. Elevate did not significantly reduce disease caused by either pathogen. Two of the products tested, Serenade and Contans, are biological control materials. Continued demonstration of efficacy by one or both of these products may provide the opportunity to utilize biological control agents to manage Sclerotinia leaf drop .*

Introduction

Sclerotinia minor and *S. sclerotiorum* are two soil-borne fungi that can cause leaf drop of lettuce in Arizona. As with other fungal diseases of vegetable crops, environmental conditions govern disease development. Mild to moderate temperatures and moist soil conditions favor leaf 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 leaf drop, a fungicide treatment can be applied to the lettuce beds immediately after thinning when the 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 leaf 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 2000-2001 vegetable season to test the potential efficacy of these new products on Sclerotinia leaf drop of lettuce.

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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 68EF, 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 40EF 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 68EF, 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 November 2, 2000 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 December 8 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 20. Treatment beds were separated by single nontreated beds. Unless noted otherwise in the data table, 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 on December 21, 2000 and January 3, 2001. Mean soil temperature (EF) at the 4 in. depth was as follows: Dec, 59; Jan, 57; Feb, 60; Mar 1-14, 62. Total rainfall in inches was as follows: December, 0.00; January, 0.31, February, 0.85; Mar 1-14, 0.61. Furrow irrigation was used for the duration of this trial. The severity of disease was determined at plant maturity (March 14) 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

A high level of disease control in the *S. minor* plots occurred with an appropriate concentration of Plantpro 45, Fluazinam, Contans, BAS 510, BAS 510+BAS 500, Medallion and Serenade. The same products (except Serenade) at an appropriate rate significantly reduced the amount of leaf drop caused by *S. sclerotiorum*. Elevate did not significantly reduce disease caused by either pathogen. Two of the products tested, Serenade and Contans, are biological control materials. Continued demonstration of efficacy by one or both of these products may provide the opportunity to utilize biological control agents for management of Sclerotinia leaf drop . The following data table illustrates the degree of control obtained by two applications of the various materials tested in this trial.

Sclerotinia leaf drop of lettuce fungicide trial, 2001.

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Treatment [1]	Rate (lb a.i./A)	Dead plants per 25 ft plot [2]	
		S. minor	*S. sclerotiorun*
Plantpro 45 (water incorporation) [4]	4.4	2.3	31.3
Fluazinam 4.17SC	1.0	4.3	25.3
Contans (water incorporation) [4]	2.0 lb prod.	4.7	22.7
BAS 510 70WG	0.5	5.3	29.7
BAS 510 70WG + BAS 500 20WG	0.25 + 0.125	6.3	27.3
BAS 510 70WG + BAS 500 20WG	0.4 + 0.2	7.0	29.7
BAS 510 70WG	0.4	8.0	29.3
Medallion 50WP (mechanical incorp.) [3]	0.178	8.3	26.7
Fluazinam 4.17SC	0.5	9.3	28.0
Serenade AS (water incorporation) [4]	1.0 gal prod.	9.7	30.3
Medallion 50WP	0.178	10.7	32.7
Ronilan 50DF	1.0	10.7	28.0
Contans (water incorporation) [4]	4.0 lb prod.	11.0	11.0
BAS 510 70WP	0.25	11.0	24.7
Rovral 4F	1.0	11.0	28.7
Serenade AS (water incorporation) [4]	0.5 gal prod.	11.0	30.3
Plantpro 45 (water incorporation) [4]	1.5	11.3	28.3
Serenade AS (water incorporation) [4]	2.0 gal prod.	13.0	30.3
Elevate 50WDG	0.75	16.3	34.7
Nontreated	-------	22.7	40.3
LSD (Least Significant Difference, *P*=0.05)		8.6	11.5

1 Treatments were applied after thinning on Dec 21, 2000 and again on Jan 3, 2001.

2 Disease assessment was performed at crop maturity on Mar 14, 2001. Each 25 ft. plot contained approximately 55 plants. All diseased plants were dead or dying.

3 Treated and inoculated zone between lettuce rows was cultivated to a depth of 1 inch after application of chemical.

4 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.