Comparative performance of chemical, biological and cultural tools to manage lettuce drop caused by *Sclerotinia minor and S. sclerotiorum*

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Introduction

- Lettuce drop is an economically important disease caused by *Sclerotinia minor* and *S. sclerotiorum*.

- Several trials were conducted over a multi-year period with the following objectives:
  1.) To compare the efficacy of currently registered fungicides.
  2.) To evaluate new chemistries and methods of application.
  3.) To examine the effect of a summer soil flooding period on viability of sclerotia.

- The ultimate goal of these studies was to develop disease management strategies that will optimize control of lettuce drop.

Materials and Methods

- These studies was conducted at The University of Arizona Yuma Agricultural Center.

- Sclerotia of *S. minor* and *S. sclerotiorum* were produced in the laboratory on potato pieces and barley seed, respectively.

- For all disease control trials, lettuce was seeded during the first week of November on raised beds in double rows 30 cm apart.

- After thinning to a 30-cm spacing within rows in early December, sclerotia of *S. minor* or *S. sclerotiorum* were spread on the surface of each 7.6-m-long plot between the rows of lettuce, then incorporated to a depth of 5-cm.

- Objective 1). Registered products (Table 1) were applied to the soil surface once after thinning and again about 2 weeks later. Data presented are from four trials.

- Objective 2). The efficacy of one soil surface application of the fungicide fluazinam was compared to two applications of Endura, applied either to the soil surface or physically incorporated into the soil to a depth of 5 cm after application, where the pathogen sclerotia were located. Data presented are from two trials.

- Objective 3). For these trials, sclerotia were placed in packets, placed in field soil at depths of 0, 10, and 20 cm within microplots, then flooded for 1 to 4 weeks. Sclerotia were collected weekly and plated onto potato dextrose agar to determine their ability to germinate. Data presented are from three field trials.

Table 1. Products and rates tested.

Product name	Material per ha.	Active ingredient
Botran	2.2 kg a.i.	Dicloran
Contans	4.6 kg product	*Coniothyrium minitans*
Endura	0.6 kg a.i.	Boscalid
Omega	1.1 kg a.i.	Fluazinam
Rovral	1.1 kg a.i.	Iprodione
Serenade	9.4 liters prod.	*Bacillus subtilis*
Switch	0.6 kg a.i.	Cyprodinil + fludioxonil

Figure 1. Efficacy of products for control of lettuce drop. Each value is the mean from four trials.

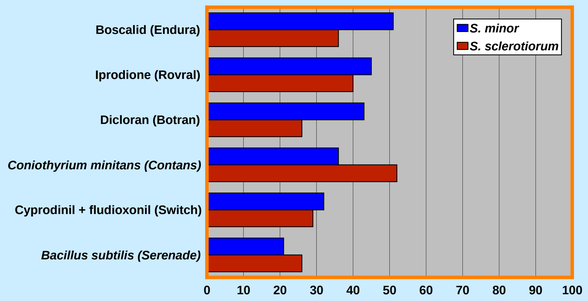


Figure 2. Efficacy of lettuce drop control with fluazinam and boscalid applied to soil surface or incorporated into the top 5 cm of soil.

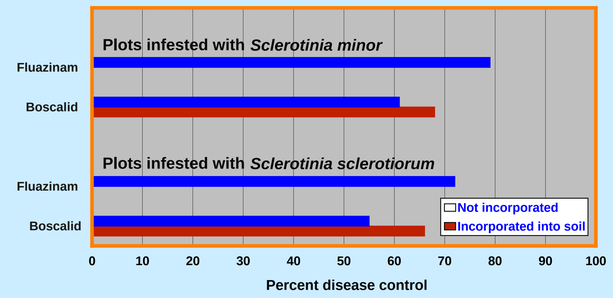
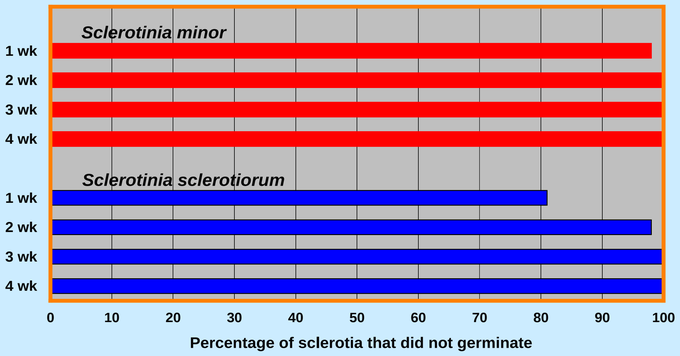


Figure 3. Effect of soil flooding duration on viability of *Sclerotinia* sclerotia. Mean soil temperatures at 10 cm depth ranged from 30 to 33C.



Results

- Compared to nontreated plots, the highest mean reduction in disease for these trials in the presence of *S. minor* was 51% on plots treated with boscalid and in the presence of *S. sclerotiorum* was 52% on plots treated with *Coniothyrium minitans* (Figure 1).

- Disease control was significantly higher in plots containing *S. minor* and treated with boscalid and dicloran compared to those containing *S. sclerotiorum*; however, the opposite was true for *Coniothyrium minitans* (Figure 1).

- In two additional trials, incorporating boscalid into the soil compared to application without incorporation increased disease control from 61 to 68% in plots containing *S. minor* and from 55 to 66% in plots containing *S. sclerotiorum* (Figure 2).

- In the same trials (Figure 2), a single soil surface application of fluazinam reduced the final number of diseased plants in plots containing *S. minor* and *S. sclerotiorum* by 79 and 72%, respectively.

- In field microplot studies (Figure 3), sclerotia of both pathogens were virtually no longer viable after placement in soil that was flooded in the summer for 2 or more weeks, where mean soil temperatures ranged from 30 to 33C.

Discussion

- The mean upper limit of lettuce drop control over a 4-year period was approximately 50% employing fungicides currently registered in the USA and using conventional application methods.

- The potential level of disease control achievable by application of fungicides could be increased by alternate methods of application, such as physical incorporation in soil, or by registration of fluazinam.

- Virtually complete destruction of sclerotia and control of lettuce drop was possible by maintaining a high level of soil moisture in infested fields in regions where soil temperatures are high when lettuce is not in production.