Fungicides for Reducing Losses Caused by Sclerotinia Blight on Peanut

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ABSTRACT

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Vinclozolin, myclozolin, and dicloran reduced *Sclerotinia minor* blight on peanuts and produced significantly greater pod yields than untreated controls. The efficacy of all three materials was improved by applications on a preventative rather than an on-demand schedule. Application of myclozolin tank-mixed with chlorothalonil for leaf spot control was as effective in controlling Sclerotinia blight as application with large droplet nozzles. Ectaconazole was not effective against Sclerotinia blight in these trials.

Sclerotinia blight of peanut, incited by *Sclerotinia minor* Jagger has occurred in the Virginia-North Carolina Tidewater area since 1971 (7). In this peanut-production area, Sclerotinia blight has become a serious disease; losses of 50% have been documented in some fields (1,10). Sclerotinia blight is also established in seven of 23 peanut-producing counties in Oklahoma as a major peanut disease (13). In 1981, the disease was located in two adjacent Texas fields, but the significance to Texas peanut production has not been assessed (B. Jones, *personal communication*).

Sclerotinia blight has been controlled mainly through cultural practices. Efficacious fungicides have not been registered for use on peanut (1). Some suppression of disease can be achieved by using the herbicides dinoseb or dinoseb plus naptalam (11), by discontinuing spraying operations once the row middles close in order to avoid mechanical injury from tractor tires (9), by foliar sulfate application, by avoiding low soil pH (2), and by avoiding the use of chlorothalonil and captafol in the leaf spot program (4,5). Chlorothalonil and captafol are two efficacious leaf spot fungicides, but they are reported to cause greater Sclerotinia blight incidence (8).

Procymidone, a candidate fungicide for Sclerotinia blight, was reported previously (6). This fungicide could be used on demand or prophylactically and could be applied with standard leaf spot spray equipment. This fungicide, unfortunately, is no longer being tested on Sclerotinia blight in peanut.

The objectives of this study were to obtain field efficacy data for vinclozolin and myclozolin against Sclerotinia blight of peanut in naturally infested fields and to determine the number of applications needed for optimum pod production, the preferred timing of application, and the most efficacious method for application.

MATERIALS AND METHODS

For the 1981 tests, three fields were selected because they had severe Sclerotinia blight in 1979, the last year the fields were in peanut production. Corn was grown in all three fields in 1980. There was one field each in Isle of Wight and Southampton counties, VA, and one in Northampton County, NC. Sclerotinia blight occurs throughout this range. Plots were arranged in a randomized block design with four reps of two 7.6-m-long rows; spacing between rows was 0.9 m. All three experiments were identical except for randomization, and all three fields were planted with peanut cultivar Florigiant between 1 and 15 May.

Fungicides evaluated were vinclozolin (Ronilan 50W), dicloran (Botran 75W), myclozolin (BAS 436 00 F), and ectaconazole (Vangard 10W). Chlorothalonil at 1.12 kg a.i./ha and methomyl at 1 kg a.i./ha were applied (tank-mixed) for leaf spot and insect control. Chlorothalonil was applied six times between 2 July and 11 September to each field, whereas methomyl was applied on 13 August to each field and 2 wk later to the Northampton field. All maintenance sprays for leaf spot and insect control were applied through a two-row boom with three D2-23 nozzles per row. Compressed CO_2 was used to create 207-kPa pressure and deliver 140 L/ha volume. Fungicides that were not applied in tank-mix with the maintenance sprays

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were applied through a two-row boom with one 8008 LP nozzle over each row. This boom was operated at 138 kPa pressure to deliver 374 L/ha.

The tank-mix treatments of myclozolin and chlorothalonil were made to each field with the D2-23 nozzles on 7 July and again on 13 August. Applications of other treatments to the Southampton field, using the 8008 LP nozzles, were made on 7 July, 30 July, and 13 August. These applications had been scheduled in advance and were to be applied prophylactically (before symptoms appeared). Applications of treatments, except the tank-mixed myclozolin, to the other two fields were "on-demand" (after symptoms appeared) on 13 August, 25 August, and 10 September.

Disease evaluations were made on a 14-day schedule. Sclerotinia infection centers were counted on whole plots at each evaluation. A locus of infection was defined as an area of disease signs and symptoms equal to or less than 30 cm long in a standard row (12). Each locus was marked with a wire stake flag so that newly appearing loci could be differentiated from previous ones. Peanut pods were dug and harvested by combine between 2 and 14 October with commercial equipment. Weights were taken on field-run peanuts without additional drying or curing.

RESULTS

The first Sclerotinia blight was found on 13 August in all three fields. All of the sclerotia observed in the field agreed with Kohn's description of *S. minor* (3).

At the Northampton County site, disease incidence was high in untreated plots (four Sclerotinia infection centers per 15 m of row) and dicloran, myclozolin, and vinclozolin statistically reduced disease incidence (Figs. 1 and 2). In this test, dicloran was the least efficacious of the three and the myclozolin tank-mix applications were the most efficacious. Although all myclozolin treatments showed relatively similar disease intensity, the tank-mixed applications were the only ones that had been applied prophylactically. These treatments both started and ended with a statistically lower amount of disease. This would suggest that prophylactic applications have an advantage over on-demand treatments. Yields (Table 1) correlated well with degree of final disease control ($r = -0.82$).

In the Isle of Wright County field, initial disease incidence was moderate (one Sclerotinia infection center per 15 m of row) and subsequent disease incidence was moderate (Figs. 3 and 4). The disease intensity in the control plots was linear over time. The three efficacious fungicides again lowered the final disease intensity and yields were high for these treatments (Table 1). The correlation coefficient between final disease incidence and yield was $r = -0.78$. Tank-mixed myclozolin again had an initially lower amount of disease, resulting in statistically lower final disease evaluation despite a similar increase in disease intensity during the season (Fig. 4).

In the Southampton County field, the fungicide treatments were begun on a preventative rather than an on-demand schedule. Initial disease incidence was very low although the disease intensity subsequently was moderate (Table 2). The control plots had a disease incidence

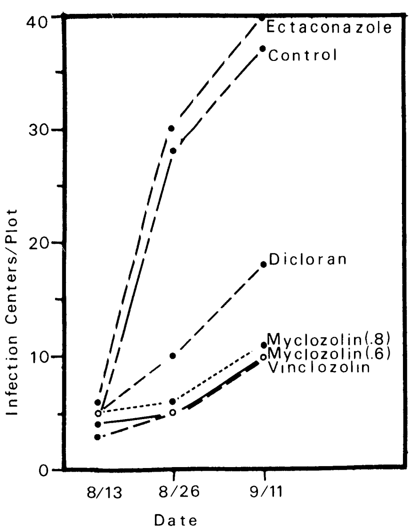

Fig. 1. Sclerotinia blight incidence in the Northampton County field for fungicides applied three times on-demand: ectaconazole (0.34 kg/ha), dicloran (4.48 kg/ha), vinclozolin (0.84 kg/ha), and myclozolin (0.84 kg/ha and 0.56 kg/ha).

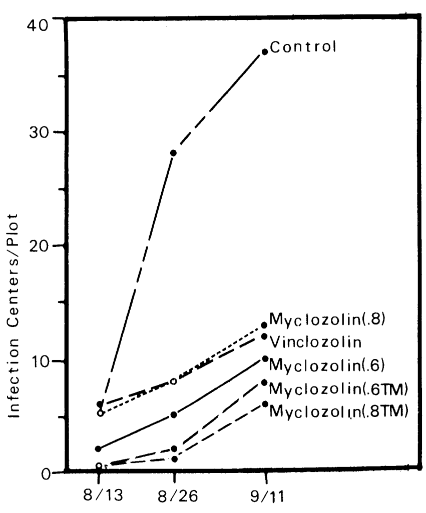

Fig. 2. Sclerotinia blight incidence in the Northampton County field for fungicides applied twice on-demand: vinclozolin (0.84 kg/ha) and myclozolin (0.84 kg/ha and 0.56 kg/ha), and for fungicides applied twice prophylactically tank-mixed (TM) with chlorothalonil: myclozolin (0.84 kg/ha and 0.56 kg/ha).

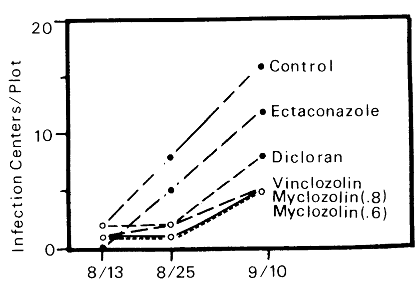

Fig. 3. Sclerotinia blight incidence in the Isle of Wight County field for fungicides applied three times on-demand: ectaconazole (0.34 kg/ha), dicloran (4.48 kg/ha), vinclozolin (0.84 kg/ha), and myclozolin (0.84 kg/ha and 0.56 kg/ha).

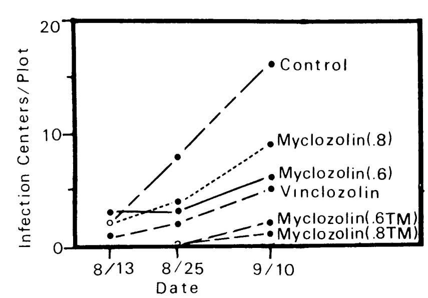

Fig. 4. Sclerotinia blight incidence in the Isle of Wight County field for fungicides applied twice on-demand: vinclozolin (0.84 kg/ha) and myclozolin (0.84 kg/ha and 0.56 kg/ha), and for fungicides applied twice prophylactically tank-mixed (TM) with chlorothalonil: myclozolin (0.84 kg/ha and 0.56 kg/ha).

Table 1. Peanut pod yields after fungicidal treatments to control Sclerotinia blight

Fungicide	Rate (a.i. kg/ha)	No. of applications	Yield (kg/ha)[a] Northampton	Isle of Wight	Southampton
Control	...	...	2566	3929	4093
Myclozolin	0.84 TM[b]	2	5629*	5821*	6235
	0.56 TM	2	4508	6100*	5957
	0.84	2	4682	6213*	7187*
	0.56	2	4180	5896*	6009
	0.84	3	3662	6368*	6116
	0.56	3	3765	5940*	6450*
Vinclozolin	0.84	2	5403*	5943*	6162
	0.84	3	4963*	6168*	6783*
Dicloran	4.48	3	3489	6270*	6204
Ectaconazole	0.34	3	2495	4510	4610

[a]Treatment means marked with an asterisk are significantly different from the control in that column at the $P = 0.05$ level by Dunnett d′.

[b]TM = Tank-mixed with chlorothalonil and applied through D2-23 nozzles.

Table 2. Disease incidence in the Southampton County field where test fungicides were applied prophylactically

Fungicide	Rate (a.i. kg/ha)	Dates	Average infection centers/plot[a]		
			13 Aug.	25 Aug.	11 Sept.
Control	···	···	1	4	14
Myclozolin	0.84 TM[b]	16 July, 13 Aug.	0	0*	0*
	0.56 TM	16 July, 13 Aug.	0	0*	0*
	0.84	16 July, 30 July	0	0*	0*
	0.56	16 July, 30 July	0	0*	1*
	0.84	16 July, 30 July, 13 Aug.	0	0*	1*
	0.56	16 July, 30 July, 13 Aug.	0	0*	0*
Vinclozolin	0.84	16 July, 30 July	0	1*	2*
	0.84	16 July, 30 July, 13 Aug.	0	0*	1*
Dicloran	4.48	16 July, 30 July, 13 Aug.	0	0*	0*
Ectaconazole	0.34	16 July, 30 July, 13 Aug.	0	2	13

[a]Treatment means marked with an asterisk are significantly different from the control at that evaluation at $P = 0.05$ by Dunnett d′.
[b]TM = Tank-mixed with chlorothalonil and applied through D2-23 nozzles.

similar to that in the Isle of Wright County field (Figs. 3 and 4). The excellent degree of control afforded by the efficacious treatments and good yields (Table 1) resulting from those treatments ($r = -0.91$ between yield and final disease incidence) suggests that against moderate Sclerotinia disease pressure, preventative rather than demand applications may be more desirable. Phytotoxicity was not observed with any treatment in any field during this study and no problems with tank-mixing were encountered.

DISCUSSION

Interpretation of the correlation coefficients in the three trials showed that 83, 69, and 60% of the variations in yield were attributable to disease intensity for the Southampton, Northampton, and Isle of Wight fields, respectively. When the trial where the fungicides were applied prophylactically was compared with trials where they were applied on-demand, the prophylactic or preventatively scheduled treatments resulted in better performance from all of the efficacious fungicides. When results from the two trials where myclozolin was applied prophylactically (and tank-mixed with chlorothalonil) and on-demand (separate from the chlorothalonil) were compared in the same trial, the prophylactic applications again resulted in better control. Applying the fungicides before symptoms appeared reduced disease intensity and generally resulted in larger yields.

Myclozolin was effective in controlling Sclerotinia blight either applied as a tank-mix with chlorothalonil to the peanut foliage or applied alone to the lower stem and soil surface. Application of dicloran to the soil surface has been recommended. If growers could apply myclozolin with their regular leaf spot program, they could eliminate trips over the field required for separate applications of the fungicides for leaf spot and Sclerotinia blight. They could also eliminate the extra steps of switching from hollow cone nozzles used every 2 wk for leaf spot fungicides to the flat fan nozzles used exclusively for dicloran. Sclerotinia blight occurs chiefly on plant parts in contact with the soil. Fungicides applied to control the disease have always been applied by using methods designed to penetrate the canopy, eg, dragging the nozzles below the top of the canopy, and using low-pressure/large-droplet nozzles to reduce canopy interception. Myclozolin was effective when applied through the D2-23 nozzles usually reserved for the leaf spot fungicide. Because myclozolin is thought to be a contact fungicide, systemic movement is not expected. It is possible that the small droplets from the D2-23 nozzles penetrated the canopy to the plant parts in contact with the soil or that the myclozolin deposited on the foliage was redistributed by rainfall to the soil.

Incidence of Sclerotinia blight has been reported to be increased by the use of chlorothalonil as the sole leaf spot fungicide (4,5,8). For this reason, chlorothalonil was chosen as the leaf spot fungicide and no growth regulator was used. The intent was to create a luxuriant canopy and increase the potential for Sclerotinia blight to occur. Good disease control was obtained with certain fungicides in spite of cultural practices selected to increase disease pressure.

Dicloran was applied at 12.4 kg a.i./ha and not at the labeled rate of 8.4 kg a.i./ha as prescribed under Emergency Use Permit in Virginia. Vinclozolin is currently registered for use on strawberries, and a peanut label is being sought. Myclozolin is an experimental fungicide. Ectaconazole has shown potential against leaf spot and southern stem rot but was ineffective against Sclerotinia blight in these trials.

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