Fungicides for Reducing Losses Caused by Sclerotinia Blight on Peanut

D. E. DOUGHERTY, Research Representative, BASF Wyandotte Corp., Raleigh, NC 27610; D. J. SAROJAK, Fungicide Specialist, BASF Wyandotte Corp., 100 Cherry Hill, Parsippany, NJ 07054; and F. LÖCHER, Fungicide Development Head, BASF AG., Landwirtschaftliche Versuchsstation, D-6703 Limburgerhof, West Germany

ABSTRACT

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 Florigiatan between 1 and 15 May.

Fungicides evaluated were vinclozolin (Ronilan 50W), dicloran (Botran 75W), myclozolin (BAS 436 00 F), and ectaconazole (Vanguard 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 CO2 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.
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 myclobutin 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 myclobutin, 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, myclobutin, and vinclozolin statistically reduced disease incidence (Figs. 1 and 2).

In this test, dicloran was the least efficacious of the three and the myclobutin tank-mix applications were the most efficacious. Although all myclobutin 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 Wight 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 myclobutin 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: etaconazole (0.34 kg/ha), dicloran (4.48 kg/ha), vinclozolin (0.84 kg/ha), and myclobutin (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 myclobutin (0.84 kg/ha and 0.56 kg/ha), and for fungicides applied twice prophylactically tank-mixed (TM) with chlorothalonil: myclobutin (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: etaconazole (0.34 kg/ha), dicloran (4.48 kg/ha), vinclozolin (0.84 kg/ha), and myclobutin (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 myclobutin (0.84 kg/ha and 0.56 kg/ha), and for fungicides applied twice prophylactically tank-mixed (TM) with chlorothalonil: myclobutin (0.84 kg/ha and 0.56 kg/ha).

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

<table>
<thead>
<tr>
<th>Fungicide</th>
<th>Rate (a.i. kg/ha)</th>
<th>No. of applications</th>
<th>Yield (kg/ha)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Northampton</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td>2566</td>
</tr>
<tr>
<td>Myclobutin</td>
<td>0.84 TM**</td>
<td>2</td>
<td>5629*</td>
</tr>
<tr>
<td></td>
<td>0.56 TM</td>
<td>2</td>
<td>4508</td>
</tr>
<tr>
<td></td>
<td>0.84</td>
<td>2</td>
<td>4682</td>
</tr>
<tr>
<td></td>
<td>0.84</td>
<td>1</td>
<td>4180</td>
</tr>
<tr>
<td></td>
<td>0.56</td>
<td>3</td>
<td>3662</td>
</tr>
<tr>
<td></td>
<td>0.56</td>
<td>3</td>
<td>3765</td>
</tr>
<tr>
<td></td>
<td>0.56</td>
<td>3</td>
<td>5403*</td>
</tr>
<tr>
<td>Vinclozolin</td>
<td>0.84</td>
<td>2</td>
<td>4963*</td>
</tr>
<tr>
<td></td>
<td>0.84</td>
<td>3</td>
<td>3489</td>
</tr>
<tr>
<td>Dicloran</td>
<td>4.48</td>
<td>3</td>
<td>2495</td>
</tr>
<tr>
<td>Etaconazole</td>
<td>0.34</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

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

**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
\((r = -0.91)\) 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 prevent-
atively scheduled treatments resulted in
better performance from all of the
efficacious fungicides. When results from
the two trials where mycelolin 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.

Mycelolin was effective in controlling
Sclerotinia blight either applied as a tank-
mix with chlorothalonil or in separate
applications. Mycelolin soaked the
tangible foliage and prevented blight at
the lower stem and soil surface. Application of dicloran to the soil surface has been recommended.
If growers could apply mycelolin with
their regular leaf spray 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 nozzle 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, e.g., dragging the
nozzles below the top of the canopy, and
using low-pressure/droplet nozzles to
reduce canopy interception. Mycelolin
was effective when applied through the
D2-23 nozzles usually reserved for the
leaf spot fungicide. Because mycelolin 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 mycelolin 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. Vincozolin is
currently registered for use on straw-
berries, and a leaf label is being sought.
Mycelolin is an experimental
fungicide. Ectaconazole has shown
potential against leaf spot and southern
stem rot but was ineffective against
Sclerotinia blight in these trials.

**LITERATURE CITED**

1975. Sclerotinia blight of peanut in North
Carolina and Virginia and its chemical control.

of applied plant nutrients on sclerotinia blight

economically important plant pathogenic

and benomyl on the severity of Sclerotinia blight

5. Porter, D. M. 1980. Increased severity of
Sclerotinia blight in peanuts treated with
captafol and chlorothalonil. Plant Dis.
64:394-395.

of peanut with procymidine. Plant Dis.
64:865-867.

blight of peanuts. Phytopathology 64:263-264.

of Sclerotinia minor on media containing
chlorothalonil and benomyl. Plant Dis.

Sclerotinia blight development in peanut vines
injured by tractor tires. Peanut Sci. 5:87-90.

1977. Severity of Sclerotinia blight of peanuts as
detected by infrared aerial photography. Peanut
Sci. 4:73-77.

of Sclerotinia blight of peanuts with dinotriphenol

12. Rodriguez-Kabana, R., Backman, P. A., and
Williams, J. C. 1975. Determination of yield
losses to Sclerotium rolfsii in peanut fields.

13. Wadsworth, D. F. 1979. Sclerotinia blight of
peanuts in Oklahoma and occurrence of the
sexual stage of the pathogen. Peanut Sci. 6:77-79.