Effects of Chemigation with Chlorothalonil and Diniconazole on Soil Fungi and Pod, Peg, and Stem Diseases of Peanut

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ABSTRACT

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Chlorothalonil and diniconazole were applied to peanut in microplots through irrigation water with hand sprinklers or by conventional sprays for control of leaf spots. Soil was infested with *Sclerotium rolfsii* or *Rhizoctonia solani* anastomosis group 4 (AG-4) or was noninfested. Foliage disease caused by *Cercosporidium personatum*, populations of *R. solani* AG-4 in soil, and the number of lesions on pods, pegs, and stems were usually reduced by treatments with fungicides (compared with no fungicide) but there were usually no differences between application methods. Chlorothalonil reduced the severity of pod rot in soil infested with *S. rolfsii*.

The application of pesticides through irrigation water is referred to as chemigation (6). Chlorothalonil has been applied successfully through overhead sprinkler irrigation to control foliage diseases in vegetables and leaf spots in peanut (1,7,9,16). Chlorothalonil has activity against *Rhizoctonia solani* Kühn anastomosis group 4 (AG-4), which causes fruit rot in cucumber (17) and tomato (10) and crown rot in sugar beet (13). The same fungus causes limb blight and pod and peg rot in peanut (4). It has been suggested that the increased yields that occur with chemigation of chlorothalonil may be partially because of the control of root and pod diseases (1). Diniconazole is a new sterol-inhibiting fungicide that is being evaluated for leaf spot control on peanut and other crops. This research was initiated to determine if applications to peanut foliage of chlorothalonil and diniconazole through irrigation water would influence populations of soil fungi and pod, peg, and stem diseases induced by *R. solani* AG-4 and *Sclerotium rolfsii* Sacc.

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MATERIALS AND METHODS

In vitro fungitoxicity of chlorothalonil. Chlorothalonil was incorporated into sterile Difco PDA (45–50 C) at concentrations of 0–100 μg/ml and poured into petri plates. A different isolate of *Cercospora arachidicola* Hori, *Fusarium oxysporum* Schlecht., *R.*

solani AG-4, and an unidentified orange basidiomycete was used in each of two tests. A single isolate of *R. solani* AG-1 and AG-2 type 2, *Rhizoctonia*-like binucleate CAG-2, *Laetisaria arvalis* Burdsall, *R. zeae* Voorhees, *F. solani* (Martius) Sacc., *Trichoderma harzianum* Rifai, *Trichoderma* spp., *S. rolfsii*, and *Pythium aphanidermatum* (Edson) Fitzp. was used in either the first or second test. Hyphal-tip cultures were transferred to four petri plates of each concentration. Isolates were kept at 30 C in continuous light in an incubator for 10 days in the first test and at 24–26 C under continuous fluorescent light on a laboratory bench for 2 wk in a second test. The diameter of cultures was measured every 2–4 days, and the morphology of the cultures was observed visually at the end of the second test.

Greenhouse studies. Microplots were established in a greenhouse in February 1985. Each microplot was a galvanized metal stock tank 91 cm in diameter and 61 cm deep placed on a gravel floor. Each tank was filled with 10 cm of gravel, 10 cm of sand, and 36 cm of moist soil from a field in Berrien County that was planted in corn in 1982 and peanut in 1983 and 1984. Fertilizer (101 g/m^2 of a commercial 5-10-15 blend of NPK) was incorporated 10–15 cm into each microplot on 18 February. The microplots were watered (1.25 cm) on 22 February, and the soil was allowed to settle. On 25 February, 40 peanut seed were planted 3–5 cm apart in a circle 47 cm in diameter, 22 cm from the rim, in each microplot. Peanuts began emerging on 5 March, and the plants were thinned to 20 per microplot on 13 March. Late-emerging and volunteer plants were removed on 28 March.

A factorial experiment in a randomized complete block design with three replications was used. Soil treatments were infested with peanut residues or *S. rolfsii* or were noninfested, with and without chemigation with chlorothalonil (Bravo 500). Peanut stem and leaf residues were collected in mid-February 1985 from the field in Berrien County, and approximately 264 g per microplot (4,256 kg/ha) were spread evenly on the soil surface and incorporated to a depth of 10–15 cm. *S. rolfsii* was grown 22 days in flasks of sterile wheat bran and scattered over flats of 24-day-old tomato grown on heat-treated soil in a greenhouse. Four days later, the dying tomatoes, soil, and wheat bran were mixed, and 3 L of the mixture were placed into the center of each microplot receiving the treatment of *S. rolfsii*. The mixture was spread uniformly over the soil surface up to 10 cm from the plants. The same method was used to infest all succeeding tests with *S. rolfsii*.

Chemical treatments. Chlorothalonil was applied on 27 March, 10 and 24 April, and 8 May at 1.24 kg a.i./ha in 0.4 cm of water (2,520 ml per microplot) with a sprinkler can. The same procedure was used in succeeding experiments in the greenhouse and field to simulate application through sprinkler irrigation. The plots were irrigated as needed (16 times) with 0.6–1.25 cm of water, totaling 15 cm.

Plants were sprayed with permethrin, diazinon, acephate, and malathion periodically to control insects and mites. The microplots were weeded by hand, and no herbicides were used.

Soil cores (2.5 cm diameter, 5 cm deep) were removed from each microplot on 27 February and 22 May. Soil was assayed on tannic acid benomyl (TAB) agar (15) with a multiple-pellet soil sampler (5) for *R. solani* and *S. rolfsii* and by soil dilutions on PARP agar for *Pythium* spp. (8), modified PCNB agar for *Fusarium* spp. (12), and OAES agar for numerous saprophytic fungi (19). Plants were removed as they died and 5- to 10-mm sections of tissue adjacent to stem or hypocotyl lesions were surface-disinfested for 30–60 sec in 0.5% NaOCl. They were blotted dry on sterile filter paper and incubated on water agar. Hyphal tips were transferred to PDA and identified. All plants were removed on 22 May and rated for root and hypocotyl discoloration and decay on a scale of 1–5, where $1 < 2$, $2 = 2$–10, $3 = 11$–50, and $4 > 50\%$ discoloration and decay; $5 =$ dead plant. The number of pegs and pods with lesions was recorded on two plants selected at random in each microplot.

In a second experiment, peanut was planted on 30 January 1986 and thinned as previously described. A factorial design with three replications was used. Treatments were 61 g a.i./ha (according to manufacturer's suggestions) of diniconazole + 0.5% Agri oil or no fungicide. Soil was infested with *S. rolfsii* or *R. solani* AG-4 or was noninfested. Inoculum of *R. solani* AG-4 was grown for 2–3 wk on 2 L of 3% cornmeal-sand (w/w) and was mixed with 2 L of heat-treated soil. On 20 February, approximately 700 ml was placed in the center 25 cm of each microplot, 10 cm from the plants. Microplots infested with *S. rolfsii* were prepared the same day. The fungicide was applied six times on a biweekly schedule beginning 6 March.

Field experiments. Microplots were prepared in a field of Fuquay loamy sand (loamy, siliceous, thermic, Arenic Plinthic Paleudults, pH 6.6, 0.5% organic matter) at the University of Georgia Coastal Plain Experiment Station at Tifton in March and April of 1985. Each microplot was a 0.9-m-diameter fiberglass cylinder inserted 15 cm into soil with a 15-cm rim aboveground to prevent movement of water and soil into the plot. Microplots were separated by a 1.8-m alley planted with centipede grass.

The field was double-cropped to corn and snap bean in 1984 followed by a rye cover crop during the winter of 1984–1985. Peanut was grown with standard management practices suggested by the Georgia Cooperative Extension Service. A 3×3 factorial experiment was established in a randomized complete block design with four replications. Soil was infested with *R. solani* AG-4 or *S. rolfsii* or was noninfested. Leaf spot control treatments were chlorothalonil applied through irrigation water or with a ground spray and a nontreated control. The inoculum of *R. solani* AG-4 was grown for 12 days in flasks of 3% cornmeal sand (w/w) and 50 ml per microplot was incorporated 5 cm deep (1:33,360 of inoculum to soil) on 8 May. Twenty peanut seed were planted per microplot. Inoculum of *S. rolfsii* was prepared and applied with the same methods used in greenhouse experiments. Controls were planted on 9 May. Stand counts were recorded 2–3 wk after planting. Soil was collected in each microplot on 4 June, 18 July, and 12 September and was assayed on selective media. All microplots were irrigated with overhead sprinklers as needed to prevent drought injury. Fungicide treatments were begun on 7 June and continued every 14 days through 29 August for seven applications. Leaf spot ratings were taken just before lifting on 13 September, and pod weights were determined from air-dried samples. The plots were left fallow during the winter of 1985–1986, and a similar experiment was conducted in 1986. Soil treatments were the residual effects of 1985, and leaf spot control treatments were the same as in 1986. Chlorothalonil was applied at the same rate as in 1985. One application of chemigation and ground spray treatments was inadvertently missed during the season in early September. Leaf spot severity and the incidence of white mold were evaluated on 15 September, and pods were dug and weighed in late September.

An additional microplot experiment was established in 1986 with the same experimental design and soil treatments as in 1985, except that diniconazole (61 g a.i./ha) was used as the fungicide for leaf spot control. Fungicide treatments were applied on the same schedule as chlorothalonil, and both experiments were rated for disease and harvested at the same time. Soil was collected on 8 January 1987 and assayed for *R. solani* AG-4 and other basidiomycetes on TAB.

All data were analyzed by least squares analysis of variance and general linear models statistical procedures. Data were transformed as necessary for statistical analysis, but all data are reported before transformation.

RESULTS

Chlorothalonil in vitro. The reaction of fungi to chlorothalonil was similar in

both tests. *C. arachidicola* did not grow at concentrations of 0.01 μg/ml or higher, but the growth of *T. harzianum*, *P. aphanidermatum*, *R. zeae*, and *S. rolfsii* was not inhibited by chlorothalonil at 100 μg/ml after 5 days. Concentrations of 0.1–1.0 μg/ml caused a 10–50% reduction in culture diameter after 5 days in *L. arvalis*, *F. oxysporum*, *F. solani*, and *Trichoderma* spp. Concentrations of 10 and 100 μg/ml caused >50% inhibition in *R. solani* AG-4 after 2 days incubation, but growth was only slowed; all petri plates were covered in 6–10 days. In contrast, AG-2 type 2 was completely inhibited by chlorothalonil at 1 μg/ml, whereas AG-1 and CAG-2 were inhibited 62 and 75%, respectively, by 1 μg/ml after 5 days. One isolate of the unidentified orange basidiomycete had very little growth at 1 μg/ml or more after 1 wk, whereas the other culture could tolerate 1 and 10 μg/ml but was severely inhibited at 100 μg/ml.

At 10 or 100 μg/ml of chlorothalonil, cultures of *L. arvalis* and the unidentified orange basidiomycete were convoluted and produced atypical or few sclerotia; *R. solani* AG-4 produced fewer sclerotia and irregular growth, and color was ochre to tan instead of dark brown when cultures were inverted; *Trichoderma* spp. was convex and clumped; *F. solani* was convoluted and appressed; and *F. oxysporum* was less floccose and more compact. Growth of *R. zeae* was not affected, but fewer sclerotia were produced on the surface of the agar at 100 μg/ml than in nonamended agar.

Greenhouse experiment with chlorothalonil. Peanut leaf spot did not develop, probably because of the low humidity in the greenhouse during the test. Air and soil temperatures were lower than averages for the Georgia coastal plain from June to August. However, minimum air and soil temperatures were similar to late September and October when late peanuts are harvested.

Populations of soil fungi were not significantly different among soil treatments 2 days after planting. However, there were significantly higher populations of *Aspergillus* spp. and *Cladosporium* spp. in microplots that were to receive chlorothalonil than in microplots that were not to receive chlorothalonil.

Populations of most soil fungi were not influenced by treatments 85 days after planting. Populations of *S. rolfsii* were reduced significantly and populations of *Penicillium* spp. + *Paecilomyces* spp. were increased significantly by simulation of applications of chlorothalonil in irrigation water. Populations of other fungi not influenced by treatments included *F. solani*, *Fusarium* spp., *R. solani* AG-4, *R. zeae*, *Rhizoctonia*-like binucleate CAG-3 (3), *Trichoderma* spp., *Neocosmospora vasinfecta* E. F. Smith, *Helminthosporium* spp., *Curvularia* spp., *Cladosporium* spp., *Mucor* spp., *Rhizopus* spp., *Zygorhynchus* spp., *Aspergillus niger* v. Tiegh., and *Aspergillus* spp.

Lesions on stems were increased more by incorporation of stem residues than with other treatments (Table 1). The number of pods and pegs with lesions was increased more by *S. rolfsii*, but not by incorporation of residues, when compared with noninfested soil. Chlorothalonil greatly reduced the number of lesions on stems, pods and pegs, and hypocotyls. Root growth was stimulated more by the incorporation of stem residues than with *S. rolfsii* and the control. However, chlorothalonil stimulated root growth in all treatments. Chlorothalonil increased plant height at 35 (20.3 vs. 18.9 cm) but not at 85 days.

There were no differences in numbers of dead plants among treatments. Fungi isolated most frequently from hypocotyl and stem lesions were *R. solani* AG-4, *A. niger*, *F. solani*, and *F. oxysporum*. *S. rolfsii* was not isolated.

Greenhouse experiment with diniconazole. Diniconazole did not significantly influence populations of *R. solani* AG-4 in soil nor the number of plants with hypocotyl lesions. However, peg, pod, and stem lesions were reduced by diniconazole treatment (Table 2). Diniconazole reduced plant height 7 wk after planting and reduced total plant weight at harvest (140 days) 39% (Table 2).

Fungi were isolated from 10 dying seedlings 4–6 wk after plantings. *R. solani* AG-4, *F. oxysporum*, and *A. niger* were isolated from five, four, and two of the seedlings, respectively. *S. rolfsii* was not isolated.

Field tests. Populations of *R. solani* AG-4 in soil were reduced by both application methods of chlorothalonil in 1985, but there were no significant differences among treatments in 1986 (Table 3). Populations of *R. solani* AG-4 were higher in infested than noninfested soil through 12 September 1985, but there were no differences among soil treatments in 1986 (Table 3).

Populations of the binucleate *Rhizoctonia*-like CAG-2, a fungus that

Table 1. Influence of soil treatments and chemigation with chlorothalonil on growth and disease in peanut in greenhouse microplots

Treatment	Number of plants with: Stem lesions	Hypocotyl lesions	Pod and peg rot[w]	Pods and pegs with lesions[x]	Fresh foliage wt (g)	Root growth[y]
Fungicide						
Chlorothalonil	9.0 b[z]	8.9 b	2.00 b	3.11 b	1,175	4.89 a
None	14.9 a	14.3 a	2.89 a	9.00 a	1,141	3.11 b
Soil						
Stem residue	13.5 a	11.7	2.33	5.83 ab	1,117	4.50 a
Sclerotium rolfsii	10.8 b	10.3	2.50	6.83 a	1,175	3.83 b
None	11.5 b	12.8	2.50	5.50 b	1,182	3.67 b

[w] Pod and peg rot index: 1 <2, 2 = 2–10, 3 = 11–50, and 4 >50% discoloration and decay; 5 = dead plant.
[x] Number of pegs and pods on two plants with lesions.
[y] Scale of 1–5, with 1 = poor and 5 = excellent.
[z] Numbers within columns of soil or fungicide treatments followed by the same letter are not significantly different according to Duncan's multiple range test, $P = 0.05$. No letter indicates no significant difference. All data were taken 12 wk after planting.

Table 2. Influence of diniconazole on growth and disease severity in peanut in greenhouse microplots infested with *Rhizoctonia solani* anastomosis group 4 (AG-4) and *Sclerotium rolfsii*

Treatment	Number of lesions at harvest[x] Stem	Pegs and pods[y]	Hypocotyls	Fresh plant wt (g)	Plant height at 7 wk (cm)
Fungicide					
Diniconazole	0.2 b[z]	11.0 b	14.6	1,060 b	7.0 b
None	10.6 a	29.7 a	13.2	1,735 a	9.8 a
Soil					
R. solani AG-4	4.2	17.7	15.0	1,418	8.5
S. rolfsii	6.3	21.5	13.7	1,474	8.5
Control	5.7	21.8	13.0	1,301	8.4

[x] At 20 wk after planting.
[y] Number of lesions on two plants per microplot.
[z] Numbers within columns of fungicide treatments followed by the same letter are not significantly different according to Duncan's multiple range test, $P = 0.05$. No letter indicates no significant difference. There were no significant differences among soil treatments and no interaction between fungicide and soil treatments.

Table 3. Populations of *Rhizoctonia solani* anastomosis group 4 (AG-4) and other soil basidiomycetes from field microplots treated with chlorothalonil in 1985 and 1986[y]

	R. solani AG-4					CAG-2					*Sclerotium rolfsii*		
	Days after planting					Days after planting					Days after planting		
	1985			1986		1985			1986		1985		
Treatment	26	70	126	0	174	26	70	126	0	174	26	70	126
Soil													
Control	14.1 b[z]	0.5 b	0.0 b	2.1	9.0	3.5	11.2 a	2.1	8.1	63.0	0	0 b	0 b
R. solani AG-4	70.0 a	13.8 a	13.4 a	2.6	0.0	0.0	0.5 b	0	4.7	55.1	0	0 b	0 b
S. rolfsii	2.0 c	5.3 b	0.0 b	4.3	0.6	5.1	3.7 b	0	4.3	20.2	1.5	2.7 a	5.7 a
Chlorothalonil													
Chemigation	22.7	5.3	1.0 b	2.1	0.6	2.5	6.4	1.5	8.1	47.2	1.0	1.1	0.5
Ground spray	37.3	9.6	3.1 b	2.6	0.0	3.0	3.2	0.0	4.7	27.0	0.5	1.6	2.6
None	26.8	4.7	9.3 a	4.3	9.0	3.0	5.9	0.5	4.3	64.1	0	0	2.6

[y] Colony-forming units/100 g of oven-dried soil.

[z] Numbers within columns of soil or chlorothalonil treatments followed by the same letter are not significantly different according to the Waller-Duncan *k*-ratio *t* test, $P = 0.05$. No letter indicates no significant difference. The only significant interactions between soil and fungicide treatments were in populations of *R. solani* AG-4 at 126 and 174 days after planting in 1985 and 1986, respectively.

has shown potential as a biocontrol agent, were not influenced by chlorothalonil treatments. *S. rolfsii* was rarely detected in 1985 on TAB agar and only in microplots infested with *S. rolfsii*. There were no significant differences among chlorothalonil treatments, and the fungus was not detected in soil assays in 1986. On 3 September 1985, white mold was observed in every microplot infested with *S. rolfsii* that received no chlorothalonil treatment but was not observed in other microplots. Pod rot was estimated as slight to moderate in the treatments of *S. rolfsii* + chlorothalonil (chemigation or ground spray) and heavy in the treatment of *S. rolfsii*.

Populations of *Pythium* spp. were not different among treatments except for samples on 11 November 1986, when populations were significantly greater in microplots receiving chlorothalonil as a ground spray than in microplots receiving chemigation (219 vs. 162 cfu/g). Populations of *Cladosporium* spp. in soil were reduced by both chlorothalonil treatments. Populations of total soil fungi were reduced by sprays with chlorothalonil, when compared with the control, on 12 September 1985. Populations of other fungi were usually not affected significantly by chlorothalonil or soil treatments.

Yield of pods was reduced in soil infested with *S. rolfsii* but not in soil infested with *R. solani* AG-4 in 1985, compared with noninfested soil (Table 4). Pod weight was increased by both chlorothalonil treatments, compared with plots receiving no chlorothalonil, but ground sprays increased total plant weight significantly when compared with chemigation and the control (Table 4). Leaf spot severity ratings were consistently lower in ground spray treatments than in chemigation and consistently lower in chemigation than the control (Table 4).

In 1986, chemigation with chlorothalonil and diniconazole did not control leaf spot, probably because an application of each was omitted inadvertently in early September. There was almost no yield in the experiment with chlorothalonil in chemigated and control plots, and there were no differences among soil treatments (Table 4).

Table 4. Yield and leaf spot control in peanuts with different soil and chlorothalonil treatments in field microplots

	1985			1986		
Treatment	Leaf spot severity ratings[x]	Total plant wt (g/plot)	Pod yield (g/plot)	Leaf spot severity ratings[x]	Leaf necrosis[y] (%)	Pod yield (g/plot)
Soil						
Control	2.8	1,125	605 a[z]	2.5	12.3	121
Rhizoctonia solani AG-4	2.8	1,055	536 ab	2.5	13.5	89
Sclerotium rolfsii	2.8	1,054	479 b	2.7	13.0	89
Chlorothalonil						
Chemigation	3.0 b	1,080 b	573 a	3.0 b	16.8 a	2 b
Ground spray	1.3 c	1,291 a	587 a	1.0 b	1.1 b	295 a
None	4.0 a	863 c	459 b	3.3 a	20.5 a	0 b

[x] Scale of 1–5, where 1 = no leaf spot and 5 = completely defoliated. Data taken on 3 and 15 September in 1985 and 1986, respectively.

[y] Percentage leaf area necrotic just before digging (0–20%).

[z] Numbers within columns of soil or chlorothalonil treatments followed by the same letter are not significantly different according to the Waller-Duncan *k*-ratio *t* test, $P = 0.05$. No letter indicates no significant difference. There were no significant differences between soil and fungicide treatments.

In the experiment with diniconazole, plant stands were reduced significantly in soil infested with *R. solani* AG-4 when compared with infestation with *S. rolfsii* and noninfestation 4 wk after planting (1, 18, and 19 plants per microplot, respectively). Only microplots infested with *R. solani* AG-4 were replanted, and stands were increased to 15 plants per microplot. Pod yields were greater in soil infested with *R. solani* than in other treatments. Chemigation increased pod yield over the control, but yield was much less with chemigation than with ground sprays (Table 5). Populations of *R. solani* AG-4 were reduced with both methods of applying diniconazole, but populations of *Pythium* spp., binucleate *Rhizoctonia*-like fungi, *L. arvalis*, and other unidentified basidiomycetes were not affected significantly by diniconazole.

DISCUSSION

The application of chlorothalonil and diniconazole by chemigation gave variable results in peanut culture. Frequently, white mold and populations of *R. solani* AG-4 in soil and the number of root, hypocotyl, peg, and pod lesions were reduced when compared with the control, but not when compared with a ground spray. Populations of other soil fungi with chemigation treatments were rarely different from treatments with ground sprays. Chlorothalonil is widely used to control leaf spot diseases of peanut and has provided good leaf spot control when applied through overhead sprinklers (14).

With chemigation, less than 10% of the chlorothalonil is retained on leaves (11). Chlorothalonil is effective in protecting cucumber and tomato fruits from *R. solani* AG-4 on the soil surface

Table 5. Populations of *Rhizoctonia solani* anastomosis group 4 (AG-4) in soil, leaf spot severity, and yield in peanut in field microplots treated with diniconazole

Treatment	*R. solani* AG-4[w] Days after planting 21	*R. solani* AG-4[w] Days after planting 237	Leaf spot severity ratings[x]	Leaf necrosis[y] (%)	Pod yield (g/plot)
Soil					
R. solani AG-4	15.7[z]	6.4	1.5 b	11.6 b	128 a
Sclerotium rolfsii	0.8 b	0.0	2.2 a	14.0 a	78 ab
Control	1.2 b	6.4	2.3 a	13.8 a	62 b
Diniconazole					
Chemigation	7.7	0.5 b	2.4 a	18.4 a	63 b
Ground spray	4.1	0.0 b	1.0 b	2.4 b	173 a
None	5.6	12.4 a	2.7 a	18.5 a	33 c

[w] Colony-forming units/100 g of oven-dried soil.
[x] Scale of 1–5, where 1 = no leaf spot and 5 = completely defoliated. Data taken on 15 September 1986.
[y] Percentage leaf area necrotic just before digging (0–20%).
[z] Numbers within columns of soil or chlorothalonil treatments followed by the same letter are not significantly different according to *t* tests (LSD), $P = 0.05$. No letter indicates no significant difference. There were no significant interactions between soil and diniconazole treatments.

(10,17) and in reducing the severity of Rhizoctonia crown rot of sugar beet (13). Our research corroborates research that indicates that chlorothalonil applied by chemigation suppresses certain diseases on lower branches (1) and indicates that the fungicide may protect pods and pegs against invasion by *R. solani* AG-4. The water solubility of chlorothalonil is 0.6 mg/L. Chlorothalonil applied by ground sprays is ineffective in controlling *S. rolfsii* (2), but our research suggests that chemigation may be beneficial in reducing white mold caused by the pathogen.

Additional research is needed on the efficacy of diconazole on leaf spot and soilborne pathogens when applied by chemigation. Since diniconazole reduced populations of *R. solani* AG-4 but not populations of binucleate *Rhizoctonia*-like fungi, *L. arvalis*, and other basidiomycetes, the fungicide might be effective in controlling limb blight without reducing populations of potential biocontrol agents occurring naturally in soil.

An additional benefit of chemigation is reduced soil compaction and vine injury from tractor traffic (6,11). Whether or not chemigation of foliar fungicides with commercial sprinkler irrigation systems will reduce root, pod, peg, and stem diseases in peanut is a moot point. Additional research with replicated plots under commercial systems is necessary to determine if chemigation is equal to or better than ground sprays in controlling soilborne pathogens. In Georgia, Rhizoctonia limb blight has become a severe disease in irrigated fields with heavy vegetative growth (18), and white mold is widespread and causes major economic losses (4). If chemigation with foliar fungicides will contribute to the control of diseases caused by *R. solani* AG-4 and *S. rolfsii*, costs to the grower will be reduced and net profits will be increased (6).

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