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Late Leaf Spot and Rust

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Evaluation of Calendar and AU-Pnuts Fungicide Schedules for the Control of Late Leaf Spot and Rust on Peanut in Southwest Alabama

A. K. Hagan, H.L. Campbell, K.L. Bowen, and M. Pegues

INTRODUCTION

Within the past decade, peanut *(Arachis hypogaea)* production has rapidly expanded across five counties in Southwest Alabama. In this new production area, late leaf spot (caused by the fungus *Cercosporidium personatum*) is more common and damaging than early leaf spot (caused by the fungus *Cercospora arachidicola*). When not controlled, both diseases can defoliate peanut and reduce anticipated yield by 50 percent *(20).* In addition, rust (caused by the fungus *Puccinia arachidis*) is a threat to partially defoliate and reduce pod yield, particularly in those years when one or more tropical storms strike. In the arid tropics and subtropics, rust-related yield losses may exceed 50 percent for subsistence farmers that cannot afford protective fungicides *(22).* In contrast, white mold [southern stem rot] (caused by the fungus *Sclerotium rofsii*) does not appear as damaging here as this disease is in the traditional peanut production counties in Southeast Alabama *(1).*

With almost daily afternoon thunderstorms and the occasional tropical storm, an intensive fungicide program is considered essential to protecting peanut in Southwest Alabama from damaging outbreaks of late leaf spot, early leaf spot, and rust and, consequently, to producing high pod yields. To control these diseases, fungicide applications, which should be initiated 30 to 40 days after planting, must be repeated at 10- to 14-day intervals until 2 weeks before the anticipated digging date *(23).* Depending on rainfall patterns and cultivar selection, the total number of fungicide applications in a leaf spot and rust control program typically should range from six to eight.

The recommended calendar fungicide program for controlling foliar and soilborne diseases accounts for nearly 25 percent of the variable costs in a peanut production budget. With the availability of peanut cultivars with partial resistance to early and late leaf spot *(2,6,8,9,11,13),* reducing fungicide inputs by lengthening application intervals may be an option for peanut producers. Previously, lengthening application

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intervals for Bravo Weather Stik or Echo 720 6F (chlorothalonil) at 1.5 pints per acre from 2 to 3 weeks on the partially late leaf spot resistant Southern Runner peanut cultivar increased disease severity *(3)*. However, yields were reduced in only one of three years on partially leaf spot resistant peanut cultivars when application intervals for Bravo Weather Stik or Echo 720 6F *(3,10)* were extended from 2 to 3 weeks. While heavier leaf spot damage was noted on the peanut cultivars Florida C-99R, MDR-98, and Georgia Green treated at extended than on the conventional 2-week calendar schedule, yields for the conventional and extended interval Folicur 3.6F and Abound 2SC, but not the Bravo Ultrex programs, were very similar *(18)*.

The AU-Pnuts leaf spot advisory triggers applications on the number of accumulated rain events, which are equal to a minimum of 0.10 inch of rain or irrigation in a 24-hour period, and the 5-day average rainfall forecast. Starting at true ground cracking when seedlings first emerge, rain events are counted. Regardless of the 5-day average rainfall forecast, the first fungicide application is made no later than the sixth rain event. Starting 10 days after the first application, additional fungicide treatments are triggered after (a) three rain events, (b) the 5-day average rainfall is forecast to be above 50 percent, or (c) a combination of one or two rain events and the 5-day average rainfall forecast. In early trials, 1.25 and up to 2.5 fewer applications per year on the peanut cultivar Florunner *(16)* and Southern Runner *(15)*, respectively, were made when fungicide applications were scheduled according to the AU-Pnuts leaf spot advisory. Brenneman and Culbreath *(3)* saw a reduction of two fungicide applications in two of three years with AU-Pnuts compared to the standard 2-week calendar schedule. A similar reduction in applications numbers with an AU-Pnuts Abound 2SC treatment program by Bowen et al. *(2)* occurred but the risk of inadequate early leaf spot control and yield loss increased.

The objective of this study was to compare the effectiveness of the 2-, 3-, and 4-week calendar application schedules and the AU-Pnuts leaf spot advisory with recommended Abound 2SC, Folicur 3.6F, and Bravo Ultrex programs for the control of late leaf spot and rust on partially disease resistant peanut cultivars.

METHODS

Production methods. Peanuts were planted on May 28, 2003, May 13, 2004, and May 12, 2005 at the rate of six seed per foot of row in a field at the Gulf Coast Research and Extension Center, Fairhope, Alabama. The late maturing (maturity group 5) runner peanut cultivar DP-1, which was planted in 2003, was replaced with the late maturing (maturity group 5) cultivar Florida C-99R in 2004 and 2005. Both of these cultivars are partially resistant to early and late leaf spot as well as white mold *(6,8,13)*. Test sites are maintained in a cotton – cotton – peanut rotation, which is a cropping pattern that will minimize white mold pressure *(1)*. The soil type is a Malbis fine sandy loam with less than 1 percent organic matter.

The test site was prepared for planting with a disk harrow and ripper/hipper. Optimal soil fertility and pH were maintained according to the results of a soil fertility assay conducted by the Soil Testing Laboratory at Auburn University *(14)*. Broadleaf and grass weeds were controlled by lightly incorporating a pre-emergence application of 1.8 pints per acre of Prowl 3.3 with a disk harrow. Newly emerged weeds were controlled with an application of 5.5 fluid ounces per acre of Gramoxone Maxx 3.0 plus 1.5 pints per acre of Storm 4L plus 2 pints per 100 gallons of Activate non-ionic surfactant about five to seven days after ground cracking. In 2005, 1 pint per acre of Butoxone 200 plus 5.5 fluid ounces per acre of Gramoxone Maxx 3.0 plus 1.5 pints per acre of Storm 4L plus 1 quart Induce wetter/spreader per 100 gallons of spray volume was applied. Poast Plus 1EC at 1 pint per acre plus Prime Oil at 1 quart per acre was applied to control escape grass weeds on June 25, 2003. Cadre 70DG at 1.44 ounces per acre plus Activate surfactant at 1 pint per 100 gallons of spray volume was made on July 11, 2003 for broadleaf weed and nutsedge control. On June 27, 2005, Cadre 70 DG at 1 ounce per acre plus Strongarm 84WDG at 0.3 ounce per acre plus 2 quarts of Induce wetter/spreader at 100 gallons of spray volume per acre was broadcast to control escaped broadleaf weeds. In addition, escape weeds were pulled by hand. Temik 15G at 7 pounds per acre was applied in-furrow at planting to control thrips. The test sites were not irrigated.

Fungicide programs. Plots consisted of four 30-foot rows spaced 3 feet apart. Full canopy sprays were made on 2-, 3-, or 4-week calendar schedule, as well as according to the AU-Pnuts leaf spot advisory using an All Terrain Vehicle-mounted, four-row boom sprayer with three TeeJet® TX-8 nozzles per row calibrated to deliver 10 gallons per acre of spray volume.

Application dates in 2003 for the 2-week calendar schedule were July 8, July 22, August 4, August 18, September 2, September 14, and September 29; for the 3-week calendar schedule, July 8, July 29, August 18, September 8, and September 29; and for the 4-week calendar schedule, July 8, August 4, September 8, and October 7. In addition, AU-Pnuts advisory applications were made on July 8, July 22, August 4, August 18, September 2, and September 23, 2003.

In 2004, application dates for the 2-week calendar and AU-Pnuts advisory schedule were June 21, July 6, July 20, July 29, August 13, August 26, and September 8; for the 3-week calendar schedule, June 21, July 11, August 3, August 19, and September 8; and for the 4-week calendar schedule, June 21, July 20, August 13, and September 8.

In 2005, dates for the 2-week calendar schedule and AU-Pnuts advisory applications were June 22, July 5, July 20, August 1, August 15, September 1, and September 13; for the 3-week calendar schedule, June 22, July 13, August 1, August 22, and September 13; and for the 4-week calendar schedule, June 22, July 20, August 15, and September 13.

In all three years, the 2-, 3-, and 4-week calendar schedules for Folicur 3.6F at 0.45 pint per acre included four, three, and two applications of this fungicide, respectively, while three of six applications in the 2003 AU-Pnuts advisory schedule were made at the above rate of Folicur 3.6F. In 2004 and 2005, Folicur 3.6F at 0.45 pint per acre was applied on four of the seven treatment dates as scheduled by the AU-Pnuts advisory. For all Abound 2SC programs, two applications of this fungicide at 1.15 pints per acre were made approximately 60 and 90 days after planting. Applications of Bravo Ultrex at 1.4 pounds per acre filled the remaining treatment slots in the Folicur

3.6F and Abound 2SC programs. In all three years, the 2-, 3-, and 4-week calendar programs consisted of seven, five, and four fungicide applications, respectively, while six, seven, and seven applications were triggered by the AU-Pnuts advisory in 2003, 2004, and 2005, respectively.

Disease assessment. Early and late leaf spot were rated on the center two rows using the Florida peanut leaf spot scoring system *(7)* where 1 = no disease, 2 = very few lesions in canopy, 3 = few lesions in lower and upper leaf canopy, 4 = some lesions in lower and upper canopy with light defoliation (≤10 percent), 5 = lesions noticeable in upper canopy with some defoliation (≤25 percent), 6 = lesions numerous with significant defoliation (≤50 percent), 7 = lesions numerous with heavy defoliation (≤75 percent), 8 = numerous lesions on few remaining leaves with severe defoliation (≤90 percent), 9 = very few remaining leaves covered with lesions and severe defoliation (≤95 percent), and 10 = plants defoliated or dead.

Leaf spot ratings were taken on July 30, August 13, August 27, September 11, and October 2, 2003; July 28, August 11, August 25, September 7, September 27, and October 18, 2004; July 7, July 20, August 3, August 17, September 8, September 22, and October 10, 2005. Leaf spot ratings presented in the table are those recorded on October 2, 2003, October 18, 2004, and October 10, 2005.

Rust severity was rated on the center two rows of each plot on October 2, 2003, October 18, 2004, and October 10, 2005 using the ICRISAT 1-9 rating scale where 1 = no disease, 2 = few necrotic spots on older leaves, 3 = few pustules mainly on older leaves, 4 = pustules mostly on lower and middle leaves and disease evident, 5 = many pustules mostly on lower and middle leaves with yellowing and necrosis of lower and middle leaves, 6 = as for rating 5 but heavy sporulation in pustules, 7 = pustules all over plant with lower and middle leaves withering, 8 = as for rating 7 except withering is more severe, and 9 = 50 to 100 percent of leaves withered *(21)*.

White mold hit counts, where 1 hit is ≤ 1 foot of consecutive white mold-damaged plants per row, were made on the center two rows when the plots were inverted on October 18, 2003, October 18, 2004, and October 10, 2005 *(19)*. Windrows were combined two to four days later. Yields are reported at 10 percent moisture.

RESULTS

During 2003, 2004, and 2005, weather patterns were very conducive for peanut production. In all three years, monthly rainfall totals either reached or exceeded the historical average in May, June, July, August, and September but were below to well-below average for October. Heavy rains associated with several hurricanes or tropical storms in 2004 and 2005 created favorable conditions for the development of late leaf spot and rust. Temperatures in all three years remained near the historical average.

Leaf spot diseases. While late leaf spot was far more common than early leaf spot in 2003, overall leaf spot pressure, as indicated by a disease rating no higher than 3.9 for the Bravo Ultrex 4-week calendar schedule, was limited to some leaf spotting and a low level of premature defoliation (see table). For the Bravo Ultrex and Abound 2SC programs, late leaf spot ratings were noticeably lower for the 2- and 3-week than

Impact of Application Schedule on Disease Control with Abound 2SC, Bravo Ultrex, and Folicur 3.6F and On the Yield of the Florida C-99R Peanut Cultivar at the Gulf Coast Research and Extension Center, Fairhope AL

Fungicide	Application: Rate	Application: Timing	Application: Interval	Late leaf spot [1]: 2003	Late leaf spot [1]: 2004	Late leaf spot [1]: 2005	Rust [2]: 2003	Rust [2]: 2004	Rust [2]: 2005	Yield: 2003	Yield: 2004	Yield: 2005
	amt/ac										*lb/ac*	
Bravo Ultrex	1.4 lb	1-7	2-week	3.0	3.2	3.2	3.5	4.0	3.8	4122	5622	6237
Bravo Ultrex	1.4 lb	1-5	3-week	3.0	4.1	4.3	4.5	5.3	4.7	4171	5216	5912
Bravo Ultrex	1.4 lb	1-4	4-week	3.9	4.4	4.5	5.5	6.2	5.0	3316	5187	5612
Bravo Ultrex	1.4 lb	--	AU-Pnuts [3]	3.4	3.3	3.5	4.5	4.5	3.7	4118	5511	6200
Bravo Ultrex Folicur 3.6F	1.4 lb 0.45 pt	1,2,7 3,4,5,6	2-week	3.4	4.8	4.1	4.5	6.0	4.5	4110	5255	6230
Bravo Ultrex Folicur 3.6F	1.4 lb 0.45 pt	1,5 2,3,4	3-week	3.8	4.8	4.5	5.7	5.7	6.2	4209	5398	5632
Bravo Ultrex Folicur 3.6F	1.4 lb 0.45 pt	1,4 2,3	4-week	3.8	5.2	5.3	5.3	6.3	6.2	3788	4903	5208
Bravo Ultrex Folicur 3.6F	1.4 lb 0.45 pt	—	AU-Pnuts	2.8	4.8	3.8	3.7	6.8	5.2	4587	5021	6322
Bravo Ultrex Abound 2SC	1.4 lb 1.15 pt	1,2,4,6,7 3,5	2-week	2.8	3.6	3.6	3.2	4.7	3.8	4316	5646	6230
Bravo Ultrex Abound 2SC	1.4 lb 1.15 pt	1,3,5 2,4	3-week	3.0	4.1	3.9	3.7	4.5	5.0	4406	5279	5769
Bravo Ultrex Abound 2SC	1.4 lb 1.15 pt	1,4 2,3	4-week	3.3	4.7	4.8	5.0	5.8	5.2	4190	5478	5072
Bravo Ultrex Abound 2SC	1.4 lb 1.15 pt	—	AU-Pnuts	2.7	3.5	3.3	3.2	4.2	3.8	4913	5758	6647

[1] Late leaf spot severity was assessed using the Florida leaf spot scoring system.

[2] Rust severity was rated using the ICRISAT 1-9 rating scale.

[3] AU-Pnuts disease advisory rules specify that the first application be made immediately after six or more rain events ($\geq$0.10 in) and second and subsequent applications immediately after three rain events.

for the 4-week calendar schedules. Regardless of application interval, late leaf spot ratings for all of the Folicur 3.6F calendar programs were similar. Among the Folicur 3.6F treatments, better late leaf spot control was obtained when applications were triggered by AU-Pnuts than on a calendar schedule. For the Abound 2SC and Bravo Utrex programs, late leaf spot ratings for the 2-week calendar and the AU-Pnuts advisory schedules were similar. With the exception of the AU-Pnuts advisory treatment, Abound 2SC gave better late leaf spot control than Folicur 3.6F. While the 2- and 3-week calendar treatments for Bravo Ultrex and Abound 2SC had similar leaf spot ratings, the 4-week and AU-Pnuts treatments for the latter fungicide proved more effective in controlling this disease.

Due in part to hurricane Ivan, leaf spot and rust ratings were higher in 2004 than in the previous year. Late leaf spot was far more common and damaging than early leaf spot. With Bravo Ultrex and Abound 2SC, better late leaf spot control was obtained with the 2-week than at longer calendar schedules (see table). In contrast, leaf spot ratings for the all of the Folicur 3.6F calendar schedules were similar. Late leaf spot ratings for the 2-week and the AU-Pnuts advisory treatments for Abound 2SC and Bravo Ultrex also did not differ. In contrast, Folicur 3.6F gave better leaf spot control when applied on a 2-week schedule than according to the AU-Pnuts advisory. Very little late leaf spot-related defoliation was noted on the peanut treated according to the Bravo Ultrex or Abound 2SC AU-Pnuts advisory and on the 2-week calendar schedule. Overall, less effective control of late leaf spot was provided by the Folicur 3.6F program compared with the Bravo Ultrex or Abound 2SC programs.

Due to frequent rain showers in 2005 and three tropical storms, a total of seven fungicide applications were made on the same dates according to the AU-Pnuts advisory and the 2-week calendar schedule (see table). Application interval had a significant impact on the level of late leaf spot control obtained with recommended Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs. As expected, better late leaf spot control was consistently obtained when applications were made on a 2- than on a 4-week calendar schedule. While the 2- and 3-week Abound 2SC and Folicur 3.6F treatments gave the same level of late leaf spot control, the 2-week Bravo Ultrex treatment gave better control of this disease than the 3-week treatment with this same fungicide. Leaf spot ratings for the 2-week and AU-Pnuts advisory schedule treatments for the Bravo Ultrex, Abound 2SC, and Folicur 3.6F programs were similar.

Peanut rust. In 2003, rust caused more damage than leaf spot diseases. On a 2-week calendar schedule, Abound 2SC and Bravo Ultrex gave more effective rust control than Folicur 3.6F (see table). Rust ratings for the 2-week Bravo Ultrex and Abound 2SC treatments were much lower than for those taken for the 3- and 4-week calendar schedules with these same fungicides. A considerable decline in rust control was seen when application interval for the Folicur 3.6F program were lengthened from 2 to 3 weeks. Rust ratings for the 3- and 4-week calendar Folicur 3.6F treatments were similar.

In 2004, better rust control was obtained with the 2-week and AU-Pnuts leaf spot advisory treatments for Abound 2SC and Bravo Ultrex than with Folicur 3.6F applied at the same schedules (see table). On the Bravo Ultrex-treated peanuts, rust severity increased as application intervals were extended from 2, to 3, and finally 4 weeks. The 2- and 3-week treatment schedules for Abound 2SC, which both had similar rust ratings, gave better disease control than the 4-week treatment schedule with the same fungicide. Overall, Folicur 3.6F failed to give the level of rust protection that was obtained with comparable Abound 2SC and Bravo Ultrex treatments.

For 2005, application interval again had a significant effect on the level of rust control obtained with all fungicide programs. With the Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs, rust control declined when application intervals lengthened from 2 to 3 weeks but not from 3 to 4 weeks (see table). The level of rust control given by the 2-week and AU-Pnuts treatments for Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs was similar.

White mold. Overall, white mold pressure was low in all three years. Differences, however, in the disease incidence in 2003 occurred when treatment intervals for the Abound 2SC and the Folicur 3.6F programs were lengthened from 2 to 4 weeks (data not shown). The Abound 2SC AU-Pnuts advisory treatment was as effective in controlling this disease as the 2- and 3-week calendar schedules with the same fungicide. Incidence of white mold was similar for all Folicur 3.6F and Bravo Ultrex calendar and AU-Pnuts advisory treatments. The 2- and 3-week Abound 2SC and Folicur 3.6F treatments had fewer white mold hits than comparable Bravo Ultrex treatments. In 2004, white mold incidence was similar for the calendar and the AU-Pnuts advisory treatments with Bravo Ultrex and Folicur 3.6F. While the white mold hit counts for all of the Abound 2SC treatments were similar, the 4-week and AU-Pnuts advisory treatments gave better control of this disease than did the corresponding Folicur 3.6F treatments. Disease incidence was similar for the Abound 2SC, Bravo Ultrex, and Folicur 3.6F 2-week schedule treatments. Due to low white mold pressure in 2005, fungicide treatment schedules had no impact on disease mold incidence (data not shown).

Yield. Despite sizable differences in late leaf spot, rust, and white mold damage in 2003, application interval did not have a sizable impact on the yield of the Abound 2SC calendar treatments (see table). Abound 2SC 2-week and AU-Pnuts advisory treatments also had similar yields. The 4-week Bravo Ultrex treatment yielded less than the 2- and 3-week as well as the AU-Pnuts schedule treatments with the same fungicide. Yields for all of the Folicur 3.6F calendar schedule treatments were similar. However, yield response for the Folicur 3.6F AU-Pnuts program was superior to that obtained with the 4-week calendar program. Yields of the 2-week calendar schedule treatments for Abound 2SC, Bravo Ultrex, and Folicur 3.6F did not greatly differ.

Yield response was similar across all calendar schedule and AU-Pnuts treatments for the Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs in 2004 (see table). Yields for the 2-week and the AU-Pnuts advisory treatments for Abound 2SC, which gave superior late leaf spot and rust control, were higher than those recorded for the less effective AU-Pnuts and 4-week calendar schedule treatments for Folicur 3.6F.

In 2005, yields were higher for the 2-week than for the 4-week schedule treatments for Abound 2SC and Folicur 3.6F (see table). A noticeable difference in yield between the 3- and 4-week calendar schedule treatments for Abound 2SC was also seen. In contrast, the Bravo Ultrex calendar and AU-Pnuts leaf spot advisory treatments all had similar yields. Yield for the 2-week Folicur 3.6F calendar schedule was similar to yields obtained with the 2-week Abound 2SC and the Bravo Ultrex treatments. As expected, the AU-Pnuts and 2-week calendar treatments for the Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs, which had the same application dates, also had similar yields.

DISCUSSION

Due to almost daily convection thundershowers and the occasional tropical storm, producers in Southwest Alabama have been cautioned to maintain a strict 10- to 14-day calendar schedule when applying fungicides to control leaf spot diseases and rust on peanut *(23)*. In the last year, low contract prices for peanuts coupled with rising production costs and the release of peanut cultivars with partial resistance to early leaf spot and late leaf spot has stimulated interest among producers to cut costly production inputs such as fungicides. Reducing fungicide program costs by lengthening application intervals or by adopting the AU-Pnuts leaf spot advisory are two options available to peanut producers.

Previously, increased leaf spotting and premature defoliation have been seen when application intervals were lengthened beyond the recommended 2-week interval, even on peanut cultivars with partial resistance to early and late leaf spot *(3,9,10,15,18)*. While significant increases in rust and late leaf spot ratings were seen in one and two years, respectively, between the 2- and 3-week Bravo Ultrex programs on the partially leaf spot resistant cultivars DP-1 and Florida C-99R, yield response was similar on both cultivars at these calendar treatment schedules. Brenneman and Culbreath *(3)* in two of three years and Jacobi et al. *(16)* in one year observed a similar response with Bravo 720 6F when this fungicide was applied at 2- and 3-week intervals on the partially late leaf spot resistant peanut cultivar Southern Runner. Similar results with extended 3-week intervals with Bravo Ultrex on Florida C-99R against early leaf spot were also recently reported by Hagan et al. *(10)*. When application intervals were extended from 2 out to 4 weeks, late leaf spot and rust control with Bravo Ultrex declined in all trials, but significantly lower yield was seen only in 2003. Although late leaf spot ratings for the 2- and 3-week Folicur 3.6F calendar schedules did not significantly differ, the former treatment schedule gave better rust control in two of three years. In addition, yield responses with the 2-, 3-, and 4-week Folicur 3.6F calendar schedules were similar in two of three years.

While rust ratings were significantly higher for the 3-week than for the 2-week Folicur 3.6F calendar treatment in 2003 and 2005, late leaf spot ratings and yield for both treatments were similar in all trials. In a Georgia study *(3)* on the peanut cultivar Southern Runner, Folicur 3.6F treatments applied at 3-week intervals had higher late leaf spot ratings than the 2-week treatments in two of three years, but this higher rating did not translate into a significant yield reduction. On leaf spot resistant peanut cultivars, the 3-week Folicur 3.6F treatment gave poorer early leaf spot control compared with the 2-week treatment with the same fungicide *(10,12)*. However, yield response for the 2- and 3-week Folicur 3.6F calendar treatments greatly differed in only one of three years *(10)*. Surprisingly, the level of late leaf spot and rust control, as well as yield response obtained in this study with the 3- and 4-week Folicur 3.6F calendar treatments, was similar.

Lengthening application intervals had relatively little effect on the efficacy of Abound 2SC for the control of late leaf spot and rust. Although rust ratings were lower for the 3-week than for the 2-week Abound 2SC calendar treatments in 2005, similar late leaf spot ratings were observed for these two treatments in all three trials. However, late leaf spot and rust ratings for the 2- and 4-week Abound 2SC calendar schedule treatments greatly differed in two of three years and all three years, respectively. While the yield for the 2- and 3-week Abound 2SC calendar treatments was similar in all three trials, significant differences in yield were seen in one of three years between the 2- and 4-week treatments of the same fungicide. In a concurrent study at another Alabama location, 3- and 4-week Abound 2SC calendar treatments, which saved two or three fungicide applications, were as effective in controlling early leaf spot and maintaining yield in two of three years as the recommended 2-week calendar schedule with this same fungicide *(10)*.

The AU-Pnuts leaf spot advisory has been shown to reduce total fungicide application numbers without a decline in the control of either leaf spot disease or a reduction in yield *(3,9,10,15,16)*. When compared with the recommended 2-week calendar treatment, one to possibly two fungicide applications are saved annually by adopting the AU-Pnuts leaf spot advisory *(3,9,10,15,16)*. In contrast, application numbers for the AU-Pnuts leaf spot advisory and 2-week calendar schedule at this location, which is close to the Gulf of Mexico and Mobile Bay, were the same in two of three years. With nearly equal application numbers, the levels of late leaf spot and rust control as well as yield response obtained with the AU-Pnuts advisory and the 2-week calendar treatments for the Abound 2SC, Bravo Ultrex, and Folicur 3.6F programs were similar. Results of this study indicate that the AU-Pnuts leaf spot advisory, which was developed and validated at locations in Alabama *(9,10,15,16)* and Georgia *(3)* subject to fewer convective summer thundershowers, is not suitable for scheduling fungicide applications on peanut at locations near the Gulf of Mexico.

Among the 2-week treatments, Folicur 3.6F consistently was less effective in controlling late leaf spot than either the Abound 2SC or Bravo Ultrex programs, which demonstrated similar efficacy in controlling this disease. Similar differences in early leaf spot efficacy between the recommended Folicur 3.6F, Bravo Ultrex, and Abound 2SC programs were recently reported in Alabama *(13)*. Earlier trials have shown that Folicur 3.6F was as, if not more, effective than Abound 2SC *(17)* and Bravo Weather Stik *(3)* in controlling leaf spot diseases of peanut. While Hagan et al. *(13)* noted that the efficacy decline for Folicur 3.6F may be related to poor rainfastness characteristics for the formulated commercial product, increasing tolerance or resistance in target fungi may also be the cause of some control failures with this fungicide.

While nearly all fungicides recommended for the control of leaf spot diseases on peanut in Alabama are also registered for the control of rust *(23)*, relatively little information concerning their efficacy for the control of this disease is available. At the standard 2-week calendar schedule, the best rust control was obtained with the Abound

2SC program that included two mid-season applications of 1.15 pounds per acre of this fungicide and five applications of 1.4 pounds per acre of Bravo Utrex. When applied on the same schedule, the recommended treatment regime for Folicur 3.6F at 0.45 pint per acre was less effective against this disease in two of three years than the standard seven-application Bravo Ultrex calendar program and, in all three years, the above Abound 2SC program. As previously noted, a decline in Folicur 3.6F efficacy against early leaf spot was reported in Alabama *(10).* Kucharek and Semer *(17)* observed that a tank mixture of reduced rates of Abound 2SC and Folicur 3.6F sometimes gave better rust control than the recommended Bravo Ultrex or Folicur 3.6F programs. In two recent field trials in southwest Alabama, better control of rust was given by a seven-application Bravo Ultrex program than with the recommended Folicur 3.6F and Abound 2SC programs *(4,5).*

Making fewer fungicide applications may not be the best method of maximizing peanut profits, particularly in well-rotated fields where peanut yield potential exceeds 4,000 pounds per acre and late summer weather patterns favor damaging late leaf spot and rust outbreaks. Fungicide inputs are much like crop insurance: both protect the producer from catastrophic yield loss. Extending treatment intervals from the recommended 2 weeks to 3 or 4 weeks resulted in a savings of two or three, respectively, fungicide applications but with some increase in damage attributed to late leaf spot and rust. While yield response in this study with the 2- and 3-week schedules generally was similar, a significant decline in yield was seen in one of three years at the 4-week calendar schedule with all fungicide programs. With extended treatment intervals also comes the risk of a late summer or early fall tropical weather system, particularly in Southwest Alabama, that could delay digging long enough for the peanuts to suffer sufficient late leaf spot or rust-induced defoliation, which could trigger yield losses far in excess of the savings realized from eliminating two or three applications of Bravo Ultrex or a similar chlorothalonil fungicide. That risk of a catastrophic yield loss would be higher for peanut cultivars like Carver or Georgia Green, which are not as resistant to leaf spot diseases as Florida C-99R *(11,13).*

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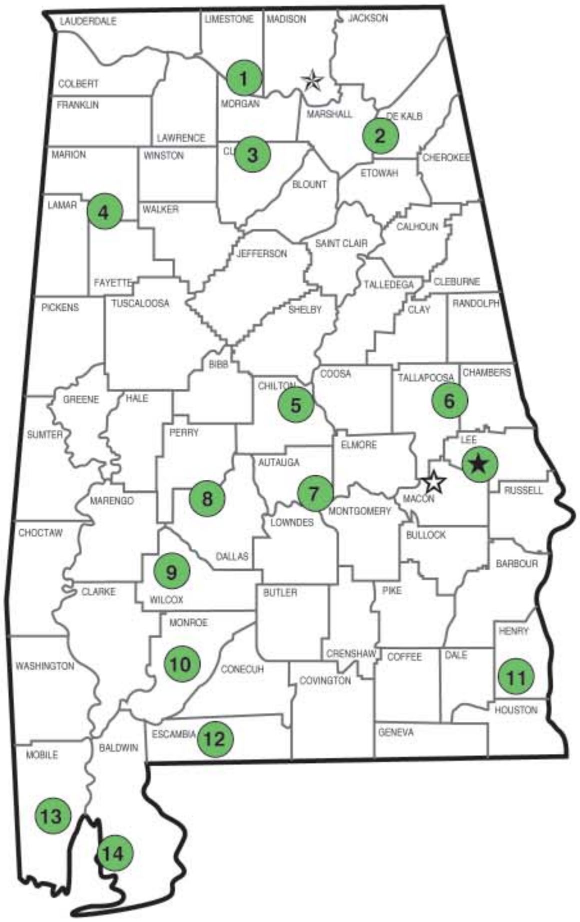

Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.
☆ Alabama A&M University.
☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Research and Extension Center, Belle Mina.
2. Sand Mountain Research and Extension Center, Crossville.
3. North Alabama Horticulture Research Center, Cullman.
4. Upper Coastal Plain Agricultural Research Center, Winfield.
5. Chilton Research and Extension Center, Clanton.
6. Piedmont Substation, Camp Hill.
7. Prattville Agricultural Research Unit, Prattville.
8. Black Belt Research and Extension Center, Marion Junction.
9. Lower Coastal Plain Substation, Camden.
10. Monroeville Agricultural Research Unit, Monroeville.
11. Wiregrass Research and Extension Center, Headland.
12. Brewton Agricultural Research Unit, Brewton.
13. Ornamental Horticulture Research Center, Spring Hill.
14. Gulf Coast Research and Extension Center, Fairhope.