

# 2016 Evaluation of Foliar Fungicides for Disease Control in Peanut in Jay, FL<sup>1</sup>

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This fact sheet is intended for Extension agents, specialists, and producers working with commercial peanut production in the Florida Panhandle. Since the research was conducted in the Western Panhandle, readers are advised to consult fact sheets specific to their areas of production and may use this document as a comparison to determine efficacy of specific fungicide programs.

This report includes a summary of the 2016 foliar fungicide programs for control of early and late leaf spot and white mold (southern stem rot) in peanut at Jay, Florida. It shows the effectiveness of 13 fungicide programs for disease control. All programs contained active ingredients for the control of white mold (*Sclerotium rolfsii*) except the Bravo treatment (program 2), which was considered a control. These data represent only one year at one location, and readers are cautioned that test results should be considered over several locations and years before final conclusions are considered valid. These data are meant to serve as a guide in the selection of effective fungicide programs for peanut.

## Fungicide Treatments, Treatment Rates, and Application Timing

- Provost:** Bravo 1.5 pt (30, 44 days after planting (DAP)); Provost 10.7 fl oz (58, 72, 86, 100 DAP); Bravo 1.5 pt (114 DAP)
- Bravo:** Bravo 1.5 pt (30, 44, 58, 72, 86, 100, 114 DAP)
- Provost/Muscle ADV:** Bravo 1.5 pt (30, 44 DAP); Provost 10.7 fl oz (58 DAP); Muscle ADV 2.0 pt (72 DAP); Provost 10.7 fl oz (86, 100 DAP); Bravo 1.5 pt (114 DAP)
- Muscle ADV:** Bravo 1.5 pt (30, 44 DAP); Muscle ADV 2.0 pt (58, 72, 86, 100 DAP); Bravo 1.5 pt (114 DAP)
- Priaxor/Muscle ADV:** Priaxor 6.0 fl oz (44 DAP); Muscle ADV 2.0 pt (58 DAP); Priaxor 8.0 fl oz (72 DAP); Muscle ADV 2.0 pt (86, 100 DAP); Bravo 1.5 pt (114 DAP)
- Elatus:** Elatus 7.3 dry oz (30 DAP); Bravo 1.5 pt (44 DAP); Elatus 7.3 dry oz (58 DAP); Bravo 1.5 pt (72 DAP); Elatus 7.3 dry oz (86 DAP); Bravo 1.5 pt (100, 114 DAP)

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7. **Elatus:** Bravo 1.5 pt (30, 44 DAP); Elatus 9.5 dry oz (58 DAP); Bravo 1.5 pt (72 DAP); Elatus 9.5 dry oz (86 DAP) Bravo 1.5 pt (100, 114 DAP)
8. **Fontelis/Muscle ADV:** Bravo 1.5 pt (30, 44 DAP); Fontelis 16 fl oz (58, 72, 86 DAP); Muscle ADV 2.0 pt (100 DAP); Bravo 1.5 pt (114 DAP)
9. **Bravo/Convoy:** Bravo 1.5 pt (30, 44 DAP); Convoy 16 fl oz + Bravo 1.5 pt (58, 72, 86, 100 DAP); Bravo 1.5 pt (114 DAP)
10. **Abound/Alto:** Bravo 1.5 pt (30, 44 DAP); Abound 18.5 fl oz + Alto 5.5 fl oz (58 DAP); Bravo 1.5 pt (72 DAP); Abound 18.5 fl oz + Alto 5.5 fl oz (86 DAP); Bravo 1.5 pt (100, 114 DAP)
11. **Banded Proline/Provost:** Banded Proline 5.7 oz + Bravo 1.5 pt (30 DAP); Provost 10.7 oz (58, 72, 100 DAP); Bravo 1.5 pt (114 DAP)
12. **Banded Proline/Provost/Convoy:** Banded Proline 5.7 oz + Bravo 1.5 pt (30 DAP); Provost 10.7 oz (58, 72 DAP); Convoy 16 oz + Bravo 1.5 pt (86 DAP); Provost 10.7 oz (100 DAP); Bravo 1.5 pt (114 DAP)
13. **Muscle ADV/Convoy:** Muscle ADV 2.0 pt (30, 44 DAP); Convoy 16 oz + Bravo 1.5 pt (58 DAP); Muscle ADV 2.0 pt (72, 86, 100, 114 DAP)

## 2016 Growing Conditions and Experimental Design

The trial was conducted at the UF/IFAS West Florida Research and Education Center (UF/IFAS WFREC) in Jay, FL during 2016 on a Red Bay sandy loam. Soybean was planted in the field in 2015. FloRun™ ‘157’ was planted at seven seeds per foot in single three-foot rows on June 6, 2016. Thimet was applied in-furrow at a rate of 7 lb/ac. Treatment applications were made at 20 gal/ac (GPA) using XR TeeJet 11002-VK nozzles mounted to a two-row CO<sub>2</sub>-powered backpack sprayer. Weed control consisted of 1 qt Prowl H<sub>2</sub>O/ac on May 27, 4 oz Cadre/ac plus 1 qt Butyrac/ac on June 23, and 2 oz Classic/ac plus 1 qt Butyrac/ac on August 8. The trial was non-irrigated.

Treatments consisted of 13 spray programs (Table 1) that were implemented at 30 days after planting (DAP). Treatments were arranged as a randomized complete block design with four replications. Plots were four rows wide and 25 feet long. Disease incidence and yield data were collected

from the two center rows. Peanut was dug on October 3 and picked on October 10.

Early and late leaf spot (*Cercospora arachidicola* and *Cercosporidium personatum*, respectively) ratings were made periodically throughout the season and based on the Florida 1–10 scale (Chiteka et al. 1988). The leaf spot scale used by Chiteka et al. (1988) is briefly described in Table 2. Tomato spotted wilt virus (TSWV) and white mold data were based on the number of hits within a 50-foot row. TSWV ratings were made on August 12. White mold ratings were made on October 3 after peanuts were inverted.

Weather data were obtained from the Florida Automated Weather Network (FAWN) station located on the Jay research farm. “Normal” represents the mean from 2002–2016 (Table 3).

Statistical analyses were conducted using Proc Mixed within SAS 9.4. Only TSWV and end-of-season leaf spot data had unequal variances. These data were non-parametrically modeled within PROC GLIMMIX. Other response variables, including white mold and yield data, did not violate the homoscedasticity assumption. Repeated measures data were regressed on time (Littell et al. 2006). Replication was held as a random effect, and fungicide program and time were held as fixed effects. Multiple pairwise means separation tests were conducted at the 95% confidence level using the Tukey Honest Significant Difference (HSD) Test with the %pdmix800 macro in SAS 9.4 (Saxton 1998) unless otherwise stated.

## Results

Tomato spotted wilt virus ratings were generally low, below eight hits per 50-foot row with mean values ranging from two to six hits per 50-foot row (Figure 1). Even though statistical differences were noted among the treatments, differences of one or two hits would likely have minimal biological impacts.

Leaf spot disease was first detected at the 72 DAP (August 15) rating with all the treatments having mean values greater than 1 (Figure 2). Fungicide programs 11 and 13 had higher ratings than programs 3, 5, 6, and 10. Treatments 11 (Banded Proline/Provost) and 13 (Convoy/Muscle ADV) had the highest leaf spot scale rating over time, while treatments 3 (Provost/Muscle ADV) and 5 (Priaxor/Muscle ADV) had the lowest rating. Overall, all programs kept total defoliation to 50% or less by the end of the season (Figure 3).

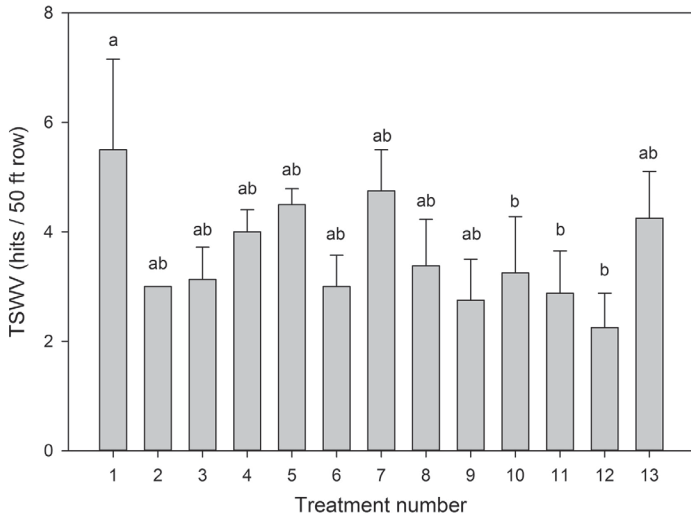


Figure 1. Tomato spotted wilt virus ratings during 2016 in Jay, FL. Error bars represent standard errors of the means. All replications for treatment 2 scored equally, so no error bar is visible. Different letters represent significantly different means (Tukey HSD,  $p < 0.05$ ). Credits: Mulvaney et al. (2017)

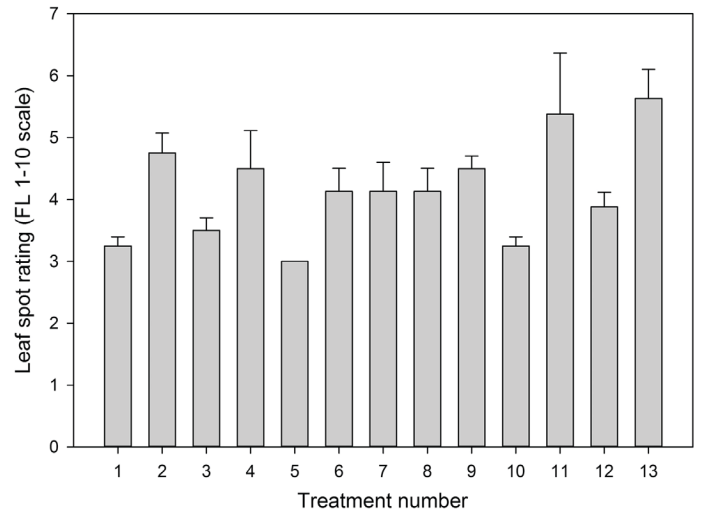


Figure 3. End-of-season leaf spot ratings on October 3, 2016 at Jay, FL. Leaf spot ratings were scored on the Florida 1–10 scale (Table 2). Note that scoring is conducted on a 1–10 scale, but the y-axis is adjusted for clarity. Error bars represent standard errors of the means. All replications for treatment 5 scored equally, so no error bar is visible. Treatment means were not significantly different using multiple pairwise means separation tests (Tukey HSD,  $p < 0.05$ ). Credits: Mulvaney et al. (2017)

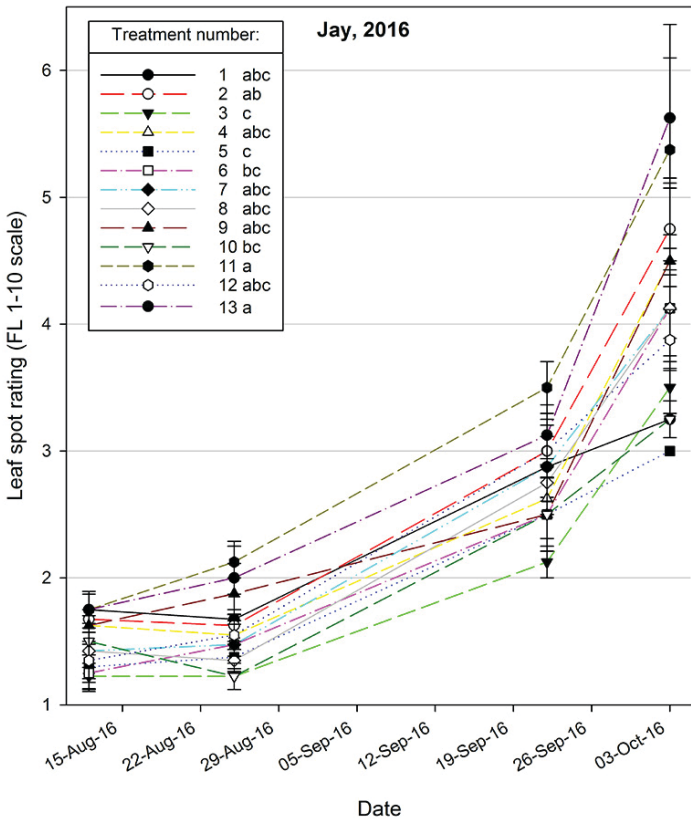


Figure 2. Leaf spot ratings over time during 2016 in Jay, FL. Leaf spot ratings were scored on the Florida 1–10 scale (Table 2). Note that scoring is conducted on a 1–10 scale, but the y-axis is adjusted for clarity. Error bars represent standard errors of the means. Different letters by the treatments within the legend represent significantly different means (Tukey HSD,  $p < 0.05$ ). Credits: Mulvaney et al. (2017)

White mold ratings were highest in the Bravo only program (treatment 2), which is expected because Bravo has no activity against white mold (Figure 4). Treatments 5 (Priaxor + Muscle ADV) and 6 (Elatus) had the lowest number of hits with a mean less than two hits per 50 feet of row. Although not statistically significant, treatment 11 (Banded Proline + Provost) had a higher number of hits than the other Provost programs (treatments 1, 3, and 12), which could be related to the absence of a spray at 86 DAP.

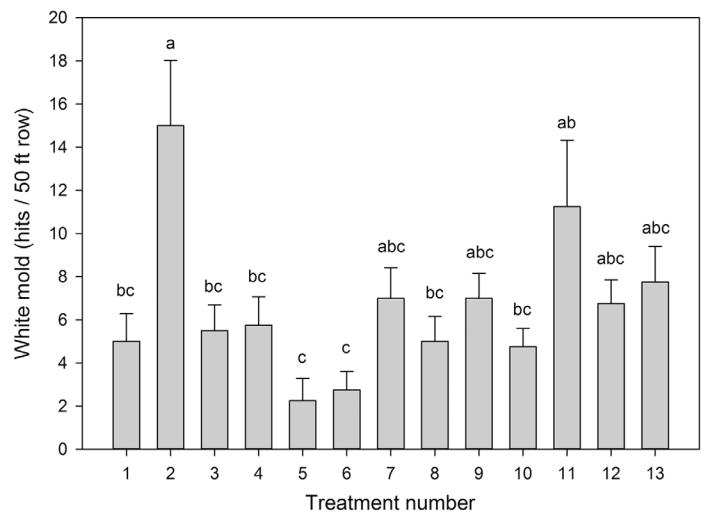


Figure 4. White mold ratings during 2016 in Jay, FL. Error bars represent standard errors of the means. Different letters represent significantly different means (Tukey HSD,  $p < 0.05$ ). Credits: Mulvaney et al. (2017)

Peanut yield data are shown in Figure 5. The Bravo only program had the lowest yields, highlighting the need for a white mold program during 2016.

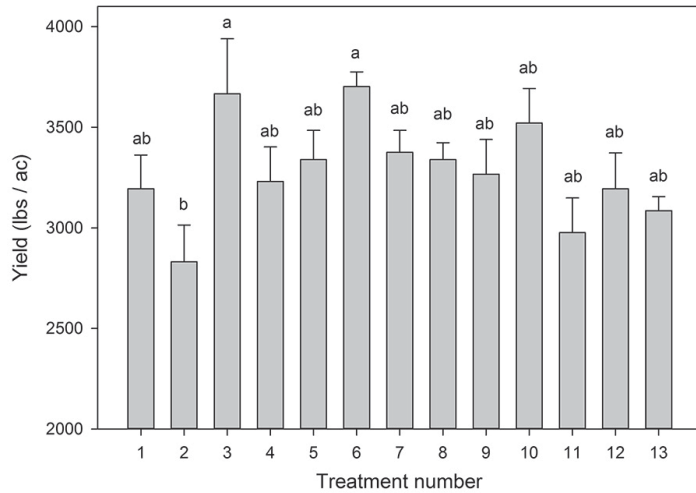


Figure 5. Peanut yield during 2016 in Jay, FL. Error bars represent standard errors of the means. Different letters represent significantly different means (Tukey HSD,  $p < 0.05$ ). Credits: Mulvaney et al. (2017)

There appears to be a strong negative linear correlation between yield and white mold ratings, with treatments 2 and 11 having the highest white mold hits and lowest yields. The average monthly air temperature in 2016 from June to September was 80°F or greater, indicating that temperatures were conducive for white mold, while rainfall tended to be lower than the 15-year average for all months except September. These warm temperatures and reductions in rainfall could be one reason why leaf spot pressure was low and did not have a consistent effect on yield.

## Conclusion

Overall, all the fungicide programs numerically increased yields when compared to chlorothalonil alone. Treatments 6 (Elatus), 3 (Provost + Muscle ADV), and 10 (Abound + Alto) produced the top three yields of the trial. These results represent only one year at one location, and readers are cautioned that test results should be considered over several locations and years before final conclusions are considered valid. These data are meant to serve as a guide in the selection of effective fungicide programs for peanut and will be updated as new data become available.

## References

Chiteka, Z., D. Gorbet, D. Knauff, F. Shokes, and T. Kucharek. 1988. "Components of resistance to late leafspot in peanut. II. Correlations among components and their significance in breeding for resistance." *Peanut Science* 15: 76–81.

Littell, R.C., W.W. Stroup, G.A. Milliken, R.D. Wolfinger, and O. Schabenberger. 2006. *SAS for Mixed Models*. 2<sup>nd</sup> ed. Cary, NC: SAS Institute.

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Table 1. Treatments, application timings, and rates for peanut fungicide trials in Jay, FL during 2016. DAP = Days after planting.

Treatment	Program	Fungicide Group	30 DAP Jul 6	44 DAP Jul 20	58 DAP Aug 3	72 DAP Aug 17	86 DAP Aug 31	100 DAP Sept 14	114 DAP Sept 28
1	Provost	3	Bravo 1.5 pt	Bravo 1.5 pt	Provost 10.7 fl oz	Provost 10.7 fl oz	Provost 10.7 fl oz	Provost 10.7 fl oz	Bravo 1.5 pt
2	Bravo	M5	Bravo 1.5 pt	Bravo 1.5 pt	Bravo 1.5 pt	Bravo 1.5 pt	Bravo 1.5 pt	Bravo 1.5 pt	Bravo 1.5 pt
3	Provost/Muscle ADV	3/3	Bravo 1.5 pt	Bravo 1.5 pt	Provost 10.7 fl oz	Muscle ADV 2.0 pt	Provost 10.7 fl oz	Provost 10.7 fl oz	Bravo 1.5 pt
4	Bravo/Muscle ADV	M5/3	Bravo 1.5 pt	Bravo 1.5 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Bravo 1.5 pt
5	Priaxor/Muscle ADV	7+11/3		Priaxor 6.0 fl oz	Muscle ADV 2.0 pt	Priaxor 8.0 fl oz	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Bravo 1.5 pt
6	Elatus	11+7	Elatus 7.3 dry oz	Bravo 1.5 pt	Elatus 7.3 dry oz	Bravo 1.5 pt	Elatus 7.3 dry oz	Bravo 1.5 pt	Bravo 1.5 pt
7	Elatus	11+7	Bravo 1.5 pt	Bravo 1.5 pt	Elatus 9.5 dry oz	Bravo 1.5 pt	Elatus 9.5 dry oz	Bravo 1.5 pt	Bravo 1.5 pt
8	Fontelis/Muscle ADV	7/3	Bravo 1.5 pt	Bravo 1.5 pt	Fontelis 16 fl oz	Fontelis 16 fl oz	Fontelis 16 fl oz	Muscle ADV 2.0 pt	Bravo 1.5 pt
9	Bravo/Convoy	M5/7	Bravo 1.5 pt	Bravo 1.5 pt	Convoy 16 fl oz + Bravo 1.5 pt	Convoy 16 fl oz + Bravo 1.5 pt	Convoy 16 fl oz + Bravo 1.5 pt	Convoy 16 fl oz + Bravo 1.5 pt	Bravo 1.5 pt
10	Abound/Alto	11/3	Bravo 1.5 pt	Bravo 1.5 pt	Abound 18.5 fl oz + Alto 5.5 fl oz	Bravo 1.5 pt	Abound 18.5 fl oz + Alto 5.5 fl oz	Bravo 1.5 pt	Bravo 1.5 pt
11	Banded Proline/Provost	3/3	Ban. Proline 5.7 fl oz + Bravo 1.5 pt		Provost 10.7 fl oz	Provost 10.7 fl oz		Provost 10.7 fl oz	Bravo 1.5 pt
12	Banded Proline/Provost/Convoy	3/3/7	Ban. Proline 5.7 fl oz + Bravo 1.5 pt		Provost 10.7 fl oz	Provost 10.7 fl oz	Convoy 16 fl oz + Bravo 1.5 pt	Provost 10.7 fl oz	Bravo 1.5 pt
13	Convoy/Muscle ADV	7/3	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Convoy 16 fl oz + Bravo 1.5 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt	Muscle ADV 2.0 pt

Table 2. Florida 1–10 leaf spot ratings used for the study as described by Chiteka et al. (1988).

Leaf Spot Rating	Description
1	No disease
2	Very few lesions (none on upper canopy)
3	Few lesions (very few on upper canopy)
4	Some lesions with more on upper canopy and slight defoliation noticeable
5	Lesions noticeable even on upper canopy with noticeable defoliation
6	Lesions numerous and very evident on upper canopy with significant defoliation (50%+)
7	Lesions numerous on upper canopy with much defoliation (75%+)
8	Upper canopy covered with lesions with high defoliation (90%+)
9	Very few leaves remaining; remaining leaves covered with lesions (some plants completely defoliated)
10	Plants dead

Table 3. Weather conditions during 2016 in Jay, FL.

Month	Total Rainfall (in)	Rainfall Deviation from Normal (in, 2002–2016)	Average Minimum Air Temperature (°F)	Average Maximum Air Temperature (°F)
May	2.93	-1.49	63.2	84.8
June	5.47	-0.65	69.8	91.0
July	7.56	-0.19	72.9	92.1
August	3.83	-1.56	73.1	91.3
September	6.69	1.63	69.6	89.9
October	0	-4.34	56.7	84.7