

PEANUT DISEASE MANAGEMENT

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Seedling Diseases:

All peanut seed should be treated with a fungicide to reduce the incidence of seed-transmitted and soilborne seedling diseases such as *Aspergillus* crown rot, *Cylindrocladium*, *Pythium* and *Rhizoctonia*. **Dynasty PD** (mefenoxam + fludioxonil + azoxystrobin), **Rancona V PD** (ipconazole + carboxin + metalaxyl), **Vitavax PC** (Captan + PCNB + carboxin), **Trilex Star** (Captan + trifloxystrobin + metalaxyl + thiophanate-methyl), and **Trilex Optimum** (Captan + trifloxystrobin + metalaxyl) seed treatments are all effective in reducing seedling disease and protecting stand counts. Adequate stand counts reduce the risk of tomato spot wilt virus.

Tomato spotted wilt virus (TSWV):

This virus is transmitted to peanuts by thrips, primarily tobacco thrips. TSWV stunts plants, reduces yield and causes shriveled, misshapen pods. All peanut fields in S. C. are vulnerable to yield loss from TSWV regardless of whether the farm has any history of peanut production.

A 6-step program is recommended to reduce Tomato Spotted Wilt:

Using more of these together improves chances of minimizing TSWV risk and yield loss.

1. **Varietal Resistance** – Varieties with partial resistance to TSWV are listed in the variety characteristic chart of the peanut production guide. No variety is immune.
2. **Planting Date Window** – Early planting (Late April – 10 May) has greater risk of virus infection, but with large acreage, we must start planting the first week of May. Late planting (1 June or later) may also increase virus risk. The thrips model from NCSU (<https://climate.ncsu.edu/cottonTIP>) can be used to provide an indication of how much general thrips pressure is predicted for a location and planting window.
3. **Plant Population/Seeding Rate** – The goal is a uniformly emerged stand of 4 plants per row ft. Plant 6 seeds/row ft (or at least 5/row ft for large seeded Virginia types) into good soil moisture. Uniform emergence and vigorous early growth reduce virus risk.
4. **Insecticide Treatment** – Apply in-furrow treatments of Thimet 20G (4.7 lb/A on 38” rows to all fields. See insecticide table for phorate rates by row spacing. Admire Pro (10 fl oz in-furrow) or Velum Total (18 fl oz/A) tank mixed with inoculant may also be used for preventing thrips stunting under low virus risk (e.g., Bailey, TifNV-High O/L). However, imidacloprid usually increases severity of virus infections.

**If thrips are stunting peanut seedlings, treat immediately with acephate:
Orthene 75S (0.5-1.0 lb/A) or Orthene 97SP (6-12 oz/A).**

5. **Strip-tillage** – Surface crop residue reduces the number of thrips landing in peanut fields, in turn reducing virus infection.
6. **Twin-row planting** – faster ground cover means less virus. Twin-row planting requires a specialized planter.

Tomato spotted wilt management is mostly over when the planter leaves the field.

Leaf Spots and Other Foliar Diseases:

Foliar disease control programs for S. C. are targeted primarily at **late leaf spot** (*Nothopassalora personata*) because this disease most consistently causes economic loss. Late leaf spot spores can be carried for miles in the wind and therefore any field is at some risk regardless of peanut history. However, field history greatly affects late leaf spot risk because leaf spot spores persist on peanut residue in the soil. All fields should be rotated out of peanut for a minimum of two years to reduce late leaf spot pressure (longer is better). Adjacent fields which had poor late leaf spot control at the end of the previous season can also be a source of significant infection, especially if upwind. Fortunately, other row crops and weeds are not significant hosts for late leaf spot. Late leaf spot is diagnosed by the black spores on the underside of dark brown to black lesions on leaves (see pictures). Yellow halos may or may not be present surrounding late leaf spot lesions.

Other foliar fungal diseases include **early leaf spot, pepper spot, leaf scorch, web blotch, Phyllosticta leaf spot, and rust**. There are also several physiological leaf spot symptoms which commonly occur, often in response to stress, such as “**irregular leaf spot**”. Physiological leaf spots do not respond to fungicides and can be difficult to distinguish from fungal diseases in the field. The best and simplest management approach is that if our fungicide program is good enough to prevent the most common and aggressive disease (late leaf spot), then we will usually be OK on the other foliar diseases.

Risk factors for late leaf spot:

- Short rotations (less than 2 years out of peanuts)
- Highly susceptible variety (e.g., Virginia types, TUFRunner 511, Georgia 13M, Spain)
- Late planting (May 26 and later)
- Poor control of volunteer peanuts in rotational crops or nearby fields
- Poor end of season control of late leaf spot in an adjacent upwind field the previous year
- Starting fungicide programs any later than 45 DAP; better early than late
- Extending spray intervals beyond 15 days
- Repeated, frequent periods of leaf wetness: excessive rain, frequent irrigation
- Rain off immediately after application – wait 24 h to irrigate
- Consecutive use of fungicides with the same mode of action (except chlorothalonil); products like strobilurins (Abound, Headline) and Topsin must be tank mixed (with chlorothalonil) to reduce risk of resistance development or control failure

Early Season Protection: Application of Propulse, Proline, or Velum in-furrow at planting can help contribute early-season protection of leaf spots. Our studies from 2017 to 2020 on runner and Virginia type peanuts have shown Thimet applied in-furrow at planting provides significant protection against late leaf spot. This work has been published in 2020 in Plant Disease.

Importance of Chlorothalonil (Bravo and generics): Chlorothalonil is the foundation of peanut leaf spot control programs because it is the only product proven to have multiple modes of action to reduce the risk of developing leaf spot resistance. Multiple sequential chlorothalonil applications have been used for over 40 years without resistance development. Alternating or tank mixing chlorothalonil with other products can delay development of resistance towards those alternative compounds. Chlorothalonil in the last spray can also help prevent resistant leaf spot strains from overwintering and causing infection in the following year.

Slowing a Growing Leaf Spot Epidemic: Effective fungicide programs are designed to prevent disease, not “cure” it after the fact. If something goes wrong and you find late leaf spot lesions in the bottom of the canopy (particularly with > 30 days until harvest) treat immediately with Provost Silver 13 fl oz + Microthiol Disperss 5 lb/A, Topsin 4.5FL 10 fl oz + 1.5 pt Bravo, or Priaxor 4 fl oz + Provost Opti 10.7 fl oz/A. Retreat in 10 days.

White Mold:

White mold (*Sclerotium rolfsii*) is the most consistently damaging soil disease under S. C. conditions. This fungus invades peanut lateral branches in contact with the soil, as well as pods and pegs. White mold infections are driven primarily by high soil temperatures and humidity. Dry weather offers no protection from white mold. Drought can prevent infection from being noticed aboveground, but infection underground on pegs and pods can continue where it may not be noticed until harvest. Some of our most severe white mold outbreaks often occur under drought with excessive canopy temperatures.

Symptoms include dark brown lesions on stems and pods, rotted pods and pegs, wilting of individual or multiple stems and plant death. Unless severely infected, tap roots generally remain intact and flexible with white mold, whereas CBR infection decays tap roots much quicker.

Signs: Mycelium of *S. rolfsii* is white and produces a fan-like growth as it spreads. The resting stage of white mold (sclerotia) persists in the soil from year to year making rotation out of host crops (peanut, soybean and other legumes including many weeds) highly important. These sclerotia can be seen as small (< 5/64" = 2 mm), round structures that are initially white and later become tan to dark brown. With ample moisture, sclerotia can be found on infected peanut tissues or leaf litter. **Note:** A similar looking fungus, false white mold (*Phanerochaete*), also produces white mycelium and can be found in peanut fields. False white mold does not produce sclerotia and does not damage peanuts; if it is found on peanuts and is scraped away, tissue beneath it will look healthy.

Risk factors for white mold:

- Peanut or soybean history
- Less than 2 years rotated out of peanut, soybean or other legume
- Any variety other than Bailey, Sullivan, Sugg, Wynne or Georgia 12Y should be considered highly susceptible. AU-NPL 17, FloRun 331, Georgia 14N, TifNV-Hi O/L and Georgia 07W also show some tolerance though not as good as the previous group.
- Early planting (first week of May or earlier); delaying planting until mid-May may help suppress white mold due to higher seedling soil temperatures and faster early root growth
- Lack of rain preventing fungicide from being washed into the soil
- Extended, unusually hot temperatures in July and August

Variety resistance (particularly Bailey, Sullivan, Georgia 12Y, FloRun 331 and AU-NPL 17) is far more effective than any chemical treatment in suppressing white mold. These varieties typically control white mold with standard fungicide programs.

Early Season Banded Sprays: Banded application of Proline (38" rows: 5.5 fl oz/A in 20 gal/A on 12" band) OR Elatus (38" rows: maximum 8.9 oz/A in ≥ 10 gal/A, 7 – 10" band) to peanut seedlings at 21 – 35 DAP can improve white mold control under extreme disease pressure. See table on Early Season Band Treatment Options for row-spacing banded rates. See following tables for fungicide efficacy and comments.

Night/Pre-Dawn Spraying: Peanut plants fold their leaves at night making it easier for soil fungicide treatments to reach the base of the plant and soil surface. Applying white mold treatments at night has been shown to increase control effectiveness, at least under severe white mold pressure. If Bravo (a non-systemic) is being relied on for leaf spot control, control of this foliar disease may be reduced with night spraying because of reduced leaf coverage. For growers interested in trying night applications, we recommend the 60, or 60 and 75 DAP treatments as priorities.

Cylindrocladium Black Rot (CBR):

CBR is caused by a soil fungus (*Cylindrocladium parasiticum*) that occurs in the same field areas from year to year, often in low spots. CBR is transmitted from field to field by contaminated seed and equipment. **Rotation** (≥ 2 years out of peanuts and elimination of soybean from the rotation) and **resistance** are the best defenses against severe CBR. Rotation alone will not eliminate significant injury.

Symptoms and signs: When first infected, peanut plants can turn light green or yellow. As CBR infections progress, peanut stems or entire plants wilt and eventually die. CBR rots roots, including the tap root, causing them to turn black and fall apart (tap roots infected by white mold remain intact and flexible much longer). Under drier conditions, symptoms of CBR infection may be limited to chlorotic yellowing and plant stunting. When conditions have been moist, brick-red reproductive structures (perithecia) might appear on crowns, lower stems, pegs and pods. Infected seed can develop cinnamon-colored speckles (microsclerotia) on seed coats before rotting.

Risk factors for CBR:

- Confirmed history of economic CBR loss in the field
- Soybean or peanut history
- Short rotations out of peanut, soybean or other legumes
- Poorly drained, more organic soils such as found in low areas of a field
- Any variety other than Bailey, Perry or Sugg (Emery is particularly susceptible to CBR)
- Lack of control over seed source (seed transmission)
- Early planting (April): lower soil temperatures slow root growth

CBR Management:

Variety resistance (Bailey) is far more effective than any chemical treatment in suppressing CBR. Bailey often adequately suppresses CBR without fumigation or in-furrow fungicides.

On susceptible varieties in fields with a proven history of CBR loss, use **Propulse** (13.6 fl oz/A) OR **Proline** (5.7 fl oz/A) **in-furrow** (with inoculant), OR **fumigate with Vapam (10 gal/A)**. Vapam must be shanked into a bed at ~10" depth 14 days prior to planting. Soil temperature at 4" depth should be at least 60° F. Avoid fumigating when there is a high risk of heavy rain (> 1.0") within 2 days. See the following tables on fungicide efficacy and comments.

Rhizoctonia Limb Rot:

Rhizoctonia Limb Rot is caused by naturally-occurring soil fungi, *Rhizoctonia* spp. (e.g., *R. solani*), that can cause lesions and rot on limbs/stems, leaves, pegs, and pods. Lesions on stems are light to dark brown and often have a target pattern. Dense canopies and prolonged moisture (e.g., irrigation) encourages disease development. Damage caused by tractor traffic increases occurrence of limb rot. Management recommendations are similar as for white mold (see Disease Response Chart for fungicide activity).

Web Blotch:

Web blotch, caused by *Phoma arachidicola*, produces lesions on upper leaf surfaces. Symptoms start as small, tan to dark brown blotches with irregular edges or netlike gray-brown lesions that can become large (0.5") and cover entire leaves. Older lesions darken and have rough, dull surfaces. Severe infections cause leaves to become brittle, which can lead to substantial defoliation. Web blotch development favors cool, moist conditions and is more common under irrigation. Many of the fungicides effective against late leaf spot share activity towards web blotch (see Disease Response Chart for fungicide activity).

General Guidelines for Fungicide Programs:

- Begin leaf spot control **absolutely no later than 45 DAP**. For high risk situations such as highly susceptible varieties (e.g., Bailey, Sullivan, Georgia 13M, TUFRunner 511), or short rotations, particularly under irrigation, increase late leaf spot protection using one of the options listed in footnotes of the following tables. **Many fields benefit from starting fungicide protection at 30 – 40 DAP when conditions favor leaf spot development.**
- **Apply a soil fungicide (see following disease control table) starting absolutely no later than 60 DAP.** White mold must be prevented. Hot weather accelerates white mold growth.
- If premium fungicides (e.g., Miravis, Provost Silver, Proline, Lucento) are substituted for basic tebuconazole + chlorothalonil treatment, prioritize their use starting at 60 DAP rather than later to get the most potential for improved white mold and/or leaf spot control.
- Soil fungicides must be washed into the soil to be effective against white mold, but **wait 24 – 48 h before irrigating** to also help control leaf spot.
- **Except for treatments containing chlorothalonil (Bravo), do not make consecutive applications of the same mode of action (MOA).** Bravo has multiple modes of action which has allowed for many years of use without leaf spot resistance. In each field, do not apply more than a combined total of 2 strobilurin-containing products (Abound, Elatus, Evito, Headline or Priaxor) in any growing season to reduce risk of resistance, and do not apply strobilurin fungicides or Topsin alone.
- **Never apply Topsin, tebuconazole, or strobilurins (Abound, Headline) alone, and do not make more than 2 tank-mixed Topsin applications per season.** Topsin is very susceptible to development of resistance. Late leaf spot is already resistant to tebuconazole, and it is already resistant to strobilurins in several areas.
- **No fungicide program is fool-proof.** Spot check fields for leaf spot and white mold, particularly from 60 DAP to two weeks before anticipated digging date.
- Under low pressure, a final leaf spot application at 105 DAP may be adequate to provide control through at least a 135 DAP harvest date, but check fields at 105 – 120 DAP. If leaf spot is present on 5% of lower leaves and harvest will be delayed > 135 DAP, apply an additional chlorothalonil treatment. If no leaf spot is present and harvest will be delayed beyond 145 DAP, apply an insurance treatment. Many fields including Virginias require fungicide protection at 120 DAP to manage late leaf spot depending on weather and year.
- From our studies and work with peanut Extension and research specialists in the VC and southeast, it appears that for mature runner types, yield loss starts to become significant after approximately 30% of the canopy becomes defoliated from leaf spot. For mature Virginia types, losses started to become significant at 25% or more canopy defoliation. **For a crop that is not yet at optimal maturity, the situation is more complicated, but as a rough guide, Virginia types after 40% defoliation losses appear to increase more than gains from additional maturity. For not yet mature runners, they appear to tolerate at least 50% defoliation before increasing yield loss. Soil, weather and digging conditions are very important and harvest decisions should take all factors into account.**

Note: The disease control programs on the following pages are example guidelines. Timing should be modified to account for opportunities to wash soil fungicides into the pegging zone if no irrigation is available. Under drought conditions, growers have to rely on judgment of the 5-day weather forecast to decide when to apply a soil fungicide before a rain. Ideally, fungicide treatments would be washed into the soil after 1 – 2 days to get both maximum foliar and soil disease suppression.

DISEASE CONTROL PROGRAM OPTIONS

If premium fungicides are substituted for basic tebuconazole + chlorothalonil (generic Folicur + Bravo), prioritize their use starting 60 DAP rather than later to maximize potential benefits.

Treatment options and timing (days after planting)							
30	45*	60*	75	90	105	120	
Bravo (1-1.5 pt) (+ Cadre) (unless leaf spot risk is known low)	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	Bravo for late maturing peanuts**	
	tebuconazole 7.2 fl oz + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt		tebuconazole 7.2 + Bravo 1.5 pt
		Substitute, see below	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 + Bravo 1.5 pt	tebuconazole 7.2 fl oz + Bravo 1.5 pt		tebuconazole 7.2 fl oz + Bravo 1.5 pt
			Substitute, see below	Substitute, see below	Substitute, see below		

*Under high leaf spot risk (e.g., very susceptible variety, irrigated or with frequent rain-off and leaf wetting, or late planting) use a premium fungicide with strong leaf spot activity at 60 DAP; use of additional premium products can improve management. Spray intervals can be reduced to 10 days for improved leaf spot control under frequent rain-off conditions. **Make sure leaf spot prevention begins no later than 45 DAP and soil fungicide is applied no later than 60 DAP.** White mold must be prevented; hot weather and a closed canopy in Jul – Aug accelerates white mold growth. Do not use surfactants or crop oil with fungicides unless necessary for herbicide performance in tank mixes. The goal is to wash white mold fungicides into the soil. Spray **before** irrigation or rain when possible.

**An extra late season Bravo application may be needed for late maturing peanuts or for earlier maturing peanuts if disease is present. If it has been 15 days since the last application and peanuts will be dug within the next 25 days, do not treat unless > 5% of leaflets in the bottom of the canopy have late leaf spot lesions. Never spray fungicide within 2 weeks of harvest – it is off-label and is too late to affect defoliation.

The treatments in the following tables can be substituted for tebuconazole + Bravo from 60 DAP to 105 DAP. Except for treatments containing Bravo (chlorothalonil), consecutive use of the same mode of action (MOA) group is not recommended in order to delay leaf spot resistance. Bravo has multiple modes of action and there has been no evidence of resistance in 40+ years of use.

MOA = Fungicide Resistance Action Committee (FRAC) Mode of Action Group. Having the same mode(s) of action does not mean treatments are equally effective.

There is no single perfect all-around fungicide. The best programs combine several products that complement each other to minimize disease and resistance risk at reasonable cost.

2021 Fungicide Supply

As of January, 2021, there does not appear to be an anticipated shortage of chlorothalonil and tebuconazole for the 2021 growing season. There is still uncertainty regarding trade policies with the EU. The following are a few example programs assuming limited chlorothalonil and tebuconazole availability. As always, an effective disease management program strongly benefits from the combined use of multiple integrated pest management practices (e.g., variety resistance, length of rotation period, planting date).

Where available supplies are further limited, the more effective 1.5 pt rate of Bravo listed here may be reduced to the 1 pt rate, or substitutions (Elast, fixed copper...) may be used.

Example treatment options and timing (days after planting) for limited chlorothalonil (Bravo) and tebuconazole (generic Folicur) availability situations

	0	30	45	60	75	90	105	120
Higher risk								
Thimet 4.7 lb/A in-furrow at plant	Bravo 1 pt	Alto 5.5 oz + Microthiol Disperss 5 lb	Miravis 3.4 oz + (teb 7.2 oz <u>OR</u> Elatus 8 oz <u>OR</u> Convoy 32 oz)	(three week interval for greater buffer instead of four weeks)	Provost Silver 13 oz <u>OR</u> Lucento 5.5 oz (both can benefit from + Microthiol Disperss 5 lb for greater efficacy)	Bravo 1.5 pt + teb 7.2 oz	Bravo 1.5 pt + teb 7.2 oz	
Lower risk								
		Bravo 1.5 pt <u>OR</u> Absolute 7 oz	Provost Silver 13 oz <u>OR</u> Elatus 8 oz <u>OR</u> Lucento 5.5 oz	Bravo 1.5 pt + teb 7.2 oz <u>OR</u> Bravo 1.5 pt + Convoy 16 oz	Provost Silver 13 oz <u>OR</u> Elatus 8 oz	Bravo 1.5 pt + Topsin 10 oz + teb 7.2 oz	Bravo 1.5 pt	Bravo 1.5 pt

Approximate Rainfast Times After Application for Selected Fungicides

Alto	1 hour
Approach Prima	1 hour
Bravo WeatherStik	When dry
Elatus	1 hour
Fontelis	1 hour
Headline	When dry
Lucento	2 hours
Miravis	1 hour
Priaxor	When dry
Proline	When dry
Provost Silver	2 hours if dry when applied, 3 hours if wet (dew)
Revytek	When dry
Topsin	2 hours

Rainfast times are more applicable for foliar diseases like late leaf spot than they are for soil diseases, since rain helps fungicides reach lower areas where soil diseases are active.

PEANUT DISEASE CONTROL

FOLIAR DISEASE CONTROL ONLY (Early and late leaf spot, pepper spot, web blotch, rust)			
Product	Rate/A	MOA*	Comments
Bravo Weather Stik 6SC (and chlorothalonil generics)	1.5 pt	M5	Chlorothalonil products are preventative only against leafspot and require excellent coverage. Rust infection is rather rare in SC peanut production, but if rust is detected with more than 3 weeks to harvest, include chlorothalonil every 10 days until 2 weeks before harvest.
Bravo + Topsin 4.5 FL or Topsin M 70W	1 pt + 8-10 fl oz 0.33-0.5 lb	M5 + 1	Topsin should only be used in Bravo tank mixes. Maximum 2 appl. per season.
Alto 100 SL + Bravo	5.5 fl oz + 16 fl oz	3 + M5	Systemic triazole activity + protectant Bravo.
Miravis 1.67 SC	3.4 fl oz	7	Exceptional leaf spot activity, strong residual. Requires soil fungicide mix.
Elatus 0.45 WG	7.3-9.5 fl oz	7 + 11	Systemic. Leaf spot activity benefits from Bravo tank mix under high pressure.
Provost Silver 3.5	11-13 fl oz	3	Highly effective against soil and foliar diseases.
Provost Opti 3.6 + Microthiol Disperss	10.7 fl oz + 5 lb	3 + M2	Excellent activity against soil and foliar diseases. Microthiol Disperss greatly enhances leaf spot activity of Provost Opti.
Priaxor 4.17	4-6 fl oz	7 + 11	Systemic activity against leaf spot.
Revytek 3.33	8-15 fl oz	3 + 7 + 11	Highly effective systemic activity against leaf spot. SC white mold data limited.
Bravo + Topguard	1 pt + 7-14 fl oz	M5 + 3	Topguard adds systemic leaf spot control to Bravo.
Absolute 500 SC	3.5 fl oz	3 + 11	Systemic triazole and strobilurin activity.
Headline 2.08 + Bravo	6-9 fl oz + 16 fl oz	11 + M5	Highly systemic and rain-fast. We are seeing reduced strobilurin effectiveness against leaf spot.
Custodia 2.67 SC	15.5 fl oz	3 + 11	Add 1 pt/A Bravo for late leaf spot use. Max 2 appl.
Muscle ADV 3.84	2 pt	3 + M5	Add 0.5 pt/A Bravo for late leaf spot use.
Lucento 4.17	5.5 fl oz	3 + 7	Systemic activity against leaf spot.

FOLIAR AND SOIL DISEASE CONTROL (Other than CBR)			
Product	Rate/A	MOA*	Comments
Tebuconazole (generic Folicur 3.6) + Bravo	7.2 fl oz + 1.5 pt	3 + M5	Tebuconazole alone no longer controls leaf spot or web blotch. Must be tank mixed with Bravo.
Convoy 40SC + Bravo	16 fl oz + 1.5 pt	7 + M5	Must be tank mixed with Bravo for adequate leaf spot control. Effective white mold suppression.
Umbra 3.37 + Bravo	19-38 fl oz + 1 pt	3 + 7 + M5	Effective white mold suppression. Tank mixing with Bravo improves leaf spot control.
Provost Silver 3.5	13 fl oz	3	Highly effective against soil and foliar diseases.
Elatus 0.45 WG	7.3-9.5 fl oz	7 + 11	Excellent white mold activity. Traditionally excellent leaf spot activity may be becoming variable.
Priaxor 4.17	8 fl oz	7 + 11	Systemic activity against white mold and leaf spot.
Revytek 3.33	15 fl oz	3 + 7 + 11	Highly effective systemic activity against leaf spot. SC white mold data limited.
Fontelis 1.67	16 fl oz	7	Systemic activity against white mold and leaf spot.
Lucento 4.17	5.5 fl oz	3 + 7	Systemic activity against white mold and leaf spot.
Propulse 3.34	13.6 fl oz	3 + 7	Systemic activity against soil and foliar disease.
Custodia 2.67 SC	15.5 fl oz	3 + 11	Add 1 pt/A Bravo for late leaf spot use. Max 2 appl.
Muscle ADV 3.84	2 pt	3 + M5	Add 0.5 pt/A Bravo for late leaf spot use.
Headline 2.08 + Bravo	12-15 fl oz + 16 fl oz	11 + M5	Highly systemic and rain-fast. We are seeing reduced strobilurin effectiveness against leaf spot. Headline erratic on white mold due to rapid uptake on leaves.

*Except for treatments containing Bravo (chlorothalonil), consecutive use of the same mode of action (MOA) group is not recommended in order to delay leaf spot resistance.

PEANUT DISEASE CONTROL (cont.)

Early Season Banded Treatment Options for Improved White Mold and Leaf Spot Management			
Product	Rate/A	MOA	Comments
Elatus 0.45 WG	8.9 oz (38" rows)	7 + 11	<p>Recommended as early season (approximately 21 DAP) banded application for high risk white mold fields. May also provide early season leaf spot control. Apply in a minimum of 10 gal/A. Set band width at 7 – 10" for single rows (twin-rows: widen band to cover both rows).</p> <p>Banded rates are 0.5 – 0.65 oz/1,000 row ft, which is equivalent to 8.7 – 9.5 oz/A on 30" rows, 7.3 – 9.4 oz/A on 36" rows, and 6.9 – 8.9 oz/A on 38" rows. Do not exceed 9.5 oz/A.</p>
Proline 480 SC	5.5 fl oz (38" rows) 5.7 fl oz (30", 36" rows)	3	<p>Recommended as early season (21-35 DAP), high volume (20 gal/A) banded application (up to 12" band) for high risk white mold fields. Also provides extended (21 day) early season leaf spot control.</p> <p>Banded rate is 0.4 fl oz/1,000 row ft (maximum 5.7 fl oz/A), which is equivalent to 5.7 fl oz/A on 30" or 36" rows and 5.5 fl oz/A on 38" rows.</p> <p>Proline must be used in-furrow for CBR suppression (see below) and over the top for white mold control.</p>

CBR CONTROL			
Product	Rate/A	MOA	Comments
Proline 480 SC (in-furrow, suppression)	5.5 fl oz (38" rows) 5.7 fl oz (30", 36" rows)	3	<p>Resistance: Bailey variety is more effective than any chemical treatment in reducing CBR loss and often provides adequate control without fumigation or in-furrow fungicide treatment.</p> <p>Crop rotation is extremely important in reducing CBR risk. Delaying planting until mid-May can suppress CBR by increasing soil temp.</p> <p>Proline is applied in-furrow with inoculant. In-furrow rate is 0.4 fl oz/1,000 row ft (maximum 5.7 fl oz/A), equivalent to 5.7 fl oz/A on 30" or 36" rows and 5.5 fl oz/A on 38" rows.</p>
Propulse 3.34 SC (in-furrow, suppression)	13.6 fl oz	3 + 7	<p>Resistance: Bailey variety is more effective than any chemical treatment in reducing CBR loss and often provides adequate control without fumigation or in-furrow fungicide treatment.</p> <p>Crop rotation is extremely important in reducing CBR risk. Delaying planting until mid-May can suppress CBR by increasing soil temp.</p> <p>Propulse is applied in-furrow with inoculant. Also provides effective early season late leaf spot protection</p>
Vapam HL (metam sodium 42%)	10 gal	NC	<p>Resistance: Bailey variety is more effective than any chemical treatment in reducing CBR loss and often provides adequate control without fumigation or in-furrow fungicide treatment.</p> <p>Vapam must be shanked into the soil (8" depth) and bedded at least 14 days prior to planting. Soil temperature at 4" depth should be 60°F. Do not fumigate when rain (1.0" or more) is expected within 48 hrs.</p>

GUIDE TO PEANUT FUNGICIDES

Product	Chemistry	MOA*	Risk of leaf spot resistance	Feed hay	PHI (days)	Strengths	Limitations
Abound	Strobilurin (azoxystrobin)	11	High	Y	14	Has white mold activity and may be the best Rhizoctonia material. Systemic leaf spot and web blotch activity.	Erratic against established white mold infections 75 – 90 DAP. Mix with Alto or Bravo to improve leaf spot activity.
Absolute	Triazole (tebuconazole) + Strobilurin (trifloxystrobin)	3 + 11	Already resistant + high	N	14	Systematic leaf spot activity.	Less effective against white mold.
Alto	Triazole (cyproconazole)	3	High	Y	30	Systematic leaf spot activity.	Minimal if any soil disease control. Mix with Bravo.
Approach Prima	Triazole (cyproconazole) + Strobilurin (picoxystrobin)	3 + 11	High + high	Y	30	Systemic leaf spot activity.	Minimal if any soil disease control, leaf spot activity benefits from chlorothalonil or sulfur tank mix.
Bravo/ generics	Chloronitrile (chlorothalonil)	M5	Low	N	14	Low cost, reliable leaf spot control. Multiple modes of action reduce risk of leaf spot resistance. Can make multiple consecutive appl.	No soil disease activity. Not curative or systemic. Less effective than many systemics on web blotch. Preventative activity only against leaf spot.
Convoy	Benzamide (flutolanil)	7	Low	N	40	Excellent white mold and Rhizoctonia activity.	No activity against foliar diseases or CBR. Must tank-mix with chlorothalonil.
Custodia	Triazole (tebuconazole) + Strobilurin (azoxystrobin)	3 + 11	Already resistant + high	N	14	Activity against foliar and soil diseases.	Needs Bravo tank-mix for adequate leaf spot control. Max 2 appl. recommended.
Domark	Triazole (tetraconazole)	3	Medium risk	N	14	Systemic activity against leaf spots.	Not effective for soil disease. Requires Bravo tank mix for effective late leaf spot activity.
Elast	Guanidine (dodine)	U12	Low to medium	Y	14	Leaf spot alternative to Bravo for lower disease pressure situations.	Less effective than Bravo for leaf spot on highly susceptible varieties. No soil efficacy.
Elatus	Carboxamide (benzovindiflupyr) + Strobilurin (azoxystrobin)	7 + 11	Medium to high	Y	30	Systemic late leaf spot activity. Excellent activity against white mold.	Should be alternated with MOA alternative to strobilurin and carboxamide. Requires Bravo tank mix under high late leaf spot pressure.
Endura	Carboxamide (boscalid)	7	Medium to high	N	14	Activity against Sclerotinia blight (not common in SC). Good leaf spot activity.	Inadequate against white mold.
Evito	Strobilurin (fluoxastrobin)	11	High	Y	14	Performance of 5.7 oz similar to 18 oz Abound.	Performance of 5.7 oz similar to 18 oz Abound.
Folicur/ generics	Triazole (tebuconazole)	3	Already resistant	N	14	Very cost-effective control of white mold and limb rot.	Not effective against web blotch. No longer effective against late leaf spot; must tank-mix with Bravo.
Fontelis	Carboxamide (penthopyrad)	7	Medium to high	Y	14	Excellent white mold activity and effective against leaf spot.	Rotate with alternative chemistry to reduce leaf spot resistance risk.
Headline	Strobilurin (pyraclostrobin)	11	High	N	14	Systemic leaf spot activity at 6-9 oz, some white mold activity at 12-15 oz rates. Rapid uptake for systemic activity in leaves.	White mold activity erratic. Leaf spot activity of Headline (and other strobilurins) may have declined. Do not exceed 2 strobilurin appl. per season.

GUIDE TO PEANUT FUNGICIDES (Cont.)

Product	Chemistry	MOA*	Risk of leaf spot resistance	Feed hay	PHI (days)	Strengths	Limitations
Lucento	Triazole (flutriafol) + Carboxamide (bixafen)	3 + 7	Medium to high	N	14	Systemic leaf spot activity. Active against soil diseases including white mold.	Should be rotated with other products and MOA for effective disease management programs.
Miravis	Carboxamide (pydiflumetofen)	7	Medium to high	Y	14	Exceptional leaf spot activity, strong residual	Requires tank mix for soil disease control. Rotate with alternative chemistry to reduce leaf spot resistance risk.
Muscle ADV	Triazole (tebuconazole) + Chloronitrile (chlorothalonil)	3 + M5	Already resistant + low	N	14	Activity against foliar and soil diseases.	Needs Bravo tank-mix for adequate leaf spot control.
Priaxor	Carboxamide (fluxapyroxad) + Strobilurin (pyraclostrobin)	7 + 11	Medium to high	N	14	White mold and leaf spot activity at 8 oz. Has demonstrated highly effective leaf spot control.	Maximum of two appl. per season recommended.
Proline	Triazole (prothioconazole)	3	Medium	N	14	Excellent leaf spot and white mold activity in early season band. CBR suppression in-furrow.	Rotate with alternative chemistry to reduce leaf spot resistance risk.
Propulse	Triazole (prothioconazole) + Carboxamide (fluopyram)	3 + 7	Medium to high	N	14	Excellent leaf spot and white mold activity. CBR suppression in-furrow.	Rotate with alternative chemistry to reduce leaf spot resistance risk.
Provost Silver	Triazole (prothioconazole + tebuconazole)	3	High	N	14	High control for major foliar (leaf spot) and soil (WM, Rhizoc.) diseases.	Triazoles vulnerable to leaf spot resistance. Rotate or tank-mix with other chemistry.
Provost Opti + Microthiol Disperss	Triazoles above + Sulfur	3 + M2	Medium to high	N	14	Microthiol Disperss 5 lb/A greatly improves leaf spot activity of Provost Opti	Must be rotated with other chemistries.
Quash	Triazole (metconazole)	3	Medium	N	14	Effective against white mold.	Needs Bravo tank-mix for leaf spot control.
Revytek	Triazole (mefentrifluconazole) + Carboxamide (fluxapyroxad) + Strobilurin (pyraclostrobin)	3 + 7 + 11	Medium to high	Y	14	Systemic and highly effective foliar activity; active against soil diseases. Multiple MOA.	SC white mold data limited.
Topguard	Triazole (flutriafol)	3	Medium	N	7	Systemic leaf spot control, active against white mold.	Triazoles vulnerable to leaf spot resistance. Must be rotated or tank-mixed with other MOA.
Topsin 4.5FL	Benzimidazole (thiophanate-methyl)	1	Very high	Y	14	Topsin adds systemic activity to Bravo. Cost effective, high risk treatment for leaf spot.	Topsin alone very susceptible to resistance. Must be tank-mixed and limited to two applications per year. Little or no soil activity.
Umbra	Triazole (flutriafol) + Carboxamide (flutolanil)	3 + 7	Medium to high	N	40	Excellent white mold and Rhizoctonia activity, some leaf spot activity.	Leaf spot control requires a tank mix partner (bravo) for effective management.
Velum	Carboxamide (fluopyram)	7	Medium to high	N	14	In-furrow suppression of leaf spot, white mold and nematodes.	Rotate with other MOA.

DISEASE RESPONSE CHART FOR PEANUT FUNGICIDES

Product	Rate/A	Late leaf spot	White mold	Rhizoctonia limb rot	Cylindrocladium black rot (CBR)	Web blotch
Absolute	3.5-7 oz	Good	Poor	Good? (7 oz)	None	Good?
Alto + Bravo	5.5 oz + 1 pt	V. Good	Fair/Poor	Fair/Poor?	Poor	Good
Approach Prima	6.8 oz	Good	Fair/Poor	?	Poor	Good?
Bravo (or generics)	1.5 pt	V. Good	None	None	None	Fair
Convoy + Bravo	13-32 oz + 1.5 pt	Good	V. Good/Ex.	V. Good	None	Fair
Domark	5.25-6.9 oz	Good	None	None	None	Good?
Evito	5.7 oz	Good	Good	?	Poor	Good?
Elast ¹	15 oz	Fair	None	None	None	None
Elatus	7.3-9.5 oz	Good/V. Good	Ex.	V. Good/Ex.?	Poor	Good
Endura	8-10 oz	Good	Fair	?	Poor	Good
Fontelis	16 oz	Good	Ex.	Good?	Poor	?
tebuconazole + Bravo	7.2 oz + 1-1.5 pt	V. Good	V. Good	V. Good	Poor/Fair	Good?
Headline	6-12 oz	Fair/Good	Fair (12-15 oz)	Good/V. Good?	Poor	Ex.
Lucento	5.5 oz	Good/V. Good	Good	Good?	Good?	?
Miravis	3.4 oz	Ex.	None	None	None	V. Good?
Priaxor	4-8 oz	V. Good	Good/V. Good (6-8 oz)	V. Good/Ex.? (8 oz)	Poor	Good?
Priaxor + Provost Opti	4 oz + 10.7 oz	Ex.	Ex.	V. Good?	Poor/Fair	Good?
Proline	5.7 oz	Ex.	Ex.	V. Good	Good (in-furrow)	Good?
Propulse	13.6 oz	Ex.	Ex.	V. Good	V. Good/Ex. (in-furrow)	Good?
Provost Silver	13 oz	V. Good	V. Good	V. Good	Poor/Fair	Good?
Provost Opti + Microthiol Disperss	10.7 oz + 5 lb	Ex.	V. Good	V. Good	Poor/Fair	Good?
Quash + Bravo	3-4 oz + 1 pt	V. Good	V. Good	?	Poor?	Good?
Revytek	8-15 oz	V. Good	V. Good?	?	?	?
Topguard	7-14 oz	Fair/Good	Good	?	None	Good?
Topsin 4.5FL ² + Bravo	8-10 oz + 1.5 pt	V. Good ²	None	Fair?	None	Fair?
Umbra + Bravo	19-38 oz + 1 pt	V. Good	V. Good/Ex.	V. Good	None	Fair

***Ratings are based on the relative performance of the listed application rates. Effective disease control and resistance prevention requires multiple application programs with a combination of materials. None** = no control; **Poor** = low level of control; **Fair** = erratic control or suppression only; **Good** = controls typical disease pressure; **V. Good** = very good: better than average disease control; **Ex.** = excellent: consistent superior control.

¹**Elast** is not recommended for highly susceptible Virginia-type varieties.

²**Topsin** is highly effective against leaf spot as a tank-mix with Bravo. Never use Topsin alone, and never exceed 2 total Topsin applications per season.