UNIVERSITY OF GEORGIA EXTENSION

UGA PEANUT PRODUCTION

The Pest Management Quick Reference Guide

ugapeanutteam.org

PEANUT WEED MANAGEMENT

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Important Things to Consider:

- Start clean using a combination of tillage, cover crops, and/or herbicides.
- Use 2-4 residual herbicides in the system, depending upon the need and/or weed.
- Cracking or early-postemergence applications of paraquat may not always be needed in peanut fields that started off weed-free and where at-planting residual herbicides (Dual Magnum, Prowl, Sonalan, Strongarm, and Valor) were activated with timely rainfall or irrigation.
- Make timely postemergence applications (weeds ≤ 3" tall, not the average).
- Hand-remove weed escapes before seed is viable.

WSSA Group #15 Herbicides in Peanut

The WSSA Group #15 herbicides, including **Anthem Flex** (carfentrazone + pyroxasulfone), **Dual Magnum** (S-metolachlor), **Outlook** (dimethenamid-P), **Warrant** (acetochlor), and **Zidua** (pyroxasulfone), have become very important herbicides for use in Georgia peanut weed control programs. They provide residual control of many troublesome weeds, including Palmer amaranth, annual grasses, and tropical spiderwort. More importantly, weed resistance to this MOA has not yet evolved in Georgia (at least for now). Although there may be some slight differences in individual weed species control with these herbicides, there have not been major differences in performance when used in current UGA recommended peanut herbicide programs (Table 1). Field research conducted in 2020 also re-confirmed that peanuts have excellent tolerance (safety) to this group of herbicides when applied according to their labels.

Soil-Applied Glyphosate and Peanut

Glyphosate is one of the most widely used herbicides for weed control in many crops. Glyphosate has an average ½-life in soils of 30 days with a range of 5.7 to 40.9 days. The majority of research suggests that soil-applied glyphosate is tightly bound/adsorbed and therefore, has a low potential to cause plant phytotoxicity. However, there have been a few reports of soil applications causing unacceptable crop injury depending upon numerous factors including species sensitivity, rate, soil type, and phosphate fertilizer competition. Limited research has focused on the potential negative effects of soil-applied glyphosate on peanut. Research conducted in 2020 indicated that glyphosate, applied at very high rates (Roundup PowerMax II @ 160 oz/A, either 6 DBP or 1 DAP), had no effect on peanut density/stand, canopy height/width, or yield.

New Herbicides on the Horizon - Update

- **Brake 1.2L** (fluridone), from SePRO, has been under evaluation for use in peanut weed control programs since 2013. In UGA field trials, Brake has provided good to excellent residual control of Palmer amaranth. Brake will not be a stand-alone product and will be tank-mixed with other residual herbicides. Current research goals for Brake are fine-tuning application rates, tank-mixes, and investigating peanut variety tolerance. Brake has a mode of action that is currently under-utilized in row crops (WSSA#12, PDS-inhibitor). ***Brake is not registered for use in Georgia peanuts at the current time.***
- **Vulcarus 4.17SC** (trifludimoxazin), from BASF, is a new soil-applied residual herbicide that provides control of many broadleaf weed species including Palmer amaranth and Florida beggarweed. Peanut research with this herbicide at UGA began in 2018. Although trifludimoxazin is a WSSA Group #14 herbicide (PPO-inhibitor), similar to Cobra, Reflex, Valor, and Ultra Blazer, it may be more effective on PPO-resistant weeds due to a different enzyme-binding configuration. At this point, it is too early in the development stage to determine if trifludimoxazin will make a successful transition into the commercial peanut herbicide market.

TABLE 1. HERBICIDE PROGRAMS FOR PEANUT

		TIMING				
System	**Tillage**	**Preplant Burndown[1]**	**PPI**	**PRE**	**EPOST (~10-20 DAP[2])**	**POST (~30-45 DAP)**
Non-Irrigated (Dryland)	strip-till[3]	Glyphosate or Paraquat + 2,4-D		*No Rain in 7-10 DAP* Paraquat + Prowl	Paraquat + Storm or Basagran + Dual Magnum or Warrant or Zidua or Anthem Flex or Outlook	***ALS Resistance:*** Cobra or Ultra Blazer + (Dual Magnum or Warrant or Zidua or Anthem Flex or Outlook) + 2,4-DB ***No ALS Resistance:*** Cadre[4] + (Dual Magnum or Warrant or Zidua or Anthem Flex or Outlook) + 2,4-DB ***A 4-way tank-mixture can be used if required (Cadre + Cobra or Ultra Blazer + 2,4-DB + Dual Magnum or Warrant or Zidua or Outlook)*
				Rain in 7-10 DAP Paraquat + Prowl + Valor		
	conventional		Prowl or Sonalan + Strongarm[d]	No PRE if rain is not expected in 7-10 DAP *Rain in 7-10 DAP* *4* Valor	Paraquat + Storm or Basagran + Dual Magnum or Warrant or Zidua or Anthem Flex or Outlook	
Irrigated	strip-till[c]	Glyphosate or Paraquat + 2,4-D		Paraquat + Prowl + Valor + Strongarm[4]		
	conventional			Prowl or Sonalan + Valor + Strongarm[4]		

[1]Apply at least 7 days before planting. If there will be a long delay between the burndown application and planting (>10 days), add a residual herbicide (Valor or Dual Magnum or Warrant or Outlook) to the burndown treatment. [2]DAP = days after planting. [3]Annual grass control in strip-tillage systems is often more difficult thus additional applications of a postemergence grass herbicide (i.e. Fusilade, Poast, and Select) will be required. [4]Before using Cadre and/or Strongarm, rotational crop restrictions need to be considered

***SPECIAL NOTE: Dual Magnum/Warrant/Outlook are in the same herbicide family (chloroacetamide) and have the same mode of action (inhibit very long chain fatty acids). Zidua/Anthem Flex are not in the same herbicide family (isoxazoline) but have the same mode of action. Multiple applications (> 2) of these herbicides in a single year should be avoided to prevent or delay the evolution of resistance. These residual herbicides have no postemergence activity.*

INSECT MANAGEMENT

Mark Abney, Extension and Research Entomologist

Insect and mite infestations in peanut can result in severe economic loss, but not every field will be infested with damaging pest populations every year. The complex of pests present in peanut can also vary significantly from year to year and even from field to field within a year. An understanding of the risk factors that contribute to pest outbreaks combined with weekly scouting provide a foundation for a successful insect management program in peanut. Below is a quick reference for some of the most common and/or economically important arthropod pests of peanut, conditions that favor their development, and tips for scouting for them in the field.

- **Thrips:**
  - ***Favorable Conditions:*** Thrips can be found in almost every peanut field every year. Injury is most common and noticeable on seedling plants between emergence and 30 days after planting. Early planting, conventional tillage, single row pattern, and no at-plant insecticide increase the risk of thrips injury.
  - ***Scouting Tips:*** Examine fields for the presence of adult and immature stages in the first three to four weeks after emergence. Immature thrips will usually be found in folded terminal leaflets.

Adult thrips

- **Lesser Cornstalk Borer (LCB):**
  - ***Favorable Conditions:*** hot, dry, well drained sandy soils, open crop canopy.
  - ***Scouting Tips:*** Look for wilted stems, check stems for silk tubes, remove plants and check tap root, pods, and stems for feeding/tunneling injury and larvae. Moths are a good sign of LCB infestation. Plants in a "skip" or at the ends of rows with bare soil around them will usually be attacked first.

LCB moth

LCB larva

- **Three Cornered Alfalfa Hopper (TCAH):**
  - ***Favorable Conditions:*** TCAH can be found in most Georgia peanut fields, but densities tend to be highest when soil moisture is adequate for optimum peanut growth. Low numbers of adults can be found in fields in late spring, but populations increase as the summer progresses.
  - ***Scouting Tips:*** Adults are highly mobile and readily seen as they fly when disturbed; they are also easily collected in sweep nets. Nymphs are responsible for much of the injury to peanut, but they are difficult to see. Beat sheet sampling or careful examination of vines is required to find nymphs. Decisions to treat TCAH populations with insecticide should consider the relative abundance of adults, nymphs, and stem injury.

TCAH adult

TCAH nymph

- **Southern Corn Rootworm (SCRW) & Banded Cucumber Beetle (BCB):**
  - ***Favorable Conditions:*** Soil moisture is critical to the development of SCRW and BCB, and they are almost always found in heavy-textured soils with good moisture. Irrigated fields are at increased risk of rootworm, but non-irrigated fields can be infested in seasons with ample rainfall. Low spots in fields with high water holding capacity are at increased risk from this pest.
  - ***Scouting Tips:*** The immature stage of the beetle lives entirely below ground. Dig adjacent to peanut rows or remove plants to examine pods for damage and check the soil for larvae.

SCRW adult

BCB adult

- **Potato Leafhopper (PLH):**
  - ***Favorable Conditions:*** PLH is found sporadically in peanut fields every year in Georgia. Infestations often begin along field margins and spread inward.
  - ***Scouting Tips:*** Adults are small but can be seen flying when disturbed; nymphs are similar in appearance to adults but cannot fly. Look for hopperburn (V-shaped yellowing of leaflet tips associated with leafhopper feeding), especially near field edges. Hopperburn will persist after the insects have left the field, so it is important to determine if infestations are active before making a treatment decision.

PLH

- **Two Spotted Spider Mite (TSSM):**
  - ***Favorable Conditions:*** TSSM can be found in some peanut fields in Georgia every year, but infestations are more likely to develop and cause injury when conditions are hot and dry. In out-break years, non-irrigated corners of irrigated fields are often severely injured while the irrigated portion of the field has few or no mites. Areas near field margins, especially near dirt roads or paths, are usually infested first. Mowing infested weedy vegetation adjacent to peanut fields can result in mites migrating to the crop in large numbers.
  - ***Scouting Tips:*** Be sure to watch field edges for signs of mite infestation. Small patches of yellowing peanuts are an early indication of infestations. Mites are usually found on the lower surface of leaves, and they can be difficult to see at low densities. Early detection is critical to achieving effective control.

TSSM

Foliage Feeding Caterpillars

- ***Scouting Tips:*** Scouting is best accomplished by vigorously shaking peanut vines and foliage to dislodge the insects onto the ground or a beat sheet. Sampling three feet of row at ten locations in a field is sufficient for a typical 40 to 80 acre field. All caterpillars should be counted, and their size and species composition should be noted. The threshold is 4 to 8 foliage feeding caterpillars per foot of row. Use lower threshold range when vines are small and/or stressed.

- **Beet Armyworm:**
  - ID: caterpillar up to 1.25 inches; generally green with or without dark stripes running lengthwise down the body; small black dot on each side of the body directly above the 2nd pair of true legs. Eggs laid in masses.

Beet Armyworm

- **Corn Earworm/Tobacco Budworm:**
  - ID: caterpillar up to 1.75 inches; color variable and not reliable for identification; 4 pair abdominal prolegs; skin coarse and covered with short black hairs. The caterpillars of these species cannot be distinguished in the field without dissection and magnification, but positive identification is important for selecting insecticides. Moths are similar in size but are easily distinguished.

Tobacco Budworm Moth

Corn Earworm Moth

Tobacco Budworm

- **Fall Armyworm:**
  - ID: caterpillar up to 1.5 inches; gray, light brown, or mottled green; skin smooth without hairs; four abdominal prolegs; prominent inverted "y" on the head capsule; eggs laid in masses.

Fall Armyworm

- **Granulate Cutworm:**
  - ID: caterpillar up to 1.5 inches; brown to gray; smooth skin may appear "greasy"; curl into a tight ball when disturbed.
  - Feeds on foliage at night and rests in the soil during the day; minor, sub-economic feeding injury is common; occasionally, heavy infestations cause severe defoliation.

Cutworm Larva

- **Rednecked Peanutworm (RNPW):**
  - ID: caterpillar up to 0.25-0.3 inches; white to cream color with reddish pro and mesothorax.
  - Larvae usually found in folded leaflets in terminal buds; feeding injury often seen as symmetrical holes the unfurled leaflets. Beat sheets do not provide a reliable estimate of RNPW populations.

RNPW

- **Soybean Looper (SBL):**
  - ID: caterpillar up to 1.5 inches; green with faint white stripes; body tapers toward the head; "loops" when it crawls, and is sluggish when disturbed; two pair of abdominal prolegs.
  - SBL infestations typically start low in the peanut canopy where they can be missed if fields are not scouted properly. SBL can be difficult to control because of their location in the canopy and limited susceptibility to some insecticides.

SBL

- **Velvetbean Caterpillar (VBC):**
  - ID: caterpillar up to 2 inches; pale head capsule; body typically green with yellow or white stripes running down its length (VBC can be black or brown); wiggle violently when disturbed; 4 pair of abdominal prolegs; anal prolegs project backwards like a "V". Small VBC can be confused with soybean looper, but loopers have only two pair of abdominal prolegs.
  - Favorable conditions: VBC does not overwinter in Georgia, but it migrates into the state each year. The first moths are often detected in June in South Georgia, but infestations do not typically reach threshold densities until later in the summer.

Dark colored VBC

VBC

VBC moth

DISEASE AND NEMATODE MANAGEMENT

Bob Kemerait, Extension Plant Pathologist

Critical Points to remember for the 2021 season:

1. Diseases and nematodes were problematic for many growers in 2020. Tomato spotted wilt, white mold, and late leaf spot were of greatest impact across the Georgia peanut production region in 2020. There were a number of reasons for this; however weather (rainfall and temperature) was near-perfect at times for development and spread of diseases. Stand-loss was also a problem, largely the result of seed-quality issues stemming from the 2019 harvest season.

2. Below are key "take-away" points from 2020.
   a. **Tomato spotted wilt** continued to cause significant damage. Region-wide, losses were estimated at 4%; however losses were much greater in some fields. Growers are encouraged to make sound-management decisions at planting. Management Tip: Growers should consult the 2021 version of Peanut Rx for tactics to reduce risk to Tomato spotted wilt disease. Once the furrow is closed, the die is cast for management of Tomato spotted wilt.
   b. **Losses to nematodes**, both the peanut root-knot nematode and lesion nematodes, occurred across the state. Growers should recognize that important management options for the root-knot nematode include crop rotation, resistant varieties, and use of nematicides at planting. A later application to reduce damage to the pods and pegs does not replace management decisions made before the furrow is closed.
   c. **Peanut rust** was more severe in 2020 than it has been recent years. Peanut rust can be a very damaging disease; however rust generally did not cause problems in fields already protected with a good leaf spot program that included a mixture of products.
   d. **Peanut leaf spot diseases**, especially late leaf spot, were severe in a number of fields in 2020. Reasons for such included environmental conditions favorable for development and spread of disease, weather that affected a grower's ability to make timely fungicide applications, and short crop rotations. Combinations of these factors put tremendous pressure on some fungicide programs. ***Management Tip:*** to prevent losses to leaf spot, especially late leaf spot, it is imperative to a) stay on a timely, proven program, and b) select fungicides or mixtures of fungicides based upon threat of disease in the field, and c) continue appropriate management programs through the end of the season.
   e. **White mold** was severe in many fields in 2020 due in part to warm conditions throughout much of the season. Also, with peanuts "staying in the ground" for nearly 150 days, MORE attention must be given to protecting the crop from white mold even after the traditional "4-block- 60-to-104-days-after-planting" window ends.

3. **New Products for 2021**
   a. EXCALIA (inpyrfluxam) is a Group 7 (SDHI) fungicide for white mold to be used at rates of 2.0-4.0 fl oz/A. PHI: 40 days. An additional fungicide for management of leaf spot must be mixed with EXCALIA.
   b. VELUM (fluopyram) is a Group 7 (SDHI) nematicide to be used at rate of 6.5-6.84 fl oz/A for the suppression of nematodes. Velum, unlike "Velum Total", does not contain imidicloprid for thrips control. Growers who use VELUM must choose an additional product for thrips control.
   c. Provysol (mefentrifluconazole) is a Group 3 (triazole) fungicide for leaf spot to be used at rates of 5.0 fl oz/A and will likely be tank-mixed with products like Excalia and Convoy to provide control of leaf spot and white mold diseases. PHI: 14 days.
   d. Mazinga ADV (tetraconazole + chlorothalonil) is a Group 3 + Group M5 fungicide pre-mix for leaf spot control at a rate of 32 fl oz/A. PHI: 14 days.

4. Growers should continue use **Peanut Rx** to develop strategies to reduce risk to Tomato spotted wilt, white mold, and leaf spot in their peanut crop.
   a. Peanut Rx has been fully updated for the 2021 season.
   b. Prescription fungicide programs based on Peanut Rx are an effective way to reduce costs of a fungicide program. Specific prescription programs based upon your results from Peanut Rx will be available from companies, to include, Syngenta, CORTEVA, Valent, Bayer CropScience, Nichino, BASF, and SipCam.
   c. An on-line calculator for Peanut Rx is available at www.peanutrx.org.

5. Critical components of a leaf spot fungicide program include a) variety, b) crop rotation, c) timeliness of fungicide application, and d) selection of fungicide.
   a. In UGA small-plot research trials from 2020, fungicide programs that were assessed for management of leaf spot performed as they have in previous years of study.
   b. In large plot, on-farm fungicide studies conducted by county agents, leaf spot was generally well-controlled by all programs.
   c. Late-leaf spot was severe in some fields in southwestern Georgia. Growers there are encouraged to consult with UGA Extension and with your Ag-chemical representatives to best understand modifications to fungicide programs during the 2021 season.

6. There is increased interest in adding sulfur to fungicide programs for management of leaf spot.
   a. Some sulfur formulations (generally at a rate of 5 lb/A) have significantly improved the control of leaf spot when tank-mixed with products azoxystrobin (Abound), Headline, Umbra, EXCALIA, and tebuconazole.
   b. Sulfur formulations at (5 lb/A) to include Microthiol Disperss, Microthiol 80W, Drexel Sulfur 80W, Drexel Suffa 6F, TechnoS 90W, and Accoidal 80 WG, performed similarly when mixed with either azoxystrobin or tebuconazole.
   c. Kolla 6F performed well; however was not as effective as the Microthiol products.

7. Critical components of a white mold fungicide program also include timeliness of application and timelines of irrigation or rainfall following applications, preferably within 12-24 hours.

8. Management of white mold can be improved by
   a. Early-season banded applications of Proline,
   b. Protecting the crop during the critical time 60-105 days after planting
   c. Initiating a program prior to 60 DAP and extending beyond 105 DAP when conditions favor development of white mold or where disease is active in the field later in the season
   d. Using products known to be more effective against white mold
   e. Timely irrigation between 8-24 hours after a fungicide application
   f. Applying fungicides for white mold control at night

9. Management of nematodes includes a) variety selection, b) crop rotation, and c) selection of nematicides. Products for management of nematodes in 2021 include
   a. Telone II (4.5-9 gal/A),
   b. AgLogic (7 lb/A in-furrow),
   c. Velum Total (18 fl oz/A in-furrow)
   d. Velum (6.5 to 6.84 fl oz/A in-furrow)
   e. Propulse (13.6 fl oz/A pegging-time) Note: also effective for control of white mold and leaf spot
   f. Vydate CLV (for directions on in-furrow and foliar applications, see label)
   g. Return XL (for application information, see label)

10. Lesion nematodes are an emerging problem on peanuts in some areas, especially when high numbers are present in a field and damage occurs to the pegs. Research continues; however use of Propulse or perhaps, Vydate-CLV at pegging time is likely to be an important management tool.

11. Aspergillus crown rot is an important seedling disease, especially when conditions are hot and dry at planting, or when seed-quality is a concern. Farmer-saved-seed is often at greatest risk. To manage Aspergillus crown rot,
   a. Ensure quality of seed
   b. Ensure effective fungicide seed treatment with excellent seed coverage
   c. In 2021, Rancona will likely be the predominant fungicide seed treatment for peanut
   d. Use in-furrow products such as Velum and Proline. Note that azoxystrobin products (Abound, etc.) have been widely used as in-furrow treatments in peanut, but are less effective against Aspergillus crown rot now than in the past
   e. Manage insects such as Lesser Cornstalk Borers
   f. Avoid planting into hot and dry soils
   g. Irrigate to cool hot soils.

12. Other diseases of importance include Cylindrocladium Black Rot (CBR), Peanut Rust, Pythium Pod rot and Diplodia Collar Rot,

13. For more information and timely updates, consult your local UGA Extension agent.

Continued >

Note 1:

Exchange applications:

To include systemic activity, chlorothalonil (1.5 pt) on a 14-day spray interval can be replaced with products such as with:

1. Chlorothalonil, 1.0 pt + Alto, 5.5 fl oz (Note PHI for Alto is 30 days)
2. Chlorothalonil, 1.0 pt + thiophanate methyl, 5 fl oz (no more than two applications)
3. Chlorothalonil, 1.0 pt + Domark 230ME, 2.5 fl oz
4. Mazinga (32 fl oz/A)
5. Thiophanate methyl, 10 fl oz (no more than one application)
6. Aproach Prima, 6.8 fl oz (best used earlier in season)
7. Priaxor, 4 fl oz (or 6 fl oz replaces two early applications. Priaxor at 8 fl oz/A provides leaf spot and white mold control)
8. Absolute, 3.4 fl oz (early season use only)
9. Tebuconazole, 7.2 fl oz + chlorothalonil, 1.0 pt (replaces 1.5 pt chlorothalonil and fights white mold)
10. Provysol (5 fl oz/A) likely tank-mixed with EXCALIA, Convoy, or tebuconazole.

Older products that can be used for leaf spot control (sometimes mixed with chlrothalonil include sulfur (e.g. Microthiol Microthiol Disperss, 5lb/A) and mancozeb (Koverall) --

Note 2:

Microthiol 80 WDG or Microthiol Disperss may be tank mixed at 5 lbs. per acre with FRAC 3,7, 11 fungicides or combinations of those.

Topsin 4.5 FL, 10 ounces per acre as tank mix with Manzate Pro-Stick or Penncozeb 75 DF at 1.5 lbs. per acre in either the 105 or 120 DAP applications.

Note 3:

Below are examples of fungicide programs and the list does not include all possible products. Generic azoxystrobin products exist as do many generic formulations of tebuconazole. Further information on all products can be obtained from your local UGA Extension office.

FUNGICIDE APPLICATIONS

Days After Planting	Planting (0)	30	45	60	75	90	105	120
Basic full season fungicide program		chlorothalonil 1.5 pt/A	chlorothalonil 1.5 pt/A	Tebuconazole 7.2 fl oz/A chlorothalonil 1.0 pt/A	Tebuconazole 7.2 fl oz/A chlorothalonil 1.0 pt/A	Tebuconazole 7.2 fl oz/A chlorothalonil 1.0 pt/A	Tebuconazole 7.2 fl oz/A chlorothalonil 1.0 pt/A	chlorothalonil 1.5 pt/A
Sipcam		MAZINGA ADV 32 fl oz/A	MAZINGA ADV 32 fl oz/A	Muscle ADV 2.0 pt/A	Muscle ADV 2.0 pt/A	Muscle ADV 2.0 pt/A	Muscle ADV 2.0 pt/A	chlorothalonil 1.5 pt/A
SipCam		MAZINGA ADV 32 fl oz/A	MAZINGA ADV 32 fl oz/A	Elatus 7.3 oz Miravis 3.4 fl oz/A	Muscle ADV 2.0 pt/A	Elatus 7.3 fl oz/A Miravis 3.4 fl oz/A	Muscle ADV 2.0 pt/A	chlorothalonil 1.5 pt/A
Bayer Nematode	Velum 6.5 fl oz/A		Absolute MAX 3.5 fl oz/A	Propulse 13.7 oz	Provost Silver 13 fl oz/A	Elatus 7.3 oz	Provost Silver 13 fl oz/A	chlorathalonil 1.5 pt/A
Bayer Foliar Only		chlorathalonil 1.5 pt/A	Absolute MAX 3.5 fl oz/A	Elatus 7.3 oz	Provost Silver 13 fl oz/A	Elatus 7.3 oz	Provost Silver 13 fl oz/A	chlorathalonil 1.5 pt/A
Nichino			Priaxor 6 fl oz/A	Umbra 36 fl oz/A Echo 1.0 pt/A	Muscle ADV 2.0 pt/A	Umbra 36 fl oz/A Echo 1.0 pt/A	Muscle ADV 2.0 pt/A	chlorothalonil 1.5 pt/A
Nichino sulfur			Priaxor 6 fl oz/A	Umbra 36 fl oz/A Microthiol Disperss Micronized 5 lb	Muscle ADV 2.0 pt/A	Umbra 36 fl oz/A Microthiol Disperss Micronized 5 lb	Muscle ADV 2.0 pt/A	chlorathalonil 1.5 pt/A
FMC			LUCENTO 5.5 fl oz/A	Convoy 32 fl oz/A chlorathalonil 1.5 pt/A	LUCENTO 5.5 fl oz/A	Elatus 9.5 oz	Muscle ADV 2.0 pt/A	chlorothalonil 1.5 pt/A
CORTEVA		Aproach Prima 6.8 fl oz/A	Muscle ADV 2.0 pt/A	Fontelis 16 fl oz/A	Fontelis 16 fl oz/A	Fontelis 16 fl oz/A	Muscle ADV 2.0 pt/A	chlorothalonil 1.5 pt/A
Syngenta		chlorothalonil 1.5 pt/A	chlorothalonil Alto 5.5 oz	Elatus 9.5 fl oz/A Miravis 3.4 fl oz/A		Elatus 9.5 fl oz/A Miravis 3.4 fl oz/A		chlorothalonil 1.5 pt/A
Syngenta		chlorothalonil 1.5 pt/A	Elatus 7.3 fl oz/A	Elatus 7.3 fl oz/A Miravis 3.4 fl oz/A		Elatus 7.3 oz Miravis 3.4 fl oz/A		chlorothalonil 1.5 pt/A
BASF			Priaxor 6 fl oz/A	Convoy 32 fl oz/A Provysol 5 fl oz/A	Priaxor 8 fl oz/A	Convoy 32 fl oz/A Provysol 5 fl oz/A	Muscle ADV 2 pt/A	chlorothalonil 1.5 pt/A
BASF			Priaxor 6 fl oz/A	Excalia 3 fl oz/A Provysol 5 fl oz/A	Priaxor 8 fl oz/A	Excalia 3 fl oz/A Provysol 5 fl oz/A	Muscle ADV 2 pt/A	chlorothalonil 1.5 pt/A
BASF			Priaxor 6 fl oz/A	Convoy 32 fl oz/A Echo 1.5 fl oz/A	Provysol 5 fl oz/A Teb 7.2 fl oz/A	Convoy 32 fl oz/A Echo 1.5 fl oz/A	Provysol 5 fl oz/A Teb 7.2 fl oz/A	chlorothalonil 1.5 pt/A
Valent		Leaf Spot Fungicide	Leaf Spot Fungicide	Excalia 4 fl oz/A Leaf Spot Fungicide	Leaf Spot Fungicide	Excalia 4 fl oz/A Leaf Spot Fungicide	Leaf Spot Fungicide	chlorothalonil 1.5 pt/A
Valent		Leaf Spot Fungicide	Excalia 2 fl oz/A Leaf Spot Fungicide	Excalia 2 fl oz/A Leaf Spot Fungicide	Leaf Spot Fungicide	Excalia 2 fl oz/A Leaf Spot Fungicide	Leaf Spot Fungicide	chlorothalonil 1.5 pt/A
Gowan		Domark 2.5 fl oz/A	Domark 2.5 fl oz/A	Standard*	Standard*	Standard*	Domark 5.25 fl oz/A*	chlorothalonil 1.5 pt/A
*white mold product as needed		chlorothalonil 1.0 pt/A	chlorothalonil 1.0 pt/A	white mold program	white mold program	white mold program		

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